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Interventions for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section (Review)

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[Intervention Review]

Interventions for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

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ABSTRACT

Background

Nausea and vomiting are distressing symptoms which are experienced commonly during caesarean section under regional anaesthesia and in the postoperative period.

Objectives

To assess the efficacy of pharmacological and non-pharmacological interventions versus placebo or no intervention given prophylactically to prevent nausea and vomiting in women undergoing regional anaesthesia for caesarean section.

Search methods

For this update, we searched Cochrane Pregnancy and Childbirth's Trials Register, ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP) (16 April 2020), and reference lists of retrieved studies.

Selection criteria

We included randomised controlled trials (RCTs) of studies and conference abstracts, and excluded quasi-RCTs and cross-over studies.

Data collection and analysis

Review authors independently assessed the studies for inclusion, assessed risk of bias and carried out data extraction. Our primary outcomes are intraoperative and postoperative nausea and vomiting. Data entry was checked. Two review authors independently assessed the certainty of the evidence using the GRADE approach.

Main results

Eighty-four studies (involving 10,990 women) met our inclusion criteria. Sixty-nine studies, involving 8928 women, contributed data. Most studies involved women undergoing elective caesarean section. Many studies were small with unclear risk of bias and sometimes few events. The overall certainty of the evidence assessed using GRADE was moderate to very low.

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5-HT$_3$ antagonists: We found intraoperative nausea may be reduced by 5-HT$_3$ antagonists (average risk ratio (aRR) 0.55, 95% confidence interval (CI) 0.42 to 0.71, 12 studies, 1419 women, low-certainty evidence). There may be a reduction in intraoperative vomiting but the evidence is very uncertain (aRR 0.46, 95% CI 0.29 to 0.73, 11 studies, 1414 women, very low-certainty evidence). There is probably a reduction in postoperative nausea (aRR 0.40, 95% CI 0.30 to 0.54, 10 studies, 1340 women, moderate-certainty evidence), and these drugs may show a reduction in postoperative vomiting (aRR 0.47, 95% CI 0.31 to 0.69, 10 studies, 1450 women, low-certainty evidence).

Dopamine antagonists: We found dopamine antagonists may reduce intraoperative nausea but the evidence is very uncertain (aRR 0.38, 95% CI 0.27 to 0.52, 15 studies, 1180 women, very low-certainty evidence). Dopamine antagonists may reduce intraoperative vomiting (aRR 0.41, 95% CI 0.28 to 0.60, 12 studies, 942 women, low-certainty evidence) and postoperative nausea (aRR 0.61, 95% CI 0.48 to 0.79, 7 studies, 601 women, low-certainty evidence). We are uncertain if dopamine antagonists reduce postoperative vomiting (aRR 0.63, 95% CI 0.44 to 0.92, 9 studies, 860 women, very low-certainty evidence).

Corticosteroids (steroids): We are uncertain if intraoperative nausea is reduced by corticosteroids (aRR 0.56, 95% CI 0.37 to 0.83, 6 studies, 609 women, very low-certainty evidence) similarly for intraoperative vomiting (aRR 0.52, 95% CI 0.31 to 0.87, 6 studies, 609 women, very low-certainty evidence). Corticosteroids probably reduce postoperative nausea (aRR 0.59, 95% CI 0.49 to 0.73, 6 studies, 733 women, moderate-certainty evidence), and may reduce postoperative vomiting (aRR 0.68, 95% CI 0.49 to 0.95, 7 studies, 793 women, low-certainty evidence).

Antihistamines: Antihistamines may have little to no effect on intraoperative nausea (RR 0.99, 95% CI 0.47 to 2.11, 1 study, 149 women, very low-certainty evidence) or intraoperative vomiting (no events in the one study of 149 women). Antihistamines may reduce postoperative nausea (aRR 0.44, 95% CI 0.30 to 0.64, 4 studies, 514 women, low-certainty evidence), however, we are uncertain whether antihistamines reduce postoperative vomiting (average RR 0.48, 95% CI 0.29 to 0.81, 3 studies, 333 women, very low-certainty evidence).

Anticholinergics: Anticholinergics may reduce intraoperative nausea (aRR 0.67, 95% CI 0.51 to 0.87, 4 studies, 453 women, low-certainty evidence) but may have little to no effect on intraoperative vomiting (aRR 0.79, 95% CI 0.40 to 1.54, 4 studies; 453 women, very low-certainty evidence). No studies looked at anticholinergics in postoperative nausea, but they may reduce postoperative vomiting (aRR 0.55, 95% CI 0.41 to 0.74, 1 study, 161 women, low-certainty evidence).

Sedatives: We found that sedatives probably reduce intraoperative nausea (aRR 0.65, 95% CI 0.51 to 0.82, 8 studies, 593 women, moderate-certainty evidence) and intraoperative vomiting (aRR 0.35, 95% CI 0.24 to 0.52, 8 studies, 593 women, moderate-certainty evidence). However, we are uncertain whether sedatives reduce postoperative nausea (aRR 0.25, 95% CI 0.09 to 0.71, 2 studies, 145 women, very low-certainty evidence) and they may reduce postoperative vomiting (aRR 0.09, 95% CI 0.03 to 0.28, 2 studies, 145 women, low-certainty evidence).

Opioid antagonists: There were no studies assessing intraoperative nausea or vomiting. Opioid antagonists may result in little or no difference to the number of women having postoperative nausea (aRR 0.75, 95% CI 0.39 to 1.45, 1 study, 120 women, low-certainty evidence) or postoperative vomiting (aRR 1.25, 95% CI 0.35 to 4.43, 1 study, 120 women, low-certainty evidence).

Acupressure: It is uncertain whether acupressure/acupuncture reduces intraoperative nausea (aRR 0.55, 95% CI 0.41 to 0.74, 9 studies, 1221 women, very low-certainty evidence). Acupressure may reduce intraoperative vomiting (aRR 0.52, 95% CI 0.33 to 0.80, 9 studies, 1221 women, low-certainty evidence) but it is uncertain whether it reduces postoperative nausea (aRR 0.46, 95% CI 0.27 to 0.75, 7 studies, 1069 women, very low-certainty evidence) or postoperative vomiting (aRR 0.52, 95% CI 0.34 to 0.79, 7 studies, 1069 women, very low-certainty evidence).

Ginger: It is uncertain whether ginger makes any difference to the number of women having intraoperative nausea (aRR 0.66, 95% CI 0.36 to 1.21, 2 studies, 331 women, very low-certainty evidence), intraoperative vomiting (aRR 0.62, 95% CI 0.38 to 1.00, 2 studies, 331 women, very low-certainty evidence), postoperative nausea (aRR 0.63, 95% CI 0.22 to 1.77, 1 study, 92 women, very low-certainty evidence) and postoperative vomiting (aRR 0.20, 95% CI 0.02 to 1.65, 1 study, 92 women, very low-certainty evidence).

Few studies assessed our secondary outcomes including adverse effects or women's views.

Authors' conclusions

This review indicates that 5-HT$_3$ antagonists, dopamine antagonists, corticosteroids, sedatives and acupressure probably or possibly have efficacy in reducing nausea and vomiting in women undergoing regional anaesthesia for caesarean section. However the certainty of evidence varied widely and was generally low. Future research is needed to assess side effects of treatment, women's views and to compare the efficacy of combinations of different medications.

PLAIN LANGUAGE SUMMARY

Reducing nausea and vomiting in women having a caesarean birth with regional anaesthesia

What is the issue?

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The aim of this Cochrane Review was to find out from randomised controlled trials how effective drugs and other treatments are for reducing nausea and vomiting during and after caesarean section with epidural or spinal anaesthesia, when compared with an inactive control. We searched for all relevant studies to answer our review question (April 2020).

Why is this important?

Women often prefer to be awake for the birth of their child, so when possible, a caesarean is performed under regional anaesthesia (spinal or epidural). Nausea and vomiting are commonly experienced during and immediately after caesarean section with regional anaesthesia. This is distressing for women. Vomiting during surgery can also challenge the operating surgeon and put the mother at risk of fluids from the stomach going into her windpipe.

Several drugs are commonly used to reduce nausea and vomiting. There are also some non-drug approaches such as acupressure/acupuncture and ginger. Possible side effects include headaches, dizziness, low blood pressure and itching.

What evidence did we find?

We identified 69 randomised controlled studies (involving 8928 women) that provided data. Data were mostly on non-emergency caesareans and most findings were supported only by low or very low-certainty evidence. This was due to many of the studies being old, with small numbers of participants or unclear methodology. A few outcomes had moderate-certainty evidence.

5-HT_3 antagonists (like ondansetron, granisetron): these probably reduce nausea after surgery, and they may also reduce nausea during surgery (low-certainty evidence) and vomiting after surgery, but any effect on vomiting during surgery is unclear.

Dopamine antagonists (like metoclopramide, droperidol): these may reduce vomiting during surgery and nausea after surgery, but it is unclear whether they reduce nausea during surgery and vomiting after surgery.

Steroids (like dexamethasone): these probably reduce nausea after surgery and may reduce vomiting after surgery, but it is unclear whether steroids reduce nausea and vomiting during surgery.

Antihistamines (like dimenhydrinate, cyclizine): these may reduce nausea after surgery, but they make little or no difference to nausea and vomiting during surgery and vomiting after surgery.

Anticholinergics (like glycopyrrolate, scopolamine): these may reduce nausea during surgery and vomiting after surgery, but they may make little to no difference to vomiting during surgery. There were no studies on nausea after surgery,

Sedatives (like propofol, midazolam, ketamine): these probably reduce nausea and vomiting during surgery and may reduce vomiting after surgery, but it is uncertain whether they reduce nausea after surgery.

Opioid antagonists (like nalbuphine): only one small study provided data on nausea and vomiting after surgery, and found they may make little or no difference.

Acupressure/acupuncture: this may reduce vomiting during surgery but it is uncertain if it reduces nausea during surgery or nausea and vomiting after surgery.

Ginger: it is unclear if ginger reduces nausea and vomiting during surgery or nausea and vomiting after surgery.

Few studies assessed women's views. What limited data there were on side effects did not find any differences.

What does this mean?

Several classes of drugs may help to reduce the number of women who experience nausea and vomiting during and after regional anaesthesia for caesarean births, although more data are needed. Acupressure may also help but we did not find enough data on ginger. Very few studies looked at women's views and overall, there were not enough data on possible side effects.

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Summary of findings 1. 5-HT3 antagonists compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

5-HT3 antagonists compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: women undergoing regional anaesthesia for caesarean section
Setting: hospitals across low-, middle- and high-income countries
Intervention: 5-HT3 antagonists
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with 5-HT3 antagonists				
Nausea - intraoperative	Study population		RR 0.55 (0.42 to 0.71)	1419 (12 RCTs)	⊕⊕⊖⊖ LOW [1 2]	
	479 per 1000	263 per 1000 (201 to 340)				
Vomiting - intraoperative	Study population		RR 0.46 (0.29 to 0.73)	1414 (11 RCTs)	⊕⊖⊖⊖ VERY LOW [3 4 5]	
	241 per 1000	111 per 1000 (70 to 176)				
Nausea - postoperative	Study population		RR 0.40 (0.30 to 0.54)	1340 (10 RCTs)	⊕⊕⊕⊖ MODERATE [6]	
	338 per 1000	135 per 1000 (101 to 183)				
Vomiting - postoperative	Study population		RR 0.47 (0.31 to 0.69)	1450 (10 RCTs)	⊕⊕⊖⊖ LOW [5 7]	
	228 per 1000	107 per 1000 (71 to 157)				

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.

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Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

1 Downgrade 1 for risk of bias: > 90% of data comes from studies with unclear selection bias
2 Downgrade 1 for inconsistency: there may be substantial heterogeneity I^2 = 65%, Chi^2 P = 0.0009.
3 Downgrade 1 for risk of bias: > 80% of data comes from studies with unclear selection bias
4 Downgrade 1 for inconsistency: there may be substantial heterogeneity I^2 = 58%, Chi^2 P = 0.008.
5 Downgrade 1 for publication bias: there is some evidence of possible publication bias in the funnel plot.
6 Downgrade 1 for risk of bias: > 65% of data comes from studies with unclear selection bias
7 Downgrade 1 for risk of bias: > 70% of data comes from studies with unclear selection bias

Summary of findings 2. Dopamine antagonists compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Dopamine antagonists compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: women undergoing regional anaesthesia for caesarean section
Setting: hospitals across low-, middle- and high-income countries
Intervention: dopamine antagonists
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with dopamine antagonists (B)				
Nausea - intraoperative	Study population		RR 0.38 (0.27 to 0.52)	1180 (15 RCTs)	⊕⊝⊝⊝ VERY LOW [1 2]	
	444 per 1000	169 per 1000 (120 to 231)				
Vomiting - intraoperative	Study population		RR 0.41 (0.28 to 0.60)	942 (12 RCTs)	⊕⊕⊝⊝ LOW [1]	
	211 per 1000	87 per 1000 (59 to 127)				
Nausea - postoperative	Study population		RR 0.61 (0.48 to 0.79)	601 (7 RCTs)	⊕⊕⊝⊝ LOW [1]	
	393 per 1000	240 per 1000 (189 to 311)				

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Vomiting - postoperative	Study population		RR 0.63 (0.44 to 0.92)	860 (9 RCTs)	⊕⊖⊖⊖ VERY LOW [1] [3]
	264 per 1000	167 per 1000 (116 to 243)			

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 2 for risk of bias: all the data come from studies with unclear risk of selection bias.
[2] Downgrade 1 for inconsistency. Moderate to substantial heterogeneity, I^2 = 54%, Chi^2 P = 0.005
[3] Downgrade 1 for publication bias: evidence of some publication bias in the funnel plot

Summary of findings 3. Corticosteroids compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Corticosteroids compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: women undergoing regional anaesthesia for caesarean section
Setting: hospitals across low-, middle- and high-income countries
Intervention: corticosteroids
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with corticosteroids (C)				
Nausea - intraoperative	Study population		RR 0.56 (0.37 to 0.83)	609 (6 RCTs)	⊕⊖⊖⊖ VERY LOW [1] [2]	
	403 per 1000	226 per 1000 (149 to 334)				
Vomiting - intraoperative	Study population		RR 0.52 (0.31 to 0.87)	609 (6 RCTs)	⊕⊖⊖⊖ VERY LOW [1] [3]	

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	141 per 1000	73 per 1000 (44 to 123)			
Nausea - postoperative	Study population		RR 0.59 (0.49 to 0.73)	733 (6 RCTs)	⊕⊕⊕⊖ MODERATE [4]
	491 per 1000	290 per 1000 (240 to 358)			
Vomiting - postoperative	Study population		RR 0.68 (0.49 to 0.95)	793 (7 RCTs)	⊕⊕⊖⊖ LOW [5 6]
	355 per 1000	241 per 1000 (174 to 337)			

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 2 for risk of bias: all the data comes from studies with unclear risk of selection bias
[2] Downgrade 1 for inconsistency: there is moderate heterogeneity $I^2 = 50\%$ and Chi^2 P = 0.06.
[3] Downgrade 1 for imprecision: Wide CI close to line of no difference. Only 61 events out of 609 women.
[4] Downgrade 1 for risk of bias: 69% of data comes from studies with unclear risk of selection bias.
[5] Downgrade 1 for risk of bias: 83%% of data comes from studies with unclear risk of selection bias.
[6] Downgrade 1 for inconsistency: may show moderate heterogeneity. $I^2 = 52\%$. Chi^2 P = 0.03.

Summary of findings 4. Antihistamines compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Antihistamines compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: preventing nausea and vomiting
Setting: in women undergoing regional anaesthesia for caesarean section
Intervention: antihistamines
Comparison: placebo

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Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with Placebo	Risk with antihistamines				
Nausea - intraoperative	Study population		RR 0.99 (0.47 to 2.11)	149 (1 RCT)	⊕⊝⊝⊝ VERY LOW [1] [2]	
	155 per 1000	153 per 1000 (73 to 327)				
Vomiting - intraoperative	Study population		not estimable	149 (1 RCT)	⊕⊝⊝⊝ VERY LOW [1] [3]	Only one RCT with no intraoperative vomiting events
	0 per 1000	0 per 1000 (0 to 0)				
Nausea - postoperative	Study population		RR 0.44 (0.30 to 0.64)	514 (4 RCTs)	⊕⊕⊝⊝ LOW [4]	
	309 per 1000	136 per 1000 (93 to 198)				
Vomiting - postoperative	Study population		RR 0.48 (0.29 to 0.81)	333 (3 RCTs)	⊕⊝⊝⊝ VERY LOW [4] [5]	
	189 per 1000	91 per 1000 (55 to 153)				

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

__CI:__ Confidence interval; __RR:__ Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 2 for risk of bias; only one study with unclear risk of bias across 6 domains and high risk for one domain
[2] Downgrade 2 for imprecision: wide CI, only 23 events out of 149 women in a single study.
[3] Downgrade 2 for imprecision: there are no events.
[4] Downgrade 2 for risk of bias: all data from studies with unclear risk of selection bias
[5] Downgrade 1 for imprecision: only 45 events out of 333 women.

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Summary of findings 5. Anticholinergics compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Anticholinergics compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: women undergoing regional anaesthesia for caesarean section
Setting: hospitals across low-, middle- and high-income countries
Intervention: anticholinergics
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with anticholinergics				
Nausea - intraoperative	Study population		RR 0.67 (0.51 to 0.87)	453 (4 RCTs)	⊕⊕⊖⊖ LOW [1]	
	665 per 1000	446 per 1000 (339 to 579)				
Vomiting - intraoperative	Study population		RR 0.79 (0.40 to 1.54)	453 (4 RCTs)	⊕⊖⊖⊖ VERY LOW [1 2 3]	
	304 per 1000	240 per 1000 (122 to 468)				
Nausea - postoperative	Study population		-	(0 RCTs)	-	
	see comment	see comment				
Vomiting - postoperative	Study population		RR 0.55 (0.41 to 0.74)	161 (1 RCT)	⊕⊕⊖⊖ LOW [4 5]	
	728 per 1000	401 per 1000 (299 to 539)				

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

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[1] Downgrade 2 for risk of bias: all the data from studies with unclear selection bias.
[2] Downgrade 1 for inconsistency: there may be moderate heterogeneity I^2 = 52% Chi^2 P = 0.10.
[3] Downgrade 1 for imprecision: wide CI, crossing the line of no difference. 120 events out of 453 women participants.
[4] Downgrade 1 for risk of bias: only one study with unclear allocation concealment but adequate sequence generation
[5] Downgrade 1 for imprecision: a single study shows a wide confidence interval away from the line of no difference but with 91 events out of 161 women participants.

Summary of findings 6. Sedatives compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Sedatives compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: women undergoing regional anaesthesia for caesarean section
Setting: hospitals across low-, middle- and high-income countries
Intervention: sedatives
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with sedatives (F)				
Nausea - intraoperative	Study population		RR 0.65 (0.51 to 0.82)	593 (8 RCTs)	⊕⊕⊕⊖ MODERATE [1]	
	375 per 1000	244 per 1000 (191 to 308)				
Vomiting - intraoperative	Study population		RR 0.35 (0.24 to 0.52)	593 (8 RCTs)	⊕⊕⊕⊖ MODERATE [2]	
	294 per 1000	103 per 1000 (71 to 153)				
Nausea - postoperative	Study population		RR 0.25 (0.09 to 0.71)	145 (2 RCTs)	⊕⊖⊖⊖ VERY LOW [3 4]	
	441 per 1000	110 per 1000 (40 to 313)				
Vomiting - postoperative	Study population		RR 0.09 (0.03 to 0.28)	145 (2 RCTs)	⊕⊕⊖⊖ LOW [5]	
	356 per 1000	32 per 1000 (11 to 100)				

***The risk in the intervention group** (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

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CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 1 for risk of bias: 56% of data from studies with low risk of selection bias.
2 Downgrade 1 for risk of bias: 75% of data were from studies with unclear selection bias.
[3] Downgrade 1 for inconsistency: moderate heterogeneity. I^2 = 58%. Chi^2 P = 0.09.
[4] Downgrade 2 for imprecision: low number of events - 37 and low number of participants 145. Wide CI though a reasonable distance from line of no difference.
[5] Downgrade 2 for imprecision: low number of events - 23 and low number of participants 145. Wide CI but a good distance from the line of no difference although the data of high effectiveness comes from just one study of 44 women.

Summary of findings 7. Opioid antagonists compared to placebo for preventing nausea and vomiting

Opioid antagonists compared to placebo for preventing nausea and vomiting

Patient or population: preventing nausea and vomiting
Setting: in women undergoing regional anaesthesia for caesarean section
Intervention: opioid antagonists
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with opioid antagonists				
Nausea - intraoperative	Study population		-	(0 studies)	-	
	see comment	see comment				
Vomiting - intraoperative	Study population		-	(0 study)	-	
	see comment	see comment				
Nausea - postoperative	Study population		RR 0.75 (0.39 to 1.45)	120 (1 RCT)	⊕⊕⊖⊖ LOW [1]	
	267 per 1000	200 per 1000 (104 to 387)				

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Vomiting - postoperative	Study population		RR 1.25 (0.35 to 4.43)	120 (1 RCT)	⊕⊕⊖⊖ LOW [2]
	67 per 1000	83 per 1000 (23 to 295)			

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the **relative effect** of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 2 for imprecision. Only 28 events out of 120 women in one study. Wide CI crossing line of no difference.
[2] Downgrade 2 for imprecision. Only 9 events out of 120 women in one study. Wide CI crossing line of no difference.

Summary of findings 8. Acupressure/acupuncture compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Acupressure/acupuncture compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section

Patient or population: women undergoing regional anaesthesia for caesarean section
Setting: hospitals across low-, middle- and high-income countries
Intervention: acupressure/acupuncture
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with acupressure/acupuncture (K)				
Nausea - intraoperative	Study population		RR 0.55 (0.41 to 0.74)	1221 (9 RCTs)	⊕⊖⊖⊖ VERY LOW [1 2]	
	466 per 1000	256 per 1000 (191 to 345)				
Vomiting - intraoperative	Study population		RR 0.52 (0.33 to 0.80)	1221 (9 RCTs)	⊕⊕⊖⊖ LOW [1]	

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	236 per 1000	123 per 1000 (78 to 189)			
Nausea - postoperative	Study population		RR 0.46 (0.27 to 0.75)	1069 (7 RCTs)	⊕⊖⊖⊖ VERY LOW [1 3]
	411 per 1000	189 per 1000 (111 to 308)			
Vomiting - postoperative	Study population		RR 0.52 (0.34 to 0.79)	1069 (7 RCTs)	⊕⊖⊖⊖ VERY LOW [1 4]
	302 per 1000	157 per 1000 (103 to 239)			

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 2 for risk of bias: all the data comes from studies which are unclear risk of selection bias.
[2] Downgrade 1 for inconsistency: substantial heterogeneity I^2 = 69% Chi^2 P = 0.0010.
[3] Downgrade 1 for inconsistency: substantial heterogeneity. I^2 = 81% and Chi^2 P = < 0.0001. Could be downgrade by 2, borderline decision
[4] Downgrade 1 for inconsistency: moderate heterogeneity. I^2 = 62% and Chi^2 P = 0.01.

Summary of findings 9. Ginger compared to placebo for preventing nausea and vomiting

Ginger compared to placebo for preventing nausea and vomiting

Patient or population: preventing nausea and vomiting
Setting: in women undergoing regional anaesthesia for caesarean section?
Intervention: ginger
Comparison: placebo

Outcomes	Anticipated absolute effects* (95% CI)		Relative effect (95% CI)	№ of participants (studies)	Certainty of the evidence (GRADE)	Comments
	Risk with placebo	Risk with ginger				

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Nausea - intraoperative	Study population		RR 0.66 (0.36 to 1.21)	331 (2 RCTs)	⊕⊖⊖⊖ VERY LOW [1 2 3]
	586 per 1000	387 per 1000 (211 to 709)			
Vomiting - intraoperative	Study population		RR 0.62 (0.38 to 1.00)	331 (2 RCTs)	⊕⊖⊖⊖ VERY LOW [1 4]
	408 per 1000	253 per 1000 (155 to 408)			
Nausea - postoperative	Study population		RR 0.63 (0.22 to 1.77)	92 (1 RCT)	⊕⊖⊖⊖ VERY LOW [5 6]
	174 per 1000	110 per 1000 (38 to 308)			
Vomiting - postoperative	Study population		RR 0.20 (0.02 to 1.65)	92 (1 RCT)	⊕⊖⊖⊖ VERY LOW [5 7]
	109 per 1000	22 per 1000 (2 to 179)			

*__The risk in the intervention group__ (and its 95% confidence interval) is based on the assumed risk in the comparison group and the __relative effect__ of the intervention (and its 95% CI).

CI: Confidence interval; **RR:** Risk ratio.

GRADE Working Group grades of evidence
High certainty: we are very confident that the true effect lies close to that of the estimate of the effect.
Moderate certainty: we are moderately confident in the effect estimate; the true effect is likely to be close to the estimate of the effect, but there is a possibility that it is substantially different.
Low certainty: our confidence in the effect estimate is limited; the true effect may be substantially different from the estimate of the effect.
Very low certainty: we have very little confidence in the effect estimate; the true effect is likely to be substantially different from the estimate of effect.

[1] Downgrade 2 for risk of bias: Only 2 studies both with unclear risk of selection bias
[2] Downgrade 1 for inconsistency. Substantial heterogeneity. I^2 = 74%, Chi^2 P = 0.05
[3] Downgrade 1 for imprecision. Very wide CI crossing the line of no difference. 170 events and 331 women participants
[4] Downgrade 1 for imprecision: Wide CI. meeting the line of no difference. 112 events and 331 women participating
[5] Downgrade 2 for risk of bias: Only 1 study with unclear risk of selection bias
[6] Downgrade 2 for imprecision: Wide CI. Only 6 events out of 92 women
[7] Downgrade 2 for imprecision: Wide CI crosses line of no difference. 5 events only and just 92 women included

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BACKGROUND

Nausea and vomiting are unpleasant symptoms commonly experienced by pregnant women during caesarean section under regional anaesthesia, and may also occur in the postpartum period following a caesarean under either regional or general anaesthesia. Nausea and vomiting around the time of the birth of a baby can be uncomfortable and distressing for the woman. If vomiting occurs intraoperatively during the caesarean under regional anaesthesia, it offers significant challenges to the operating surgeon, may increase the duration of surgery, the risk of bleeding, the risk of inadvertent surgical trauma and the risk of aspiration of gastric contents (Paranjothy 2014).

Caesarean section is one of the most commonly performed surgical procedures. World Health Organization data indicate that worldwide around 140 million babies are born each year. Globally caesarean rates vary widely; from less than 5% of births in low-income countries (e.g. Zimbabwe) to above 30% in high-income countries (e.g. Germany) (Boerma 2018) and in one study of NHS trusts the caesarean section rate ranged from 14.9% to 32.1% (Bragg 2010). These figures suggest the number of caesareans worldwide is at least 10 to 20 million per year. Caesarean section rates have also risen considerably in many countries in recent years and this trend is continuing (Chen 2018). There are several reasons why general anaesthesia should be avoided if possible in the later stages of pregnancy, and most women want to be awake for the birth of their child, so except where there is a contraindication or in some emergency situations, most caesareans are carried out under regional anaesthesia using spinal or epidural techniques.

Many factors can contribute to the development of nausea and vomiting at caesarean section. While some causes of nausea and vomiting are common to other non-obstetric surgical procedures, many are unique to caesarean sections. There is a body of published literature, including consensus guidelines (Gan 2019), to help anaesthetists reduce the risk of postoperative nausea and vomiting. However, because some of the underlying causes of nausea and vomiting during caesarean section may be specific to the procedure, it is reasonable to assume that the choice of effective treatments may also differ from other types of surgery. Anaesthetists need to consider specific evidence in this setting. Since all interventions are associated with increased healthcare costs and potential risks to the woman (and potentially to the neonate, via either placental transfer or breastfeeding) it is clear that antiemetic use should be evidence-based.

In some countries, for example in the United Kingdom, there is a recommendation that to reduce nausea and vomiting at caesarean delivery the routine administration of drugs (antiemetics - drugs to reduce nausea and vomiting) or acupressure should be considered (NICE 2011). However, many anaesthetists may choose to give antiemetic medication only when nausea and vomiting occur (treatment) rather than as prophylaxis (prevention). It is not known to what extent medications which have been shown to be efficacious as treatment are also efficacious as prophylaxis (and vice versa).

The aim of this review is to assess the effectiveness of interventions to prevent nausea and vomiting given as prophylaxis during caesarean section under regional anaesthesia. Future reviews will be required to assess studies on interventions for treatment (rather than prevention) of nausea and vomiting, procedures performed as emergencies and caesarean deliveries performed under general anaesthesia.

Description of the condition

Nausea is the unpleasant subjective urge to vomit, while vomiting is the physiological process associated with propulsive abdominal muscular spasms leading to the expulsion of gastric contents. Retching involves the same propulsive muscular spasms as vomiting but without the expulsion of any gastric contents.

There are several aetiological factors (factors causing or contributing to the development of a condition or disease) which may contribute to the development of nausea and vomiting during caesarean section. These may include the following.

- Haemodynamic changes (i.e. changes in blood flow) such as hypotension (low blood pressure - a frequent side effect of regional anaesthesia, Chooi 2017) and reduced cardiac output from aorto-caval compression resulting from placing the woman on her back (supine position) (Cooke 1979).
- Surgical stimulation from visceral traction such as manual delivery of the baby and in particular, exteriorisation of the uterus(temporary removal of the uterus from the abdominal cavity to facilitate repairing the incision), Wahab 1999).
- Intraoperative medications may contribute to nausea and include opiates, antibiotics and administered uterotonics such as oxytocin and particularly ergometrine (De Groot 1998).
- Psychological factors such as stress, anxiety, fatigue and prolonged starvation should not be underestimated as contributors to nausea and vomiting. This may particularly be the case with emergency caesarean delivery.
- Medications given prior to the caesarean, such as medications to reduce the risk of aspiration (Paranjothy 2014). If the woman has been in labour prior to surgery then pain relief already provided such as opioids and nitrous oxide may also have residual emetogenic effects.

Few prospective observational studies or audit data have been published and so the underlying incidence of nausea and vomiting during caesarean section is uncertain. It is also likely that the baseline rate will vary considerably depending on the anaesthetic, analgesic and vasopressor regimen that is being used. However, it would seem reasonable to use the rates in the placebo arms of well-designed randomised trials as an indication of the baseline rate of nausea and vomiting. Published placebo data show rates of intraoperative nausea in the order of 48% (Habib 2013) to 79% (Abouleish 1999). Vomiting rates are typically lower than the rates of nausea, in the order of 15% (Voigt 2013) to 38% (El-Deeb 2011a). Most studies recruit women in the setting of elective caesarean section, and it is likely that rates are higher in the setting of emergency caesarean section.

Nausea and vomiting in the postpartum period are also common, and can affect women who received either regional or general anaesthesia. In most types of surgery, the use of regional anaesthesia is thought to be associated with lower rates of postoperative nausea and vomiting than general anaesthesia (Gan 2019); however, this difference may not be apparent following caesarean delivery. Almost all postoperative analgesia regimens involve the use of opioid type medications, either by oral,

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intravenous or neuraxial (spinal or epidural) routes, all of which can contribute to nausea and vomiting.

Description of the intervention

In this review, we have included pharmacological and non-pharmacological interventions given specifically for the purpose of preventing nausea and vomiting in women undergoing caesarean under regional anaesthesia. Whilst hypotension is an important cause of these symptoms during a caesarean, treatment for hypotension during regional anaesthesia has already been specifically addressed in another Cochrane Review (Chooi 2017). Similarly, interventions to reduce the risk of acid aspiration may well affect nausea and vomiting and these interventions have also been addressed in another Cochrane Review (Paranjothy 2014).

The pharmacological interventions available include medications from a wide range of drug classes including serotonin and dopamine receptor antagonists, corticosteroids, antihistamines, sedatives and anticholinergics (Flake 2004). A number of non-pharmacological approaches have also been used traditionally to treat nausea in pregnancy, and some of these have been studied in this setting. These include acupuncture or acupressure (Ho 2006) and oral ginger (Kalava 2013).

How the intervention might work

Pharmacological interventions

For many of the recognised interventions used for the prevention of nausea and vomiting, the mechanism of action is not well understood. However, most treatments can be classed pharmacologically based on their biochemical receptor target. Nausea and vomiting caused by visceral stimulation is thought to be mediated predominantly via serotonin (5-HT) and dopamine receptors. The chemoreceptor trigger zone (CTZ) is a small region within the brainstem responsible for the symptoms of medication and toxin related emesis, including post anaesthetic nausea and vomiting, and is also mediated by serotonin and dopamine. In contrast, nausea and vomiting caused by central nervous system and vestibular mechanisms, such as motion sickness, are thought to be mediated mainly via histamine and acetylcholine.

The main classes of medications in use include the following (Flake 2004; Gan 2003).

1. Serotonin (5-HT_3) receptor subtype-3 antagonists (e.g. ondansetron, granisetron) antagonise the emetic effects of serotonin in the small bowel, vagus nerve and CTZ (Peixoto 2006). They are effective (George 2009) and have few side effects.
2. Dopamine receptor antagonists (e.g. metoclopramide, prochlorperazine, droperidol, domperidone) antagonise the effects of dopamine at the D2 receptors in the CTZ. They have a wide variety of associated side effects including sedation, agitation, and extra-pyramidal effects (Chestnut 1987). Droperidol has been associated with very rare, but potentially life-threatening, cardiac arrhythmias.
3. Corticosteroids also known as steroids (most commonly dexamethasone) are regarded as being highly effective, but their mechanism of action is unclear (Tzeng 2000). Whilst long-term steroid use can lead to a wide variety of side effects such as fluid and electrolyte changes, obesity, and diabetes, single antiemetic doses are well tolerated, even in diabetics.
4. Antihistamines (e.g. promethazine and cyclizine (Nortcliffe 2003) can cause a variety of adverse effects including sedation and dry mouth.
5. Anticholinergic agents (e.g. glycopyrrolate (Ure 1999) and scopolamine (Kotelko 1989) are mainly useful for nausea and vomiting caused via the vestibular system, i.e. motion sickness. They can also cause a dry mouth and potentially urinary retention.
6. Sedatives. Very low doses of sedatives such as midazolam or propofol (Mukherjee 2006; Tarhan 2007) seem to have antiemetic efficacy. The mechanism of action is unclear, but may relate to the contribution of psychological factors such as stress and anxiety to the incidence of emetic symptoms.
7. Opioids antagonists or partial agonists. A number of studies have attempted to demonstrate the beneficial effects of opioids. Whilst opioids would generally be considered a cause, rather than a treatment, of nausea and vomiting, it is possible that when two opioids are administered together, one of them may reduce the opioid-induced emetic symptoms caused by the other. If one drug is an opioid antagonist or partial agonist (such as naloxone or nalbuphine) (Charuluxananan 2003), then it may reduce the opioid-related side effects (such as nausea, itch and constipation) without unduly reducing the analgesic benefits.

Non-pharmacological interventions

1. Acupuncture or acupressure: acupressure or acupuncture at the P6 point at the wrist has long been a traditional treatment for nausea, particularly sea sickness. The mechanism of action of acupuncture and acupressure is not well understood (Duggal 1998; Harmon 2000). Potential adverse effects of acupuncture include infection or trauma from acupuncture needles.
2. Alternative natural therapies such as ginger (Kalava 2013; Zeraati 2016) and peppermint (Lane 2012; Niaki 2016) also have long histories of use as traditional treatments for reducing nausea in pregnancy. Although associated with minimal side effects, their efficacy is uncertain (Matthews 2015).

Why it is important to do this review

Nausea and vomiting are very common symptoms experienced both during and following caesarean section, may increase morbidity, and can be very distressing for women and their families. Many interventions are available and routine prophylactic treatment has been proposed (NICE 2011). The available interventions have widely varying cost and significant side-effect profiles. Whilst guidelines exist for the prevention of nausea and vomiting after general anaesthesia in non-pregnant patients (Gan 2019), the aetiology of emetic symptoms at caesarean section are clearly multifactorial and the current literature may not be directly applicable. This review is important to ensure that women undergoing caesarean section are offered interventions to prevent nausea and vomiting which are safe, efficacious and cost-effective.

OBJECTIVES

To assess the efficacy of pharmacological and non-pharmacological interventions versus placebo or no intervention given prophylactically to prevent nausea and vomiting in women undergoing regional anaesthesia for caesarean section.

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METHODS

Criteria for considering studies for this review

Types of studies

We included published and unpublished randomised controlled trials (RCTs), including conference abstracts. We planned to include cluster-randomised trials, but none were identified. Quasi-RCTs and cross-over studies were excluded.

Types of participants

Pregnant women undergoing elective or emergency caesarean section under regional anaesthesia.

Types of interventions

In this updated review, we have included studies where the participants were women undergoing caesarean section under regional anaesthesia (either spinal, epidural or both) comparing interventions for nausea and vomiting against placebo or no intervention. Intervention versus intervention comparisons were excluded. We included studies where the intervention was given with the express purpose of preventing nausea and vomiting, either intraoperative, postoperative, or both.

Interventions included the following categories.

1. Serotonin (5-HT_3) receptor antagonists (e.g. ondansetron, granisetron).
2. Dopamine receptor antagonists (e.g. metoclopramide, prochlorperazine, droperidol, domperidone).
3. Corticosteroids (e.g. dexamethasone).
4. Antihistamines (e.g. promethazine, cyclizine).
5. Anticholinergic agents (e.g. glycopyrrolate, scopolamine).
6. Sedatives (e.g. midazolam, propofol).
7. Opioids antagonists or partial agonists (e.g. nalbuphine).
8. Acupressure/acupuncture.
9. Alternative therapies such as ginger or peppermint.

We compared the different drug classes against placebo, setting out individual drugs and doses as subgroups.

We excluded:

1. studies where the authors were comparing two different treatments (unless there was also a control/placebo arm) and studies investigating combinations of treatments;
2. studies where the intervention was for reducing aspiration pneumonitis, as this is the subject of another review (Paranjothy 2014);
3. studies where the express purpose was to treat another problem which may impact upon the development of nausea or vomiting, such as studies assessing agents for treating hypotension. This has also been studied in another review (Chooi 2017);
4. studies where a recognised antiemetic was given, but the focus of the study was on another effect of that medication (for example, studies on the haemodynamic effects of ondansetron);
5. studies which assessed the efficacy of interventions for treatment, rather than prevention, of nausea and vomiting. This may be the subject of a separate future review;
6. studies where the intervention was not recognised as an antiemetic and did not have a reasonable theoretical justification for affecting nausea and vomiting, e.g. supplemental oxygen; intravenous fluids; anticonvulsants; antidepressants, opioid agonists.

Types of outcome measures

Primary outcomes

1. Nausea intraoperatively.
2. Vomiting (and/or retching) intraoperatively.
3. Nausea postoperatively.
4. Vomiting (and/or retching) postoperatively.

Secondary outcomes

1. Nausea plus vomiting/retching.
2. Maternal adverse effects: e.g. sedation, restlessness, extra-pyramidal effects, surgical bleeding, hypotension, atonic uterus.
3. Neonatal morbidity: e.g. Apgar scores less than seven at five minutes.
4. Initiation of breastfeeding.
5. Duration of exclusive breastfeeding.
6. Maternal satisfaction (using a validated questionnaire).

In this review, when authors reported retching and vomiting separately, we combined these data, as we believe retching is more pathophysiologically analogous to vomiting than nausea. In this update, we clarified our approach to the postoperative data. Where a paper reports a number of time epochs (for example, zero to four hours, four to eight hours, etc), we have included data from the earliest reported time period because we believe these data were most likely to reflect the efficacy of the intervention.

Search methods for identification of studies

The following methods section of this review is based on a standard template used by Cochrane Pregnancy and Childbirth.

Electronic searches

For this update, we searched Cochrane Pregnancy and Childbirth's Trials Register by contacting their Information Specialist (16 April 2020).

The Register is a database containing over 25,000 reports of controlled trials in the field of pregnancy and childbirth. It represents over 30 years of searching. For full current search methods used to populate Pregnancy and Childbirth's Trials Register including the detailed search strategies for CENTRAL, MEDLINE, Embase and CINAHL; the list of handsearched journals and conference proceedings, and the list of journals reviewed via the current awareness service, please follow this link.

Briefly, Cochrane Pregnancy and Childbirth's Trials Register is maintained by their Information Specialist and contains trials identified from:

1. monthly searches of the Cochrane Central Register of Controlled Trials (CENTRAL);
2. weekly searches of MEDLINE (Ovid);
3. weekly searches of Embase (Ovid);
4. monthly searches of CINAHL (EBSCO);

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5. handsearches of 30 journals and the proceedings of major conferences;
6. weekly current awareness alerts for a further 44 journals plus monthly BioMed Central email alerts.

Search results are screened by two people and the full text of all relevant trial reports identified through the searching activities described above is reviewed. Based on the intervention described, each trial report is assigned a number that corresponds to a specific Pregnancy and Childbirth review topic (or topics), and is then added to the Register. The Information Specialist searches the Register for each review using this topic number rather than keywords. This results in a more specific search set that has been fully accounted for in the relevant review sections (Included studies, Excluded studies, Studies awaiting classification or Ongoing studies).

In addition, we searched ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP) for unpublished, planned and ongoing trial reports (1 April 2020) using the search methods described in Appendix 1.

Searching other resources

We searched for further studies in the reference list of the studies identified.

We did not apply any language or date restrictions.

Data collection and analysis

For methods used in the previous version of this review, *see* Griffiths 2012.

For this update, the following methods were used for assessing the 174 new studies that were identified as a result of the updated search.

The following methods section of this review is based on a standard template used by Cochrane Pregnancy and Childbirth.

Selection of studies

Two review authors independently assessed for inclusion all the potential studies identified as a result of the search strategy. We resolved any disagreement through discussion or, if required, we consulted the third review author.

Data extraction and management

We designed a form to extract data. For eligible studies, two review authors extracted the data using the agreed form. We resolved discrepancies through discussion or, if required, we consulted the third review author. Data were entered into Review Manager software (RevMan 2020) and checked for accuracy.

When information regarding any of the above was unclear, we planned to contact authors of the original reports to provide further details.

Assessment of risk of bias in included studies

Two review authors independently assessed risk of bias for each study using the criteria outlined in the *Cochrane Handbook for Systematic Reviews of Interventions* (Higgins 2019). Any disagreement was resolved by discussion or by involving a third assessor.

(1) Random sequence generation (checking for possible selection bias)

We described for each included study the method used to generate the allocation sequence in sufficient detail to allow an assessment of whether it should produce comparable groups.

We assessed the method as:

- low risk of bias (any truly random process, e.g. random number table; computer random number generator);
- high risk of bias (any non-random process, e.g. odd or even date of birth; hospital or clinic record number);
- unclear risk of bias.

(2) Allocation concealment (checking for possible selection bias)

We described for each included study the method used to conceal allocation to interventions prior to assignment and assessed whether intervention allocation could have been foreseen in advance of, or during recruitment, or changed after assignment.

We assessed the methods as:

- low risk of bias (e.g. telephone or central randomisation; consecutively numbered sealed opaque envelopes);
- high risk of bias (open random allocation; unsealed or non-opaque envelopes, alternation; date of birth);
- unclear risk of bias.

(3.1) Blinding of participants and personnel (checking for possible performance bias)

We described for each included study the methods used, if any, to blind study participants and personnel from knowledge of which intervention a participant received. We considered that studies were at low risk of bias if they were blinded, or if we judged that the lack of blinding unlikely to affect results. We assessed blinding separately for different outcomes or classes of outcomes.

We assessed the methods as:

- low, high or unclear risk of bias for participants;
- low, high or unclear risk of bias for personnel.

(3.2) Blinding of outcome assessment (checking for possible detection bias)

We described for each included study the methods used, if any, to blind outcome assessors from knowledge of which intervention a participant received. We assessed blinding separately for different outcomes or classes of outcomes.

We assessed methods used to blind outcome assessment as:

- low, high or unclear risk of bias.

(4) Incomplete outcome data (checking for possible attrition bias due to the amount, nature and handling of incomplete outcome data)

We described for each included study, and for each outcome or class of outcomes, the completeness of data including attrition

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and exclusions from the analysis. We stated whether attrition and exclusions were reported and the numbers included in the analysis at each stage (compared with the total randomised participants), reasons for attrition or exclusion where reported, and whether missing data were balanced across groups or were related to outcomes. Where sufficient information was reported, or could be supplied by the trial authors, we planned to re-include missing data in the analyses which we undertook.

We assessed methods as:

- low risk of bias (e.g. no missing outcome data; missing outcome data balanced across groups);
- high risk of bias (e.g. numbers or reasons for missing data imbalanced across groups; 'as treated' analysis done with substantial departure of intervention received from that assigned at randomisation);
- unclear risk of bias.

(5) Selective reporting (checking for reporting bias)

We described for each included study how we investigated the possibility of selective outcome reporting bias and what we found.

We assessed the methods as:

- low risk of bias (where it is clear that all of the study's pre-specified outcomes and all expected outcomes of interest to the review have been reported);
- high risk of bias (where not all the study's pre-specified outcomes have been reported; one or more reported primary outcomes were not pre-specified; outcomes of interest are reported incompletely and so cannot be used; study fails to include results of a key outcome that would have been expected to have been reported);
- unclear risk of bias.

(6) Other bias (checking for bias due to problems not covered by (1) to (5) above)

We described for each included study any important concerns we had about other possible sources of bias.

(7) Overall risk of bias

We made explicit judgements about whether studies were at high risk of bias, according to the criteria given in the *Handbook* (Higgins 2019). With reference to (1) to (6) above, we planned to assess the likely magnitude and direction of the bias and whether we considered it is likely to impact on the findings. In future updates, we will explore the impact of the level of bias through undertaking sensitivity analyses - *see* Sensitivity analysis.

Measures of treatment effect

Dichotomous data

For dichotomous data, we presented results as summary risk ratio with 95% confidence intervals. Where a random-effects model has been used, we report this as an average risk ratio (aRR).

Continuous data

We planned to use mean difference if outcomes were measured in the same way between trials and standardised mean difference to combine trials that measured the same outcome, but used different methods.

Unit of analysis issues

Cluster-randomised trials

We planned to include cluster-randomised trials in the analyses along with individually-randomised trials, but did not identify any. Had we identified any, we would have adjusted their standard error using the methods described in the *Handbook [Section16.3.4 and 16.3.6]* using an estimate of the intracluster correlation co-efficient (ICC) derived from the trial (if possible), from a similar trial or from a study of a similar population. If we had used ICCs from other sources, we would have reported this and conduct sensitivity analyses to investigate the effect of variation in the ICC. If we had identify both cluster-randomised trials and individually-randomised trials, we planned to synthesise the relevant information. We would have considered it reasonable to combine the results from both if there is little heterogeneity between the study designs. We will also acknowledge heterogeneity in the randomisation unit and perform a sensitivity analysis to investigate the effects of the randomisation unit.

Cross-over trials

We excluded cross-over trials.

Other unit of analysis issues

Where we found multi-arm studies, we assessed which arms were relevant to our question and included data taking care not to double count the data in the placebo group by dividing the placebo data equally amongst the relevant comparisons such that when the data were pooled, the correct number of events and participants were included.

Dealing with missing data

For included studies, we noted levels of attrition. In future updates, if more eligible studies are included, the impact of including studies with high levels of missing data in the overall assessment of treatment effect will be explored by using sensitivity analysis.

For all outcomes, analyses were carried out, as far as possible, on an intention-to-treat basis i.e. we attempted to include all participants randomised to each group in the analyses. The denominator for each outcome in each trial was the number randomised minus any participants whose outcomes were known to be missing.

Assessment of heterogeneity

We assessed statistical heterogeneity in each meta-analysis using the Tau^2, I^2 and Chi^2 statistics. We regarded heterogeneity as reported in the Cochrane Handbook (Higgins 2019):

- 0% to 40%: might not be important;
- 30% to 60%: may represent moderate heterogeneity*;
- 50% to 90%: may represent substantial heterogeneity*;
- 75% to 100%: considerable heterogeneity*.

and either a Tau^2 was greater than zero, or there was a low P value (less than 0.10) in the Chi^2 test for heterogeneity.

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Assessment of reporting biases

In future updates, if there are 10 or more studies in the meta-analysis we will investigate reporting biases (such as publication bias) using funnel plots. We will assess funnel plot asymmetry visually. If asymmetry is suggested by a visual assessment, we will perform exploratory analyses to investigate it.

Data synthesis

We carried out statistical analysis using the Review Manager software (RevMan 2020).

We used random-effects meta-analyses for combining data because we considered that there would be heterogeneity sufficient to expect that the underlying treatment effects would differ between trials because our question is around groups of drugs and so we are combining data from different drugs and different doses within the meta-analyses.

The random-effects summary was treated as the average range of possible treatment effects and we discuss the clinical implications of treatment effects differing between trials. If the average treatment effect was not clinically meaningful, we did not combine trials. The results are presented as the average treatment effect with 95% confidence intervals, and the estimates of Tau^2 and I^2.

Subgroup analysis and investigation of heterogeneity

If we identified substantial heterogeneity, we investigated it using subgroup analyses and sensitivity analyses. We considered whether an overall summary was meaningful, and if it was, we used random-effects analysis to produce it.

We carried out the following subgroup analyses.

1. Different drugs with the same group of drugs
2. Difference doses of the drugs within the group of drugs

The following four primary outcomes were used in subgroup analyses.

1. intraoperative nausea
2. intraoperative vomiting
3. postoperative nausea
4. postoperative vomiting

We assessed subgroup differences by interaction tests available within RevMan (RevMan 2020). We reported the results of subgroup analyses quoting the Chi^2 statistic and P value, and the interaction test I^2 value.

Sensitivity analysis

We carried out sensitivity analyses to explore the effect of trial quality assessed by selection bias (sequence generation and allocation concealment) and attrition bias (incomplete outcome data), with poor-quality studies (either high risk or unclear risk) being excluded from the analyses in order to assess whether this makes any difference to the overall result.

Summary of findings and assessment of the certainty of the evidence

For this update, the certainty of the evidence was assessed using the GRADE approach as outlined in the GRADE handbook to assess the certainty of the body of evidence relating to the following outcomes for the main comparisons. All nine comparisons were chosen as a specific focus as they represent the most clinically-relevant comparisons in this updated review.

Comparisons for GRADE and Summary of findings

1. 5-HT3 antagonists versus placebo
2. Dopamine antagonists versus placebo
3. Corticosteroids versus placebo
4. Antihistamines versus placebo
5. Anticholinergics versus placebo
6. Sedatives versus placebo
7. Opioid antagonists/partial agonists versus placebo
8. Acupressure/acupuncture versus placebo
9. Ginger versus placebo

Outcomes for GRADE and Summary of findings

1. Incidence of intraoperative nausea
2. Incidence of intraoperative vomiting/retching
3. Incidence of postoperative nausea
4. Incidence of postoperative vomiting/retching

We used the GRADEpro Guideline Development Tool to import data from Review Manager 5.3 (RevMan 2020) in order to create 'Summary of findings' tables. A summary of the intervention effect and a measure of certainty each of the above outcomes was produced using the GRADE approach. The GRADE approach uses five considerations (study limitations, consistency of effect, indirectness, imprecision and publication bias) to assess the quality of the body of evidence for each outcome. The evidence can be downgraded from 'high certainty' by one level for serious (or by two levels for very serious) limitations, depending on assessments for risk of bias, serious inconsistency, indirectness of evidence, imprecision of effect estimates or potential publication bias.

RESULTS

Description of studies

Results of the search

We assessed 218 new trial reports, plus the change in scope meant we also reassessed the 204 trial reports referenced in the previous version of the review.

All in all in this 2021 update, there are 84 included studies (112 reports) (Characteristics of included studies) and 236 excluded studies (269 reports) (Characteristics of excluded studies). Ten studies are awaiting classification (Characteristics of studies awaiting classification). These are predominantly conference abstracts where we have been unable to contact the authors or studies in a non-English language where we have been unable to obtain a translation as yet. There are 27 studies identified as ongoing (31 reports) (Characteristics of ongoing studies).

The change in scope meant we excluded nine studies from the 2012 publication, six of these studies had provided data (Chestnut 1989; Gaiser 2002; Owczarzak 1997; Pecora 2009; Phillips 2007; Shahriari 2009), and three had provided no data (Biwas 2002; Chaudhuri 2004; Manullang 2000).

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In addition, there were eight comparisons in multi-arm studies where, due to our change in scope, some arms were now excluded and the data from these women were not included in our review (Abdollahpour 2015; Habib 2013; Khalayleh 2005; Levin 2019; Mokini 2014; Shen 2012; Voigt 2013; Wu 2007).

(See: Figure 1)

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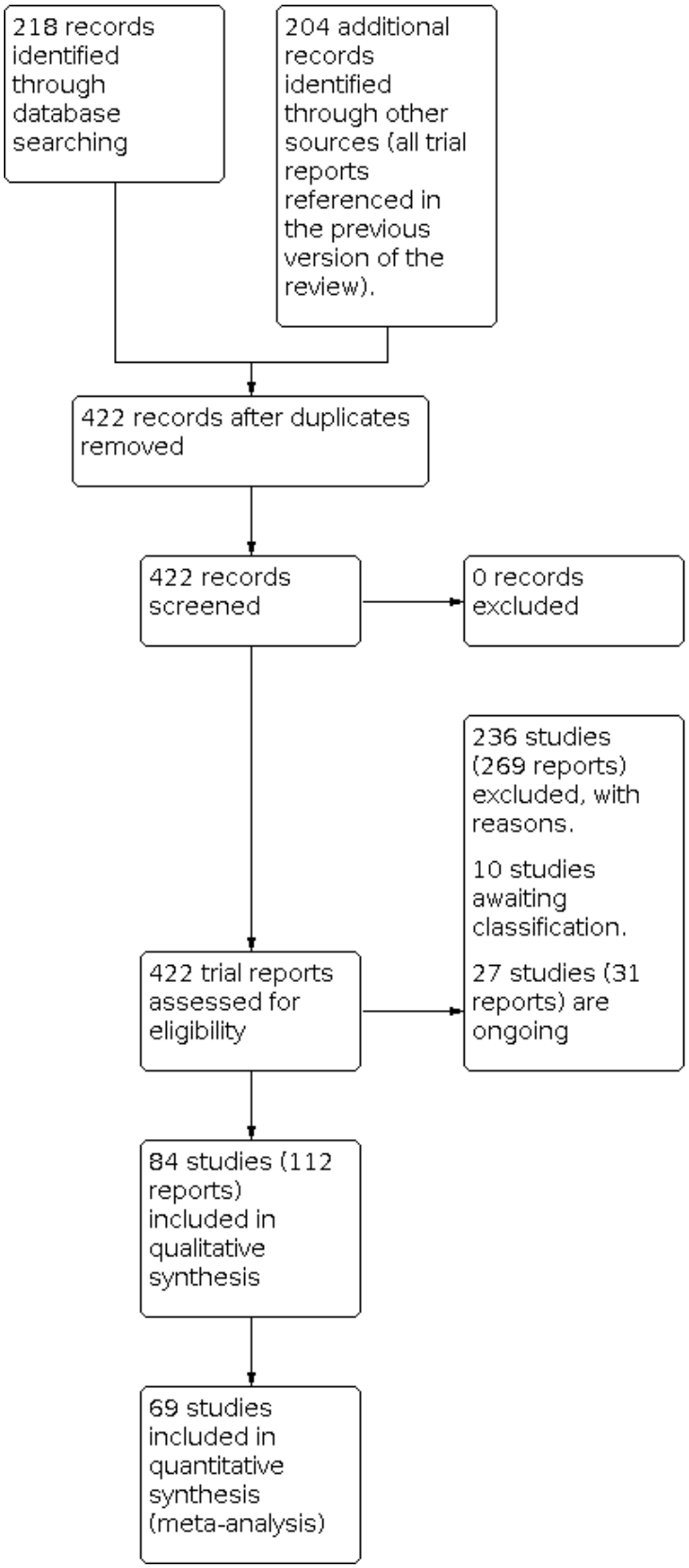
Figure 1. Study flow diagram.



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Included studies

Of the 84 included studies (involving 10,990 women), 69 studies involving 8928 women provided usable data for this review, taking into account the arms of the multi-arm studies which are not included in our inclusion criteria (Abdel-Aleem 2012; Abdollahpour 2015; Abouleish 1999; Ahn 2002; Apiliogullari 2007; Baciarello 2011; Biswas 2003; Caba 1997; Cardoso 2013; Carvalho 2010; Charuluxananan 2003; Cherian 2001; Chestnut 1987; Choi 1999; Dasgupta 2012; Direkvand-Moghadam 2013; Duggal 1998; Duman 2010; El-Deeb 2011a; Garcia-Miguel 2000; Habib 2006; Habib 2013; Harmon 2000; Harnett 2007; Hassanein 2015; Ho 1996; Ho 2006; Huang 1992; Ibrahim 2019; Jaafarpour 2008; Kalava 2013; Kampo 2019; Kasodekar 2006; Khalayleh 2005; Koju 2015; Kotelko 1989; Levin 2019; Li 2012; Lussos 1992; Mandell 1992; Maranhao 1988; Mohammadi 2015; Mokini 2014; Mukherjee 2006; Munnur 2008; Niu 2018; Noroozinia 2013; Nortcliffe 2003; Pan 1996; Pan 2001; Pan 2003; Parra-Guiza 2018; Peixoto 2006; Rasooli 2014; Rudra 2004a; Sahoo 2012; Selzer 2020; Shabana 2012; Shen 2012; Stein 1997; Tarhan 2007; Tkachenko 2019; Tzeng 2000; Uerpairojkit 2017; Ure 1999; Voigt 2013; Wang 2001; Wu 2007; Zeraati 2016).

Fifteen studies are included but do not contribute data to the meta-analysis because the data were either presented in a graphical format only, or there was no information on the number of women in each outcome group (Birnbach 1993; Boone 2002; ; Imbeloni 1986; Jang 1997; Kim 1999; Lee 2002; Lim 2001a; Lim 2001b; Liu 2015a; Modir 2019; Pazoki 2018; Quiney 1995; Sanansilp 1998; Weiss 1995; Yazigi 2002). We have written to these authors requesting further information.

Multi-arm studies

There are 41 multi-arm studies, 31 are three-arm studies (Abdollahpour 2015; Apiliogullari 2007; Baciarello 2011; Birnbach 1993; Choi 1999; Direkvand-Moghadam 2013; Duman 2010; El-Deeb 2011a; Garcia-Miguel 2000; Habib 2013; Harnett 2007; Hassanein 2015; Kampo 2019; Khalayleh 2005; Levin 2019; Li 2012; Maranhao 1988; Modir 2019; Munnur 2008; Nortcliffe 2003; Pan 1996; Pan 2001; Parra-Guiza 2018; Pazoki 2018; Peixoto 2006; Rasooli 2014; Sanansilp 1998; Stein 1997; Tarhan 2007; Tkachenko 2019; Tzeng 2000; Voigt 2013) and 10 studies are four-arm studies (Ahn 2002; Biswas 2003; Charuluxananan 2003; Lee 2002; Mokini 2014; Mukherjee 2006; Shen 2012; Voigt 2013; Wang 2001; Wu 2007). Where two or more arms of a study fell within the same comparison, we treated the data as described in the Unit of analysis issues.

Of the multi-arm studies which provided data, 18 compared more than one drug against placebo but the drugs were in different categories and so in different comparisons (Biswas 2003; Choi 1999; Direkvand-Moghadam 2013; Duman 2010; El-Deeb 2011a; Garcia-Miguel 2000; Harnett 2007; Hassanein 2015; Kampo 2019; Nortcliffe 2003; Pan 1996; Pan 2001; Parra-Guiza 2018; Peixoto 2006; Shen 2012; Stein 1997; Tzeng 2000; Wu 2007). Six multi-arm studies providing data included arms with one of our excluded drugs or a combination of drugs, so data from these arms were excluded (Abdollahpour 2015; Habib 2013; Khalayleh 2005; Levin 2019; Li 2012; Voigt 2013). Seven multi-arm studies providing data looked at different concentrations of the same drug or different routes of administration and we adjusted the placebo data accordingly (Ahn 2002; Apiliogullari 2007; Baciarello 2011; Lee 2002; Mukherjee 2006; Tkachenko 2019; Wang 2001). Four multi-arm studies looked at different drugs from the same category and so were in the same comparison and here we adjusted the placebo data accordingly (Maranhao 1988; Munnur 2008; Rasooli 2014; Tarhan 2007). One four-arm study looked at two drugs from different categories and for one of these drugs looked at two doses, the placebo data was dealt with accordingly (Charuluxananan 2003) and another four-arm study one arm was excluded as it was a combination of drugs and the other two arms were drugs in different categories (Mokini 2014). Four of the multi-arm studies provided no data that we could use in this review (Birnbach 1993; Pazoki 2018; Sanansilp 1998; Modir 2019).

Populations

The included studies covered women undergoing elective and emergency caesarean sections under regional anaesthesia, with either spinal or epidural anaesthesia. Most studies reported women in American Society of Anesthesiologists physical status classification (ASA) Grade 1 to 2, and so generally with no medical problems (Characteristics of included studies)

Interventions

The studies covered drugs in seven different classes of drugs. For 5-HT3 antagonists (e.g. ondansetron, granisetron) there were 21 studies involving providing data on 2686 women; for dopamine antagonists (e.g. metoclopramide, droperidol) there were 20 studies providing data on 1880 women; for corticosteroids (e.g. dexamethasone) there were 12 studies providing data on 1182 women; for antihistamines (e.g. dimenhydrinate, cyclizine) there were four studies providing data on 514 women; for anticholinergics (e.g. glycopyrrolate, scopolamine) there were six studies providing data on 787 women; for sedatives (e.g. propofol, midazolam) there were 13 studies providing data on 1265 women; and for opioid antagonists/partial agonists (nalbuphine) there were two studies providing data on 197 women. Ten studies on acupressure/acupuncture provided data on 1401 women and two studies on ginger which provided data on 365 women (Characteristics of included studies).

Outcomes

Most studies reported intraoperative nausea, intraoperative vomiting, postoperative nausea and postoperative vomiting separately, but a few reported combines nausea and vomiting both intraoperative and postoperative. Some studies reported looking for side effects/adverse effects such as hypotension, itching, dizziness. Few studies looked at women's satisfaction (Characteristics of included studies).

Settings

The 84 studies were undertaken in a wide range of countries across the world (see Characteristics of included studies):

Americas (24 studies) - USA 18 studies, South America four studies (including one from Columbia and two from Brazil), Canada two studies;

Asia (24 studies) - India five studies, China five studies, Nepal one study, Thailand three studies, Taiwan three studies; South Korea five studies, Singapore two studies;

Middle East (14 studies) - Iran 10 studies, Lebanon one study, Turkey three studies;

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UK/Europe (10 studies) - UK four studies, Germany one study, Ireland one study, Italy one study, Spain two studies; Ukraine one study;

Africa (seven studies) - Egypt six studies, Ghana one study.

For two studies, there was no information provided on the setting, and three studies were conducted across multiple countries (e.g. USA and UK).

Dates of included studies

Fifty-nine studies did not report the dates over which their studies were undertaken. The studies which reported dates covered 2001 to 2017 and publication dates range from 1987 to 2020 (Characteristics of included studies).

Funding sources of included studies

Seventy-one studies did not report funding sources. Of the studies reporting this information, two studies reported commercial company funding (Abouleish 1999; Duggal 1998), one study specifically reported no commercial funding (Cherian 2001), nine studies reported finding from universities, hospitals and public funding bodies (Abdollahpour 2015; Cardoso 2013; Direkvand-Moghadam 2013;Duggal 1998; Modir 2019; Parra-Guiza 2018; Pazoki 2018; Selzer 2020; Zeraati 2016), and two studies reported specifically that they had no funding (Kampo 2019; Levin 2019).

Declarations of interest of authors of included studies

Seventy-three studies did not report on declarations of interest of the authors. Eleven studies reported no conflict of interest for their authors (Abdel-Aleem 2012; Abouleish 1999; Cardoso 2013;Kampo 2019; Koju 2015; Levin 2019; Niu 2018; Parra-Guiza 2018; Selzer 2020; Uerpairojkit 2017; Voigt 2013).

Elective versus emergency caesarean sections

Of all our included studies, the vast majority were specifically restricted to elective caesarean sections. Only one study mentioned including both elective and emergency caesareans but they did not present the data separately (Caba 1997). One other study specifically included only women undergoing emergency caesarean section (Huang 1992). Most of the remaining studies did not mention whether they included elective or emergency caesareans. We have, therefore, not been able to consider the subgroup comparison of elective versus emergency caesarean section.

Excluded studies

Excluded studies

We have excluded a total of 236 studies (269 reports). The excluded studies are listed in the reference section under excluded studies and the table Characteristics of excluded studies states the reasons for exclusion from this review. Studies were excluded for a wide variety of reasons. Some studies were excluded for multiple reasons. Many studies that were excluded, assessed interventions for reducing the risk of aspiration pneumonitis at caesarean section rather than reducing the risk of nausea and vomiting, as the search strategy included both these circumstances in the original protocol, which remains part of the aspiration pneumonitis review (Paranjothy 2004). Fifty-four studies looking at aspiration prophylaxis and are included in the review of interventions for reducing aspiration prophylaxis at caesarean section (Paranjothy 2014). Seven studies (Fujii 1998a; Fujii 1998b; Fujii 1999; Fujii 2002; Fujii 2004; Numazaki 2000; Numazaki 2003) were excluded following investigation into research authenticity (Carlisle 2012).

Although our review assesses interventions for prevention (rather than treatment) of nausea and vomiting, our current search would identify treatment studies too. There were only three randomised controlled trials (RCTs) identified which specifically assessed interventions for treatment (rather than prevention) of nausea and vomiting (Fazel 2017; Kimura 2011; Lane 2012). Four studies were excluded because the women had their caesarean sections with general anaesthesia (Abadi 2018; Huseyinogclu 2016; Hussain 2014; Kocamanoglu 2005).

One hundred and seven studies were excluded because they studied aspects of anaesthesia other than interventions given for the prevention of nausea and vomiting. Many studies assessed antiemetic medication but were focused on the haemodynamic effects of the medication, or the quality and duration of anaesthesia (rather than the antiemetic effect). Some studies examined other medication such as analgesics, antidepressants or anticonvulsants, again not focused on their antiemetic effects. Some other studies compared different surgical techniques, or other interventions such as supplemental oxygen, intravenous fluids or prolonged fasting. These were also outside the inclusion criteria for our review (Characteristics of excluded studies).

Fifty studies were excluded as they compared different treatments, or combinations of treatments, without a placebo or control group.

Thirteen studies were excluded as they were deemed not to be an RCT (Atkinson 1980; Boschi 1984; Brock-Utne 1989; Chen 2005; Colman 1988; Datta 1982; Dewan 1982; Dundee 1979; Fazel 2017; Qvist 1983; Santos 1984; Sultan 2014; Tanaka 2007).

Seven studies were excluded as the publications had been retracted since our previous review was published.

Risk of bias in included studies

Overall risk of bias is reported in Figure 2 and Figure 3.

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Figure 2. Methodological quality summary: review authors' judgements about each methodological quality item for each included study.

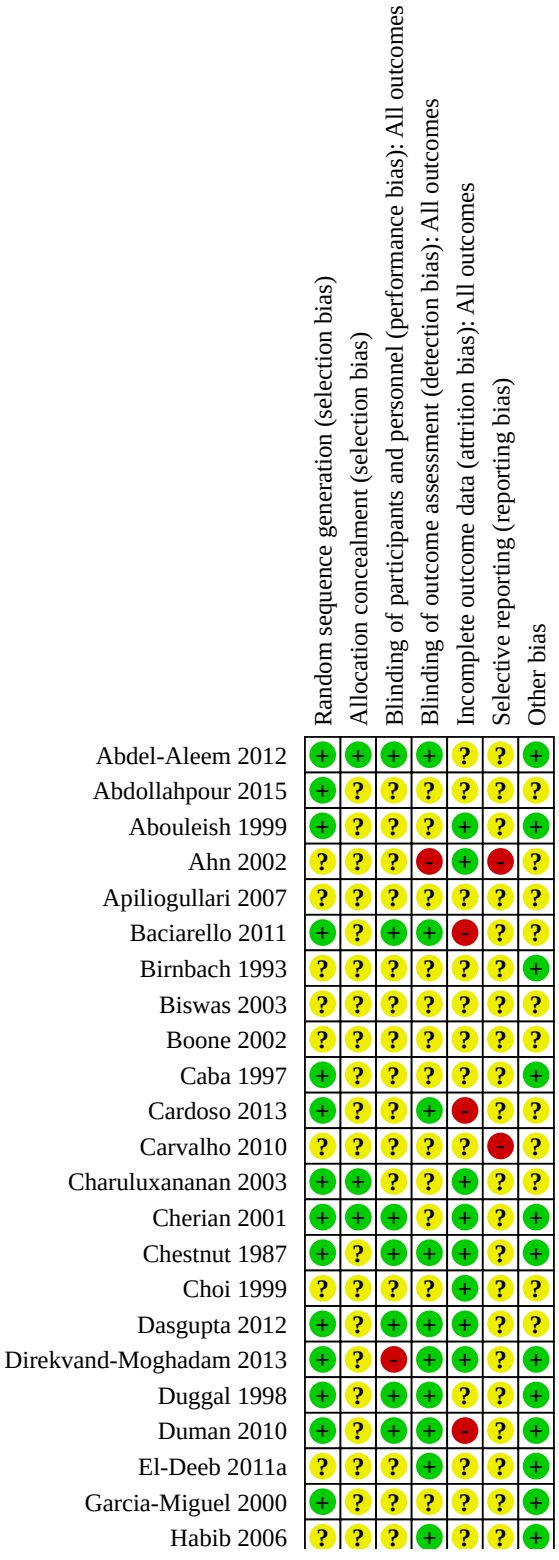

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Figure 2. (Continued)

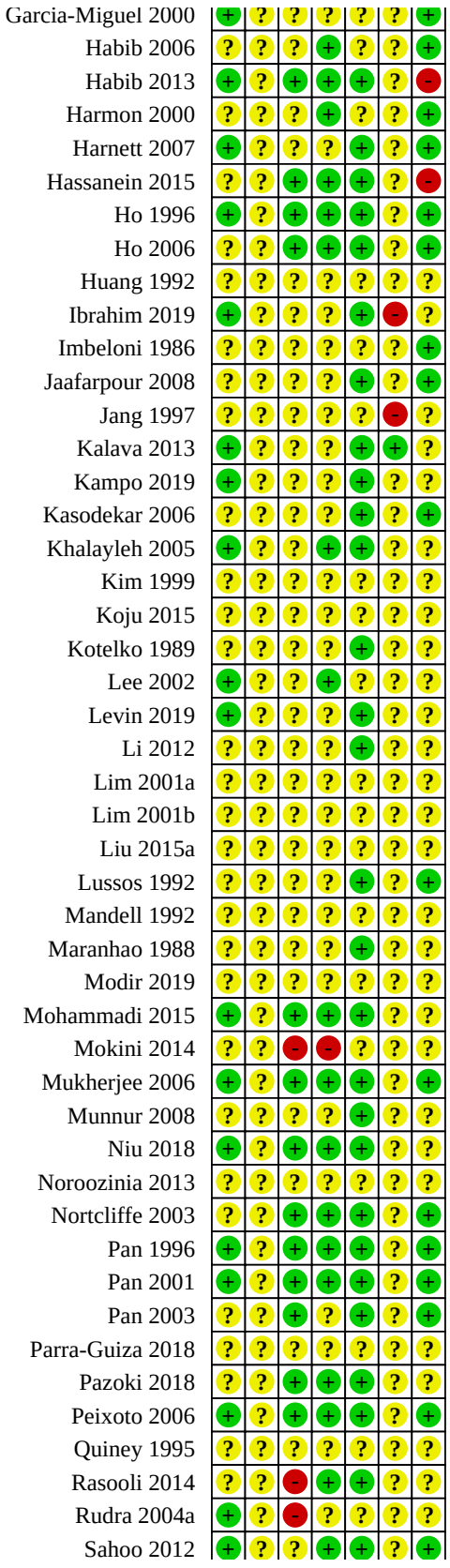

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Figure 2. (Continued)

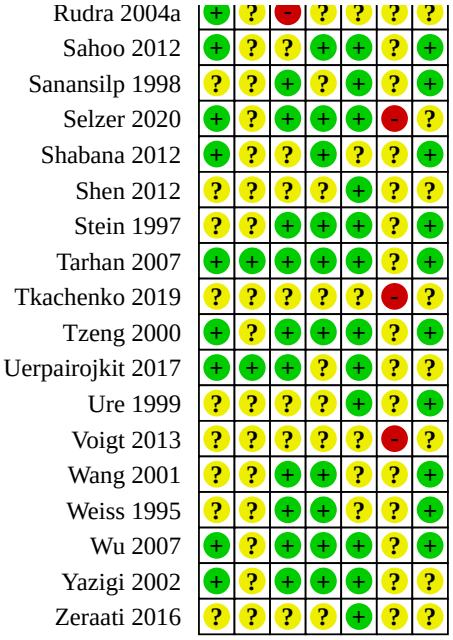
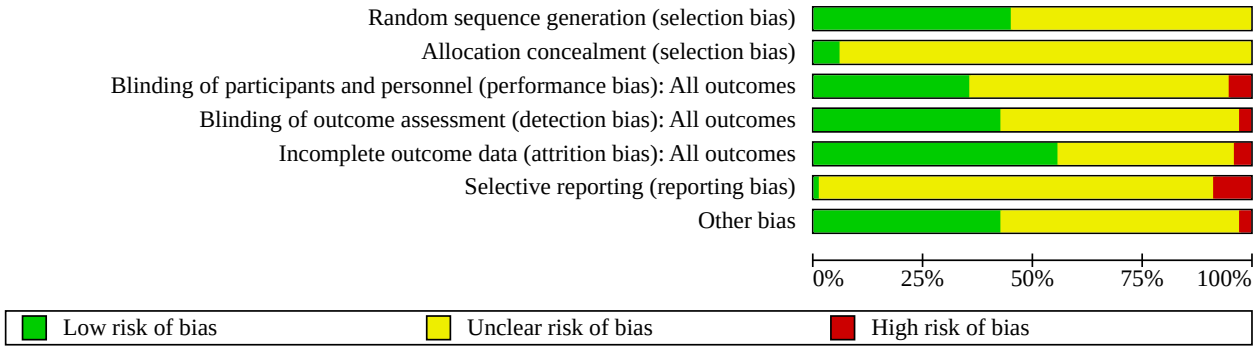


Figure 3. 'Risk of bias' graph: review authors' judgements about each risk of bias item presented as percentages across all included studies.



Allocation

Of the 84 studies included in the review, random sequence generation was judged to be of low risk of bias in 38 studies, with 46 studies being judged of unclear risk. Many studies simply stated that "patients were randomised" without providing any further details.

Allocation concealment was generally poorly described. It was judged to be of low risk of bias in five studies and of unclear risk in 79 studies. There were only five studies where both sequence generation and allocation concealment were judged to be of low risk (Abdel-Aleem 2012; Charuluxananan 2003; Cherian 2001; Tarhan 2007; Uerpairojkit 2017).

Blinding

Blinding was assessed in more detail in this updated review. Blinding was sometimes described poorly, with many studies simply describing a "double blind" design.

We judged blinding of participants and clinicians as of low risk of bias in 30 studies,and of unclear bias in 50studies. Blinding was considered at high risk of bias in four studies because the treating anaesthetist was likely not blinded to the study drug (Direkvand-Moghadam 2013; Mokini 2014; Rasooli 2014; Rudra 2004a). In all these studies, it seemed some effort at blinding the treating clinician could have been made.

Blinding of outcome assessors was variably described, with 36 studies judged to be of low risk and 46 studies judged to be of

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unclear risk. Two studies were considered to be of high risk of bias in this regard (Ahn 2002; Mokini 2014).

Incomplete outcome data

Incomplete outcome data were addressed adequately and so at low risk of bias in 47 studies. In 34 studies, it was judged to be of unclear bias, and at high risk of bias in three studies (Baciarello 2011; Cardoso 2013; Duman 2010). In these three studies, data on a significant number of participants were excluded and we were unable to be re-include on an intention-to-treat basis.

Selective reporting

As we were generally not able to assess study protocols, 76 studies were judged to be unclear about selective reporting bias with just one study assessed as low risk (Kalava 2013).. However, seven studies were judged to show a high risk of bias (Ahn 2002; Carvalho 2010; Ibrahim 2019; Jang 1997; Selzer 2020; Tkachenko 2019; Voigt 2013), generally because they did not report outcomes which were pre-specified in the study methods.

Other potential sources of bias

Thirty-six studies were judged to be free of other potential sources of bias, with 46 being unclear. Two studies were judged to be at high risk of bias (Habib 2013; Hassanein 2015). One study was conducted at two different centres. There seemed to be many differences in practice between the two centres and the study seemed poorly controlled (Habib 2013). Another study included an unspecified number of women undergoing additional surgical procedures (such as tubal ligation (Hassanein 2015).

Effects of interventions

See: **Summary of findings 1** 5-HT3 antagonists compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 2** Dopamine antagonists compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 3** Corticosteroids compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 4** Antihistamines compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 5** Anticholinergics compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 6** Sedatives compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 7** Opioid antagonists compared to placebo for preventing nausea and vomiting; **Summary of findings 8** Acupressure/acupuncture compared to placebo for preventing nausea and vomiting in women undergoing regional anaesthesia for caesarean section; **Summary of findings 9** Ginger compared to placebo for preventing nausea and vomiting

1) 5-HT_3 receptor antagonists versus placebo (25 studies, 3942 women, Comparison 1)

Whilst 25 studies assessed this comparison, only 21 provided usable data on outcomes involving 2686 women (Abouleish 1999; Charuluxananan 2003; Cherian 2001; Dasgupta 2012; El-Deeb 2011a; Garcia-Miguel 2000; Harnett 2007; Kasodekar 2006; Koju 2015; Mohammadi 2015; Munnur 2008; Pan 1996; Pan 2001; Pan 2003; Parra-Guiza 2018; Peixoto 2006, Sahoo 2012; Shen 2012; Uerpairojkit 2017; Voigt 2013; Yazigi 2002). Four studies provided no data which could be included in our analyses (Boone 2002; Lee 2002; Pazoki 2018; Yazigi 2002). Of the studies that provided data, 17 studied ondansetron (Abouleish 1999; Charuluxananan 2003; Cherian 2001; El-Deeb 2011a; Garcia-Miguel 2000; Harnett 2007; Koju 2015; Munnur 2008; Pan 1996; Pan 2001; Pan 2003; Parra-Guiza 2018; Peixoto 2006, Sahoo 2012; Shen 2012; Uerpairojkit 2017; Yazigi 2002), five examined granisetron (Dasgupta 2012; Kasodekar 2006; Lee 2002; Mohammadi 2015; Munnur 2008) and one studied tropisotron (Voigt 2013).

The studies which provided data were undertaken in: USA (six studies); Egypt (two studies); India (two studies); Iran (one study); Iran (one study); Spain (one study); Thailand (one study); and UK (one study).

Of the 21 studies providing data, only three were judged to have had both adequate sequence generation and allocation concealment (Abouleish 1999; Charuluxananan 2003; Cherian 2001). The remaining are unclear. Five studies were considered to have adequate and well-described blinding (Dasgupta 2012; Mohammadi 2015; Pan 1996; Pan 2001; Peixoto 2006). The remainder are unclear in at least one element (*see* Figure 2 and Figure 3).

Primary outcomes

Intraoperative nausea

5-HT_3 antagonists may reduce the number of women having intraoperative nausea (average risk ratio (RR) 0.55, 95% confidence interval (CI) 0.42 to 0.71), 12 studies, 1419 women, random-effects (T^2 = 0.11; Chi^2 P = 0.0009; I^2 = 65%), Analysis 1.1). The certainty of the evidence was low, downgraded for serious risk of bias and serious inconsistency (Summary of findings 1).

In a subgroup analysis by drug and dose, there was significant difference in treatment effect between the subgroups (Chi^2 = 7.72, P = 0.05, I^2 = 61.1%).

The sensitivity analysis left only one study (with 81 women) at low risk of bias across selection and attrition bias and this showed no reduction and a wide CI crossing the line of no difference (average RR 1.11, 95% CI 0.45 to 2.79).

Intraoperative vomiting

5-HT_3 antagonists may lead to a reduction in the number of women having intraoperative vomiting, but the results are very uncertain (average RR 0.46, 95% CI 0.29 to 0.73, 11 studies, 1414 women, random-effects (T^2 = 0.27, Chi^2 P = 0.008, I^2 = 58%), Analysis 1.2).The certainty of the evidence is very low, downgraded for serious risk of bias, serious inconsistency and some evidence of publication bias (Summary of findings 1).

In the subgroup analysis by dose of drug, there was no evidence of differences in treatment effect between the subgroups (Chi^2 = 4.33, P = 0.22, I^2 = 32.2%).

The sensitivity analysis left only one study (with 81 women) at low risk of bias across selection and attrition bias, it showed a similar result to the main analysis but a wider CI (RR 0.38, 95% CI 0.18 to 0.81).

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Postoperative nausea

5-HT_3 antagonists probably reduce the number of women having postoperative nausea (average RR 0.40, 95% CI 0.30 to 0.54, 10 studies, 1340 women, random-effects (T^2 = 0.09, Chi^2 P = 0.10, I^2 = 37%) (Analysis 1.3). The certainty of the evidence was moderate, downgraded for serious risk of bias (Summary of findings 1).

The subgroup analysis by drug and dose did not identify any heterogeneity (Chi^2 = 0.15, df = 3 (P = 0.99), I^2 = 0%).

The sensitivity analysis left only two studies (with 338 women) at low risk of bias across selection and attrition bias and this showed similar finding, with a wider CI (average RR 0.56, 95% CI 0.38 to 0.83).

Postoperative vomiting

5-HT_3 antagonists may reduce the number of women having postoperative vomiting (average RR 0.47, 95% CI 0.31 to 0.69, 10 studies, 1450 women, random-effects (T^2 = 0.13, Chi^2 P = 0.10, I^2 = 37%), Analysis 1.4). The certainty of the evidence was low, downgraded for serious risk of bias and some evidence of publication bias (Summary of findings 1).

The subgroup analysis by drug and dose did not identify any differences (Chi^2 = 1.15, df = 3 (P = 0.76), I^2 = 0%).

The sensitivity analysis left only two studies (with 338 women) at low risk of bias across selection and attrition bias and this showed a wider CI crossing the line of no difference (average RR 0.94, 95% CI 0.53 to 1.67).

Secondary outcomes

Intraoperative nausea + vomiting

Only one small study (Voigt 2013) looked at this outcome and so there are insufficient data to make any judgement (Analysis 1.5).

Postoperative nausea + vomiting

$5HT_3$ antagonists may reduce the number of women having postoperative nausea plus vomiting (RR 0.57, 95% CI 0.41 to 0.80, five studies, 576 women), however, the certainty of the evidence is low due to unclear risk of bias on most aspects including selection and attrition bias. (Analysis 1.6).

Maternal satisfaction

We identified two differing results in women's satisfaction between the 5-HT_3 receptor antagonist ondansetron and placebo. One study showed a benefit from the ondansetron (RR 1.99, 95%CI 1.35 to 2.94, 1 study, 105 women) (Pan 2001), and the other showed no difference (RR 0.98, 95% CI 0.82 to 1.16, 1 study 81 women) (Cherian 2001) (Analysis 1.7).

Adverse effects and side effects

There were no events in the one study involving 100 women that assessed a composite outcome of adverse effects. There was no indication of adverse effects for a number of outcome measures: headaches/dizziness (average RR 1.04, 95% CI 0.60 to 1.79, 4 studies, 433 women, Analysis 1.9); hypotension (average RR 1.22, 95% CI 0.72 to 2.08, 3 studies 290 women, Analysis 1.10); and pruritis/itching (RR 0.85, 95% CI 0.69 to 1.05, 4 studies 488 women, ,Analysis 1.11); dry mouth (RR 0.75, 95% CI 0.17 to 3.22, 1 study, 130 women, Analysis 1.12); drowsiness/sedation (RR 3.94, 95% CI 0.45 to 34.63, 2 studies, 170 women, Analysis 1.13). .

Rescue antiemetics used: $5HT_3$ antagonist ondansetron may reduce the use of rescue antiemetics (RR 0.32, 95% CI 0.11 to 0.93, 1 study, 158 women, Analysis 1.14) but more data are needed.

2) Dopamine antagonists versus placebo (24 studies, 2965 women, Comparison 2)

Twenty-four studies compared dopamine antagonists with placebo, of which 20 studies provided data for analysis involving 1880 women (Biswas 2003; Chestnut 1987; Choi 1999; Direkvand-Moghadam 2013; Duman 2010; Garcia-Miguel 2000; Habib 2013; Huang 1992; Kampo 2019; Khalayleh 2005; Lussos 1992; Mandell 1992; Maranhao 1988; Mokini 2014; Pan 1996; Pan 2001; Peixoto 2006; Stein 1997; Tzeng 2000; Wu 2007). Four studies provided no data which could be included in our analyses (Birnbach 1993; Imbeloni 1986; Kim 1999; Sanansilp 1998). Of the studies providing data, 15 studied metoclopramide (Biswas 2003; Chestnut 1987; Choi 1999; Direkvand-Moghadam 2013; Duman 2010; Garcia-Miguel 2000; Habib 2013; Huang 1992; Kampo 2019; Khalayleh 2005; Lussos 1992; Maranhao 1988; Mokini 2014; Pan 2001; Stein 1997). Five examined droperidol (Mandell 1992; Pan 1996; Peixoto 2006; Tzeng 2000; Wu 2007).

The 20 studies which provided data were undertaken in: USA (seven studies); one in the USA and Canada, Taiwan (two studies); India (one study); Iran (two studies); Spain (one study); Turkey (one study); Africa (one study) South America (two studies) and two studies where the setting was not described.

Overall, the studies were of uncertain or variable quality. Of the 20 studies which provided data, only three were judged to have had both adequate random sequence generation and allocation concealment (Chestnut 1987; Habib 2013; ; Stein 1997). Nine studies were judged to have had adequately described blinding (Chestnut 1987; Duman 2010; Habib 2013; ; Pan 1996; Pan 2001; Peixoto 2006; Stein 1997; Tzeng 2000; Wu 2007). All the remaining being unclear (Figure 2) except for one study where it seemed likely that the patient and clinicians would both have been aware of the group allocation (Direkvand-Moghadam 2013). study appeared at high risk of bias due to missing data, where substantial numbers of patients were excluded after randomisation and weren't able to be re-included (Duman 2010).

Primary outcomes

Intraoperative nausea

Dopamine antagonists may reduce the number of women having intraoperative nausea but the results are very uncertain (average RR 0.38, 95% CI 0.27 to 0.52, 15 studies, 1180 women, random-effects (T^2 = 0.19, Chi^2 P = 0.005, I^2 = 54%), Analysis 2.1). The certainty of the evidence was very low, downgraded for very serious risk of bias and serious inconsistency (Summary of findings 2).

In the subgroup analysis by dose and drug, there was no evidence of differences in treatment effects between the subgroups (Chi^2 = 0.79, df = 6 (P = 0.99), I^2 = 0%)..

We could not undertake a sensitivity analysis because none of the studies providing data were at low risk of bias across selection and attrition bias. .

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Intraoperative vomiting

Dopamine antagonists may reduce the number of women with intraoperative vomiting (average RR 0.41, 95% CI 0.28 to 0.60, 12 studies, 942 women, random-effects, T^2 = 00.02, Chi^2 P = 0.40, I^2 = 5%, Analysis 2.2). The certainty of the evidence was low, downgraded for very serious risk of bias.

In the subgroup analysis by drug and dose, there was no evidence of differences in treatment effects between the subgroups Chi^2 = 2.70, df = 5 (P = 0.75), I^2 = 0%.

We could not undertake a sensitivity analysis because none of the studies providing data were at low risk of bias across selection and reporting bias, and this also showed a reduced relative risk but a CI that crossed the line of no difference (average RR 0.34, 95% CI 0.10 to 1.23).

Postoperative nausea

Dopamine antagonists may reduce the number of women with postoperative nausea (average RR 0.61, 95% CI 0.48 to 0.79, 7 studies, 601 women, random-effects, T^2 = 0.01, Chi^2 P = 0.35, I^2 = 10%, Analysis 2.3). The certainty of the evidence is low, downgraded for very serious risk of bias (Summary of findings 2).

In the subgroup analysis by drug and dose, there was no evidence of differences in treatment effects between subgroups (Chi^2 = 2.84, df = 2 (P = 0.24), I^2 = 29.5%)

We could not undertake a sensitivity analysis because none of the studies providing data were at low risk of bias across selective and reporting bias,

Postoperative vomiting

Dopamine antagonists may lead to a reduction in the number of women having postoperative vomiting but the results are very uncertain (average RR 0.63, 95% CI 0.44 to 0.92, 9 studies, 860 women, T^2 = 0.13, Chi^2 P = 0.08, I^2 = 43%, Analysis 2.4). The certainty of the evidence is very low due to very serous risk of bias and some evidence of publication bias. (Summary of findings 2), . These findings were broadly consistent when the individual interventions of metoclopramide and droperidol were assessed separately.

In the subgroup analysis by type and dose of drug, there was no evidence of differences in treatment effects between subgroups (Chi^2 = 2.03, df = 2 (P = 0.36), I^2 = 1.3%).

We could not undertake a sensitivity analysis because none of the studies providing data were at low risk of bias across selective and reporting bias.

Secondary outcomes

Intraoperative nausea + vomiting

There is only one small study with 98 women so the findings are very uncertain (average RR 0.12, 95% CI 0.02 to 0.88, Analysis 2.5).

Postoperative nausea + vomiting

There are four studies involving 450 women, so the findings are uncertain (average RR 0.23, 95% CI 0.05 to 1.02, Analysis 2.6). However, one study has a very extreme result (Kampo 2019). We have checked the paper and can find nothing to explain this result, so we also report the findings as well excluding these data (average (RR 0.49, 95% CI 0.32 to 0.75, 3 studies, 220 women).

Maternal satisfaction

We identified no overall difference in women's satisfaction between dopamine antagonists and placebo (RR 1.42, 95% CI 0.91 to 2.21, 1 study, 102 women, Analysis 2.7).

Adverse effects and side effects

Although there were no estimates of a composite outcome of adverse effects, a few studies did measure anxiety, headaches/ dizziness, hypotension and pruritus. There were no differences identified (Analysis 2.8; Analysis 2.9; Analysis 2.10; Analysis 2.13).

Subgroup analyses

For possible variations between individual drugs, *see* Analysis 2.1 to Analysis 2.7.

3) Corticosteroids versus placebo (15 studies, 1830 women, Comparison 3)

Fifteen studies looked at corticosteroids versus placebo, of which 12 studies involving 1182 women provided data for the review. Studies compared corticosteroids against placebo, all studied dexamethasone but in various doses from 2.5 mg to 10 mg (Abdel-Aleem 2012; Biswas 2003; Cardoso 2013; Hassanein 2015; Jaafarpour 2008; Nortcliffe 2003; Parra-Guiza 2018; Selzer 2020; Tkachenko 2019; Tzeng 2000; Wang 2001; Wu 2007). Two included studies provided no data for the review (Lim 2001b; Modir 2019).

The studies were undertaken in: Taiwan (three studies); Egypt (two studies); Brazil (one study); India (one study); Iran (one study), Colombia (one study), Ukraine (one study), USA (one study)and UK (one study).

The studies were of questionable quality with only one being judged as having adequate sequence generation and allocation concealment (Abdel-Aleem 2012;). Six had adequate blinding (Abdel-Aleem 2012; Hassanein 2015; Selzer 2020; Tzeng 2000; Wang 2001; Wu 2007). One study excluded many women after randomisation if they suffered intraoperative nausea or vomiting and this amounted to 31% of the enrolled subjects (Abdel-Aleem 2012). Another study excluded 46% of women after randomisation if they were not the first patient of the day (Cardoso 2013).

Primary outcomes

Intraoperative nausea

Dexamethasone may reduce the number of women having intraoperative nausea but the results are very uncertain (average RR 0.56, 95% CI 0.37 to 0.83, 6 studies, 609 women, random-effects (T^2 = 0.12, Chi^2 P = 0.06, I^2 = 50%), Analysis 3.1), The certainty of the evidence was very low, downgraded for very serious risk of bias and serious inconsistency (Summary of findings 3).

In the subgroup analysis by dose of drug and route of administration (intravenous and intrathecal) , there was evidence of differences between the various doses and routes of administration (Chi^2 = 7.54, df = 2 (P = 0.02), I^2 = 73.5%).

The sensitivity analysis could not be undertaken as none of the included studies were low risk for selection.and attrition bias.

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Intraoperative vomiting

Dexamethasone may reduce the number of women having intraoperative vomiting but the results are very uncertain (average RR 0.52, 95% CI 0.31 to 0.87, 6 studies, 609 women, random-effects (T^2 = 0.00, Chi^2 P = 0.69, I^2 = 0%, Analysis 3.2). The certainty of the evidence being very low, downgraded for very serious risk of bias, and serious imprecision (Summary of findings 3).

The subgroup analysis by dose of drug and route of administration (intravenous and intrathecal showed no difference between the subgroups (Chi^2 = 1.80, df = 2 (P = 0.41), I^2 = 0%).

The sensitivity analysis could not be undertaken as none of the included studies were low risk for selection and attrition bias.

Postoperative nausea

Dexamethasone probably reduces the number of women having postoperative vomiting (average RR 0.59, 95% CI 0.49 to 0.73, 6 studies, 733 women, random-effects (T^2 = 0.01, Chi^2 P = 0.36, I^2 = 9%), Analysis 3.3). The certainty of the evidence was moderate, downgraded for serious risk of bias.

The subgroup analyses by dose of drug and route of administration (intravenous and intrathecal) showed no difference between the subgroups (Chi^2 = 6.87, df = 5 (P = 0.23), I^2 = 27.2%).

The sensitivity analysis could not be undertaken as none of the included studies were low risk for selection.and attrition bias. .

Postoperative vomiting

Dexamethasone may reduce the number of women having postoperative vomiting (average RR 0.68, 95% CI 0.49 to 0.95, 7 studies, 793 women, random-effects (T^2 = 0.11, Chi^2 P = 0.03, I^2 = 52%) Analysis 3.4). The certainty of the evidence was low, downgraded for serious risk of bias and serious inconsistency (Summary of findings 3).

The subgroup analysis by dose of drug and route of administration (intravenous and intrathecal) showed some variation (Chi^2 = 14.65, df = 5 (P = 0.01), I^2 = 65.9%).

The sensitivity analysis could not be undertaken as none of the included studies were low risk for selection.and attrition bias..

Secondary outcomes

Intraoperative nausea + vomiting

We identified only one study of 108 women (Selzer 2020) so the findings are very uncertain (average RR 1.65, 95% CI 0.96 to 2.84, Analysis 3.5).

Postoperative nausea + vomiting

We identified only one study of 108 women (Selzer 2020) so the findings are very uncertain (RR 0.94, 95% CI 0.79 to 1.12, Analysis 3.6).

Adverse effects and side effects

Although there were no estimates of a composite outcome of adverse effects, a few studies did measure hypotension and pruritis but there were insufficient data to make any firm statement about adverse effects (Analysis 3.7; to Analysis 3.10).

4) Antihistamines versus placebo (4 studies, 654 women, Comparison 4)

Four studies compared antihistamines with placebo, all studies providing data on 514 women (Apiliogullari 2007; Carvalho 2010; Duman 2010; Nortcliffe 2003).

The studies were undertaken in: Iran (one study); Turkey (one study) Canada (one study) and UK (one study).

Only one study had adequate sequence generation (Duman 2010). All four studies were unclear with regard to allocation concealment. Only one study had adequate blinding (Duman 2010). Two studies were assessed as high risk of bias - one due to missing data that could not be re-included (Duman 2010) and one due to pre-specified outcomes not reported (Carvalho 2010).

Primary outcomes

Intraoperative nausea

Antihistamines (e.g. dimenhydrinate) may make little of no difference to intraoperative nausea (RR 0.99, 95% CI 0.47 to 2.11, 1 study, 149 women, Analysis 4.1). The certainty of the evidence was very low, downgraded for very serious risk of bias, and very serious imprecision Summary of findings 4).

It was not possible to undertake subgroup analysis as only one study assessed this outcome (Carvalho 2010).

It was not possible to undertake sensitivity analysis as only one study (with unclear risk of selection and reporting bias) assessed this outcome (Carvalho 2010).

Intraoperative vomiting

Antihistamines (e.g. dimenhydrinate) may make little of no difference to intraoperative nausea as there were no events in the one study of 149 women looking at this outcome and the GRADE assessment of this study was very low due to very serious risk of bias and very serious imprecision (Analysis 4.2, Summary of findings 4).

It was not possible to undertake subgroup analysis as only one study assessed this outcome (Carvalho 2010).

It was not possible to undertake sensitivity analysis as only one study (with unclear risk of selection and reporting bias) assessed this outcome (Carvalho 2010).

Postoperative nausea

Antihistamines may lead to a reduction in postoperative nausea (average RR 0.44, 95% CI 0.30 to 0.64, 4 studies, 514 women, random-effects (T^2 = 0.02, Chi^2 P = 0.34, I^2 = 11%), Analysis 4.3) as the certainty of the evidence is low, downgraded for very serious risk of bias. (Summary of findings 4).

In the subgroup analysis by type and dose of drug, there was no evidence of differences in treatment effects between subgroups (Chi^2 = 3.98, df = 3 (P = 0.26), I^2 = 24.6%).

In the sensitivity analysis there were no studies with low risk of selection and attrition bias.

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Postoperative vomiting

Antihistamines may lead to a reduction in postoperative vomiting but the results are very uncertain (average RR 0.48, 95% CI 0.29 to 0.81, 3 studies, 333 women, random-effects (T^2 = 0.00, Chi^2 P = 0.66, I^2 = 0%), Analysis 4.4), The certainty of the evidence is very low, downgraded for very serious risk of bias and serious imprecision (Summary of findings 4).

The subgroup analysis by type of drug or dose showed no difference between the subgroups (Chi^2 = 0.79, df = 2 (P = 0.67), I^2 = 0%).

In the sensitivity analysis there were no studies with low risk of selection and attrition bias.

Secondary outcomes

None of the studies looked at intraoperative 'nausea + vomiting nor postoperative 'nausea + vomiting'.

Adverse effects and side effects

Although there were no estimates of a composite outcome of adverse effects, one study involving 149 women looked at hypotension (Carvalho 2010, Analysis 4.5), but there were insufficient data to make any firm statement about hypotension.

5) Anticholenergics versus placebo (7 studies, 1088 women, Comparison 5)

Seven studies compared anticholinergics with placebo, with six of these studies (involving 787 women) reporting data that we could use in the review (Baciarello 2011; Biswas 2003; Harnett 2007; Kotelko 1989; Shen 2012; Ure 1999). One study provides no data for the review as they present data across multiple time periods and it is unclear if women have been counted multiple times (Quiney 1995).

The studies which provided data were undertaken in: USA (two studies); India (one study), Italy (one study), China (one study) and UK (one study).

Two studies had adequate sequence generation (Baciarello 2011; Harnett 2007). The other four were unclear. One study had adequate allocation concealment (Baciarello 2011) the others studies were unclear. Only one study described adequate blinding of participants and outcome assessment (Baciarello 2011). One study was judged to be at high risk of income data as 12 participants were excluded after randomisation (Baciarello 2011).

Primary outcomes

Intraoperative nausea

Anticholinergics may reduce intraoperative nausea (average RR 0.67, 95% CI 0.51 to 0.87, 4 studies, 453 women, random-effects (T^2 = 0.03, Chi^2 P = 0.13, I^2 = 47%), Analysis 5.1). The certainty of the evidence was low, downgraded for very serious risk of bias (Analysis 5.1).

The subgroup analyses by type of drug or dose showed no difference between the subgroups (Chi^2 = 0.70, df = 1 (P = 0.40), I^2 = 0%).

In the sensitivity analysis there were no studies with low risk of selection and attrition bias.

Intraoperative vomiting

Anticholenergics may make little or no difference to intraoperative vomiting (average RR 0.79, 95% CI 0.40 to 1.54, 4 studies, 453 women, random-effects (T^2 = 0.22, Chi^2 P = 0.10, I^2 = 52%), Analysis 5.2). The certainty of the evidence is very low, downgraded for very serious risk of bias, serious inconsistency and serious imprecision (Summary of findings 5).

These findings were persistent in the scopolamine subgroup, but not the glycopyrrolate subgroup, however, there were much smaller numbers in the glycopyrrolate subgroup.

In a subgroup analysis by type of drug and dose, showed no difference between the subgroups (Chi^2 = 0.86, df = 1 (P = 0.35), I^2 = 0%)

In the sensitivity analysis there were no studies with low risk of selection and attrition bias.

Postoperative nausea

None of the studies assessed postoperative nausea.

Postoperative vomiting

Only one study of 161 women looked at this outcome (Harnett 2007). So we are very uncertain whether anticholinergics reduce postoperative vomiting (RR 0.55, 95% CI 0.41 to 0.74, 1 study, 161 women, (Analysis 5.4). The certainty of the evidence was low, downgraded for serious risk of bias and serious imprecision (Summary of findings 5).

There were no assessments on subgroups nor sensitivity because there was only one study..

Secondary outcomes

Intraoperative 'nausea + vomiting'

None of the studies assessed this outcome.

Postoperative 'nausea + vomiting'

Anticholinergics may reduce the number of women with postoperative nausea and vomiting (average RR 0.46, 95% CI 0.25 to 0.85, 2 studies, 334 women, Analysis 5.6) but the certainty of the evidence is very low coming from just two small studies, so overall anticholinergics may make little or no difference.

Adverse effects and side effects

Although there were no estimates of a composite outcome of adverse effects, a few studies did measure a number of adverse and side effects, including blurred vision, anxiety/disorientation and dizziness, (Analysis 5.7 to Analysis 5.13) but we feel there are insufficient data to make any firm statement about adverse or side effects.

6) Sedatives versus placebo (17 studies, 1730 women, Comparison 6)

Seventeen studies assessed sedatives versus placebo, with 13 providing analysable data on 1265 women. Most studies assessed propofol but at differing doses (Ahn 2002; Caba 1997; Kampo 2019; Mokini 2014; Mukherjee 2006; Niu 2018; Rasooli 2014; Rudra 2004a; Tarhan 2007). Two studies assessed midazolam, two intravenous (Rasooli 2014; Tarhan 2007) and one intrathecal (Abdollahpour

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2015). Two studies assessed ketamine (Hassanein 2015; Shabana 2012). One study provided data in graphical form only (Weiss 1995) and we have written to the authors to obtain the numerical data. One study provided outcome data as percentages and it was unclear how many women were in each group (Modir 2019).

The studies which provided data were undertaken in: India (two studies); Iran (two studies); Korea (one study) Egypt (two studies); Spain (one study) Ghana (one study), China (one study) and Turkey (one study). One study did not specify where it was conducted.

The 12 studies providing data appeared to be of reasonable quality with eight studies having adequate random sequence generation but only three having adequate allocation concealment. Only four of the 12 studies had adequate blinding (Hassanein 2015; Niu 2018; Mukherjee 2006; Tarhan 2007). Four studies were rated as inadequate blinding, where it was highly likely that the participants and/or clinicians would have been aware of the group allocation (Ahn 2002; Mokini 2014; Rasooli 2014; Rudra 2004a).

Primary outcomes

Intraoperative nausea

Sedatives probably reduce the number of women having intraoperative nausea (average RR 0.65, 95% CI 0.51 to 0.82, 8 studies, 593 women, random-effects (T^2 = 0.00, Chi^2 P = 0.64, I^2 = 0%), Analysis 6.1). The certainty of the evidence was moderate, downgraded for serious risk of bias (Summary of findings 6).

Subgroup analysis by type of drug and dose showed no difference between the subgroups (Chi^2 = 5.78, df = 7 (P = 0.57), I^2 = 0%).

The sensitivity analysis included one study (with 88 women) at low risk of bias of selection and attrition bias, and this showed similar findings to the main analysis although the lower CI now crosses the line of no difference (RR 0.76, 95% CI 0.53 to 1.08).

Intraoperative vomiting

Sedatives probably reduce the number of women with intraoperative vomiting (average RR 0.35, 95% CI 0.24 to 0.52, 8 studies, 593 women, random-effects (T^2 = 0.00, Chi^2 P = 0.55, I^2 = 0%), Analysis 6.2). The certainty of the evidence was moderate, downgraded for serious risk of bias (Summary of findings 6).

Subgroup analysis by type of drug and dose showed no difference between the subgroups (Chi^2 = 3.97, df = 7 (P = 0.78), I^2 = 0%).

The sensitivity analysis included one (with 88 women) at low risk of bias of selection and attrition bias, and this showed similar findings to the main analysis (RR 0.43, 95% CI 0.20 to 0.95).

Postoperative nausea

Sedatives may reduce the number of women with postoperative nausea but the results are very uncertain (average RR 0.25, 95% CI 0.09 to 0.71, 2 studies, 145 women, (T^2 = 0.47, Chi^2 P = 0.09, I^2 = 58%), Analysis 6.3) The certainty of the evidence was very low, downgraded for serious inconsistency and very serious imprecision (Summary of findings 6).

Subgroup analysis by type of drug and dose showed some difference between the groups (Chi^2 = 4.64, df = 2 (P = 0.10), I^2 = 56.9%).

The sensitivity analysis included one study (with 88 women) at low risk of bias of selection and attrition bias, and this showed similar findings to the main analysis although the upper CI is further away from the line of no difference (RR 0.17, 95% CI 0.09 to 0.31).

Postoperative vomiting

Sedatives may reduce the number of women with postoperative vomiting (average RR 0.09, 95% CI 0.03 to 0.28, 2 studies, 145 women, (T^2 = 0.00, Chi^2 P = 0.39, I^2 = 0%), Analysis 6.4). The certainty of the evidence was low, downgraded for very serious imprecision (Summary of findings 6).

Subgroup analysis by type of drug and dose showed no difference between the groups (Chi^2 = 1.77, df = 2 (P = 0.41), I^2 = 0%).

The sensitivity analysis included one study (with 88 women) at low risk of bias of selection and attrition bias, and this showed similar findings to the main analysis although the upper CI is further away from the line of no difference ((RR 0.07, 95% CI 0.02 to 0.24).

Secondary outcomes

Intraoperative 'nausea & vomiting'

None of the studies assessed this outcome.

Postoperative 'nausea & vomiting'

Sedatives may reduce the incidence of postoperative nausea and vomiting (average RR 0.06, 95% CI 0.02 to 0.22, 2 studies, 348 women, Analysis 6.6) . However, one study has a very extreme result (Kampo 2019). We have checked the paper and can find nothing to explain this result, so we also report the findings, as well excluding these data (average (RR 0.12, 95% CI 0.04 to 0.36, 1 study, 118 women).

Adverse and side effects:

Although there were no estimates of a composite outcome of adverse effects, a few studies did measure a number of maternal adverse and side effects (Analysis 6.7 to Analysis 6.9).

One study of 80 women (Niu 2018) reported no babies had Apgar scores less than seven at five minutes in either group. Also that all women in both groups initiated breastfeeding.

7) Opioids antagonists versus placebo (4 studies, 380 women, Comparison 7)

Four studies were eligible for inclusion in this comparison (Abdollahpour 2015; Charuluxananan 2003; Ibrahim 2019; Jang 1997), but only two provided data for analysis involving 197 women (Charuluxananan 2003; Ibrahim 2019). Three studies compared opioid antagonists with placebo (Abdollahpour 2015; Charuluxananan 2003; Ibrahim 2019): two studies assessed nalbuphine, one intravenously (Charuluxananan 2003) and the other intrathecally (Ibrahim 2019); and one study assessed intrathecal sufentanil (Abdollahpour 2015). The fourth study assessed butorphanol, and although the abstract was in English, we have been unable to get the full paper translated from Korean to analyse any of the data (Jang 1997).

The studies were undertaken in Iran, Thailand, Egypt and South Korea.

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Both studies providing data were judged to have adequate random sequence generation, although blinding was not well described and judged to be unclear in both studies. The studies were also judged to be of unclear risk for other biases.

Primary outcomes

Intraoperative nausea

None of the studies assessed this outcome.

Intraoperative vomiting

None of the studies assessed this outcome.

Postoperative nausea

It is uncertain whether opioid antagonists may reduce, increase or may make little no difference to the number of women having postoperative nausea (RR 0.75, 95% CI 0.39 to 1.45, 1 study, 120 women, Analysis 7.3). The certainty of the evidence was low, downgraded due to very serious imprecision (Summary of findings 7).

It was not possible to undertake a subgroup analysis by drug and dose because there was only one study reporting this outcome.,

It was not possible to undertake a sensitivity analysis as there was only one study assessing postoperative nausea and vomiting and this study was low risk for selection and attrition bias.

Postoperative vomiting

It is uncertain whether opioid antagonists may reduce the number of women having intraoperative vomiting (RR 1.25, 95% CI 0.35 to 4.43, 1 study, 120 women, Analysis 7.4). The certainty of the evidence was low, downgraded for very serious imprecision (Summary of findings 7).

It was not possible to undertake a subgroup analysis by drug and dose because there was only one study reporting this outcome.,

It was not possible to undertake a sensitivity analysis as there was only one study assessing postoperative nausea and vomiting and this study was low risk for selection and attrition bias.

Secondary outcomes

Intraoperative 'nausea & vomiting'

No studies assessed this outcome.

Postoperative 'nausea & vomiting'

Nalbuphine (an opioid antagonist) may reduce postoperative nausea & vomiting (RR 0.09, 95% CI 0.02 to 0.37, 1 study, 77 women, nAnalysis 7.6), but the certainty of the evidence is very low and further data are needed.

Adverse effects and side effects

Only two studies assessed pruritis as a side effect (Analysis 7.7) with markedly different results, so we do not have enough data on which to make a meaningful assessment.

8) Acupressure/acupuncture versus placebo (14 studies, 1818 women, Comparison 8)

Fourteen studies compared acupressure/acupuncture with placebo, with 11 studies providing data on 1401 women (Direkvand-Moghadam 2013; Duggal 1998; El-Deeb 2011a; Habib 2006; Harmon 2000; Ho 1996; Ho 2006; Levin 2019; Li 2012; Noroozinia 2013; Stein 1997). One study addressed this question but provided graphical data only (Birnbach 1993). Data from two studies were not included as it was unclear how many women were allocated to each group (Lim 2001a; Lim 2001b). All eleven studies looked at acupressure, and none studies acupuncture.

The studies which provided data were undertaken in: USA (three studies); Iran (two studies); Canada (one study); China (two studies); Egypt (one study), Ireland (one study) and one study in the USA and Canada.

The studies providing data were of borderline quality with only four out of 11 describing adequate blinding of all relevant parties, and a further two studies providing an incomplete description of blinding. One study was judged at high risk of bias as it seemed likely the participants and treating clinicians were not blinded to group allocation (Direkvand-Moghadam 2013). However, only four of the nine studies described adequate random sequence generation and only four adequate allocation concealment. We assessed the studies as low quality using GRADE criteria on the basis of inconsistency and imprecision.

Primary outcomes

Intraoperative nausea

Acupressure/acupuncture may reduce the number of women having intraoperative nausea but the results are very uncertain (average RR 0.55, 95% CI 0.41 to 0.74), 9 studies, 1221 women, random-effects (T^2 = 0.12, Chi^2 P = 0.0001, I^2 = 69%), Analysis 8.1). The certainty of the evidence is very low, downgraded for very serious risk of bias and serious inconsistency (Summary of findings 8).

It was not possible to undertake a subgroup analysis as all the studies used acupressure and we did not differentiate between the different types of acupressure.

It was not possible to undertake a sensitivity analysis as none of the studies providing data were at low risk of selection and reporting bias.

Intraoperative vomiting

Acupressure/acupuncture may reduce the number of women having intraoperative vomiting (average RR 0.52, 95% CI 0.33 to 0.80, 9 studies, 1221 women) (random-effects (T^2 = 0.18, Chi^2 P = 0.05, I^2 = 47%), Analysis 8.2) . The certainty of the evidence is low, downgraded for very serious risk of bias (Summary of findings 8).

It was not possible to undertake a subgroup analysis as all the studies used acupressure and we did not differentiate between the different types of acupressure.

It was not possible to undertake a sensitivity analysis as none of the studies providing data were at low risk of selection and reporting bias.

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Postoperative nausea

Acupressure/acupuncture may reduce the number of women having postoperative nausea but the results are very uncertain (average RR 0.46, 95% CI 0.27 to 0.75, 7 studies, 1069 women, random-effects (T^2 = 0.32, Chi^2 P = 0.0001, I^2 = 81%), Analysis 8.3). The certainty of the evidence is very low downgraded for very serious risk of bias and serious inconsistency (Summary of findings 8).

It was not possible to undertake a subgroup analysis as all the studies used acupressure and we did not differentiate between the different types of acupressure.

It was not possible to undertake a sensitivity analysis as none of the studies were low risk for selection and attrition bias.

Postoperative vomiting

Acupressure/acupuncture may reduce the number of women having postoperative vomiting but the results are very uncertain (average RR 0.52, 95% CI 0.34 to 0.79, 7 studies, 1069 women, random-effects (T^2 = 0.17, Chi^2 P = 0.01, I^2 = 62%), Analysis 8.4). The certainty of the evidence is very low downgraded for very serous risk of bias and serious inconsistency (Summary of findings 8).

It was not possible to undertake a subgroup analysis as all the studies used acupressure and we did not differentiate between the different types of acupressure.

It was not possible to undertake a sensitivity analysis as none of the studies were low risk for selection and attrition bias.

Secondary outcomes

None of the studies reported intraoperative 'nausea + vomiting' nor postoperative 'nausea + vomiting'.

Adverse effects and side effects

It is uncertain whether acupressure/acupuncture increases side effects of anxiety, dizziness, hypotension or itching because the certainty of the evidence is very low (Analysis 8.5 to Analysis 8.8). Acupressure/acupuncture may reduce the use of rescue antiemetics (average RR 0.50, 95% CI 0.36 to 0.71, 2 studies, 240 women, Analysis 8.9) but the certainty of the evidence is very low downgraded for very severs risk of bias and very severe imprecision (Summary of findings 8).

9) Ginger versus placebo (2 studies, 365 women, Comparison 9)

Two studies compared oral ginger with placebo included 365 women both provided data for the review (Kalava 2013; Zeraati 2016). One study described adequate random sequence generation, but both were unclear regarding allocation concealment and blinding. They were judged to be of low or unclear risk for other biases.

One study was undertaken in USA and one in Iran.

Primary outcomes

Intraoperative nausea

It is uncertain whether ginger reduces, increases or makes little to no difference in the number of women having intraoperative nausea (average RR 0.66, 95% CI 0.36 to 1.21, 2 studies, 331 women, random-effects (T^2 = 0.15, Chi^2 P = 0.05, I^2 = 74%), Analysis 9.1. The certainty of the evidence is very low, downgraded for very serious risk of bias, serious inconsistency and serious imprecision (Summary of findings 9).

In a subgroup analysis by dose, there was evidence of subgroup difference (Chi^2 = 3.70, df = 1 (P = 0.05), I^2 = 73.0%).

The sensitivity analysis was not undertaken as neither of the studies were at low risk of bias of selection and attrition bias,

Intraoperative vomiting

Ginger may reduce the number of women having intraoperative vomiting or may make little or no difference (average RR 0.62, 95% CI 0.38 to 1.00, 2 studies, 331 women, random-effects (T^2 = 0.06, Chi^2 P = 0.16, I^2 = 49%), Analysis 9.2). The certainty of the evidence was very low, downgraded for very serious risk of bias, and serious imprecision (Summary of findings 9).

In a subgroup analysis by dose there was no evidence of a difference but more data are needed to be sure (Chi^2 = 1.97, df = 1 (P = 0.16), I^2 = 49.2%).

The sensitivity analysis was not undertaken as neither of the studies were at low risk of bias of selection and attrition bias,

Postoperative nausea

It is uncertain whether ginger reduces, increases or makes little to no difference to the number of women having postoperative nausea (average RR 0.63, 95% CI 0.22 to 1.77, 1 study, 92 women, Analysis 9.3). The certainty of the evidence was very low, downgraded for very serious risk of bias, and very serious imprecision (Summary of findings 9).

There is no subgroup analysis nor sensitivity analysis as there was only one study.

Postoperative vomiting

It is uncertain whether ginger reduces increases, decreases or makes little to no difference to the number of women having postoperative vomiting (average RR 0.20, 95% CI 0.02 to 1.65, 1 study, 92 women, Analysis 9.4). The certainty of the evidence was very low, downgraded for very serious risk of bias and very serious imprecision (Summary of findings 9).

There is no subgroup analysis nor sensitivity analysis as there was only one study.

Secondary outcomes

The studies did not report any of our secondary outcomes.

DISCUSSION

Summary of main results

We found 84 included studies involving 10,990 women with 69 studies providing useable data on 8928 women, and this covered nine comparisons. The certainty of the data was generally low and very low, mainly due to many of the studies being quite old and undertaken in times when methodological information was not required in publications, hence risk of bias is generally unclear and also many studies are small.

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Placebo-controlled studies

1. 5-HT$_3$ antagonists. In the 21 studies (involving 2686 women) that provided data, overall, we found that 5-HT$_3$ antagonists (mainly ondansetron and granisetron) probably reduces postoperative nausea (moderate-certainty evidence), may be effective in reducing intraoperative nausea and postoperative vomiting (low-certainty evidence), but the effect on intraoperative vomiting is uncertain (very low-certainty evidence) . There were no indications of adverse effects such as headaches, dizziness, hypotension and itchiness, although more data are needed.

2. Dopamine antagonists. In 20 studies (involving 1880 women) that provided data, we found that dopamine antagonists (both metoclopramide and droperidol) may be effective in reducing intraoperative vomiting and postoperative nausea (low-certainty evidence), but it is uncertain whether they reduce intraoperative nausea and postoperative vomiting (very low-certainty evidence). These results were broadly consistent with both metoclopramide and droperidol. However, there were insufficient data to determine if there were significant adverse effects like headaches, dizziness, hypotension and pruritus.

3. Corticosteroids. In 12 studies (involving 1182 women) that provided data, corticosteroids probably reduce postoperative nausea (moderate-certainty evidence) and may reduce postoperative vomiting (low-certainty evidence). We are uncertain whether corticosteroids reduce intraoperative nausea and vomiting (very low-certainty evidence). There were limited data on adverse effects.

4. Antihistamines. In four studies (involving 514 women) that provided data, antihistamines (mainly dimenhydrinate and cyclizine) may reduce postoperative nausea (low-certainty evidence) but may make little to no difference to intraoperative nausea, intraoperative vomiting (no events in the 149 women where this outcome was assessed) and postoperative vomiting (very low-certainty evidence). Only one small study looked at the adverse effect of hypotension.

5. Anticholenergic drugs. In the six studies (involving 787 women) that provided data, we found that anticholinergic drugs (mainly glycopyrrolate and scopolamine) may be effective at reducing intraoperative nausea and postoperative vomiting (low-certainty evidence) but may have little or no effect on intraoperative vomiting (very low-certainty evidence). No study assessed postoperative nausea. There were few data on adverse effects.

6. Sedatives. In 13 studies (involving 1265 women) provided data and addressed sedatives as an intervention. Most studies included propofol, but some included midazolam and one study used ketamine. Overall, the use of sedatives probably reduces intraoperative nausea and intraoperative vomiting (moderate-certainty evidence) and may reduce postoperative vomiting (low-certainty evidence). It is uncertain if sedatives reduce postoperative nausea (very low-certainty evidence). Reports generally provided insufficient data on potential adverse effects,in particular sedation.

7. Opioid antagonists/partial agonists. There were two studies that provided data involving 197 women assessing opioid antagonists used specifically to reduce nausea and vomiting. We found little to no difference in postoperative nausea or vomiting with these interventions (low-certainty evidence) and there were no studies assessing intraoperative nausea and vomiting. Studies only looked at the side effect of itching and found no difference on limited data.

8. Acupressure/acupuncture. In the 10 studies (involving 1401 women) that provided data, we found acupressure/acupuncture may reduce the number of women having intraoperative vomiting (low-certainty evidence) but it uncertain whether there is a reduction in intraoperative nausea, postoperative nausea and postoperative vomiting (very low-certainty evidence). There were insufficient data on potential adverse effects. .

9. Ginger. In the two studies (involving 365 women) that provided data and compared ginger with placebo, it is uncertain whether ginger reduces, increases, or has no effect on intraoperative nausea and vomiting and postoperative nausea and vomiting (all very low-certainty evidence). No side effects were assessed in either study.

Overall completeness and applicability of evidence

There are good data assessing the efficacy of most standard classes of antiemetic compared with placebo in preventing nausea and vomiting during and following caesarean section under regional anaesthesia. However, most of the trials are small and the certainty of evidence is generally low.

In this updated review we did not attempt to compare different classes of antiemetics or different combinations of therapy.

We excluded several studies that assessed the efficacy of antiemetics given for treatment (rather than prevention) of established nausea and vomiting and these would need to be dealt with in a separate review.

Quality of the evidence

The quality of the evidence in this review varied widely. Considering just the 69 studies providing data for the review, on standard 'Risk of bias' assessment, only five studies were rated as low risk on all criteria (apart from Selective Bias). In comparison, 14 studies were rated as 'unclear' or 'high risk' on some or all criteria. Seventeen studies were rated as high risk on at least one criteria - including for management of missing data (Abdel-Aleem 2012, Baciarello 2011; Cardoso 2013; Duman 2010) inadequate blinding (Ahn 2002; Direkvand-Moghadam 2013; Levin 2019; Mokini 2014; Rasooli 2014; Rudra 2004a) or selective reporting (Ahn 2002; Carvalho 2010; Ibrahim 2019; Jang 1997; Selzer 2020; Tkachenko 2019; Voigt 2013). One study was rated as high risk for other bias due to a poorly controlled study protocol (Habib 2013).

Of the 84 studies providing data, 37 described adequate random sequence generation, however only 18 described adequate allocation concealment.

Using GRADE criteria for assessing the certainty of the evidence, we found the following.

Comparison 1: 5HT$_3$ antagonists: moderate-certainty evidence for postoperative nausea (downgraded for serious risk of bias); low-certainty evidence for intraoperative nausea (downgraded for serious risk of bias and serious inconsistency) and postoperative vomiting (downgraded for serious risk of bias and possible publication bias); very low-certainty evidence for

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intraoperative vomiting (downgraded for serious risk of bias, serious inconsistency and possible publication bias). (Summary of findings 1).

Comparison 2: dopamine antagonists: low-certainty evidence for intraoperative vomiting and postoperative nausea and very low-certainty evidence for intraoperative nausea and postoperative vomiting. Intraoperative nausea (downgraded for serious risk of bias and serious inconsistency; intraoperative vomiting (downgraded for serious risk of bias); postoperative nausea (downgraded for serious risk of bias) and postoperative vomiting (downgraded for serious risk of bias and possible publication bias) (Summary of findings 2).

Comparison 3: corticosteroids: moderate-certainty evidence for postoperative nausea (downgraded for serious risk of bias); low-certainty evidence for postoperative vomiting (downgraded for serious risk of bias and serious inconsistency); very low-certainty for intraoperative nausea (downgraded for very serious risk of bias and serious inconsistency) and intraoperative vomiting (downgraded for very serious risk of bias and serious imprecision) (Summary of findings 3).

Comparison 4: antihistamines: very low-certainty evidence for intraoperative nausea, intraoperative vomiting and postoperative vomiting (all downgraded for very serious risk of bias and very serious imprecision); and low-certainty evidence for postoperative nausea (downgraded for very serious risk of bias) (Summary of findings 4).

Comparison 5: anticholinergics: low-certainty evidence for intraoperative nausea (downgraded for very serious risk of bias) and postoperative vomiting (downgraded for serious risk of bias and serious imprecision); very low-certainty evidence for intraoperative vomiting (downgraded for very serious risk of bias, serious inconsistency and serious imprecision) (Summary of findings 5).

Comparison 6: sedatives: moderate-certainty evidence for intraoperative nausea (downgraded for serious risk of bias) and intraoperative vomiting (downgraded for serious risk of bias); low-certainty evidence for postoperative vomiting (downgraded for very serious imprecision); very low-certainty evidence for postoperative nausea (downgraded for serious inconsistence and very serious imprecision) (Summary of findings 6).

Comparson 7: opioid antagonists: low-certainty evidence for postoperative nausea (downgraded for very serious imprecision) and postoperative vomiting (downgraded for very serious imprecision) (Summary of findings 7).

Comaprison 8: acupressure/acupuncture: low-certainty evidence for intraoperative vomiting (downgraded for very serious risk of bias); very low-certainty evidence for intraoperative nausea (downgraded for very serious risk of bias and serious inconsistency), postoperative nausea (downgraded for very serious risk of bias and serious inconsistency and postoperative vomiting (downgraded for very serious risk of bias and serious inconsistency) (Summary of findings 8).

Comparison 9: ginger: very low-certainty evidence for: intraoperative nausea (downgraded for risk of bias, serious inconsistency and serious imprecision), intraoperative vomiting (downgraded for risk of bias and serious imprecision); postoperative nausea (downgraded for serious risk of bias and very serious imprecision and postoperative vomiting (downgraded for serious risk of bias and very serious imprecision) (Summary of findings 9).

Potential biases in the review process

The possibility of introducing bias was present at every stage of the review process. We attempted to minimise bias in a number of ways; two review authors assessed eligibility for inclusion, carried out data extraction and assessed risk of bias. Each worked independently. Nevertheless, the process of assessing risk of bias, for example, is not an exact science and includes many personal judgements.

Agreements and disagreements with other studies or reviews

The findings of this study are broadly consistent with previously published reviews of nausea and vomiting at caesarean section (Balki 2005). Systematic reviews assessing specific medications such as ondansetron (George 2009; Zhou 2018) and metoclopramide (Mishriky 2012) have demonstrated efficacy, however a meta-analysis of acupressure did not show a positive effect (Allen 2008).

AUTHORS' CONCLUSIONS

Implications for practice

This study indicates that many agents, from a diverse range of pharmacological classes, may have efficacy in preventing intraoperative and postoperative emetic symptoms at caesarean section. This is perhaps consistent with the multi-factorial pathogenesis of the condition. Of the included interventions, $5HT_3$ antagonists, dopamine antagonists, corticosteroids, sedatives and acupressure all showed a reduction in all of our primary outcomes. However, the certainty of evidence was generally low/very low.

Several other classes of drugs and interventions show effects on some of these outcomes only, for example, antihistamines and anticholinergics. This may reflect the amount of data available.

The studies suggest that emetic symptoms are very common both during and following caesarean section. Placebo arms of trials included in this review suggest an intraoperative incidence of nausea in the order of 20% to 60%. This gives some weight to published guidelines recommending prophylaxis rather than treatment of emesis at caesarean section (NICE 2011).

Implications for research

Whilst this review provides evidence that many single agents are efficacious in preventing nausea and vomiting much of it is low/very low in certainty. A network meta-analysis might be undertaken to compare different drugs and drug groups. There are no data comparing the efficacy of agents for treatment of established nausea and vomiting although these would be dealt with in a separate review. Future studies should assess potential adverse effects and women's views.

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* Indicates the major publication for the study

CHARACTERISTICS OF STUDIES

Characteristics of included studies *[ordered by study ID]*

Abdel-Aleem 2012

Study characteristics	
Methods	RCT.
Participants	Inclusion criteria: • Women undergoing elective CS at term were eligible • N = 173 but 53 (31%) were excluded because of intraoperative nausea and vomiting, leaving 120 for analysis Exclusion criteria: • Any contraindication to spinal, contraindication/allergy to IT morphine, GI condition causing vomiting, hyperemesis, obesity, previous PONV, migraine, skin allergy causing itching, psych. • Also excluded post-enrolment if suffered intraoperative nausea and vomiting.
Interventions	Intervention: corticosteroid (Comparison 3) • Dexamethasone (8 mg IT). • N = 60. Comparator: placebo • Normal saline (IT).

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Abdel-Aleem 2012 *(Continued)*

- N = 60.

Outcomes	Nausea, vomiting, number of vomiting attacks, need for anti-emetics, sedation, itch, respiratory depression, pain, satisfaction (retching classified as vomiting).
Notes	Setting: Assiut University Hospital, Egypt. Dates: February 2008 to December 2009. Funding source: not reported Declaration of interest: none declared. We wrote to authors for clarification on whether the 53 women were excluded pre or post randomisation as it is unclear from the text of the publication. Spinal with bupivacaine and 200 mcg IT morphine

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "computer based random allocation table"
Allocation concealment (selection bias)	Low risk	Quote:“sealed opaque envelopes consecutively numbered and coded”
Blinding of participants and personnel (performance bias) All outcomes	Low risk	the patient ... was unaware of which intervention had been received
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Those assessing the outcomes were also unaware of which intervention had been received.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	53 patients were excluded enrolment although it is unclear if this was before or after randomisation.
Selective reporting (reporting bias)	Unclear risk	We were unable to assess the trial protocol.
Other bias	Low risk	Similar baseline characteristics

Abdollahpour 2015

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • ASA I or II, age 18-40, no contraindications to spinal, no allergy to local anaesthesia or study medications, absence of neuropathy, consent for spinal. • 75 women randomised, no exclusions but we only used data from 2 groups as we exclude opioid drugs. So 50 women are in our analysis

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Abdollahpour 2015 *(Continued)*

	Exclusion criteria: • GIT disease, delivery before 36 weeks, received anti-emetics in the 24 hours prior to surgery, pregnancy-induced hypertension or problems during LUSCS, administration of narcotic agents during LUSCS.
Interventions	Intervention: sedative (Comparison 6) • Midazolam (IT) • 0.02 mg/kg diluted to 1 mL with normal saline. • N = 25. Intervention: opioid (excluded from our synthesis) • Sufentanil (1.5 mcg in 0.3 mL + 0.7 mL normal saline (IT). • N = 25 Comparator: placebo • Normal saline (1 mL IT). • N = 25.
Outcomes	**Pre-specified outcomes:** Analgesia quality: - Onset (sensory, motor) - Recovery (sensory, motor) - Time to request additional analgesia Complications: - Nausea - Vomiting - Shivering - Hypotension
Notes	Setting: Semnan University of Medical Sciences, Semnan, Iran. Dates: 2012 to 2013, Funding source: the study supported by Semnan University of Medical Sciences, Semnan, Iran. Declaration of interest: not reported. Spinal anaesthesia with bupivacaine We include only the data comparing midazolam vs placebo as sufentanil is an opioid

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote:"random block method"
Allocation concealment (selection bias)	Unclear risk	No information provided

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Abdollahpour 2015 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	None described
Selective reporting (reporting bias)	Unclear risk	We were unable to assess the trial protocol
Other bias	Unclear risk	Baseline characteristics (except age) not described

Abouleish 1999

Study characteristics	
Methods	RCT
Participants	74 women 18-40 years undergoing elective CS at term under spinal anaesthesia, ASA 1-2, no significant maternal medical conditions.
Interventions	Intervention: 5-HT $_3$ antagonist (Comparison 1) • Ondansetron IV - 4 mg. • N = 36. Comparator: placebo • Normal saline 2 mL. • N = 38.
Outcomes	Nausea - presence/absence and severity. Vomiting - severity, frequency.
Notes	Setting: Texas, USA. The Middlesex Hospital, London, UK. Dates: not reported Funding source: funding was received from Glaxo-Wellcome and NEI Vision Core Declaration of interest: not reported

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated random number table.

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Abouleish 1999 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Syringes produced by pharmacy.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Described as "Double blind" but no other details provided
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Described as "Double blind" but no other details provided
Incomplete outcome data (attrition bias) All outcomes	Low risk	8 participants withdrawn, 5 withdrew consent, 2 had an exclusion criteria (oesophageal reflux), 1 failed spinal converted to GA. Data not re-included.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Mild increase in BP in the control group, not significant.

Ahn 2002

Study characteristics	
Methods	RCT.
Participants	Women undergoing elective CS under CSE anaesthesia. N = 120
Interventions	Intervention 1: sedative (Comparison 6) • Propofol TCI commenced after birth, target concentration 1 ng/mL. • N = 29 women Intervention 2: sedative (Comparison 6) • Propofol TCI commenced after birth, target concentration 1.5 ng/mL. • N = 29 women Intervention 3: sedative (Comparison 6) • Propofol TCI commenced after birth, target concentration 2 ng/mL. • N = 30 women Comparator: placebo • N = 30 women
Outcomes	Nausea, vomiting, sedation, satisfaction, pruritis, abdominal discomfort.
Notes	Setting: Korea Dates: not reported Funding source: not reported

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Ahn 2002 *(Continued)*

Declaration of interest: not reported

English abstract with main paper in Korean. We will attempt to get a translation.

Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues).

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Reported as "randomly allocated" but no information on how the sequence was generated
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	As above
Blinding of outcome assessment (detection bias) All outcomes	High risk	Authors make no mention of blinding, intraoperative data collectors (at least) likely to be aware of intervention group
Incomplete outcome data (attrition bias) All outcomes	Low risk	Only 2% data loss, 118/120 women provide data
Selective reporting (reporting bias)	High risk	Trial not pre-registered. A number of pre-specified outcomes not reported (shivering, amnesia and hypotension)
Other bias	Unclear risk	Abstract only (in English), insufficient information to assess

Apiliogullari 2007

Study characteristics

Methods	RCT
Participants	181 women. Spinal anaesthesia for CS.
Interventions	Intervention 1: antihistamine (Comparison 4) • Dimenhydrinate 50 mg. • N = 62. Intervention 2: antihistamine (Comparison 4) • Dimenhydrinate 100 mg. • N = 60. Comparator: placebo • Saline. • N = 59.

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Apiliogullari 2007 *(Continued)*

Outcomes	PONV, sedation, side effects.
Notes	Setting: Dr. Faruk Sukan Hospital and Selcuk University, Medical Faculty, Konya, Turkey. Dates: not described Funding source: not reported. Declaration of interest: not reported Abstracts only. Unpublished data provided by author

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information.
Allocation concealment (selection bias)	Unclear risk	No information.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Reported as double-blind, no other details provided.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Reported as double-blind, no other details provided.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information.
Selective reporting (reporting bias)	Unclear risk	We were unable to assess the trial protocol.
Other bias	Unclear risk	No information.

Baciarello 2011

Study characteristics

Methods	RCT
Participants	204 ASA 1-2 women undergoing CS under spinal anaesthesia. N = 216 women randomised, 204 analysed
Interventions	Intervention 1: anticholinergic (Comparison 5) • 100 mcg IT atropine and IV saline • N = 72 women randomised and 72 analysed Intervention 2: anticholinergic(Comparison 5) • 100 mcg IV atropine and IT saline

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Baciarello 2011 *(Continued)*

	• N = 72 women randomised and 67 analysed Comparator: placebo • IT saline and IV saline • N = 72 women randomised and 65 analysed
Outcomes	PONV, pain.
Notes	Setting: University Hospital of Parma, Parma, Italy and University Hospital of Messina, Messina, Italy. Dates: April 2007 to October 2008 Funding source: not reported Declaration of interest: not reported We will write to authors for further information. Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	'random sequence from random.org'
Allocation concealment (selection bias)	Unclear risk	'sealed envelope' but authors do not mention opaque nor consecutively numbered
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote:“Anaesthesiologist in charge of patient read her group assignment from sealed envelope immediately before performing anaesthesia. All other involved personal were kept blind … except the nurse assisting the physician"
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote:“assessor was not involved in intraoperative care”
Incomplete outcome data (attrition bias) All outcomes	High risk	12 patients excluded and data not able to be re-included.
Selective reporting (reporting bias)	Unclear risk	We were not able to assess the study protocol.
Other bias	Unclear risk	No information provided

Birnbach 1993

Study characteristics

Methods	RCT
Participants	60 women undergoing elective CS with spinal anaesthesia, no history of nausea or vomiting within 24 hours or after previous anaesthetics.

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Birnbach 1993 *(Continued)*

	N = 60
Interventions	Intervention 1: acupuncture/acupressure (Comparison 8) • Acupressure bands and 2 mL normal saline. • N = 20 women randomised. Intervention 2: dopamine antagonist (Comparison 2) • Metoclopramide, 10 mg IV + placebo wrist bands • N = 20 women randomised. Comparator: placebo • Placebo wrist bands and 2 mL normal saline. • N = 20 women randomised.
Outcomes	VAS nausea and vomiting.
Notes	Setting: St Lukes/Roosevelt's Hospital, New York, USA. Dates: not reported Funding source: not reported Declaration of interest: not reported This conference abstract currently provides no data for the review because we were unable to assess results from graphical data. We wrote to the authors in 2010 but did not receive a reply.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Method not stated.
Allocation concealment (selection bias)	Unclear risk	Methods not stated.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Participant was blinded, but unclear whether the assessor was blinded or not.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Participant was blinded, but unclear whether the assessor was blinded or not.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not reported.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No apparent problems.

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Biswas 2003

Study characteristics	
Methods	RCT
Participants	80 women undergoing spinal anaesthesia for CS, ASA 1, 20-35 years, without a history of nausea/vomiting, motion sickness, GI or liver disease, current antiemetic use.
Interventions	Intervention 1: anticholinergic (Comparison 5) • Glycopyrrolate 0.2 mg. • IV • N = 20. Intervention 2: corticosteroid (Comparison 3) • Dexamethasone 8 mg. • IV • N = 20. Intervention 3: dopamine antagonist (Comparison 2) • Metaclopramide 10 mg. • IV • N = 20. Comparator: placebo • Normal saline. • IV • N = 20.
Outcomes	Nausea, vomiting, cardiovascular instability, Apgar scores.
Notes	Setting: Calcutta National Medical College and Hospitals, Calcutta, India. Dates: not reported Funding source: not reported Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote:"randomly allocated."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Outcome assessor blinded, others unclear.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Outcome assessor blinded, others unclear.

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Biswas 2003 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	None described.
Selective reporting (reporting bias)	Unclear risk	Protocol not assessed.
Other bias	Unclear risk	Nil apparent.

Boone 2002

Study characteristics	
Methods	RCT
Participants	• Women undergoing CS under regional anaesthesia, poorly described. • N = 98 women randomised
Interventions	Intervention: 5-HT $_3$ antagonist (Comparison 1) • Dolasetron 12.5 mg intravenously. • N = 48 women randomised. Comparator: no treatment • No antiemetic. • N = 50 women randomised
Outcomes	Nausea/retching/vomiting - presented as a combined score.
Notes	Setting: Texas Tech University Health Sciences Center, El Paso, Texas, USA. Dates: not reported Funding source: not reported Declaration of interest: not reported Conference abstract only. This study currently provides no data for the review. We wrote to the authors in 2010 requesting separated outcome data but did not receive a reply.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote:"Randomised."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not stated.

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Boone 2002 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	None described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	None apparent.

Caba 1997

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective or emergency CS with intradural anaesthesia. • N = 60 women randomised, 57 analysed Exclusions: quote:"any contraindication to spinal anaesthesia, pre-eclampsia, clear background of hypertension and NVPO (post operative nausea and vomiting), body mass index greater than 45, and less than 6 hour fasting…"
Interventions	Intervention: sedative (Comparison 6) • Propofol, 10 mg IV single dose at the moment of cord clamping. • N = 29, but only 26 analysed. Comparator: placebo • 1 mL intralipid at the moment of cord clamping. • N = 31.
Outcomes	Nausea and vomiting before and after intervention, and postoperative; change in haemodynamics; sedation.
Notes	Setting: University Hospital Seville, Spain. Dates: not reported Funding source: not reported Declaration of interest: not reported In Spanish. Translated by Edgardo Abalos

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	'…through a table of randomisation …'

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Caba 1997 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Prepared by hospital pharmacy.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not specifically described
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not specifically described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	3 women excluded from the Protofol group, 2 had GA due to inadequate block, 1 had anaphylaxis. There appeared to be no other loss of data, but overall we felt uncertain about this.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Study was not stopped early. Baseline data were similar on age, height, weight, BMI, gestational age, birthweight, previous medication for dilatation, surgical time (minutes), other associated interventions, surgical incision: vertical intraumbilical, Pfannenstiel.

Cardoso 2013

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women having an elective CS under spinal anaesthesia • Only women who were scheduled as the first procedure of the day were included. • N = 70 (randomised 131 but then excluded 61 because they were not the first women of the day) Exclusion criteria: • Contra-indication to regional, allergic to dex/opioids/LA, pregnancy-induced hypertension, gestational diabetes mellitus, had received anti-emetics within 24 hours prior to surgery
Interventions	Intervention: corticosteroid (Comparison 3) • Dexamethasone 10 mg in 100 mL normal saline IV • Immediately after surgery • N = 35 Comparator: placebo • 100 mL normal saline IV • Immediately after surgery • N = 35 Administered prior to start of surgery
Outcomes	Incidence nausea and vomiting in first 24 hours postop, at 1, 2, 3, 6, 12, 24 hours

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Cardoso 2013 *(Continued)*

Notes	Setting: Santa Case de Misericordia, Sao Paulo, Brazil. Dates: 1 January to 30 June 2008 Funding source: Department of Anaesthesiology of same hospital. Declaration of interest: authors declared no conflicts of interest

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote:"used a computer generated table"
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Treating anaesthesiologist probably knew allocation group
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Different anaesthesiologist
Incomplete outcome data (attrition bias) All outcomes	High risk	61/131 (46%) women were excluded after randomisation as they were not the first women of the day
Selective reporting (reporting bias)	Unclear risk	Not assessed
Other bias	Unclear risk	Demographic data similar but there is insufficient methodology to assess other biases.

Carvalho 2010

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • All women undergoing elective caesarean deliveries under spinal anaesthesia • Full-term pregnancy • N = 164 women randomised, data collected on 150 women Exclusion criteria: • All women who claim allergy or hypersensitivity to dimenhydrinate; women with history of vomiting within 24 hours prior to caesarean birth; women with history of GI or psychiatric diseases and morbid obesity; women receiving any of the following drugs within 24 hours before the study: opioids, antiemetics, H2 antagonists, phenothiazine and corticosteroids; women with severe pregnancy-induced hypertension

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Carvalho 2010 *(Continued)*

Interventions	Intervention: antihistamine (Comparison 4) • Dimenhydrinate • single dose, 25 mg, IV, diluted in 9.5 mL normal saline. • N = 78 women Comparator: placebo • single dose, 10 mL normal saline, IV • N = 71 women
Outcomes	Incidence of pre or post-delivery nausea as reported by the women; etc.
Notes	Setting: Samuel Lunenfeld Research Institute, Mount Sinai Hospital, Toronto, Ontario, Canada, M5G 1X5 Dates: not reported Funding source: not reported Declaration of interest: not reported Trial registration: NCT00791960 Conference abstract only.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not reported
Allocation concealment (selection bias)	Unclear risk	Not reported
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	As above
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention of blinding of outcome assessors
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear how many women were actually randomised
Selective reporting (reporting bias)	High risk	Apgar scores and other neonatal data not reported
Other bias	Unclear risk	Insufficient methodology in the conference abstract to be able to assess other possible biases

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Charuluxananan 2003

Study characteristics	
Methods	RCT
Participants	240 ASA 1-2 women undergoing CS under spinal anaesthesia without allergy to study drugs, pruritis, skin disease.
Interventions	Intervention 1: opioid antagonist (Comparison 7) • Nalbuphine 4 mg. • N = 60. Intervention 2: 5-HT $_3$ antagonist (Comparson 1) • Ondansetron 4 mg. • N = 60. Intervention 3: 5-HT $_3$ antagonist (Comparson 1) • Ondansetron 8 mg. • N = 60. Comparator: placebo. • Normal saline. • N = 60.
Outcomes	Pruritis, post-op nausea and vomiting, adverse effects.
Notes	Setting: King Chulalongkorn Memorial Hospital, Bangkok, Thailand. Dates: not reported Funding source: not reported Declaration of interest: not reported In Comparison 1, data in Groups 2 and 3 were entered as subgroups and combined with overall data for treatment effect with the required adjustment of the placebo data for the 2 subgroups according to our methods (Unit of analysis issues)

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Random number table.
Allocation concealment (selection bias)	Low risk	Sealed envelopes and randomly allocated coded syringes were prepared by a nurse anaesthetist not involved with the study
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote:"double blind" but not specifically described
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote:"double blind" but not specifically described

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Charuluxananan 2003 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	None described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	No baseline differences.

Cherian 2001

Study characteristics	
Methods	RCT
Participants	81 women undergoing elective CS at term under spinal anaesthesia.
Interventions	Intervention: 5-HT_3 antagonist (Comparison 1) • 4 mg ondansetron IV at end of surgery and 8 mg (0.13 mg/mL ondansetron included in PCA). • N = 41. Comparator: placebo • No additional intervention. • N = 40.
Outcomes	Nausea - mild/severe, vomiting, pain, sedation, women's satisfaction.
Notes	Setting: North Staffordshire Hospital, Stoke-on-Trent, Staffordshire, England, UK. Dates: not reported. Funding source: no commercial funding reported. Declaration of interest: not reported. Combined "mild" and "severe" to form overall incidence of nausea. Combine "moderate" and "poor" satisfaction.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated sequence.
Allocation concealment (selection bias)	Low risk	Sequentially-allocated numbered envelopes.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Unclear what placebo was given, although states participants were "unaware" of group allocation.

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Cherian 2001 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Unclear what placebo was given, although states participants were "unaware" of group allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss of data described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance.

Chestnut 1987

Study characteristics	
Methods	RCT
Participants	69 ASA 1-2 women undergoing lumbar epidural for elective CS, with no history of nausea or vomiting in the 24 hours before surgery (or any adjunctive surgery apart from tubal ligation).
Interventions	Intervention 1: dopamine antagonist (Comparison 2) • Metoclopramide 0.15 mg/kg in 5 mL after cord clamping. • N = 34. Comparison: placebo • Normal saline 5 mL. • N = 35.
Outcomes	Intraoperative and PONV, anxiety, sedation.
Notes	Setting: University of Iowa College of Medicine, Iowa, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Table of random numbers.
Allocation concealment (selection bias)	Unclear risk	Pharmacy undertook preparation.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote:"The patient, anaesthesiologist, obstetrician and nursing staff were unaware of the identity of the study solution"

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Chestnut 1987 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote:"The patient, anaesthesiologist, obstetrician and nursing staff were unaware of the identity of the study solution"
Incomplete outcome data (attrition bias) All outcomes	Low risk	None described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Similar baseline variables.

Choi 1999

Study characteristics	
Methods	RCT
Participants	Women undergoing CS under regional anaesthesia N = 180
Interventions	Intervention 1: dopamine antagonist (Comparison 2) • metoclopramide 10 mg • N = 30 for epidural and 30 for spinal Intervention 2: dopamine antagonist (Comparison 2) • droperidol 0.625 mg • N = 30 for epidural and 30 for spinal Comparator: placebo • 2 mL saline • N = 30 for epidural and 30 for spinal Women were initially randomised to epidural (N = 90) or spinal (N = 90) anaesthesia. We will pool the data for these 2 types of anaesthesia
Outcomes	Nausea and vomiting, sedation, adverse effects.
Notes	Setting: Samsung Medical Centre, Sungkyunkwan University Hospital, Seoul, South Korea Dates: not reported in English abstract Funding source: none reported in English abstract Declaration of interest: none reported in English abstract Abstract in English, rest of paper in Korean. Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues)
Risk of bias	

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Choi 1999 *(Continued)*

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No detail, just reported as "... randomly assigned ..."
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No information provided
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information provided
Incomplete outcome data (attrition bias) All outcomes	Low risk	There appears to be no loss of data
Selective reporting (reporting bias)	Unclear risk	Although outcomes listed in the methods were reported, but we did not assess the trial protocol
Other bias	Unclear risk	There was insufficient methodology in the abstract to judge on other potential biasses. We would not expect exactly 30 women to be randomised to each of 6 groups

Dasgupta 2012

Study characteristics	
Methods	RCT
Participants	80 women undergoing elective CS, Calcutta medical college India, spinal anaesthesia, ASA 1-2
Interventions	Intervention: 5-HT_3 antagonist (Comparison 1) • Granisetron 0.4 mg/kg diluted to 5 mL saline • N = 40. Comparator: placebo • 5 mL saline • N = 40.
Outcomes	Postoperative nausea, retching and vomiting (retching = vomiting), nausea VAS 0-10. Adverse effects
Notes	Setting: Calcutta Medical College, Kolkata, India. Dates: January 2007 to January 2008 Funding source: not reported. Declaration of interest: not reported.

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Dasgupta 2012 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote:"random number table"
Allocation concealment (selection bias)	Unclear risk	Not described. Patients were quote:"matched for age and BMI"
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote:“study drugs were prepared by personnel not involved in the study … anaesthetists, patients and investigators who collected post-delivery data were blinded to the study drug administered”
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote:“study drugs were prepared by personnel not involved in the study … anaesthetists, patients and investigators who collected post-delivery data were blinded to the study drug administered”
Incomplete outcome data (attrition bias) All outcomes	Low risk	Nil apparent
Selective reporting (reporting bias)	Unclear risk	We were not able to assess the study protocol
Other bias	Unclear risk	It is not clear what was meant by "patients were matched by age and BMI", potential risk for allocation/selection bias?

Direkvand-Moghadam 2013

Study characteristics	
Methods	RCT
Participants	• Women, ASA 1 or 2, undergoing elective CD under spinal allocated to one of 3 groups. • N = 102
Interventions	Intervention 1: dopamine antagonist (Comparison 2) • Metoclopramide - 15 mg. • N = 34 Intervention 2: acupuncture/acupressure (Comparison 8) • P6 acupressure • N = 34 Comparison: placebo (no intervention) • N = 34
Outcomes	Incidence of nausea and vomiting intra-op, then 30, 60, 90, 120, 240 and 360 min after surgery
Notes	Setting: Mustafa University Hospital of Ilam, West Iran. Dates: Septemebr 2011 to October 2012.

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Direkvand-Moghadam 2013 *(Continued)*

Funding source: Ilam University of Medical Sciences.

Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote:"random number table"
Allocation concealment (selection bias)	Unclear risk	Allocation undertaken by midwife prior to anaesthesia
Blinding of participants and personnel (performance bias) All outcomes	High risk	Patient aware of which allocation group patient was in
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote:"researcher not aware of grouping of patients"
Incomplete outcome data (attrition bias) All outcomes	Low risk	No data missing
Selective reporting (reporting bias)	Unclear risk	Not described
Other bias	Low risk	Nil apparent

Duggal 1998

Study characteristics

Methods	RCT
Participants	244 women ASA 1-2 undergoing elective CS under spinal anaesthesia with no hyperemesis or antiemetic use in the previous 48 hours.
Interventions	Intervention: acupuncture/acupressure (Comparison 8) • Acupressure bands. • N = 122. Comparator: placebo • Sham acupressure bands. • N = 122.
Outcomes	Nausea or vomiting intraoperative and up to 10 hours postoperatively.
Notes	Setting: BC Women's Hospital and Health Centre Society, Vancouver, British Columbia, Canada. Dates: not reported.

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Duggal 1998 *(Continued)*

	Funding source: Grant from BC Medcal Services Foundation and wristbands donated from Sea Band UK Limited. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random number table.
Allocation concealment (selection bias)	Unclear risk	Method not reported.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote:"group P a pair of similar-looking placebo wristbands from which the plastic studs were missing"
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The nature of the bands was therefore unknown to the patient, anaesthetist and investigators for the duration of the study
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Many exclusions - not ITT.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance.

Duman 2010

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • Women having spinal anaesthesia for CS, non-smoking; ASA 1; term (> 38 weeks): without pregnancy complications or major systemic disease and without tubal ligation • N = 210 women Exclusion criteria: • women concurrently using any antiemetic or antipsychotic medication; women in whom non-steroidal anti-inflammatories were contraindicated, history of allergy, car sickness, hyperemesis gravidarum or PONV; women weighing < 50 kg and > 100 kg.
Interventions	Intervention 1: antihistamine (Comparison 4) • Dihenydrinate 50 mg. • N = 70, but 61 after exclusions. Intervention 2: dopamine antagonist (Comparson 2)

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Duman 2010 *(Continued)*

- Metoclopramide 10 mg.
- N = 70, but 58 after exclusions.

Comparison: placebo

- Normal saline.
- N = 70, but 63 after exclusions.

Outcomes	PONV in 1st 24 hours after surgery; nausea; vomiting; severe nausea; rescue antiemetic; pruritus; sedation.
Notes	Setting: Konya, Turkey. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. This study initially provided very limited information in abstract form. We wrote to the authors and obtained further data.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated random number table.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote:“The patients were unaware of to which group they were randomised.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote:"Nursing staff were blinded to randomisation process and selection of the drugs used in this study.”
Incomplete outcome data (attrition bias) All outcomes	High risk	Women were excluded if they received intraoperative propofol quote:“due to propofol’s known antiemetic properties". The number excluded were: Dimenhydrinate (Gp D) excluded 9/70 = 13%, Metoclopramide (Gp M) excluded 12/70 = 17%, placebo (Gp P) excluded 7/70 = 10%.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No problems apparent.

El-Deeb 2011a

Study characteristics

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El-Deeb 2011a *(Continued)*

Methods	Individual RCT
Participants	Inclusion criteria: • Women having elective CS under spinal anaesthesia • N = 450 women randomised Exclusion criteria:
Interventions	Intervention 1: 5-HT3 antagonist (Comparison 1) • Ondansetron 4 mg (2 mL) 30 min pre-op + sham electrical stimulation on false-P6 point • N = 150 women randomised Intervention 2: acupressure (Comparison 8) • Acupressure P6, electric stimulation for 30 minutes prior to spinal and saline IV • N = 150 women randomised Placebo • Control sham P6 electrical stimulation plus IV saline • N = 150 women randomised
Outcomes	Nausea and vomiting per 10 minutes intraoperative. Nausea and vomiting at 2, 4, 6, 12, 24 hours postoperative 4 mg ondansetron as rescue Adverse effects Women's satisfaction
Notes	Setting: Mansoura, Egypt. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote:"randomly allocated"
Allocation concealment (selection bias)	Unclear risk	Unspecified
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Unspecified. Sham needling was performed but no details on blinding
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Evaluation postoperatively by an independent anaesthetist who was blinded to group assignment.

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El-Deeb 2011a *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unspecified
Selective reporting (reporting bias)	Unclear risk	Unspecified
Other bias	Low risk	Nil apparent

Garcia-Miguel 2000

Study characteristics	
Methods	RCT
Participants	150 ASA 1-2 women undergoing CS under spinal anaesthesia, although three women required general anaesthesia and were excluded.
Interventions	Intervention 1: $5HT_3$ antagonist (Comparison 1) • Ondansetron 4 mg IV after cord clamping • N = 49 Intervention 2: dopamine antagonist (Comparison 2) • Metoclopramide 10 mg IV after cord clamping • N = 48 Comparison: placebo • Normal saline placebo • N = 50
Outcomes	Intraoperative nausea and vomiting
Notes	Setting: Hospital General de Segovia, Spain. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random number table
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote:"double blind" otherwise unspecified

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Garcia-Miguel 2000 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Unspecified
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	150 recruited, only 147 results, 3 required GA due to inadequate spinal
Selective reporting (reporting bias)	Unclear risk	We were not able to review the study protocol
Other bias	Low risk	Similar baseline characteristics

Habib 2006

Study characteristics	
Methods	RCT.
Participants	91 women scheduled for elective CS under spinal anaesthesia without previous experience of acupuncture or acu-stimulation or had experienced nausea or vomiting or taken antiemetics or glucocorticoids within 24 hours before surgery or who had an implanted pacemaker or defibrillator device.
Interventions	Intervention: acupuncture/acupressure (K) • Acupressure relief band on P6 of dominant hand 30-60 minutes before surgery. • N = 47. Comparison: placebo • Relief band placed on dorsum of hand. • N = 44.
Outcomes	Nausea and vomiting (intra- and postoperative), intraoperative and postoperative antiemetic use and pruritis.
Notes	Setting: Duke University Medical Center, Durham, North Carolina, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias)	Unclear risk	Not described

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Habib 2006 *(Continued)*

All outcomes		
Blinding of outcome assessment (detection bias) All outcomes	Low risk	A separate researcher who was unaware of the patient's randomisation collected the data
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	3 women excluded for protocol violations post randomisation.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline differences.

Habib 2013

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective CS under spinal anaesthesia, • N = 300 women randomised, none were excluded but we only used data from 2 groups so we analysed 199 women Exclusion criteria:
Interventions	Intervention 1: 5HT3 antagonist + dopamine antagonist - not included as combination of drugs • Ondansetron 4 mg following cord clamping • Metoclopromide 10 mg prior to spinal • N = 101 Intervention 2: dopamine antagonist (Comparison 2) • Metoclopromide 10 mg + saline placebo • N = 99 Comparison: placebo • Saline placebo x 2 • N = 100
Outcomes	Nausea intra-op (using nausea score) at 5, 10 minutes and then 10 minutely intra-op; vomiting episodes; rescue ant-emetics; pruritus and opioid consumption post-op
Notes	Setting: Duke University Medical Center, Durham, North Carolina; IWK Health Centre, Halifax, Canada; and Carver College of Medicine, Iowa, USA. Dates: Decemebr 2008 to January 2011. Funding source: not reported. Declaration of interest: not reported. Complex methodology; anti-emetic use varied between the 2 centres where study conducted.

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Habib 2013 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer generated
Allocation concealment (selection bias)	Unclear risk	Sealed opaque envelopes, but there is no mention of the envelopes being sequentially numbered
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Participants unaware of allocation
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Data collector unaware of allocation
Incomplete outcome data (attrition bias) All outcomes	Low risk	Nil
Selective reporting (reporting bias)	Unclear risk	We were unable to assess the study protocol
Other bias	High risk	2 centres with different practices, protocol poorly controlled

Harmon 2000

Study characteristics	
Methods	RCT
Participants	94 ASA 1 women 18-40 years scheduled for elective CS under spinal anaesthesia, with no previous history of nausea and vomiting postoperatively or in the previous 24 hours, obesity, diabetes, previous experience of acupuncture or acupressure.
Interventions	Intervention: acupuncture/acupressure (K) • Acupressure sea band on P6 of right forearm. • N = 47. Comparison: placebo • Stimulation on the dorsal side of the right forearm 2 cm proximal to the distal wrist crease. • N = 47.
Outcomes	Nausea and vomiting during and up to 24 hours postoperative.
Notes	Setting: University College Hospital, Galway, Ireland. Dates: not reported. Funding source: not reported.

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Harmon 2000 *(Continued)*

Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	'randomly allocated.'
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Unclear if/how the participant was blinded.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Post-op assessor blinded to allocation
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	4 participants excluded, but unclear pre or post randomisation.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance described.

Harnett 2007

Study characteristics

Methods	Individual RCT.
Participants	Inclusion criteria: • Healthy women undergoing elective CS under spinal anaesthesia • N = 240 Exclusion criteria: • Women with a history of PONV, hyperemesis, antiemetics within 1 week.
Interventions	Group 1: anticholinergic (Comparison 5) • Scopolamine patch 1.5 mg over 72 hours. • N = 80. Group 2: 5-HT $_3$ antagonist(Comparison 1) • Ondansetron 4 mg. • N = 79. Group 3: placebo • Normal saline.

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Harnett 2007 *(Continued)*

	• N = 81.
Outcomes	Intraoperative nausea, vomiting, post-op N or V at 0-2, 2-6, 6-24 hours, rescue antiemetics.
Notes	Setting: Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Postoperative nausea reported as a VAS score, and therefore were not usable data.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Computer generated scheme."
Allocation concealment (selection bias)	Unclear risk	No details given.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	The treating anaesthesiologist remained blinded to group allocation
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	No apparent exclusions or dropouts, ITT.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance.

Hassanein 2015

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • Women elective CS under spinal, ASA 1 or 2, 20–40 years • N = 135 women Excluson criteria:
Interventions	Group 1: sedative (Comparison 6) • Ketamine 0.4 mg/kg in 5 mL normal saline

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Hassanein 2015 *(Continued)*

- IV slowly after anaesthesia and before surgery
- N = 45

Group 2: steroids (Comparison 3)

- Dexamethasone 8 mg in 5 mL normal saline
- IV slowly after anaesthesia and before surgery
- N = 45

Group 3: placebo

- 5 mL normal saline.
- IV slowly after anaesthesia and before surgery
- N = 45

Outcomes	Intra-operative nausea and vomiting, sedation scores
Notes	Setting: Al-Minia University, Egypt. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. In some cases, but not all, tubal ligation was performed. These were not analysed separately.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "randomly allocated"
Allocation concealment (selection bias)	Unclear risk	Unspecified
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Syringes were given by the second anaesthetist to the anaesthetist who was unaware of the content of the syringe
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Nausea, retching and vomiting episodes were recorded by an anaesthetist who was blinded to the drug administered
Incomplete outcome data (attrition bias) All outcomes	Low risk	3 patients excluded due to inadequate spinal anaesthesia
Selective reporting (reporting bias)	Unclear risk	We were unable to assess the study protocol
Other bias	High risk	Some patients had tubal ligation as well, number unspecified

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Ho 1996

Study characteristics	
Methods	RCT.
Participants	60 women ASA 1, aged 21-35, undergoing elective CS, under spinal anaesthesia with epidural morphine, no history of carpal tunnel syndrome or nausea or vomiting within 24 hours of CS.
Interventions	Intervention: acupuncture/acupressure (K) • Seaband acupressure bands on each write at the p6 acupoint. • N = 30. Comparison: placebo • Placebo wrist bands. • N = 30.
Outcomes	Nausea, vomiting, pruritis, dizziness.
Notes	Setting: Veteran's General Hospital, Taipei, and National Yang-Ming University, Taiwan, China. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Computer-generated.
Allocation concealment (selection bias)	Unclear risk	Sealed envelopes but it unclear if they were opaque.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Placebo and treatment wristbands identical
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Assessed by anaesthetists not involved in intraoperative care, blinded to intervention
Incomplete outcome data (attrition bias) All outcomes	Low risk	None.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	None apparent.

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Ho 2006

Study characteristics	
Methods	RCT.
Participants	110 women scheduled for elective CS under spinal anaesthesia, ASA 1-2, between 23 and 40 years, without carpal tunnel syndrome or nausea and vomiting in the previous 24 hours.
Interventions	Intervention: acupuncture/acupressure (K) • P6 acupressure sea bands placed bilaterally 30 minutes before surgery. • N = 55. Comparison: placebo • Placebo wrist bands. • N = 55.
Outcomes	Nausea and vomiting - 1. spinal - skin incision, 2. incision to delivery, 3. delivery to skin closure, 4 skin closure to PACU.
Notes	Setting: Taipei Veterans General Hospital and Mackay Memorial Hospital, Taipei, Taiwan. Dates: not reported. Funding source: not described. Declaration of interest: not described.

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomised using quote: "envelope system".
Allocation concealment (selection bias)	Unclear risk	Type of envelope unclear.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Patients, anesthesiologists, obstetricians, and nurses were all blinded to treatment group". No further information provided.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Patients, anesthesiologists, obstetricians, and nurses were all blinded to treatment group". No further information provided
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance.

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Huang 1992

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Primiparous women 20-38 years, undergoing emergency CS, with regional anaesthesia, with normal heart, lung, blood, urine examination and with no history of drug allergy, pre-eclampsia, supine low BP syndrome. • N = 100 Exclusion criteria:
Interventions	Intervention: dopamine antagonist (Comparson 2) • Metoclopramide 20 mg during CS. • N = 50. Comparison: no treatment • No intervention. • N = 50.
Outcomes	Nausea, hypotension, bradycardia.
Notes	Setting: study location (hospital, city, country) not described. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No blinding of participants described.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No blinding of outcome assessor described.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	None described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.

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Huang 1992 *(Continued)*

Other bias	Unclear risk	None described.

Ibrahim 2019

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective cesarean delivery under spinal anaesthesia • ASA physical status I-II • N = 80 women randomised, 77 analysed Exclusion criteria: • Women with infection at the site of injection, coagulopathy or other bleeding diathesis, pre-existing neurologic deficits, history of hypersensitivity to any of the given drugs, inability to communicate with the investigator and history of chronic opioid use.
Interventions	Intervention: opioid antagonist (Comparison 7) • Nalbuphine 0.5 mg • Women received IT nalbuphine (0.5 mg) alongside anaesthetic (IT 10 mg of 0.5% hyperbaric bupivacaine with 0.2 mg morphine) in 0.5 mLvolume with total volume 2.5 mL.) • N = 40 women randomised to this group but 1 excluded (for PPH and needing surgical intervention) – so 39 in analysis Comparator: placebo • IT 10 mg of 0.5% hyperbaric bupivacaine with 0.2 mg morphine) in 0.5 mLvolume with total volume 2.5 mL • N = 40 women randomised to this group but 2 excluded (1 for PPH and needing surgical intervention, 1 for sensory block failed) – so 38 in analysis Both groups received bupivacaine and morphine as part of the spinal anaesthesia
Outcomes	Nausea and vomiting
Notes	Setting: Womens Health Hospital, Assiut University, Faculty of Medicine, Egypt Dates: July 2016 - August 2017 Funding source: not reported in English translation of abstract Declaration of interest: not reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...computer generated..."
Allocation concealment (selection bias)	Unclear risk	Quote: "... placed in a sealed envelope prior to study initiation...." but no mention of envelopes being opaque or serially numbered

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Ibrahim 2019 *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	As above
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	As above
Incomplete outcome data (attrition bias) All outcomes	Low risk	3/80 (4%) of women were excluded after randomisation
Selective reporting (reporting bias)	High risk	Methods say they will report itching, hypotension, bradycardia but these outcomes not reported. Paracetamol use reported but not listed in outcomes
Other bias	Unclear risk	Baseline data similar but unclear of there may be other biases

Imbeloni 1986

Study characteristics	
Methods	RCT
Participants	• Pregnant women at term undergoing CS under epidural anaesthesia. • N = 80 women randomised
Interventions	Group 1: dopamine antagonist (Comparison 2) • Metoclopramide 20 mg IV. • N = 40 women randomised. Group 2: placebo • Normal saline 4 mL. • N = 40 women randomised.
Outcomes	Nausea and vomiting.
Notes	Setting: Rio de Janeiro, Brazil. Dates: not reported in English abstract Funding source: not reported in English abstract. Declaration of interest: not reported in English abstract. This study currently provides no data for the review because for 'nausea + vomiting' data are unclear if the data are for intraoperative or postoperative. We wrote to the authors in 2009 to request further information but had no response.

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**

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Imbeloni 1986 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Quote: "Women were divided into groups randomly."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not stated.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not stated.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	None described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No apparent baseline differences.

Jaafarpour 2008

Study characteristics	
Methods	RCT
Participants	80 women undergoing elective CS under spinal anaesthesia in a university hospital in Iran. Contraindications: use of antiemetics within 24 hours, contraindication to regional anaesthesia, allergy to dexamethasone, GI disease, HT or glucose intolerance, PONV or motion sickness.
Interventions	Group 1: steroid (Comparison 3) • Dexamethasone 8 mg. • IV • N = 40. Group 2: placebo • Normal saline. • IV • N = 40.
Outcomes	Intraoperative nausea, vomiting, retching and pain.
Notes	Setting: Ilam Shahid Mostafa Khomeini Hospital, Iran. Dates: 2008 Funding source: not reported. Declaration of interest: not reported.

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Jaafarpour 2008 *(Continued)*

	Retching data were combined with vomiting.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "Randomly assigned" - no other details.
Allocation concealment (selection bias)	Unclear risk	Quote: "sealed envelopes" - no other details.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "double blind" - no other details
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Unspecified
Incomplete outcome data (attrition bias) All outcomes	Low risk	No apparent loss to follow-up or exclusions, appears to be ITT.
Selective reporting (reporting bias)	Unclear risk	We have not assessed the trial protocol.
Other bias	Low risk	No apparent baseline imbalance.

Jang 1997

Study characteristics	
Methods	RCT.
Participants	Inclusion criteria: • Women undergoing CS under epidural anaesthesia. • N = 60 women randomised Exclusion criteria:
Interventions	Intervention: opioid antagonist (Comparson 7) • Butorphanol 1.5 mg • N = 30 Comparator: placebo • N = 30 Followed by infusion.
Outcomes	Nausea, vomiting, analgesia, pruritis and other side effects.
Notes	Setting: not reported, but authors from Seoul, South Korea

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Jang 1997 *(Continued)*

Dates: not reported

Funding source: not reported

Declaration of interest: not reported

Abstract in English and tables, rest of the paper in Korean.

No data available for the review

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information except to say quote: "randomly divided"
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not reported
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not reported
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not reported
Selective reporting (reporting bias)	High risk	Methods say they will assess analgesic effects and side effects. They report satisfaction but this is not in the methods. We did not assess the trial protocol
Other bias	Unclear risk	We only have an English translation of the abstract so cannot assess this

Kalava 2013

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • Women having elective CS under spinal anaesthesia • N = 273 women randomised Exclusion criteria:
Interventions	Intervention: ginger (Comparison 9) • 2 g ginger (2 X 1 g capsules) - 1st tablet ½ hour prior to OT - 2nd tablet 2 hours after OT • N randomised = 137 but 21 excluded leaving 116 in the analysis Comparator: placebo:

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Kalava 2013 *(Continued)*

	• 2 x 1 g tablets placebo • N randomised = 136 but 13 excluded leaving 123 in the analysis
Outcomes	Post op – 2, 2.5, 24 hours – nausea, pain, itch 72 hours – side effects
Notes	Setting: New York Methodist Hospital, Brooklyn, New York, USA. Dates: June 2010 to April 2011. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "Computer generated table"
Allocation concealment (selection bias)	Unclear risk	Unspecified
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No information provided.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information provided.
Incomplete outcome data (attrition bias) All outcomes	Low risk	34 women (16%) were excluded post randomisation (13 placebo, 21 ginger) for a variety of reasons unlikely to be related to outcome.
Selective reporting (reporting bias)	Low risk	We have not assessed the trial protocol.
Other bias	Unclear risk	Baseline demographic differences (non stat sig)

Kampo 2019

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective CS under spinal anaesthesia • N = 360 women Exclusion criteria:
Interventions	Intervention 1: sedative (Comparison 6)

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Kampo 2019 *(Continued)*

	• Propofol 0.5 mg/kg, 10–15 minutes before to the end of surgery. • Spinal anaesthetic (heavy bupivacaine and 200 mcg morphine) • N = 115 women in the analysis, it was not reported how many randomised to this group Intervention 2: dopamine antagonist (Comparison 2) • Metoclopramide 10 mg, 10–15 minutes before to the end of surgery. • Spinal anaesthetic (heavy bupivacaine and 200 mcg morphine) • N = 115 women in the analysis, it was not reported how many were randomised to this group Comparator: placebo • Saline (0.9%), 10–15 minutes before to the end of surgery. • Spinal anaesthetic (heavy bupivacaine and 200 mcg morphine) • N = 115 women in the analysis, it was not reported how many were randomised to this group
Outcomes	PONV (early and late), rescue antiemetic, pain, pruritis, satisfaction
Notes	Setting: Tamale Teaching Hospital, Tamale, Ghana Dates: April 2016 to May 2017 Funding source: authors report no funding Declaration of interest: authors declare no competing interests. Data on 'nausea + vomiting' in Comparison 2 (2.6) and Comparison 6 (6.6) seem very extreme but we cannot find a possible explanation in the publication.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "...a computer generated random number table"
Allocation concealment (selection bias)	Unclear risk	Quote: "Sealed opaque envelope" but no mention of sequential numbering
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Although reported as a double-blind RCT, one drug would have a milky appearance and the other drug and control would be clear, and it is not described how the participants and personnel were blinded. Also the dose of propofol is sufficient to cause noticeable sedation in most women, so it would be obvious to the clinician if the women was given propofol.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	As above.
Incomplete outcome data (attrition bias) All outcomes	Low risk	15 out of 360 (4%) were excluded and therefore lost to follow-up
Selective reporting (reporting bias)	Unclear risk	The outcomes listed in the methods were reported in the results, but we did not assess the trial protocol
Other bias	Unclear risk	It is unclear how many women were randomised as the envelope was opened 15 minutes before end of surgery and women were excluded due to PPH

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Kasodekar 2006

Study characteristics	
Methods	RCT
Participants	176 women undergoing elective CS under spinal anaesthesia.
Interventions	Intervention: 5-HT $_3$ antagonist (A) • Granisetron 1 mg, IV. • N = 88. Comparison: placebo • Normal saline. • N = 88.
Outcomes	Intraoperative nausea, vomiting, retching, rescue antiemetic, hypotension, pain.
Notes	Setting: Mansoura University, Egypt. Dates: not reported Funding source: not reported. Declaration of interest: not reported. Conference abstract only. Retching data combined with vomiting.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Quote: "randomly."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "double blind". No further information provided.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Unspecified.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss of participants described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance.

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Khalayleh 2005

Study characteristics	
Methods	RCT
Participants	Incluson criteria: • Women having elective CS under spinal anaesthesia • N = 150 women randomised, 147 were analysed but we only used data from 2 groups so we analysed data on 98 women Excluson criteria:
Interventions	Intervention 1: opioid - excluded from the review • Fentanyl - 20 mcg IT - not included in this review because it is an opioid • N = 49 Intervention 2: dopamine antagonist (Comparison 2) • Metoclopramide 10 mg IV • N = 48 Comparator: placebo • saline • N = 50
Outcomes	intraoperative and PONV, rescue droperidol
Notes	Setting: Iran Dates: Jan 2002-Dec 2003 Funding source: not reported Declaration of Interest: not reported

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Random number table
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	As above
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "intraoperative and post operative emetic episodes were recorded by doctor who had no knowledge of which study drug the patient had received"
Incomplete outcome data (attrition bias)	Low risk	3 patients lost out of 150

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Khalayleh 2005 *(Continued)*

All outcomes

Selective reporting (reporting bias)	Unclear risk	They report no side effects in results (but do not specify which side effects), also do not mention side effects in the methods
Other bias	Unclear risk	The fact the timing of the interventions are not clear in the Methods raises the risk of other biases

Kim 1999

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing CS under combined spinal (tetracaine) and epidural (buprenorphine and bupivacaine) anaesthesia. • N = 60 Exclusion criteria:
Interventions	Intervention 1: dopamine antagonist (Comparison 2) • Metoclopramide 10 mg IV • N = 20 Intervention 2: 5HT3 antagonist (Comparison 1) • Ondansetron 4 mg IV • N = 20 Comparator: placebo • Saline • N = 20
Outcomes	Nausea, vomiting, satisfaction, side effects.
Notes	Setting: Eulgi General Hospital, Seoul, South Korea Dates: not reported Funding source: not reported in abstract Declaration of interest: not reported in abstract English abstract only, rest of paper in Korean. We will attempt to get translation No data for the review in the abstract.

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Just says "randomly"

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Kim 1999 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No information provided in abstract
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information provided in abstract
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	60 women recruited but nothing to say how many analysed
Selective reporting (reporting bias)	Unclear risk	Side effects reported in results, but not mentioned in Methods. Need a translation of the full paper
Other bias	Unclear risk	Very little methodology in the Abstract to assess for other biases

Koju 2015

Study characteristics	
Methods	RCT
Participants	50 women for elective CD under spinal
Interventions	Intervention: 5-HT $_3$ antagonist (A) • Ondansetron 4 mg, IV before spinal • N = 25 Comparison: placebo • Normal saline. • N = 25
Outcomes	PONV on 4 point scale every 15 in for 4 hours, then at 4, 8 and 24 hours
Notes	Setting: Patan Hospital, Patan, Lalitpur, Nepal. Dates: August 2008 to January 2009 Funding source: not reported. Declaration of interest: state no conflict of interest both financial and non-financial.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Unspecified:quote: "randomly allocated"

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Koju 2015 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Only reports that women and clinicians unaware of allocation
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Nurse drew up drugs, Dr administered
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No dropouts
Selective reporting (reporting bias)	Unclear risk	Resident (junior) doctors performed data collection
Other bias	Unclear risk	No baseline imbalance

Kotelko 1989

Study characteristics	
Methods	RCT
Participants	203 ASA 1-2 women undergoing elective CS, 18-38 years with epidural anaesthesia and epidural morphine.
Interventions	Intervention: anticholinergic (Comparison 5) • Transdermal scopolamine patch. • N = 102. Comparison: placebo • Placebo patch. • N = 101.
Outcomes	Nausea, vomiting, retching, rescue antiemetics required, itch, pain, adverse effects.
Notes	Setting: Cedars-Sinai Medical Center, Los Angeles, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Various adverse effects listed, pruritis used as most common side effect.
Risk of bias	
Bias	**Authors' judgement** / **Support for judgement**

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Kotelko 1989 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Quote: "randomised."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "double blind."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	None identified.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Quote: "No significant differences between groups."

Lee 2002

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective CS under spinal anaesthesia. • N = 60 women randomised Exclusion criteria:
Interventions	Intervention 1: 5HT3 antagonist (Comparison 1) • Granisetron 10 ug/kg • N = 15 Intervention 2: 5HT3 antagonist (Comparison 1) • Granisetron 20 ug/kg • N = 15 Intervention 3: 5HT3 antagonist (Comparison 1) • Granisetron 30 ug/kg • N = 15 Comparator: placebo • N = 15
Outcomes	VAS pain scores, emetic episodes, emesis scores, side effects

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Lee 2002 *(Continued)*

Notes	Setting: Samsung Cheil Hospital, Seoul, South Korea. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Full paper in English. There were no data for this review

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "randomised according to computerised list"
Allocation concealment (selection bias)	Unclear risk	Unrelated anaesthetist prepared syringes
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	As above
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "post operative emetic scores were recorded by anesthesiologist blinded to which antiemetic each patient had received"
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not clear if any data incomplete/missing
Selective reporting (reporting bias)	Unclear risk	outcomes appear to be consistent with methods, but we did not assess the trial protocol
Other bias	Unclear risk	Nil apparent

Levin 2019

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • Women having elective CS under regional anaesthesia • N = 180 women randomised, nine were excluded after randomisation but we only used data from 2 groups so we analysed data from 120 women Exclusion criteria:
Interventions	Intervention 1: acupressure P6 • Transcutaneous P6 acupoint stimulation

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Levin 2019 *(Continued)*

	• N = 60 Intervention 2: drug combination - excluded from the review • Metoclopramide + ondansetron • N = 60 Comparator: no treatment • No therapy • N = 60
Outcomes	Primary outcome: nausea and vomiting
Notes	Setting: Rutgers-Robert Wood Johnson Medical School, New Jersey, USA Dates: July 2015 to March 2016. Funding source: authors state no funding. Declaration of interest: authors state no conflict.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation sequence
Allocation concealment (selection bias)	Unclear risk	No information given
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No described blinding at all
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No described blinding at all
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up
Selective reporting (reporting bias)	Unclear risk	Authors appear to report the outcomes intended, but we did not assess the trial protocol
Other bias	Unclear risk	Very limited detail in abstract/e-poster, more detail in full paper

Li 2012

Study characteristics

Methods	RCT
Participants	Women undergoing elective CS with epidural anaesthesia

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Li 2012 *(Continued)*

	N = 180
Interventions	Intervention 1: acupressure/acupuncture (Comparison 8) • Transcutaneous electrical stimulation at Shenmen acupoint • N = 60 Intervention 2: acupressure/acupuncture - excluded at present • Transcutaneous electrical stimulation at the eye point on the ear lobe • N = 60 Comparator: no stimulation • N = 60
Outcomes	PONV at 48 hours
Notes	Setting: 2 separate regions in TsingDao, Qingdao municipal hospital and Qingdao Hiser Medical Center Dates: Nov 2011 to March 2012. Funding source: not reported. Declaration of interest: not reported. Abstract is in English, the paper in Chinese and we have a translation form. Intervention 2 is excluded at present because we are unsure whether this is an additional intervention or a sham control. We will write to the authors for clarification.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "random numbers" but no detail on how the sequence was generated
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Participants likely aware if they were receiving the intervention
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No information on whether outcome assessor was unaware
Incomplete outcome data (attrition bias) All outcomes	Low risk	All 180 participants provided data
Selective reporting (reporting bias)	Unclear risk	All prespecified outcomes appear to have been reported, but we did not assess the trial protocol
Other bias	Unclear risk	Difficult to assess as we were assessing a translation not the original paper

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Lim 2001a

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women having elective CS under spinal anaesthesia • Healthy – not defined • N = 32 women randomised Exclusion criteria: • Not stated explicitly.
Interventions	Intervention: acupuncture/acupressure (Comparison 8) • Active 'Transcutaneous acupoint electrical stimulation (TAES) device (ReliefBand) applied to the Nei-Guan P6 point • Device placed on upper limb without the BP cuff immediately before spinal block and removed following the last surgical suture • N = ? Comparator: placebo • Inactive band applied to the same place • N = ?
Outcomes	Pre-specified: • Nausea, vomiting/retching, verbal pain score • Data collected at 6 intervals but one score reported. 6 points were: end of IT injection to skin incision; skin incision to birth; birth to start of fascial closure; fascial closure at skin closure; skin closure to arrival in recovery room; 1 hour after arrival in recovery. Reported: • Nausea, vomiting/retching, verbal pain score and satisfaction
Notes	Setting: not described but authors from KK Women's and Children's Hospital, Singapore Dates: not reported Funding source: not reported Declaration of interest: not reported Conference abstract only. Wrote to authors in July 2009 for further details. No response received. No data for this review as no information on the number of women in each group.

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No information just *"…were randomised…"*
Allocation concealment (selection bias)	Unclear risk	No information just *"…were randomised…"*

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Lim 2001a *(Continued)*

Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Although there was a placebo, the women would, we think, have felt if there was electrical stimulation or not
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Although it is reported that the investigator was blinded, the women reporting on nausea and pain would probably have known – the assessor observed the vomiting.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information is reported
Selective reporting (reporting bias)	Unclear risk	The authors report on the 3 outcomes listed in Methods but also satisfaction, however this is only a conference abstract. We did not assess the trial protocol.
Other bias	Unclear risk	State similar demographics but no detail. No methodological information provided so not possible to assess this.

Lim 2001b

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women having elective CS under spinal anaesthesia • ASA 1 + 11 • N = 52 women Exclusion criteria: • History of motion sickness; hyperemesis gravidarum, pre-eclampsia; GI disease; consumption of antiemetic agent 24 hours before; dexamethasone 2 weeks prior to surgery.
Interventions	Intervention: corticosteroid (Comparison 3) • Dexamethasone 4 mg IV • Prior to administration of spinal anaesthesia • N = ? Comparator: placebo • Saline, IV • Prior to administration of spinal anaesthesia • N = ?
Outcomes	Pre-specified: • Nausea + vomiting/retching Reported: • Nausea + vomiting/retching, BP; ephedrine use.
Notes	Setting: not reported but authors from KK Women's and Children's Hospital, Singapore

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Lim 2001b *(Continued)*

	Dates: not reported Funding source: not reported Declaration of interest: not reported No data for this reviewas no information on the number of women in each group Conference abstract only. Wrote to authors in July 2009 but received no response.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Says investigator was blinded – women were probably also but there is no information on how blinding was achieved.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Says investigator was blinded but it is not clear if women were blinded and they were being asked about nausea.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No information
Selective reporting (reporting bias)	Unclear risk	Only reported nausea and vomiting but likely they collected other data. We did not assess the trial protocol
Other bias	Unclear risk	States demographically similar but no detail. No methodology reported so not possible to assess

Liu 2015a

Study characteristics

Methods	RCT
Participants	Women elective CS under regional anaesthesia N = 90
Interventions	Intervention: acupoint electrostimulation • transcutaneous acupoint electrostimulation • N = Comparator 1: sham stimulation • at a false point • N =

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Liu 2015a *(Continued)*

	Comparator 2: placebo • no intervention • N =
Outcomes	Haemodynamics, VAS nausea score, plasma 5-HT concentrations. Bleeding, administration of oxytocin, ephedrine and atropine
Notes	Setting: not stated but authors from Qingdao Regional Hospital, Shandong Province, China Dates: not reported Funding source: not reported Declaration of interest: not reported. Chinese paper with English abstract. No data for this review in the abstract.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described
Allocation concealment (selection bias)	Unclear risk	Not reported
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Sites covered with sticking plaster, but unclear if participants aware
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear from abstract
Selective reporting (reporting bias)	Unclear risk	Unclear from abstract
Other bias	Unclear risk	Unclear from abstract

Lussos 1992

Study characteristics

Methods	RCT
Participants	42 women undergoing elective CS under spinal anaesthesia, without treatment of nausea and vomiting in the week before surgery, diabetes or uteroplacental insufficiency.

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Lussos 1992 *(Continued)*

Interventions	Intervention: dopamine antagonist (Comparison 2) • 10 mg metoclopramide. • N = 21. Comparison: placebo • 2 mL normal saline. • N = 21.
Outcomes	Nausea and vomiting pre and postdelivery.
Notes	Setting: Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts, USA. Dates: not reported Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described
Incomplete outcome data (attrition bias) All outcomes	Low risk	All included.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Similar baseline characteristics.

Mandell 1992

Study characteristics

Methods	RCT
Participants	128 healthy women at term, singleton pregnancies, elective (or non-emergent) CS, with regional anaesthesia, with no other anaesthetic adjuvants or the use of adjuvants.

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Mandell 1992 *(Continued)*

Interventions	Intervention: dopamine antagonist (Comparison 2) • Droperidol 0.5 mg after delivery. • N = 67. Comparison: placebo • Normal saline. • N = 61.
Outcomes	Incidence of nausea and vomiting, narcotic administration, hypotension.
Notes	Setting: Winston-Salem, North Carolina, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Results were provided as a percentage of the overall number of participants in each group. Actual participant numbers with each outcome calculated by multiplication of this percentage by the number of participants in each group.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "double blind fashion".
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Unspecified
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear, 7 participants lost before intervention.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Only reports on those women who completed the treatment.

Maranhao 1988

Study characteristics

Methods	RCT

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Maranhao 1988 *(Continued)*

Participants	Women undergoing elective CS, under subarachnoid block.
Interventions	Intervention 1: dopamine antagonist (Comparison 2) • Metaclopramide 10 mg IV • N = 20 Intervention 2: dopamine antagonist (Comparison 2) • Droperidol 5 mg IV • N = 20 Comparator: placebo • N = 20
Outcomes	Nausea and vomiting
Notes	Setting: not clear on the photocopy, but likely South America Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Abstract in English, main paper probably Portuguese. We now have translation forms. We wrote to the authors in 2009 but have received no reply. Data in Interventions 1 and 2 were entered as subgroups and combined with overall data for treatment effect with the required adjustment of the placebo data for the 2 subgroups according to our methods (Unit of analysis issues)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "allocated by chance"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No mention of blinding at all
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	No mention of blinding at all
Incomplete outcome data (attrition bias) All outcomes	Low risk	All participants appear to have provided data
Selective reporting (reporting bias)	Unclear risk	Prespecified outcomes appear to have been reported but we did not assess the trial protocol

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Maranhao 1988 *(Continued)*

Other bias	Unclear risk	Unable to assess from our translation

Modir 2019

Study characteristics	
Methods	RCT
Participants	Women having elective CS under spinal anaesthesia N = 140
Interventions	Intervention 1: corticosteroid (Comparison 3) • Dexamethasone • N = ? Intervention 2: sedative (Comparison 6) • Ketamine • N = ? Intervention 3: (Comparison 6) • Dexmedetomidine • N = ? Comparator: placebo • N = ?
Outcomes	Nausea and vomiting
Notes	Setting: Valiasr Hospital, Arak, Iran, presumably, but not stated specifically Dates: not reported Funding source: Arak University of Medical Sciences Declaration of interest: not reported. No data for the review as it is unclear how many women in each group

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Block random allocation method used but no further details provided
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Although described as double blind - no discussion of blinding participants or personnel

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Modir 2019 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "… second project executive, who was unaware of the grouping assignment, recorded the data."
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear how many women provided data in each group
Selective reporting (reporting bias)	Unclear risk	The same outcomes in the methods are reported in the results but we did not assess the trial protocol
Other bias	Unclear risk	Women were excluded (presumably after randomisation) if they were vomiting intra-op or if dissatisfied – unclear why these women were to be excluded.

Mohammadi 2015

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women having elective CS under spinal anaesthesia • N = 100 Exclusion criteria:
Interventions	Intervention: 5HT3 antagonist (Comparison 1) • Granisetron 3 mg • N = 50 women randomised Comparator: placebo • Placebo IV • N = 50 women randomised
Outcomes	Shivering, nausea and vomiting
Notes	Setting: Dr. Shariati Hospital, Tehran, Iran. Dates: March to September 2013. Funding source: not reported. Declaration of interest: not reported. Recorded presence of nausea and vomiting, but results only shown for intra-op

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated codes, hidden

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Mohammadi 2015 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Sealed envelopes
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Separate researcher and clinician. Patients blinded
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Separate researcher and clinician
Incomplete outcome data (attrition bias) All outcomes	Low risk	No exclusions
Selective reporting (reporting bias)	Unclear risk	We did not assess the study protocol
Other bias	Unclear risk	Similar baseline characteristics

Mokini 2014

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women having CS under regional anaesthesia • N = 96 women randomised, none excluded after randomisation but we only sed data from 3 groups so we included data on 72 women in our analysis Exclusion criteria:
Interventions	Intervention 1: sedative (Comparison 6) • Propofol 1 mg/kg/hr • N = 24 Intervention 2: dopamine antagonist (Comparison 2) • Metoclopramide 10 mg • N = 24 Intervention 3: sedative + dopamine antagonist - excluded from this review • Propofol + metoclopramide • N = 24 Comparator: placebo • N = 24
Outcomes	Nausea and vomiting
Notes	Setting: authors are Italian but no details

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Mokini 2014 *(Continued)*

Dates: not reported.

Funding source: not reported.

Declaration of interest: not reported.

Conference abstract.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "... randomly allocated"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	High risk	No mention of blinding (and one intervention is white in colour)
Blinding of outcome assessment (detection bias) All outcomes	High risk	No mention of blinding (and one intervention is white in colour)
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Unclear how many women were randomised and provided data
Selective reporting (reporting bias)	Unclear risk	Inadequate info in abstract and we did not assess the trial protocol
Other bias	Unclear risk	Inadequate info in abstract

Mukherjee 2006

Study characteristics

Methods	RCT
Participants	80 ASA 1-2, age 20-34, undergoing CS under spinal anaesthesia, with no antiemetic drugs within 24 hours.
Interventions	Intervention 1: sedative (Comparison 6) • Propofol at 0.5 mg/kg/hr. • N = 20. Intervention 2: sedative (Comparison 6) • Propofol at 1.0 mg/kg/hr. • N = 20. Intervention 3: sedative (Comparison 6) • Propofol at 1.5 mg/kg/hr.

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Mukherjee 2006 *(Continued)*

	• N = 20. Comparison: placebo • Continuous infusion of 10% intralipid. • N = 20.
Outcomes	Intraoperative nausea, vomiting, retching, adverse events.
Notes	Setting: Calcutta National Medical College and Hospital, Kolkata, India. Dates: not reported Funding source: not reported. Declaration of interest: not reported. Retching combined with vomiting, dosage groups combined to yield overall treatment effect. Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues).

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation chart.
Allocation concealment (selection bias)	Unclear risk	Identical syringes prepared by uninvolved anaesthetist.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Double blinded manner".
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Outcomes assessed by anaesthetist unaware of allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss of participants.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No differences in baseline groups.

Munnur 2008

Study characteristics

Methods	RCT
Participants	Inclusion criteria:

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Munnur 2008 *(Continued)*

	• Women undergoing CS with regional anaesthesia. • N = 192 women were randomised Exclusion criteria:
Interventions	Intervention 1: 5-HT 3 antagonist (Comparison 1) • Ondansetron 4 mg. • N = 60. Intervention 2: 5-HT 3 antagonist (Comparison 1) • Granisetron 0.1 mg. • N = 50. Comparison: placebo • Normal saline. • N = 49
Outcomes	Composite PONV.
Notes	Setting: Baylor College of Medicine, Houston, Texas, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Conference abstract. Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "..randomised..." - no further information.
Allocation concealment (selection bias)	Unclear risk	No information provided.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Unclear who administered the study drug and if they (or the patients) were blinded. Study is described as “double blind”
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Post-op nurses were unaware, but it does not actually say that they did the data collection
Incomplete outcome data (attrition bias) All outcomes	Low risk	No exclusions or lost data reported.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.

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Munnur 2008 *(Continued)*

Other bias	Unclear risk	No information provided on baseline data. Only a conference abstract so not able to assess if there were other biases.

Niu 2018

Study characteristics	
Methods	RCT
Participants	• Women having elective CS under spinal anaesthesia • N = 80 women randomised and their data analysed
Interventions	Intervention: sedative (Comparison 6) • Propofol – 10 mg/mL continuous infusion. (aiming at a plasma concentration of 1000 ng/mL)· • Given after the birth· • N = 40 Comparator: placebo • N =40
Outcomes	Nausea and vomiting
Notes	Setting: Aviation General Hospital, Beijing, China Dates: October 2016 to February 2017 Funding source: not reported Declaration of interest: stated that authors have no conflicts of interest Authors also reported on maternal pain and neonatal behavioral neurological assessment (NBNA), reporting no difference between the groups

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	"random number generator"
Allocation concealment (selection bias)	Unclear risk	Quote: *"Allocated using random number by research fellow A 1:1 ratio – who was not involved with assessment or pt instructions (that was RF B). After obtaining consent, patients were allocated to either the propofol or the placebo group by opening a sealed opaque envelope."* However, it is unclear if the envelopes were sequentially numbered.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: *"The parturient head site was covered by surgical drapes during the operation so they could not see the infusion line."*
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Assessed by independent Research Fellow that was not involved with randomisation – different research fellows assessed different outcomes

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Niu 2018 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	All included in the analysis. 92 women were scheduled for CS – 12 were excluded, the remaining 80 women completed the trial
Selective reporting (reporting bias)	Unclear risk	All outcomes from the methods section were reported on but we did not assess the trial protocol..
Other bias	Unclear risk	It is not clear if there may have been other biases

Noroozinia 2013

Study characteristics	
Methods	RCT
Participants	152 women ASA 1 or 2 undergoing elective CD under spinal anaesthesia
Interventions	Intervention: acupuncture/acupressure (Comparison 8) • P6 acupressure sea bands placed bilaterally 30 minutes before surgery. • N = 76 Comparison: placebo • Placebo wrist bands. • N = 76
Outcomes	Intra-op and post-op (in first, second and third 2-hour periods) nausea and vomiting
Notes	Setting: Imam Khomeini Training Hospital, Urmia, Iran. Dates: 2010 Funding source: not reported. Declaration of interest: not reported. VAS scoring of nausea performed at unspecified times (esp intra-op, no info). Post-op incidence of vomiting performed in PACU,quote: "0-2 hrs", "2-4 hrs" and "4-6 hrs". For comparisons in this review the post-op N& V incidence was averaged over the 4 time epochs. Revman does not permit decimal entries (i.e. 1.25, 1.5), so 1.25 rounded down to 1; 1.5 rounded up to 2

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Unspecifed:quote: "randomly allocated"
Allocation concealment (selection bias)	Unclear risk	Elastic band on wrist used in all women but those with acupressure point may have known they had it
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Blinding difficult for pressure sensitive area

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Noroozinia 2013 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "Chart assessment", otherwise unspecified
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No dropouts?
Selective reporting (reporting bias)	Unclear risk	Unspecified
Other bias	Unclear risk	No sample size calculation, no VAS results presented

Nortcliffe 2003

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective CS under spinal anaesthesia, without pregnancy-induced hypertension, diabetes, GI disease or antiemetic use in the 24 hours prior to CS. • N = 99 Exclusion criteria:
Interventions	Intervention 1: antihistamine (Comparison 4) • Cyclizine 50 mg IV • N = 30. Intervention 2: steroid (Comparison 3) • Dexamethasone 8 mg IV • N = 30. Comparison: placebo • Normal saline IV • N = 30.
Outcomes	Incidence of nausea and vomiting in the 24 hours postsurgery, requirement for rescue antiemetic medication, women's satisfaction.
Notes	Setting: University Hospitals of Leicester, UK. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.
Risk of bias	

Bias	**Authors' judgement**	**Support for judgement**

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Nortcliffe 2003 *(Continued)*

Random sequence generation (selection bias)	Unclear risk	Blocked randomisation is groups of 9, unclear how produced.
Allocation concealment (selection bias)	Unclear risk	Sealed envelopes but no mention of their being sequentially numbered.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Medication prepared by the anaesthetist who did not collect data. Patients unaware of medication administered.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Medication prepared by the anaesthetist who did not collect data.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All missing data accounted for.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline differences in groups.

Pan 1996

Study characteristics	
Methods	RCT
Participants	48 women undergoing elective CS under epidural anaesthesia, ASA 1-2, not planning to breast feed, no psychiatric disease or motion sickness.
Interventions	Intervention 1: 5-HT $_3$ antagonist (Comparison 1) • Ondansetron, IV - 8 mg. • N = 16. Intervention 2: dopamine antagonist (Comparison 2) • Droperidol, IV - 0.625 mg. • N = 16. Comparison: placebo • Normal saline, IV. • N = 16.
Outcomes	Intraoperative nausea, vomiting (combined to make a cumulative score).
Notes	Setting: University Medical Centre, Virginia, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

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Pan 1996 *(Continued)*

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated.
Allocation concealment (selection bias)	Unclear risk	Who made up the syringes was not described.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Double blind". Assessor unaware of allocation.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Assessor unaware of allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss of participants described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the protocol.
Other bias	Low risk	No baseline differences.

Pan 2001

Study characteristics	
Methods	RCT
Participants	156 ASA 1-2 undergoing elective CS under epidural anaesthesia with no history of psychiatric disease or breastfeeding.
Interventions	Intervention 1: 5-HT $_3$ antagonist (Comparison 1) • 4 mg ondansetron. • N = 54. Intervention 2: dopamine antagonist (Comparison 2) • 10 mg metoclopramide. • N = 51. Comparison: placebo • 10 mL normal saline. • N = 51.
Outcomes	Nausea or vomiting intraoperative or up to 24 hours postoperative, sedation score.
Notes	Setting: University Medical Centre, Virginia, USA. Dates: not reported.

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Pan 2001 *(Continued)*

Funding source: not reported.

Declaration of interest: not reported.

All interventions given in 10 mL after clamping cord.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated.
Allocation concealment (selection bias)	Unclear risk	Not described in detail.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Explicitly stated that all were blinded.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Explicitly stated that all were blinded.
Incomplete outcome data (attrition bias) All outcomes	Low risk	8 participants were excluded after randomisation and could not be re-included.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline differences.

Pan 2003

Study characteristics

Methods	RCT
Participants	40 women undergoing elective CS under epidural anaesthesia. Women were excluded if the had a recent history of GI disease, nausea and vomiting or a quote: "maternal history of chronic utero-placental insufficiency".
Interventions	Intervention: 5-HT $_3$ antagonist (Comparison 1) • 4 mg ondansetron. • N = 20. Comparison: placebo • 2 mL normal saline placebo given prior to spinal anaesthesia. • N = 20.
Outcomes	Nausea - before/after birth, vomiting/retching before/after birth.

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Pan 2003 *(Continued)*

Notes	Setting: University Medical Center, Virginia, Richmond, Virginia, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Retching data included in vomiting.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "randomised."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "double blind"
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described.
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss of data described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No other bias apparent.

Parra-Guiza 2018

Study characteristics

Methods	RCT
Participants	Inclussion criteria: • Pregnant women scheduled for an elective CS with spinal anaesthesia • N = 300 women randomised Exclusion criteria:
Interventions	Intervention 1: 5HT3 antagonist (Comparison 1) • Ondansetron - 4 mg IV • N = 100 Intervention 2: corticosteroid (Comparison 3)

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Parra-Guiza 2018 *(Continued)*

- Dexamethazone - 4 mg IV
- N = 100

Comparator: placebo

- Saline IV
- N = 100

Outcomes	Nausea and vomiting, etc.
Notes	Setting: Columbia, South America Dates: February 2014 to September 2016 Funding source: Industrial University of Santander (Universidad Industrial de Santander) (from trial reg) Declaration of interest: authors declared no conflicts of interest (reported in Spanish at end or publication) No data available in the Abstract. Publication in Portuguese/Spanish (?) with abstract in English. No translation as yet Trial registration form reported under Guiza 2016, but publication indicated the first author should be Parra-Guiza We will try to get a translation or contact the authors for further information.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not reported in the abstract translation.
Allocation concealment (selection bias)	Unclear risk	Not reported in the abstract translation.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not reported in the translated abstract
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not reported in the translated abstract
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	No apparent loss of data after randomisation
Selective reporting (reporting bias)	Unclear risk	They do not report on pruritus in the abstract, yet this is the secondary outcome in the trial registration form. However, we do not have a translation of the paper yet, nor have we seen the trial protocol.
Other bias	Unclear risk	We were only able to assess the English abstract and so were unable to assess the whole paper.

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Pazoki 2018

Study characteristics	
Methods	RCT
Participants	Women having CS under spinal anaesthesia N = 195 women randomised, 191 women had their data analysed
Interventions	Intervention 1: 5 HT3 antagonist (Comparison 1) • Ondansetron (4 mg) • 65 randomised Intervention 2: 5 HT3 antagonist (Comparison 1) • Ondansetron (8 mg) • 65 randomised Comparator; placebo • 64 randomised
Outcomes	Headache and nausea and vomiting
Notes	Setting: Taleghani Hospital, Arak, Iran Dates: not reported Funding source: the work was supported by a grant from Arak University of Medical Sciences Declaration of interest: not reported No data included in the reviewuntil we contact authors to check the apparently conflicting information on the denominators

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	No information
Allocation concealment (selection bias)	Unclear risk	No information
Blinding of participants and personnel (performance bias) All outcomes	Low risk	*Medications were coded and administered to three groups A, B and C by an anesthetist who was not involved in the data collection, whilst the patients and the resident collecting information were unaware of patient grouping*
Blinding of outcome assessment (detection bias) All outcomes	Low risk	*Medications were coded and administered to three groups A, B and C by an anesthetist who was not involved in the data collection, whilst the patients and the resident collecting information were unaware of patient grouping*
Incomplete outcome data (attrition bias) All outcomes	Low risk	4/195 (2%) women were excluded

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Pazoki 2018 *(Continued)*

Selective reporting (reporting bias)	Unclear risk	Study just aiming at assessing headache and nausea and vomiting but we did not assess hr trial protocol and there may have been other outcomes listed.
Other bias	Unclear risk	Baselne characteristics were similar between the groups but there is very little methodology reported in the paper so assessment was unclear

Peixoto 2006

Study characteristics	
Methods	RCT
Participants	120 women undergoing elective CS under spinal anaesthesia, ASA 1-2, no pre-op emesis or antiemetic medications within 24 hours.
Interventions	Intervention 1: 5-HT $_3$ antagonist (Comparison 1) • Ondansetron 4 mg. • N = 40. Intervention 2: dopamine antagonist (Comparson 2) • Droperidol 1.25 mg. • N = 40. Comparison: placebo • Normal saline. • N = 40.
Outcomes	Nausea and vomiting up to 24 hours postoperative, adverse events.
Notes	Setting: Erechim, Brazil and Yale, Conneticut, USA. Dates: April 2001 to August 2003 Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Low risk	Randomisation code.
Allocation concealment (selection bias)	Unclear risk	Sealed envelopes, syringes prepared by member of research team not involved in care.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	All personnel unaware of allocation.
Blinding of outcome assessment (detection bias)	Low risk	All personnel unaware of allocation.

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Peixoto 2006 *(Continued)*

All outcomes		
Incomplete outcome data (attrition bias) All outcomes	Low risk	Nil.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No significant differences reported on.

Quiney 1995

Study characteristics	
Methods	RCT
Participants	Pregnant women undergoing elective CS under spinal anaesthesia. N = 40
Interventions	Intervention: anticholinergic (E) • Glycopyrrolate 4 mcg/kg. • N = 20. Comparison: placebo • Normal saline. • N = 20.
Outcomes	Hypotension, emetic symptoms, pain.
Notes	Setting: Southmead Hospital, Bristol, UK. Dates: not reported Funding source: not reported. Declaration of interest: not reported. Conference abstract. This study currently provides no data for the review because we cannot be sure women are not counted more than once because of the 3 time periods of assessment. We wrote to authors in 2009 for clarification but received no reply.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	"randomised" - but no further detail provided.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias)	Unclear risk	Not described.

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Quiney 1995 *(Continued)*

All outcomes		
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	None described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	Not described.

Rasooli 2014

Study characteristics	
Methods	RCT
Participants	Inclusiom criteria: • Women for elective CS under spinal anaesthesia • ASA 1 or 2, 20–30 years • N = 90 Exclusion criteria:
Interventions	Intervention 1: sedative (Comparison 6) • Propofol 20 mg + 1 mg/kg/hr. • bolus and infusion, after cord clamping • N = 30. Intervention 2: sedative (Comparison 6) • Midazolam 1 mg + 1.0 mg/kg/hour • bolus infusion after cord clamping • N = 30 Comparison: placebo • Bolus + infusion of saline. • N = 30.
Outcomes	nausea and vomiting and retching on 4-point score
Notes	Setting: Al-Zahra Obstetrics and Gynecology Educational Hospital, Tabriz, Iran. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Looks like N&V only examined intra-op. Authors do not state if post-op N&V specifically looked at.

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Rasooli 2014 *(Continued)*

	Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Unspecified: quote: "randomly allocated"
Allocation concealment (selection bias)	Unclear risk	Solutions were prepared by an assistant not involved in care
Blinding of participants and personnel (performance bias) All outcomes	High risk	Quote: "Double blind". However patients could see what infusion they were receiving (propofol)
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Assessments by blinded third party
Incomplete outcome data (attrition bias) All outcomes	Low risk	None
Selective reporting (reporting bias)	Unclear risk	Specified endpoints; possibly low risk?
Other bias	Unclear risk	VAS scores apparently taken but not reported

Rudra 2004a

Study characteristics

Methods	RCT
Participants	60 ASA 1-2 women scheduled for CS with spinal anaesthesia, no GI/liver/ear disease, hyperemesis, hyperlipidaemia, antiemetics within 24 hours.
Interventions	Intervention: sedative (Comparison 6) • Propofol 1 mg/kg/hour infusion. • N = 30. Comparison: placebo • 10% intralipid infusion. • N = 30.
Outcomes	Nausea, retching, vomiting, rescue antiemetics.
Notes	Setting: Calcutta National Medical College, Kolkata, India. Dates: not reported. Funding source: not reported.

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Rudra 2004a *(Continued)*

	Declaration of interest: not reported. Retching data combined with vomiting.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	High risk	Treating anaesthetist not blinded.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Unclear risk	No major differences in baseline characteristics.

Sahoo 2012

Study characteristics

Methods	RCT
Participants	52 women ASA 1-2 undergoing elective CS with spinal anaesthesia, with no contraindications to spinal anaesthesia.
Interventions	Intervention: $5HT_3$ antagonist (Comparison 1) • Ondansetron 4 mg in 10 mL saline prior to anaesthesia. • N = 26. Compaison: placebo • 10 mL saline prior to spinal anaesthesia. • N = 26.
Outcomes	Heart rate, BP, oxygen saturations, nausea, vomiting, pain.
Notes	Setting: Kolkata, India. Dates: September to December 2008

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Sahoo 2012 *(Continued)*

Funding source: not reported.

Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated randomisation.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote: "double blind". No additional information about participant blinding
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Observations were made by an anaesthetist blinded to group allocation.
Incomplete outcome data (attrition bias) All outcomes	Low risk	None apparent.
Selective reporting (reporting bias)	Unclear risk	We did not assess the study protocol.
Other bias	Low risk	Nil apparent.

Sanansilp 1998

Study characteristics

Methods	RCT
Participants	97 women undergoing CS under epidural, ASA 1-2, without history of convulsions, Parkinsonism, drug abuse and psychiatric problems.
Interventions	Group 1: dopamine antagonist (Comparison 2) • Epidural droperidol 2.5 mg (+ epidural morphine 5 mg). • N = 32. Group 2: dopamine antagonist (Comparison 2) • IV droperidol 2.5 mg (+ epidural morphine 5 mg). • N = 32. Group 3. placebo • Epidural morphine alone. • N = 33.
Outcomes	Pruritis, nausea, vomiting, sedation, pain.

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Sanansilp 1998 *(Continued)*

Notes	Setting: Siriraj Hospital, Bangkok, Thailand. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. This study currently provides no data for the review because the data are presented graphically. We have wrote to the authors in 2009 requesting the specific data.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	No information provided.
Allocation concealment (selection bias)	Unclear risk	No information provided.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote; "double blind".
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not specifically described.
Incomplete outcome data (attrition bias) All outcomes	Low risk	Appears to be no exclusions or loss to follow-up.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No evidence of other biases.

Selzer 2020

Study characteristics

Methods	RCT
Participants	Women undergoing elective CS under spinal anaesthesia (IT morphine) N = 122 women randomised
Interventions	Intervention: corticosteroid (Comparison 3) • Dexamethasone 8 mg prior to CS • IV • N = 61 women were randomised and 55 analysed Group 2: placebo.

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Selzer 2020 *(Continued)*

- Saline IV
- N = 61 women were randomised and 53 analysed

Outcomes	Nausea and vomiting (intra- and post-op), pain, satisfaction.
Notes	Setting: New York-Presbyterian Hospital/Weill Cornell Medicine in New York, NY, USA Dates: November 2012 to September 2014 Funding source: this study was funded by departmental support from the Department of Anesthesiology of Weill Cornell Medicine. There are no additional commercial or non-commercial affiliations, associations, or sources of funding to disclose. Declaration of interest: authors declared none.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "…a computer-generated simple (non-blocked) random number sequence…"
Allocation concealment (selection bias)	Unclear risk	No information on whether allocation was concealed it just reports: quote: "After randomization, the study drug…or placebo … was prepared by an unblinded investigator who had no further involvement in the study."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "All subjects, care providers, and data collectors were blinded to allocation
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "All subjects, care providers, and data collectors were blinded to allocation
Incomplete outcome data (attrition bias) All outcomes	Low risk	122 women were randomised and data from 108 analysed (11% loss of data)
Selective reporting (reporting bias)	High risk	The method section said data would be collected at 0, 1, 3, 6, 24 and 48 hours, but the results section only reports one overall incidence throughout the 48 hours. It is unclear how this overall data were calculated.
Other bias	Unclear risk	They excluded women after randomisation if they did not receive the intervention of had a PPH, these women should have still been included, but only amount to 11% loss. It is unclear if there might be other biases.

Shabana 2012

Study characteristics

Methods	RCT
Participants	220 women undergoing caesarean delivery under spinal anaesthesia

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Shabana 2012 *(Continued)*

Interventions	Intervention: sedative (F) • Ketamine 0.5 mg/kg over 20 minutes prior to spinal anaesthesia • N = 110 Comparison: placebo • Matching volume of normal saline. • N = 110
Outcomes	Nausea, vomiting, haemodynamics, adverse effects (hallucinations, sedation)
Notes	Setting: Mansoura University Hospitals, Egypt. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Authors reported the number of nausea and vomiting episodes, rather than the number of patients who had nausea and vomiting. We will attempt to contact the authors to clarify.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated random number table
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not specifically described
Blinding of outcome assessment (detection bias) All outcomes	Low risk	The treating anaesthetist was unaware of the group allocation and recorded intraoperative data
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	9 patients were excluded from the study after enrolment, it is unclear if this was before or after randomisation.
Selective reporting (reporting bias)	Unclear risk	We were not able to examine the study protocol
Other bias	Low risk	Nil apparent

Shen 2012

Study characteristics

Methods	RCT.

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Shen 2012 *(Continued)*

Participants	Incluson criteria: • Women undergoing elective CS • N = 260 randomised, no exclusions but we will only use the data from 3 of the groups as our review does not include combination drugs so 195 in the analysis Exclusion criteria:
Interventions	Intervention 1: anticholinergic (Comparison 5) • Scopolamine 0.3 mg/5 mL IV • N = 65 Intervention 2: 5HT3 antagonist (Comparison 1) • Ondansetron 4 mg IV • N = 65 Intervention 3: anticholinergic + 5HT3 antagonist - exclude as a combination of drugs • Scopolamine+ondansetron • N = 65 Comparator: placebo • N = 65
Outcomes	Nausea and vomiting
Notes	Setting: not reported but authors from China-Japan Frienship Hospital, Beijing, China Dates: not reported Funding source: not reported. Declaration of interest: not reported. English abstract only assessed, we will attempt to locate the full paper in English.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Only reported as *"…randomly divided…"*
Allocation concealment (selection bias)	Unclear risk	Not reported in abstract
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not reported in abstract
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not reported in abstract
Incomplete outcome data (attrition bias)	Low risk	Seems clear that all participants provided data (e.g.. in table 3 the percentages are in brackets)

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Shen 2012 *(Continued)*

All outcomes		
Selective reporting (reporting bias)	Unclear risk	Not possible to assess as we only have the English abstract at this point
Other bias	Unclear risk	Not possible to assess as we only have the English abstract at this point

Stein 1997

Study characteristics	
Methods	RCT
Participants	75 healthy pregnant women undergoing elective CS under spinal anaesthesia, without history of diabetes, morbid obesity previous postoperative nausea or vomiting, nausea or vomiting in the previous 24 hours.
Interventions	Intervention 1: acupuncture/acupressure (Comparison 8) • Acupressure bands + 2 mL normal saline. • N = 25. Intervention 2: dopamine antagonist (Comparison 2) • Placebo bands and 10 mg metoclopramide. • N = 25. Comparison: placebo • Placebo bands and 2 mL normal saline. • N = 25.
Outcomes	Hypotension, sedation, nausea and vomiting, Apgar score.
Notes	Setting: St. Luke's-Roosevelt Hospital Center, New York, New York, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "prospectively randomised using envelope system."
Allocation concealment (selection bias)	Unclear risk	Quote: "prospectively randomised using envelope system."
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Patients, anaesthesiologists, nurses and obstetricians were all blinded."

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Stein 1997 *(Continued)*

Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Patients, anaesthesiologists, nurses and obstetricians were all blinded."
Incomplete outcome data (attrition bias) All outcomes	Low risk	No loss to follow-up.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	None apparent.

Tarhan 2007

Study characteristics	
Methods	RCT
Participants	88 ASA 1-2, 20-38 year old women undergoing elective CS under spinal anaesthesia with no history of GI disease, recent antiemetic use or contraindication for regional anaesthesia.
Interventions	Intervention 1: sedative (Comparison 6) • Propofol 20 mg bolus, 1 mg/kg/hour. • N = 30. Intervention 2: sedative (Comparison 6) • Midazolam 1 mg bolus 1 mg/kg/hour. • N = 30. Comparison: placebo • Normal saline. • N = 28.
Outcomes	Nausea, vomiting, retching - intraoperative and postoperative.
Notes	Setting: Ankara, Turkey. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Retching combined with vomiting. In Table 2, Column 4, reports that the control group consisted of n = 28, but then in the body of the table, it states n = 30. Email correspondence with author confirms that 28 participants were actually enrolled in the control group. Drugs are in separate subgroups but then pooled in our analysis so the placebo data are dealt with according to our methods (Unit of analysis issues)
Risk of bias	

Bias	Authors' judgement	Support for judgement

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Tarhan 2007 *(Continued)*

Random sequence generation (selection bias)	Low risk	Computer-generated random number list.
Allocation concealment (selection bias)	Low risk	Drugs prepared and covered according to a random number list by a personnel member who was not aware of the study.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Double blind". No additional information about participant blinding.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Postoperative outcomes assessed by blinded clinician.
Incomplete outcome data (attrition bias) All outcomes	Low risk	None.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline differences.

Tkachenko 2019

Study characteristics	
Methods	RCT
Participants	Incclusion criteria: • Women having elective CS under spinal anaesthesia • N = 124 women provided data Exclusion criteria:
Interventions	Intervention 1: corticosteroid (Comparison 3) • Dexamethasone, 4 mg • IT • N = 42 Intervention 2: corticosteroid (Comparison 3) • Dexamethasone, 8 mg • IV • N = 41 Comparator: placebo • N = 41 We pooled the data from the 2 routes of administration of dexamethasone
Outcomes	Nausea & vomiting

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Tkachenko 2019 *(Continued)*

Notes	Setting: Kyiv City Centre of Reproductive and Perinatal Medicine, Kyiv Ukraine Dates: not reported. Funding source: not reported Declaration of interest: not reported. Conference abstract. Drugs are in separate subgroups but then pooled in our analysis so the placebo data are dealt with according to our methods (Unit of analysis issues)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Quote: "randomised"
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Quote:: “double blind” – but treating doctors unlikely to be blinded
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote:“double blind” – but treating doctors unlikely to be blinded
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	124 women provided data, unclear how many recruited
Selective reporting (reporting bias)	High risk	Authors say they will report “The patients were evaluated for blood pressure, heart rate, nausea, vomiting, shivering or other complications during intra- or postoperative period (24h).” but they only report 1 set of data and do not say if this is intra- or post-operative
Other bias	Unclear risk	Inadequate info to assess

Tzeng 2000

Study characteristics

Methods	RCT
Participants	113 women undergoing elective CS under epidural anaesthesia, ASA 1-2, age 20-35 years.
Interventions	Intervention 1: steroid (Comparison 3) • Dexamethasone 8 mg IV • N = 38. Intervention 2: dopamine antagonist (Comparison 2)

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Tzeng 2000 *(Continued)*

	• Droperidol 1.25 mg IV • N = 38. Comparison: placebo • Normal saline IV • N = 37.
Outcomes	Nausea, vomiting, need for antiemetic rescue medication.
Notes	Setting: Taipei and Tainan, Taiwan. Dates: not reported Funding source: not reported. Declaration of interest: not reported. Pruritis (local/generalised) was the only adverse event listed.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "randomisation table."
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "The randomisation process and the identity of the study drugs were blinded from the parturients, the anesthesiologists during surgery, and the investigators who collected the postoperative data".
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "The randomizations process and the identity of the study drugs were blinded from the parturients, the anesthesiologists during surgery, and the investigators who collected the postoperative data".
Incomplete outcome data (attrition bias) All outcomes	Low risk	7 women were withdrawn due to failed regional anaesthesia.
Selective reporting (reporting bias)	Unclear risk	We did not assess the study protocol.
Other bias	Low risk	No baseline difference in groups.

Uerpairojkit 2017

Study characteristics

Methods	RCT
Participants	Inclusion criteria: • Women having CS under spinal anaesthesia

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Uerpairojkit 2017 *(Continued)*

	• N = 160 women randomised; 158 women with data analysed Exclusion criteria:
Interventions	Intervention: 5HT3 antagonist (Comparison 1) • Ondansetron 2 mg/mL in 2 mL • N = 80 women randomised; 78 women with data analysed Comparator: placebo • N = 80
Outcomes	Nausea presence and severity, during first breast feed and first 24 hours, vomiting, vertigo and itching, rescue antiemetics
Notes	Setting: King Chulalongkorn Memorial Hospital and Yala Regional Hospital, Thailand Dates: 2012 to 2015 Funding source: the authors thank the Department of Obstetrics and Gynecology, Faculty of Medicine, Chulalongkorn University and Yala Regional Hospital, Yala, Thailand for their assistance and cooperation but do not mention funding as such Declaration of interest: authors reported no conflicts of interest.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "…computer random number generator…"
Allocation concealment (selection bias)	Low risk	Quote: "Corresponding code according to random number table"
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "The patients were also blinded to the study medication."
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Quote: "The study drug was given blindly according to the corresponding codes"
Incomplete outcome data (attrition bias) All outcomes	Low risk	2/160 women were excluded after randomisation
Selective reporting (reporting bias)	Unclear risk	All outcomes from methods were reported on but we did not assess the trial protocol
Other bias	Unclear risk	Baseline data were similar, but there is very little methodology reported so it is unclear if there might have been other bases.

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Ure 1999

Study characteristics	
Methods	RCT
Participants	49 ASA 1-2, singleton pregnancies, elective CS at term under spinal anaesthesia, without pregnancy-induced hypertension, placenta praevia, diabetes, coagulopathy, neurological or cardiac disease.
Interventions	Intervention: anticholinergic (Comparison 5) • Glycopyrrolate 0.2 mg. • N = 24. Comparison: placebo • Normal saline. • N = 25.
Outcomes	Nausea and vomiting, hypotension, Apgar scores.
Notes	Setting: Glasgow Royal Infirmary, Glasgow, UK. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Apgar scores not provided as median and range.

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	Not described.
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Not described.
Incomplete outcome data (attrition bias) All outcomes	Low risk	1 withdrawn prior to intervention.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	None described.

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Voigt 2013

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women undergoing elective CS under spinal anaesthesia • N = 308 women randomised, none excluded after randomisation but we only included 2 groups in our analysis so 147 women were included in our analysis Exclusion criteria:
Interventions	4 groups: Intervention 1 (group 2): 5HT3 antagonist + dopamine antagonist - not used in this review • Tropisetron+metoclopramide • N = 82 Intervention 2 (group 3): antihistamine+corticosteroid - not used in this review • Dimenhydrinate+dexamethasone • N = 79 Intervention 3 (group 4): 5HT3 antagonist (Comparison 1) • Tropisetron alone, • 4mg given after cord clamping • N = 71 Comparator (group 1): placebo • no prophylaxis • N = 76 We include only group 1 (control) and group 4 Tropisetron alone
Outcomes	Nausea and vomiting: intra-operative; early post-operative (0–2 hours); late post-operative (2–24 hours). We include intra-operative and early post-operative as per our Methods (data from the earliest time point).
Notes	Setting: Evangelian Deaconry Hospital, Freiburg, Germany. Dates: 2010 to 2012 Funding source: not reported Declaration of interest: authors stated “None of the authors have any financial relationships with commercial companies involved with a product in this study”. We will write to the authors and request data separated into nausea and vomiting and for information on the risk of bias assessments.

Risk of bias		
Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Randomisation method poorly described ("sealed envelopes")

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Voigt 2013 *(Continued)*

Allocation concealment (selection bias)	Unclear risk	Although authors report quote: "Sealed opaque envelopes opened by anaesthetist immediately prior to surgery" it is not reported if they were serially numbered.
Blinding of participants and personnel (performance bias) All outcomes	Unclear risk	No information
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Data collected by quote: "trained investigators"
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	All women appeared to be included in outcome data
Selective reporting (reporting bias)	High risk	Satisfaction and complications do not appear to be reported as per the Methods. We did not assess the trial protocol.
Other bias	Unclear risk	Limited methodological information reported.

Wang 2001

Study characteristics	
Methods	RCT
Participants	175 ASA 1-2 women (body wt 50-90 kg) undergoing elective CS under epidural anaesthesia without a history of PONV, GI disorder.
Interventions	Intervention 1: steroid (Comparison 3) • Dexamethasone 2.5 mg. • IV • N = 44. Intervention 2: steroid (Comparison 3) • Dexamethasone 5 mg. • IV • N = 44. Intervention 3: steroid (Comparison 3) • Dexamethasone 10 mg • IV • N = 43. Comparison: placebo • Placebo. • IV • N = 44.

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Wang 2001 *(Continued)*

Outcomes	Incidence of nausea, vomiting, severe vomiting (> 4 episodes), rescue antiemetics, total proportion with no nausea or vomiting.
Notes	Setting: Taipei, Taiwan. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Dose groups combined to yield overall treatment effect for dexamethasone (steroid). Drugs are in separate subgroups but then pooled in our analysis, so the placebo data are dealt with according to our methods (Unit of analysis issues)

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not stated.
Allocation concealment (selection bias)	Unclear risk	Not stated.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "The randomisation process and the identity of the study drugs were blinded from the parturients, the anesthesiologists during surgery, and the investigators who collected the postoperative data".
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "The randomisation process and the identity of the study drugs were blinded from the parturients, the anesthesiologists during surgery, and the investigators who collected the postoperative data".
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	5 excluded for missing data.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Baseline data similar.

Weiss 1995

Study characteristics

Methods	RCT
Participants	74 women undergoing spinal anaesthesia for CS.
Interventions	Intervention: sedative (Comparison 6) • Propofol 15 mg bolus after delivery of placenta. • N = no information.

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Weiss 1995 *(Continued)*

	Comparison: placebo • Intralipid. • N = no information.
Outcomes	Nausea/pruritis scales at various postoperative times.
Notes	Setting: Long Island Jewish Medical Centre, New York, USA. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. This study currently provides no data for the review because the data are presented only in graphical form. We wrote to the authors in 2009 to request the specific data. Conference abstract.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Unclear risk	Not described.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	All investigators blinded. Treatment identical in appearance to placebo.
Blinding of outcome assessment (detection bias) All outcomes	Low risk	All investigators blinded.
Incomplete outcome data (attrition bias) All outcomes	Unclear risk	Not described.
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	Nil apparent

Wu 2007

Study characteristics

Methods	Individual RCT
Participants	Inclusion criteria: • Women undergoing elective CS under spinal anaesthesia. Contraindications including if regional anaesthesia contraindicated; allergy to dexamethasone, droperidol, opioids, local anaesthetics; es-

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Wu 2007 *(Continued)*

	tablished hypertension; or glucose intolerance; GI disease; administration of antiemetic in previous 24 hours. • N = 120 women randomised, none were excluded after randomisation but we only used 3 groups in our analysis so we analysed data from 90 women. Exclusion criteria:
Interventions	Group 1: steroid (Comparison 3) • Dexamethasone 8 mg. • N = 30. Group 2: dopamine antagonist (Comparison 2) • Droperidol 1.25 mg. • N = 30. Group 3: steroid + Dopamine antagonist - data nor used in this review • Dexamethasone 4 mg + Droperidol 0.625 mg. • N = 30. Group 4: Comparison: placebo • Normal saline. • N = 30.
Outcomes	Composite outcome of nausea and vomiting
Notes	Setting: Kaohsiung Veterans General Hospital, Kaohsiung, Taiwan. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. Only useable data are postoperative vomiting. Other outcomes are amalgamated in composite score. We have written to the authors and attempt to get separated data.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Quote: "computer generated random numbers."
Allocation concealment (selection bias)	Unclear risk	No details.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Medications made up by uninvolved anaesthetist blinded to treatment
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Observers blinded to allocations.
Incomplete outcome data (attrition bias)	Low risk	No loss to follow-up, ITT analysis.

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Wu 2007 *(Continued)*

All outcomes		
Selective reporting (reporting bias)	Unclear risk	We did not assess the trial protocol.
Other bias	Low risk	No baseline imbalance.

Yazigi 2002

Study characteristics	
Methods	RCT
Participants	100 ASA 1-2 women undergoing elective CS.
Interventions	Intervention: 5-HT $_3$ antagonist (Compaeison 1) • Ondansetron 8 mg IV. • N = 50. Comparison: placebo • Normal saline. • N = 50.
Outcomes	Pruritis, nausea, vomiting, pain, side effects.
Notes	Setting: Hotel-Dieu de France University Hospital, Beirut, Lebanon. Dates: not reported. Funding source: not reported. Declaration of interest: not reported. This study currently provides no data for the review because the outcomes are reported as combined "Nausea and Vomiting". We have written to the authors requesting separated data.

Risk of bias

Bias	Authors' judgement	Support for judgement
Random sequence generation (selection bias)	Low risk	Computer-generated.
Allocation concealment (selection bias)	Unclear risk	Not described.
Blinding of participants and personnel (performance bias) All outcomes	Low risk	Quote: "Drug solutions were given according to a double blinded protocol"
Blinding of outcome assessment (detection bias) All outcomes	Low risk	Quote: "Assessment was made by an anesthesia resident who was blinded to the treatment groups".

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Yazigi 2002 *(Continued)*

Incomplete outcome data (attrition bias) All outcomes	Low risk	None described.
Selective reporting (reporting bias)	Unclear risk	Outcomes in methods reported in the results but we did not assess the trial protocol.
Other bias	Unclear risk	Similar baseline characteristics but insufficient methodology reported to be sure of no further bias.

Zeraati 2016

Study characteristics	
Methods	RCT
Participants	Inclusion criteria: • Women having CS under spinal anaesthesia • N = 92 Exclusion criteria:
Interventions	Intervention: ginger (Comparison 9) • Ginger • N = 46 Comparator: no ginger • N = 46
Outcomes	Nausea and vomiting
Notes	Setting: Bojnoord Bentolhoda Hospital, Iran Dates: 2014 Funding source: North Khorasan University of Medical Sciences Declaration of interest: not reported. We pooled the data for mild, moderate and severe nausea and the same for vomiting

Risk of bias

Bias	**Authors' judgement**	**Support for judgement**
Random sequence generation (selection bias)	Unclear risk	Described as randomised, no detail
Allocation concealment (selection bias)	Unclear risk	Not described
Blinding of participants and personnel (performance bias)	Unclear risk	Described as double blind but ginger has a taste so women likely to be aware but not clear as there is a possibility of tasteless ginger

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Zeraati 2016 *(Continued)*

All outcomes		
Blinding of outcome assessment (detection bias) All outcomes	Unclear risk	Described as double blind but ginger has a taste women likely to be aware. Outcomes "self-assessed" by women, who may or may not have known.
Incomplete outcome data (attrition bias) All outcomes	Low risk	All patients appeared to provide data
Selective reporting (reporting bias)	Unclear risk	Outcomes described in methods appeared to be reported but we did not assess the study protocol
Other bias	Unclear risk	No other apparent bias

ASA: American Society of Anaesthesiologists; **BMI:** body mass index;**BP:** blood pressure; **CS:** caesarean section; **CSE:** combined spinal epidural;**GI:** gastrointestinal; **GA:** general anaesthesia; **IT:** intrathecal;**GIT:** gastrointestinal disease;**ITT:** intention-to-treat; IV: intravenous; **LUSCS:** Lower Uterine Segment Caesarean Section; **NSAID:** non-steroidal anti-inflammatory; **PACU:** post anaesthesia care unit; **PCA:** patient controlled analgesia; **PONV:** postoperative nausea and vomiting; **PPH:** postpartum hemorrhage; **RCT:** randomised controlled trial; **VAS:** visual analogue scale.

Characteristics of excluded studies *[ordered by study ID]*

Study	Reason for exclusion
Abadi 2018	Study of acupressure vs placebo for women having CS, but under general anaesthesia.
Abboud 1984	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Abdalla 2019	No placebo group. Study on dexamethasone vs atropine vs dexamethasone + atropine for nausea and vomiting at CS
Abdellah 2018	Study comparing 2 surgical techniques (exterioration vs intraperitoneal) for CS under spinal anaesthesia.
Ackerman 1987	Study assessed lipophilic opioids drugs given predominantly for analgesia.
Ackerman 1988	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Ackerman 1989	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Afsargharehbagh 2018	No placebo group. Study looked at women having CS and compared ondansetron vs metoclopramide. Includes trial registration
Alghanem 2019	Focus of study is effects of ondansetron vs placebo on haemodynamics and not nausea and vomiting. Previous study name: NCT04140058 2019
Alipour 2017	Study looked at women having CS and compared midazolam vs ondansetron - no placebo group
Allen 2013	Dexamethazone for analgesia for post CS pain not for nausea and vomiting.
Ananthakrishnan 2004	Study compared fasting overnight with a light breakfast - not considered within our review question.

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Study	Reason for exclusion
Anonymous 2010	Focus of study was phenylephrine vs placebo in women having a CS under spinal anaesthesia assessing the incidence of nausea. However, there are no names associated with this trial registration which is now 10 years old.
Askar 2017	Study assessed combination of azithromycin + dexamethasone vs dexamethasone at CS under spinal anaesthesia, no placebo group.
Atalay 2010	The study investigated different anaesthetic techniques and their side effects, not interventions for PONV as such.
Atkinson 1980	Not an RCT.
Avramovic 1979	Study assesses an intervention given to reduce abdominal discomfort, not to reduce nausea and vomiting.
Ayorinde 2001	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Banihashem 2011	No placebo: study looking at dexamethasone vs ondansetron in women having CS under spinal anaesthesia.
Belzarena 1993	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Bifarini 1990	Following translation, study assessed drugs given for aspiration prophylaxis, not for prevention of nausea and vomiting.
Bifarini 1992	Following translation, study assessed drugs given for aspiration prophylaxis, not for prevention of nausea and vomiting.
Biwas 2002	No placebo group. Study looked at metoclopramide vs glycopyrrolate vs 'metoclopramide + glycopyrrolate'
Bonhomme 2002	Study on droperidol vs placebo, but interventions not given at CS but given postnatally
Boschi 1984	Not an RCT; women were divided into groups.
Briao 2015	This study examines pruritis - not nausea and vomiting - as the main outcome.
Brock-Utne 1989	Not an RCT; women were allocated to groups.
Brody 2008	Study relates to the use of IM ephedrine (predominantly for preventing hypotension rather than PONV).
Bylsma-Howell 1983	Study was assessing the effect of metoclopramide on gastric emptying and aspiration prophylaxis not for reducing nausea and vomiting.
Chan 1992	Study was a quasi-RCT.
Chan 1997	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Chang 2011	Study on mitazapine, an antidepressant, so not included.
Chattopadhyay 2015	No placebo: study on palonosetron vs ramosetron in women undergoing CS under spinal anaesthesia.
Chaudhuri 2004	No placebo. Study looked at 'dolasetron + metoclopramide' vs metoclopramide at CS under regional anaesthesia

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Study	Reason for exclusion
Chauhan 2014	No placebo group. Looked at nausea and vomiting with ramosetron vs ondansetron in women having CS under regional anaesthesia
Chen 2005	Not an RCT; women were assigned to groups.
Chestnut 1989	No placebo group. Study looked at nausea and vomiting with metoclopramide vs droperidol in women having CS under epidural anaesthesia
Chung 1998	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Cohen 1984	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. No information on how women were allocated to groups.
Cohen 2016a	Comparing different interventions and no placebo group. Scopolamine patch vs acupressure point P6 vs scopolamine + acupressure point P6.
Colman 1988	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. No information on how women were allocated to groups.
Connelly 1997	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Cooper 2002	Study assessed drugs given for manipulation of blood pressure, not for prevention of nausea and vomiting.
Cowan 2002	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Dahlgren 1997	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Dailey 1988	Studied effect of cimetidine and ranitidine on lignocaine concentrations in the blood.
Datta 1982	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting. No information on how women were allocated to groups.
Demirhan 2013	No placebo group. Study looked at nausea and vomiting with ondansetron vs dexamethasone vs 'ondansetron + dexamethasone' in women having CS under spinal anaesthesia
Dereu 2019	No placebo group. Study compared IT morphine with TAP block with ropivacaine + clonidine
Dewan 1982	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not described as an RCT; women were assigned to groups.
Dewan 1984	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Dewan 1985	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Dundee 1979	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. No information on how women were allocated to groups.
El Khouly 2016	Interventon (ondansetron) for reducing hypotension not nausea and vomiting. Trial registration reference: PACTR201601001397193 2015
El Saied Hafez 2017	Study is looking at the effect of gabapentin for pain relief at CS under spinal anaesthesia. Gabapentin is an anticonvulsant with side effect of nausea and vomiting and we are excluding anticonvulsant drugs.

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Study	Reason for exclusion
El-Deeb 2011	Combination drugs. Study on 'granisetron (5-HT3 antagonist) + dexamethasone (corticosteroid)' vs 'midazolam (sedative) + dexamethasone (corticosteroid)' vs placebo in women having CS under spinal anaesthesia.
Elhakim 2005	Study assess medication given for the purpose of pain relief not reduction of nausea and vomiting.
Elmetwally 2019	Study assessing effects of atropine vs metoclopramide on nausea and vomiting at CS, but no placebo group. Previous study name: NCT03932578 2019
Ewart 1990	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Fan 1994	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Farzi 2017	Primary focus was analgesia and block duration, not specifically nausea and vomiting. Drugs included: fentanyl vs sufentanil vs placebo.
Fattahi 2015	Study assesses incidence of headache not nausea and vomiting.
Fazel 2017	The study is described as a 'double-blind clinical trial' with no mention of randomisation nor of type of anaesthesia used. Also, the oil is given to women with nausea - so it appears to be a treatment study not a prevention study. The publication is in Iranian and we only have the English translation of the abstract to consider.
Flynn 1989a	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Study of effect of 400 mg cimetidine or 150 mg ranitidine or placebo on plasma levels of bupivacaine at CS.
Flynn 1989b	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Study of effect of 200 mg cimetidine plasma levels of lignocaine at CS.
Flynn 1989c	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Study of effect of 400 mg cimetidine or 150 mg ranitidine or placebo on plasma levels of lidocaine at CS.
Fogarty 1992	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Frank 1984	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Freeman 1999	Study assessed the use of sodium citrate (normally used for reducing aspiration pneumonitis during general anaesthesia) for spinal anaesthesia at CS. Although the study assessed nausea and vomiting, this was not the primary purpose.
Fujii 1998a	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).
Fujii 1998b	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).
Fujii 1999	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).

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Study	Reason for exclusion
Fujii 2002	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).
Fujii 2004	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).
Gaiser 2002	IV fluids is not an intervention we are covering in this review. Study was on IV fluids vs placebo in women having CS under regional anaesthesia.
Galehdar 2011	No placebo: study looking at high vs low oxygen in women having CS under spinal anaesthesia and oxygen is not generally given during spinal anaesthesia.
Galehdar 2016	No placebo group, studying ondansetron vs acupressure for nausea and vomiting in women having elective CS.
Gangadhara Gowda 2014	No placebo. Study compares IT fentanyl versus IV ondansetron for nausea and vomiting at CS under spinal anaesthesia.
George 2018	No placebo and comparing two methods of administration of phenylephrine (infusion vs bolus).
Ghods 2005a	Intervention was given in the postoperative period for prevention of nausea and vomiting. Our protocol includes studies only where interventions were given during the CS.
Gunka 2013	Study assessed effect of ondansetron on cardiac output, not for prevention of nausea and vomiting. Previous study name: NCT01841606 2013
Gutsche 1976	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Habib 2019	Study looking at cyclizine versus dexamethasone for nausea and vomiting but no placebo group. Previous study name: NCT03931135 2019
Hackworth 2010	Focus is hypotension and bradycardia, not nausea and vomiting: study of women having CS under spinal anaesthesia with nausea and vomiting only secondary outcomes.
Hafez 2017	The focus of this study was the effect of gabapentin (an anticonvulsant) on analgesia with a passing mention of nausea and vomiting.
Hajian 2016	Study focused on ondansetron's effect on haemodynamics, assessing blood pressure and heart rate primarily and only nausea and vomiting as additional information.
Hamzei 2015	The intervention in this study is not given primarily to prevent nausea and vomiting.
Han 2007	Study is assessing different routes of administration, not the efficacy of the medication itself.
Hildyard 2000	Data presented graphically, but without numerical results. We wrote to the authors in June 2008 but received no response.
Hodgkinson 1983	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not ITT analysis for primary outcome and high exclusion rates post randomisation.
Holdsworth 1974	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not an RCT.

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Study	Reason for exclusion
Holdsworth 1978	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Quasi-RCT.
Holdsworth 1980	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not an RCT. Assessing women's positions for GA.
Hong 2004	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Hunt 1989	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Husemeyer 1980	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Huseyinogclu 2016	Women all had general anaesthetic.
Hussain 2011	Study assessed interventions for improving gastric emptying not nausea and vomiting.
Hussain 2014	Study was with women having general anaesthetic for CS and not spinal anaesthesia, also the focus was on reducing acidity, and not nausea and vomiting.
Imeh 2014	No placebo group. Study looked at nausea and vomiting with dexamethasone vs ondansetron in women having CS under spinal anaesthesia.
Iqbal 2000	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Ishiyama 2001	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Jabalameli 2011	No placebo group. Women having CS under general anaesthesia: study looking at remifentanil vs fentanyl vs fentanyl + morphine for nausea and vomiting.
Jabalameli 2012	No placebo group: study compared midazoalm vs ondansetron vs midazoalm + ondansetron for nausea and vomiting at CS under spinal anaesthesia.
Jacquemyn 2013	Drugs are not antiemetics. Main focus of study was carbitocin and oxytocin for postpartum haemorrhage and their influence on nausea and vomiting. Prevous study name: ISRCTN95504420 2013
Jain 2015	No placebo group. Study on nausea and vomiting with ondansetron vs glycopyrrolate in women having CS under spinal anaesthesia
Jain 2017	Study drugs not antiemetics. Study on women at < 36 weeks' gestation having elective CS, looking at use of rabeprazole and ranitidine for reducing stomach volume. Previous name: CTRI/2017/11/010517 2017
Jasson 1989a	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Jeon 2000	Study randomised women having CS under regional anaesthesia to spinal vs epidural, then investigated effects of propofol on sedation with nausea and vomiting as side effects.
Kang 1982	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Kangas-Saarela 1990	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.

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Study	Reason for exclusion
Karamanlioglu 1995	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Karaoren 2019	Study on effects of sitting vs supine positions during CS on hypotension Previous study name: NCT03834259 2019
Karimi 2020	Study compared dexamethasone vs ondansetron with no placebo
Kiasari 2017	Study comparing two routes of administration of the same drug, dexamethazone, intravenous vs intrathecal. No placebo group. Previous study name: IRCT2016112631095N1 2017
Kimura 2011	This was a study of treatment not prevention. Intervention was only administered if the woman developed nausea.
King 1998	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Kita 2018	Study appears to allocate to different types of regional anaesthesia and then assess nausea and vomiting but difficult to assess.
Kjaer 2006	In this review, we are assessing the efficacy of medication given for the specific purpose of reducing nausea and vomiting at CS. In this study, the medication is given for the purpose of aspiration prophylaxis, and the incidence of emetic side effects is being studied.
Kocamanoglu 2005	Study looked at prevention of postoperative nausea and vomiting after general anaesthesia for cesarean section not regional anaesthesia.
Kumar 2017	The main focus of this study is on the effect of ondansetron on blood pressure and heart rate.
Lal 2018	Looking at medication for blood pressure not nausea and vomiting. Drugs included propofol + ranitidine + metoclopramide vs ranitidine + metoclopramide. Previous study name: CTRI/2018/03/012692 2018
Landa 2016	Study looked at ketorolac (a nonsteroidal anti-inflammatory drug (NSAID) vs placebo. This group of drugs is not included in this review.
Lane 2012	This study investigates treatment (rather than prophylaxis).
Lee 1992	Looking at opioid (nalbuphine) as analgesic in women having CS under epidural anaesthesia, opioids are excluded from this review.
Lee 2001	No placebo and focus is on analgesia. Study looked at the effect morphine vs nalbuphine on analgesia for women having a CS under regional anaesthesia.
Levin 2018	No placebo group. Study looked at women having CS under spinal anaesthesia and compared scopolamine versus acupuncture P6 versus 'scopolamine + acupuncture P6' for nausea and vomiting.
Lim 1991	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not randomised.
Lin 1996	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.

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Study	Reason for exclusion
Liu 2015	This study did not appear to report any of our primary outcomes.
Loughrey 2002	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Madhumala 2019	No placebo group, Comparing chewing gum vs ondansetron for nausea and vomiting. Prevous study name: CTRI/2019/06/019923 2019
Malekianzadeh 2012	Focus is on reducing hypotension with spinal anaesthesia for CS, not on nausea and vomiting. Previous study name: IRCT201111138090N1 2012
Manullang 2000	No placebo group. Study on nausea and vomiting with fentanyl vs ondansetron in women having CS under spinal anaesthesia.
McCaughey 1981	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not a randomised study.
Mebazaa 2003	Study assessing the anaesthetic drug, not intervention for prevention of nausea and vomiting.
Memari 2015	We are not including anticonvulsant drugs in this review. The study was on nausea and vomiting with gabapentin versus placebo in women having CS under spinal anaesthesia
Mofrad 2019	The main focus of the study is blood pressure. Previous study name: IRCT20191015045121N1 2019
Mokhtar 2016	Study on ondansetron vs placebo but focusing on shivering with nausea and vomiting only secondary outcomes Previous study name: PACTR201612001896411 2016
Murphy 1984	Study assessed effect of metoclopramide on gastric emptying for reducing nausea and vomiting.
Nado 2017	Study looked at a combination of drugs, propofol (sedative) + dexamethasone (steroid), vs placebo. Combinations of drugs are excluded from this review
Naja 2016	Study assessed effect of ondansetron vs ondansetron + dexamethasone on relieving side effects of morphine, primary outcome is pruritus, and not for prevention of nausea and vomiting. Previous study name: NCT02793843 2016
Nallam 2017	Main focus is on ondansetron vs placebo for shivering.
Nantasupha 2016	This study does not assess an intervention given at CS to reduce nausea and vomiting.
Ngan 2000	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Ngan 2001	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Ngan 2004a	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Ngan 2004b	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Niaki 2016	No placebo group. Compared cumin vs peppermint vs milk of magnesia for gastrointestinal complications at CS.

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Study	Reason for exclusion
Nivatpumin 2009	Studies metoclopramide vs ondansetron vs dexamethasone + metoclopramide vs dexamethasone + ondansetron for nausea and vomiting at CS, but no control group
Nivatpumin 2016	Interventions in this study are not given for the purpose of preventing nausea and vomiting.
Numazaki 2000	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).
Numazaki 2003	This study was retracted by the publishing journal after uncertainty was raised as to the validity of the data (Carlisle 2012).
O'Sullivan 1985	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
O'Sullivan 1988	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Olsen 1994	Study assessing interventions for blood pressure control, not prevention of nausea and vomiting.
Ormezzano 1990	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Orr 1993	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Osman 1995	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. No information on the number of women in each group.
Ostheimer 1982	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Ouyang 2002	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Owczarzak 1997	No placebo group. Study on nausea and vomiting with ondansetron vs metoclopramide in women having CS under epidural anaesthesia
Ozkan 2000	Study investigates medication given for aspiration prophylaxis not nausea and vomiting prevention.
Pakniat 2017	Study on ginger vs metoclopramide for nausea and vomiting at CS but no placebo group.
Palmer 1991	Study investigates medication given for aspiration prophylaxis not nausea and vomiting prevention.
Palmer 1995	Study assessing fentanyl for pain relief.
Pecora 2009	Study on supplemental oxygen vs placebo - not an intervention in this review.
Peivandi 2019	Study looked at women having an elective CS under spinal anaesthesia and compared naloxone with placebo focusing on pain management. Nausea was only an additional outcome.
Pellegrini 2001	Study assessed drugs given with regard to analgesia, not for prevention of nausea and vomiting. Opioid antagonists were not included in the protocol as possible interventions for reducing nausea and vomiting.
Phillips 2007	Study on supplemental oxygen vs placebo - not an intervention in this review

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Study	Reason for exclusion
Pickering 1980	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Pogodin 2012	Study looking at oxygen for nausea and vomiting at CS under spinal anaesthesia, but there is no good theoretical basis for this intervention.
Popivanov 2019	Study assessing effects of chewing gum vs ondansetron for nausea and vomiting at CS but no placebo group. Previous study name: NCT04191694 2019
Prakash 2006	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Prakash 2019	Primary focus is reducing high blood pressure with ondansetron not on nausea and vomiting Previous study name: CTRI/2019/02/017489 2019
Qvist 1983	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not randomised.
Qvist 1985	Studied effect of placental transfer of cimetidine given prior to induction of anaesthesia.
Rahman 2018	Study on peppermint + granisetron + dexamethasone vs granisetron + dexamethasone, so no placebo group. Additional previous study name: NCT03434340 2018
Ramanathan 1983	Study assessing interventions given for blood pressure control, not prevention of nausea and vomiting.
Ramin 1994	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Rasooli 2019	No placebo. Study looked at women having CS under spinal anaesthesia and compared 'phenylephrine/metoclopramide + ondansetron' vs 'phenylephrine/metoclopramide' with primary outcome of nausea and vomiting.
Ravindranathan 2018	No comparison vs placebo, propofol + ranitidine + metoclopramide vs ranitidine + metoclopramide with women having CS under spinal anaesthesia Previous study name: CTRI/2018/05/013610 2018
Razanejadi 2018	No placebo group, only dexamethasone vs ondansetron. Previous study name: IRCT20180210038681N1 2018
Rocke 1994	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Rout 1992	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Rout 1993	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Rudra 2004b	Assesses medication given predominantly for the purpose of achieving surgical analgesia, not for the purpose of reducing nausea and vomiting.
Sadeh 2019	No full placebo group. 4 mg ondansetron + 4 mg dexamethasone vs 4 mg ondansetron + 8 mg dexamethasone vs 4 mg ondansetron + placebo.

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Study	Reason for exclusion
	Previous study name: IRCT20190409043219N2 2019
Saem 2017	No placebo and focus is hypotension not nausea and vomiting. Study looking at women having CS under spinal anaesthesia and comparing lidocaine + pethidine vs lidocaine vs bupivacaine. Previous correct study name: IRCT20170417033491N2 2017
Sahare 2013	No placebo. Study looking at women having CS under spinal anaesthesia comparing ondansetron vs granisetron vs ramosetron.
Sane 2015	No placebo group. Study on nausea and vomiting with ondansetron vs dexamethasone vs 'ondansetron + dexamethasone' in women having CS under spinal anaesthesia.
Sane 2016	Study looked at midazolam vs ondansetron vs midazolam + ondansetron for nausea and vomiting at CS under spinal anaesthesia - no placebo group.
Sane 2017a	Study looking at ondansetron vs propofol in women having CS under spinal anaesthesia, no placebo group and focus is pruritus not nausea and vomiting. Previous study name: IRCT2017041527677N7 2017. Different studies from Sane 2017 and 2016
Santos 1984	Study did not appear to randomise women to each intervention.
Seidy 2010	No placebo. Study looked at women having CS (though unclear the type of anaesthesia) comparing supplemental oxygen 80% versus 30%.
Sen 2001	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Seyedhejazi 2007	Assess medication given for the purpose of achieving surgical anaesthesia, not for the purpose of reducing nausea and vomiting.
Shafaeiyan 2018	Study assessing effect of warming fluids at CS under spinal anaesthesia on pain.
Shafeinia 2020	The main focus of the study is effect of phenylephrine on haemodynamic changes and blood pressure. Now has full publication under Shafeinia 2020. Previous study name: IRCT20191007045023N1 2019
Shahriari 2009	No placebo group. Study on N&V with midazolam vs metoclopramide in women having CS under spinal anaesthesia.
Shaikh 2015	No placebo group. Study om nausea and vomiting with midazolam vs fentanyl in women having CS under spinal anaesthesia.
Shende 1998	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Shifman 2010	The study compared 2 different doses of the same drug (4 mg vs 12 mg dexamethasone).
Shin 2019	Study of women at CS under regional anaesthesia comparing midazolam + fentanyl vs midazolam where nausea and vomiting is a side effect of midazolam - no placebo group.
Siddik-Sayyid 2002	Study assessed drugs given for analgesia, not for prevention of nausea and vomiting.
Singh 2018	Focus is shivering not nausea and vomiting which are only secondary outcomes. Study looking at women having CS under spinal anaesthesia, comparing granisetron vs placebo.

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Study	Reason for exclusion
Stuart 1996	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not ITT.
Sultan 2014	Not an RCT but a pharmacokinetic study.
Sutanto 2013	Looking at affect of oral supplements on metabolic stress. Study of women having CS (type of anaesthesia not reported) comparing: oral nutritional supplement (carbohydrate, protein and fat) 200 mL at 1 kcal/mL + vitamin & minerals – no fibre vs tea with sugar 40 k cals carbohydrate.
Swaro 2018	Study assessed effect of palonosetron vs dexamethasone vs palonosetron + dexamethasone on nausea and vomiting in women having CS under spinal anaesthesia - no placebo group
Tanaka 2007	Not an RCT but a dose-response study.
Taylor 1966	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Not an RCT.
Tekyeh 2013	Study examines different doses of anaesthetic rather than an intervention for preventing nausea and vomiting.
Terui 2014	Study on acetaminophen (paracetamol) vs placebo, a drug not included in this review.
Tettambel 1983	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Quasi-RCT.
Tianthong 2018	Study focuses on ginger for abdominal extension in women having CS.
Trabelsi 2015	The focus of this study is on hypotension not nausea and vomiting
Tripathi 1995	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Tryba 1983	Assesses medication given for the purpose of aspiration prophylaxis not nausea and vomiting.
Tshibangu 2010	The study assessed the impact of IT morphine given primarily for postoperative analgesia.
Varshney 2019	Main focus is shivering not nausea and vomiting. Study is on ramosetron vs placebo in women having CS under spinal anaesthesia.
Vercauteren 2000	Study assessing drugs given for blood pressure control, not prevention of nausea and vomiting.
Viney 2012	Study of surgical techniques. Study looked at women having CS and compared intra-abdominal irrigation with no irrigation assessing nausea as the main outcome.
von Braun 1994	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting. Number of women in each group not reported.
Wang 2014	No placebo. Study on women at high risk of PPH needing hemabate during CS looking at droperidol vs dexamethasone.
Wani 2015	Study looked at women having CS under subarachnoid block comparing ondansetron vs P6 acupressure for carboprost induced nausea and vomiting - no placebo
Wig 1987	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.

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Study	Reason for exclusion
Xu 2018	Study focuses on effects of phenylephrine (a decongestant) vs bupivacaine vs placebo on maternal haemodynamics and cord blood gasses. Previous study name: NCT03507387 2018
Yang 2018	Study looking at women having CS (but no information on type of anaesthesia) comparing 50 mL of water with no water - intervention to within our remit.
Yau 1992	Study assessed interventions for reducing aspiration pneumonitis at CS not for reducing nausea and vomiting.
Yazdi 2015	Study is assessing different levels of oxygen with no placebo group and also the main focus is arterial oxygen saturation and not nausea and vomiting.
Zabetian 2014	Study looked at midazolam vs propofol in women having CS under spinal anaesthesia but there was no placebo group.
Zarief 2018	No placebo. Study looking at effect of IT atropine vs dexamethasone on nausea and vomiting. Previous study name: NCT03387956 2018
Zoroglu 1999	Study assessed interventions for reducing aspiration pneumonitis at caesarean section not for reducing nausea and vomiting.
Zue 1999	Study assessed interventions for reducing aspiration pneumonitis at caesarean section not for reducing nausea and vomiting.
Ünlügenç 2016	Study assessed ondansetron on cardiac effects, not for prevention of nausea and vomiting. Previous study name: NCT02928601 2016

CS: caesarean section;**GA:** gestational age;**IT:** intrathecal;**ITT:** intention to treat;**IV:** intravenous; **RCT:** randomised controlled trial; **PONV:** postoperative nausea and vomiting; **PPH:** postpartum hemorrhage; **vs:** versus

Characteristics of studies awaiting classification *[ordered by study ID]*

Ahn 2017

Methods	Unclear. The authors report: "*This study used a non-equivalent control pre-post quasi-experimental design.*" which suggests they did not randomise yet they say they "...randomly assigned...' .
Participants	• Women having elective CS under spinal anaesthesia • N = 52 women randomised and data on 50 analysed
Interventions	Intervention: acupressure • N = 26 Comparator: no intervention • N = 26
Outcomes	Nausea, vomiting and pain
Notes	Setting: Korea Dates: not reported

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Ahn 2017 *(Continued)*

	Funding source: no specific funding Declaration of interest: reported as none New 2020. We will write to the authors for clarification.

Biswas 2002

Methods	
Participants	Comparison between IV metoclopramide and IT fentanyl to prevent intraoperative and early PONV in patients undergoing caesarean delivery under spinal anaesthesia.
Interventions	IV metoclopramide and IT fentanyl, unclear if there is a placebo or not
Outcomes	Nausea and vomiting
Notes	We are trying to locate this paper.

Gamermann 2015

Methods	RCT.
Participants	Women undergoing CS under spinal anaesthesia. N = 56
Interventions	Intervention: acupuncture • 'one session of acupuncture' following spinal anaesthesia • N = ? Comparator: placebo • sham intervention (no needling) • N = ?
Outcomes	Nausea, vomiting, pain scores 24 and 48 hours post-op.
Notes	Setting: Dates: Funding source: Declaration of interest: Abstract only. We will write to the authors seeking the full paper. We are trying to locate the publication in Acupuncture & Related Therapies 2015 (Feb) 3(1) 11-14.

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Litchfield 2007

Methods	RCT.
Participants	Women undergoing elective CS under spinal anaesthesia. N =
Interventions	Intervention: antihistamine • Promethazine (IM) • N = Comparator: placebo • Normal saline • N =
Outcomes	Nausea and pruritus
Notes	Conference abstract only. It is unclear if this is a randomised trial or not. No data available for our review as authors are reporting scores. We will attempt to contact the author to obtain the full paper or further information and data. Setting: Naval Medical Center, Portsmouth, Virginia, USA

Malhotra 2019

Methods	RCT
Participants	Women having CS under spinal anaesthesia N =
Interventions	Intervention 1: anticholinergic • Glycopyrrolate • N = Intervention 2: corticosteroid • dexamethasone • N = Intervention 3: dopamine antagonist • metoclopramide • N = Comparator: placebo • N =
Outcomes	Nausea and vomiting
Notes	Setting: Dates:

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Malhotra 2019 *(Continued)*

	Funding source: Declaration of interest: Conference abstract with no information on the institution nor numbers of women allocate to the groups. We will try and contact the authors.

Salman 2016

Methods	
Participants	
Interventions	
Outcomes	
Notes	We are trying to locate this paper

Sane 2017

Methods	Unclear
Participants	Women having CS under spinal anaesthesia
Interventions	Intervention: granisetron Comparator: placebo
Outcomes	Pruritis
Notes	It is unclear this is an RCT and abstract doesn't mention nausea and vomiting, only pruritis (though nausea and vomiting in title). Only have Engllsh abstract and the rest of paper in Iranian. We will try to get a translation and/or write to authors.

Sarat 2007

Methods	RCT - but not clear
Participants	Women undergoing elective caesarean delivery.
Interventions	Glycopyrrolate, metoclopramide, ondansetron.
Outcomes	
Notes	Abstract only, awaiting full paper.

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Shah 2016

Methods	Unclear
Participants	Women having a CS under combined spinal epidural anaesthesia
Interventions	Bilateral acupoint stimulation at P6 vs unilateral acupoint stimulation at P6 - unclear if there is a no stimulation group
Outcomes	Nausea and vomiting
Notes	We only have the conference abstract title: 'Is bilateral nei-guan point (P6) stimulation more effective than unilateral P6 stimulation in reducing nausea and vomiting (N/V) during and after caesarean section (C/S) with combined spinal epidural (CSE) anaesthesia?'. We will write to authors for further information.

Zakeri 2014

Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Pethidine vs midazolam vs placebo
Outcomes	Analgesia, haemodynamics with nausea and vomiting 5th primary outcome
Notes	A clinical trial 0f analgesic effects, hemodynamic changes and PONV after IT injection of bupivacaine plus midazolam, bupivacaine plus pethidine or bupivacaine alone in elective cesarean Ssction Scientific enquiries: Habib Zakeri - email: zakerihabib@gmail.com We are unsure of the primary focus as nausea and vomiting is the 5th primary outcome. We will asses for classification when the full paper is published and then decide what the primary focus is. https://en.irct.ir/trial/17203 IRCT2014102719145N2 2014

CS: caesarean section;**IM:** intramuscular; **IT:** intrathecal;**IV**: intravenous;**PONV:** postoperative nausea and vomiting; **RCT:** randomised controlled trial; **vs:** versus.

Characteristics of ongoing studies *[ordered by study ID]*

Abramovitz 2007

Study name	A double-blind, placebo-controlled study to evaluate the effect of intramuscular ephedrine on the incidence of perioperative nausea and vomiting during elective caesarean section
Methods	RCT
Participants	Women having CS with spinal anaesthesia
Interventions	Ephedrine vs placebo
Outcomes	Nausea and vomiting

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Abramovitz 2007 *(Continued)*

Starting date	February 2007
Contact information	Sharon Abramovitz, email: sea2003@med.cornell.edu and Vanessa J Pressimone, email: vjp2001@med.cornell.edu
Notes	https://clinicaltrials.gov/ct2/show/NCT00432991 New York Presbyterian Hospital, USA

Amini 2019

Study name	Comparison of the effect of acupressure and ondansetron on prevention of nausea and vomiting among patients undergoing cesarean section under spinal anaesthesia
Methods	RCT
Participants	Women having elective CS under spinal anaesthesia
Interventions	Acupressure vs ondansetron vs placebo
Outcomes	Nausea and vomiting
Starting date	13 March 2019 (expected start date)
Contact information	Amir Amini, email: aminiamir150@yahoo.com
Notes	Setting: Khorramdarh Booali Hospital, Emam Hossain Square, Khorramdarh, Zanjan, Iran Previous study name: IRCT20190127042519N1 2019

An 2016

Study name	The antiemetic efficacy and safety of subhypnotic dose of propofol for decreasing the incidence of intraoperative nausea and vomiting during caesarean section
Methods	RCT
Participants	Inclusion criteria: 1. ASA I-II; 2. elective caesarean section; 3. gestation period ≥ 37 weeks; 4. breast-feeding. Exclusion criteria: 1. who had gastrointestinal diseases; 2. who had history of motion sickness and/or previous emesis 24 hours before surgery; 3. who are allergic to propofol; 4. whose body weight 2 times than normal; 5. who had a history of emesis in an intraoperative, post-delivery period; 6. who had received any antiemetic medication within 24 hours before surgery.
Interventions	Propofol vs placebo
Outcomes	Nausea, retching, vomiting
Starting date	20 Oct 2016 to 28 Feb 2017
Contact information	Jianxiong An: email - anjianxiong@yeah.net

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An 2016 *(Continued)*

Notes	http://www.chictr.org.cn/historyversionpuben.aspx?regno=ChiCTR-INR-16009539

Barzanji 2019

Study name	Assessment of pyridoxine (vitamin B6) effects on the nausea and vomiting rates in patients candidate for elective cesarean section
Methods	RCT
Participants	Women having elective CS
Interventions	Vitamin B6 (25 mg) vs vitamin B6 (50 mg) vs vitamin B6 (100 mg) vs placebo
Outcomes	Nausea and vomiting
Starting date	Expected 5 May 2019
Contact information	Seyed Arvin Barzanji email: besathospital@muk.ac.ir
Notes	IRCT20171216037910N1 Previous study name: IRCT20171216037910N1 2019

Bi 2017

Study name	Effect of propofol for prevention of post-delivery nausea and vomiting during elective cesarean delivery under spinal anaesthesia
Methods	RCT
Participants	**Inclusion**: patients aged 20-40 years, with physical statues I and II with full term pregnancy undergoing elective CS under spinal anaesthesia. N = **Excusion**: patients with allergy or hypersensitivity to granisetron, propofol or fat emulsion; history of nausea and vomiting within 24 hours before CD; history of gastrointestinal or psychiatric disease, motion sickness, smoking,PONV; morbid obesity(weight > 85 kg); consumption of drugs such as opioids, antiemetics, H2-antagonist, phenothiazines and/or corticosteroids within 24 hours before the study period; any chronic medical or surgical disorders complicating the pregnancy; and conditions contraindicating regional anaesthesia
Interventions	Intervention: propofol • Propofol (20 mg bolus and 1.0 mg/kg/hour) • N = Comparator 1: placebo - lipid emulsion • Lipid emulsion 2 mL IV, then 0.1 mL/kg/hour (ChiCTR-IOR-17010491) • N = Comparator 2: placebo • Saline 0.03 mL/kg then 0.01 mg/kg/hour

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Bi 2017 *(Continued)*

	• N = Both groups given hemabate as prophylactic for PPH
Outcomes	Primary outcome is the presence of post-delivery intra-operative nausea and vomiting. Secondary outcome include the need for rescue antiemetic, the presence of hypertension, chest pain, headache, and other adverse outcome caused by hemabate.
Starting date	1 March 2017
Contact information	Yanmei Bi, Email: scutanling@163.com. West China Second Hospital, Sichuan University, West China Women's and Children's Hospital.
Notes	Dates: 01/03/2017 to 30/09/2017 Trial registration: NCT03185156 and ChiCTR-IOR-17010491. JG+GG: include as on-going study - propofol vs placebo.

Cohen 2016b

Study name	Is Intra-operative acupuncture point P6 stimulation as effective as traditional pharmacotherapy in reducing nausea and vomiting during cesarean section with regional anaesthesia?
Methods	RCT. Ongoing study for acupuncture vs placebo data
Participants	Inclusion criteria: • Women ages 18 to 45; women with American Society of Anesthesiologists (ASA) Class I or II; women with elective primary or repeat caesarean delivery; women who receive combined spinal epidural anaesthesia; English and non-English speaking subjects will be included in the study Excluson criteria: • Women < 18 years of age; women requiring emergent caesarean delivery; history of placenta accrete; multiple gestation pregnancy; ASA status III or higher; current history of pregnancy-induced hypertension, pre-eclampsia, or eclampsia; history of any chronic medication use (other than prenatal vitamins), including inhaler medications; current urinary tract infection, pneumonia, or otitis media
Interventions	Intervention 1: • Acupressure Point P6 stimulator Interventon 2: • Metoclopramide + Ondansetron Comparator: • No anti-emetic medications and no acupuncture point P6 stimulation
Outcomes	Nausea and vomiting, etc.
Starting date	Juky 2015
Contact information	Shaul Cohen - email: cohensh@rwjms.rutgers.edu
Notes	Setting: Robert Wood Johnson University Hospital, New Brunswick, New Jersey, USA, 08901

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Cohen 2016b *(Continued)*

	Dates; Funding: Declaration of interests: Study results in Trial reg website - so look for publication.

Fanelli 2009

Study name	IntrathecalaAtropine to prevent nausea and vomiting after spinal anaesthesia with morphine for elective caesarean section: a randomised controlled trial
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Atropne IV vs atropine intrathecal vs placebo
Outcomes	Nausea and vomiting
Starting date	May 2007-May 2008
Contact information	Contact: Guido Fanelli: University and Hospital of Parma, Parma, PR, Italy 43126
Notes	Over 10 years old.

Farokhi 2016

Study name	Comparison of dexamethasone-ketamine and dexmedetomidine for prevention of postoperative nausea and vomiting during and after cesarean section under spinal anaesthesia
Methods	RCT
Participants	Women having an elective CS under spinal anaesthesia
Interventions	Dexamethasone vs ketamine vs dexmedetomidine (dexamethazone + ketamine) vs placebo
Outcomes	Nausea and vomiting, etc
Starting date	Expected start date 22 June 2017 to expected end date 22 June 2019
Contact information	Fariba Farokhi email: f.farokhi@arakmu.ac.ir and Nilufar Shams email: alikamaliir@yahoo.com
Notes	Setting: Taleghani Hospital, Emam Khomeini Street, Arak, Iran

Gazi 2018

Study name	A comparative study on effect of low dose ketamine VS dexamethasone on intraoperative nausea and vomiting during cesarean section under spinal anaesthesia

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Gazi 2018 *(Continued)*

Methods	RCT.
Participants	Women having CS under spinal anaesthesia
Interventions	Ketamine IV vs dexamethasone vs placebo
Outcomes	Nausea and vomiting
Starting date	April 2018
Contact information	Ahmad Gazi, email: dr.ghaziahmad@gmail.com and Sona Emami, email: sona_emami@yahoo.com
Notes	Setting: Alavi Hospital, Moadi Street, Ardabil, 5615783134, Ardabil, Iran GG: managed to locate at https://apps.who.int/trialsearch/Trial2.aspx?TrialID=IRCT20150808023559N18 Previous study name: IRCT20150808023559N18 2018

Hao 2019

Study name	A randomised controlled study for acupoint stimulation using subacupuncture to relieve postoperative nausea and vomiting in patients undergoing gynecological and obstetrical surgery
Methods	RCT. GG: on-going study but will need data on women having CS only, also need to know type of anaesthesia at CS
Participants	Inclusion criteria: • Women who planned gynecological surgery and caesarean section; non-smoker; women with a history of motion sickness; opioid patients; aged > 18 years and < 65 years; ASA class I - II. Exclusion criteria: • Women who refuse acupoint stimulation; women with antiemetic drugs; women with dexamethasone; mental disorders, unable to communicate with woman; allergic to adhesive tape and hypodermic acupuncture.
Interventions	Interventon: • Acupuncture with earring hole press needle Comparator: • No acupuncture with earring hole press needle
Outcomes	Nausea, vomiting etc.
Starting date	Not reported
Contact information	Study leader: Wei Hao - email: zhang6620072@163.com. Applicant Chunlei Zhang - email: zhang6620072@163.com
Notes	Setting: Hebei Hospital of Traditional Chinese Medicine, Chang'an District, Shijiazhuang, Hebei, China Trial registration: ChiCTR1900026709

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Hao 2019 *(Continued)*

	Web link: http://www.chictr.org.cn/showproj.aspx?proj=43770 (last accessed 8 July 2020)

Hess 2017

Study name	Dexmedetomidine after cesarean for the treatment of nausea and shivering
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Dexmedetomidine (a sedative) vs placebo
Outcomes	Nausea and vomiting, shivering
Starting date	18 February 2020
Contact information	Philip E Hess, MD, Beth Israel Deaconess Medical Center, Boston, Massachusetts, United States, 02215. email: phess@bidmc.harvard.edu
Notes	Setting: Beth Israel Deaconess Medical Center, Boston, Massachusetts, USA Previous study name: NCT03370562 2017

Hosseini 2020

Study name	The effect of chamomile aromatherapy with and without oxygen on severity of pain, bloating and nausea in women after cesarean section with spinal anaesthesia
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Chamomile + oxygen vs oxygen vs chamomile vs control
Outcomes	Nausea and vomiting
Starting date	12 October 2019
Contact information	Dr. Nazafarin Hosseini, email: hosseinichenar@yahoo.com
Notes	Trial registration: IRCT20141222020401N7 Web link: https://apps.who.int/trialsearch/Trial2.aspx?TrialID=IRCT20141222020401N7 Previous study name: IRCT20141222020401N7 2020

Jamilian 2014

Study name	Comparison the effect of oral gabapentin and oral ondansetron and oral ginger to prevention nausea and vomiting after cesarean section by spinal anesthesia

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Jamilian 2014 *(Continued)*

Methods	RCT
Participants	Women undergoing CS under spinal anaesthesia
Interventions	Gabapentin vs ondansetron vs ginger vs placebo
Outcomes	Nausea and vomiting
Starting date	24 December 2013
Contact information	Dr.Mehri Jamilian, email: mjamilian@arakmu.ac.ir
Notes	Setting: Arak University of Medical Sciences, Taleghani Hospital, Arak, Iran

Khatiban 2017

Study name	Effects of cardamoms inhalation aromatherapy on the mothers' nausea and vomiting in peri- and post-operation of the elective cesarean section
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Cardamoms inhalation aromatherapy vs placebo
Outcomes	Nausea and vomiting
Starting date	22 May 2017
Contact information	Mahnaz Khatiban, email: m-khatiban@umsha.ac.ir; mahnaz.khatiban@gmail.com
Notes	Setting: Hamadan University of Medical Sciences, Hamadan, Iran Also: IRCT2017050333794N1

Khojasteh 2016

Study name	The effect of metoclopramide, propofol and dexamethasone in controlling nausea and vomiting during spinal anaesthesia for cesarean section
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Propofol vs metoclopramide vs dexamethasone vs placebo
Outcomes	Nausea and vomiting
Starting date	22 November 2015
Contact information	Lila Khojasteh, email: drlilakhojaste@yahoo.com

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Khojasteh 2016 *(Continued)*

Notes	Setting: Azad University Hospitals of Tehran, Iran

Kotfis 2019

Study name	An analysis of risk factors and implementation of strategies to prevent nausea and vomiting in patients undergoing regional anaesthesia for CS
Methods	RCT
Participants	Women undergoing CS under regional anaesthesia
Interventions	Carbohydrate supplement v placebo
Outcomes	Nausea and vomiting.
Starting date	3 September 2019
Contact information	Katarzyna L Kotfis, email: katarzyna.kotfis@pum.edu.pl
Notes	Setting: Pomeranian Medical University, Szczecin, Poland, 70-111 Previous study name: NCT04069806 2019

Mendonca 2015

Study name	Prophylactic antiemetic efficacy of palonosetron vs ondansetron for cesarean sections under regional anaesthesia (PONV)
Methods	RCT
Participants	Women having caesarean under spinal anaesthesia
Interventions	Ondansetron vs palonosetron vs placebo
Outcomes	Nausea and vomiting
Starting date	October 2015
Contact information	Fabricio T Mendonca, Hospital de Base do Distrito Federal, Brasilia, DF, Brazil, 70680250
Notes	Setting: Maternal and Child Hospital of Brasilia, Federal District, Brazil

Mousavi 2019

Study name	Study of the effect of auriculotherapy on nausea and vomiting in women following elective cesarean section
Methods	RCT

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Mousavi 2019 *(Continued)*

Participants	Women with singleton pregnancy, > 37 weeks' gestation having elective CS under spinal anaesthesia
Interventions	Auriculotherapy (ear acupuncture) vs placebo
Outcomes	Nausea and vomiting
Starting date	9 May 2016
Contact information	Fatemeh Sadat Mousavi: email: fmousavi@muq.ac.ir and Nahid Golmakani: email golmakanin@mums.ac.ir
Notes	Setting: School of Nursing and Midwifery, Ibn Sina street,Danesgah Street, Mashhad, Iran Previous study name: IRCT20180526039845N1 2019

Norouzi 2013

Study name	Comparison of oral and intravenous ondansetron in the prevention of postoperative nausea and vomiting in cesarean section with spinal anaesthesia
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Interevntion 1: ondansetron (8 mg in 2 tablets) + 2 mL distilled water IV Intervention 2: 2 placebo tablets + ondansetron IV Comparator: 2 placebo tablets + 2ml distilled water
Outcomes	Primary outcome nausea and vomiting
Starting date	21 December 2012
Contact information	Dr Afsaneh Norouzi, email: norouzi.a@arakmu.ac.ir; norouzi43@yahoo.com
Notes	Setting: Talghani Hospital, Arak, Iran

Norouzi 2014

Study name	Gabapentin effect on preventing of nausea and vomiting in caesarean
Methods	RCT
Participants	Women having elective CS - but will need to check type of anaesthesia before including
Interventions	Gabapentin vs placebo
Outcomes	Nausea and vomiting
Starting date	4 December 2012

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Norouzi 2014 *(Continued)*

Contact information	Dr.Afsaneh Norouzi, email: norouzi43@yahoo.com
Notes	Setting: Amirkabir Hospital, Arak, Iran

Okutani 2012

Study name	Effect of oral fluid infusion before cesarean section on intraoperative metabolism, haemodynamic changes and postoperative nausea and vomiting
Methods	RCT
Participants	Women undergoing elective CS under spinal anaesthesia
Interventions	Oral fluid three hours prior to CS vs no intervention
Outcomes	Nausea and vomiting
Starting date	20 July 2012
Contact information	Ryu Okutani, email: ryuokutani0909@ybb.ne.jp
Notes	Setting: Osaka City General Hospital and Children's Hospital, Osaka, Japan

Rassoli 2013

Study name	The effect of subhypnotic doses of propofol and midazolam to prevent nausea and vomiting during spinal anaesthesia for elective CS
Methods	RCT
Participants	Women having CS under spinal anaesthetise
Interventions	Propofol vs midazolam vs placebo
Outcomes	Nausea and vomiting
Starting date	20 March 2011
Contact information	Dr Sousan Rasooli, email: rasoolis@tbzmed.ac.ir and rasooli_s@yahoo.com
Notes	Setting: Alzahra Hospital, Tabriz University of Medical Sciences, Tabriz, Iran.

Shahinfar 2016

Study name	The effect of ginger extract on the incidence and severity of nausea and vomiting after cesarean section under spinal anaesthesia
Methods	RCT
Participants	Women having CS under spinal anaesthesia

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Shahinfar 2016 *(Continued)*

Interventions	Ginger vs placebo
Outcomes	Nausea and vomiting
Starting date	20 March 2016
Contact information	Javad Shahinfar, email: dr.jshahinfar@gmail.com
Notes	Setting: Bentolhoda Hospital, ZAyeshgah Ave, Bojnurd, Iran

Soltani 2014

Study name	Effect of capsaicin ointment in K-K9 point, capsaicin ointment in K-D2 point and placebo ointment (Vaseline) in K-K9 point on nausea and vomiting during and postoperative cesarean section with spinal anaesthesia
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Capsaicin at acupressure points vs placebo at acupressure points
Outcomes	Nausea and vomiting
Starting date	6 August 2014
Contact information	Narges Soltani. email: soltani.n@bums.ac.ir
Notes	Setting: Omolbanin Gynecological Hospital, Khorasan Razavi, Mashhad, Iran

Thenuwara 2017

Study name	Randomised double control study to assess the efficacy of administering 1 mL of Glycopyrrolate with the spinal dose in minimizing nausea and vomiting in patients undergoing cesarean section under spinal anaesthesia
Methods	RCT
Participants	Women having CS under spinal anaesthesia
Interventions	Glycopyrrolatevs placebo
Outcomes	Nausea and vomiting
Starting date	15 May 2015
Contact information	Kokila N Thenuwara MD, University of Iowa, Iowa City, Iowa, United States, 52242
Notes	Setting: Iowa, USA

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Tindimwebwa 2009

Study name	Antiemetic efficacy and safety of dexamethasone in patients undergoing CSs at Mulago Hospital
Methods	RCT
Participants	Women having CS under either spinal or general anaesthesia
Interventions	Dexamethasone vs placebo
Outcomes	Nausea and vomiting
Starting date	March 2010
Contact information	Dr JVB Tindimwebwa Mulago National Refferal Hospital, Kampala, Uganda, 00256 and Dr Arthur Kwizera, Department of Anaesthesia, Makerere University, College of Health Sciences, Kampala, Uganda,
Notes	Setting: Mulago National Refferal Hospital, Kampala, Uganda, 00256 We want only spinal anaesthesia data

Yulin 2019

Study name	Efficacy and safety of electroacupuncture combined with tropisetron in treating carboprost tromethamine–induced nausea and vomiting during cesarean section:a prospective, randomised, controlled clinical trial (ChiCTR1900021396)
Methods	RCT
Participants	Inclusion criteria: • Women aged 22-40 years, ASA grade I or II, no history of serious heart, lung, kidney and digestive system diseases, no history of diabetes, no history of nausea, vomiting, no history of carsickness, no experience of acupuncture, no contraindication of intraspinal block CS patients. Exclusion criteria: • Women with poor anaesthetic effect and changing general anaesthesia.
Interventions	Interventions 1: • Acupuncture + tropisetron Intervention 2; • Acupuncture + normal saline Intervention 3 • Tropisetron + false acupuncture Comparator: • Normal saline + false acupuncture
Outcomes	Nausea, vomiting etc.
Starting date	1 October 2015

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Yulin 2019 *(Continued)*

Contact information	Study leader: Chang Yulin email: 17631695925@163.com. Also Yu Lili - email: 18713057030@163.com
Notes	Setting: Cangzhou Central Hospital, Cangzhou, Hebei, China Tropisetron is a serotonin 5-HT_3 receptor antagonist Trial registration: ChiCTR1900021396 Previous study name: ChiCTR1900021396 2019 Web link: Http://www.who.int/trialsearch/Trial2.aspx?TrialID=ChiCTR1900021396 Gill's webline: http://www.chictr.org.cn/com/25/hvshowproject.aspx?id=17613 (last accessed 8 July 2020)

ASA: American Society of Anaesthesiologists physical status classification; **CS:** caesarean section;**IV:** intravenous;**RCT:** randomised controlled trial; **PONV:** postoperative nausea and vomiting;**PPH:** postpartum haemorrhage;**vs:** versus

DATA AND ANALYSES

Comparison 1. 5-HT_3 antagonists vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.1 Nausea - intraoperative	12	1419	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.42, 0.71]
1.1.1 Ondansetron - 4 mg	9	1111	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.41, 0.73]
1.1.2 Ondansetron - 8 mg	1	32	Risk Ratio (M-H, Random, 95% CI)	0.45 [0.20, 1.01]
1.1.3 Granisetron - 1 mg	1	176	Risk Ratio (M-H, Random, 95% CI)	1.14 [0.59, 2.20]
1.1.4 Granisetron 3 mg	1	100	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.18, 0.61]
1.2 Vomiting - intraoperative	11	1414	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.29, 0.73]
1.2.1 Ondansetron - 4 mg	8	1059	Risk Ratio (M-H, Random, 95% CI)	0.51 [0.31, 0.84]
1.2.2 Ondansetron - 8 mg	1	32	Risk Ratio (M-H, Random, 95% CI)	0.14 [0.02, 1.03]
1.2.3 Granisetron - 1 mg	1	176	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.19, 2.28]
1.2.4 Tropisotron 2 mg	1	147	Risk Ratio (M-H, Random, 95% CI)	0.09 [0.01, 0.67]
1.3 Nausea - postoperative	10	1340	Risk Ratio (M-H, Random, 95% CI)	0.40 [0.30, 0.54]
1.3.1 Ondansetron - 4 mg	8	1023	Risk Ratio (M-H, Random, 95% CI)	0.39 [0.26, 0.58]
1.3.2 Ondansetron - 8 mg	1	90	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.18, 1.09]
1.3.3 Granisetron - 40 mcg/kg	1	80	Risk Ratio (M-H, Random, 95% CI)	0.36 [0.14, 0.90]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.3.4 Tropisotron - 2 mg	1	147	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.12, 1.71]
1.4 Vomiting - postoperative	10	1450	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.31, 0.69]
1.4.1 Ondansetron - 4 mg	8	1133	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.27, 0.71]
1.4.2 Ondansetron - 8 mg	1	90	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.19, 5.15]
1.4.3 Granisetron - 40 mcg/kg	1	80	Risk Ratio (M-H, Random, 95% CI)	0.43 [0.12, 1.54]
1.4.4 Tropisotron - 2 mg	1	147	Risk Ratio (M-H, Random, 95% CI)	0.21 [0.01, 4.38]
1.5 'Nausea + Vomiting' - intraoperative (not pre-specified)	1	147	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.53, 0.97]
1.5.1 Tropisotron - 2 mg	1	147	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.53, 0.97]
1.6 'Nausea + Vomiting' - postoperative - (not pre-specified)	5	576	Risk Ratio (M-H, Random, 95% CI)	0.57 [0.41, 0.80]
1.6.1 Ondansetron - 4 mg	3	255	Risk Ratio (M-H, Random, 95% CI)	0.68 [0.40, 1.13]
1.6.2 Ondansetron - 8 mg	1	100	Risk Ratio (M-H, Random, 95% CI)	0.38 [0.19, 0.72]
1.6.3 Tropisotron - 2 mg	1	147	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.12, 1.71]
1.6.4 Granisetron - 0.1 mg	1	74	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.22, 2.31]
1.7 Maternal satisfaction	2		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.7.1 Ondansetron - 4 mg	2		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.7.2 Ondansetron - 8 mg	0		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.7.3 Granisetron - 1 mg	0		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.7.4 Granisetron - 3 mg	0		Risk Ratio (M-H, Random, 95% CI)	Totals not selected
1.8 Maternal adverse outcomes	1	100	Risk Ratio (M-H, Random, 95% CI)	Not estimable
1.8.1 Ondansetron - 8 mg	1	100	Risk Ratio (M-H, Random, 95% CI)	Not estimable
1.9 Headache/dizziness/vertigo	4	433	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.60, 1.79]
1.9.1 Ondansetron - 4 mg	4	433	Risk Ratio (M-H, Random, 95% CI)	1.04 [0.60, 1.79]
1.10 Hypotension	3	290	Risk Ratio (M-H, Random, 95% CI)	1.22 [0.72, 2.08]
1.10.1 Ondansetron - 4 mg	2	114	Risk Ratio (M-H, Random, 95% CI)	1.44 [0.48, 4.34]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
1.10.2 Granisetron - 1 mg	1	176	Risk Ratio (M-H, Random, 95% CI)	3.00 [0.12, 72.65]
1.11 Pruritus/itching	4	488	Risk Ratio (M-H, Random, 95% CI)	0.85 [0.69, 1.05]
1.11.1 Ondansetron - 4 mg	3	298	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.36, 1.14]
1.11.2 Ondansetron - 8 mg	2	190	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.84, 1.05]
1.12 Dry mouth	1	130	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.17, 3.22]
1.12.1 Ondansetron - 4 mg	1	130	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.17, 3.22]
1.13 Drowsiness/sedation	2	170	Risk Ratio (M-H, Random, 95% CI)	3.94 [0.45, 34.63]
1.13.1 Ondansetron - 4 mg	2	170	Risk Ratio (M-H, Random, 95% CI)	3.94 [0.45, 34.63]
1.14 Rescue antiemetic (not pre-specified)	1	158	Risk Ratio (M-H, Random, 95% CI)	0.32 [0.11, 0.93]

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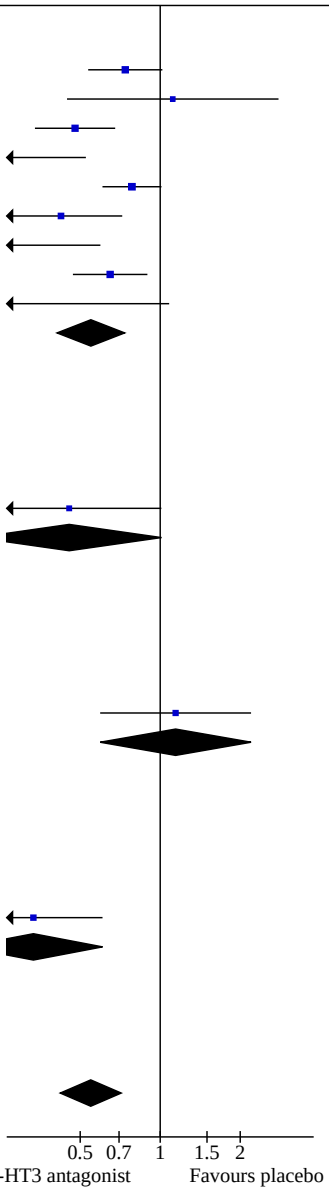
Analysis 1.1. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.1.1 Ondansetron - 4 mg						
Abouleish 1999	21	36	30	38	12.9%	0.74 [0.54 , 1.02]
Cherian 2001	8	41	7	40	5.5%	1.11 [0.45 , 2.79]
El-Deeb 2011a	33	150	69	150	12.5%	0.48 [0.34 , 0.68]
Garcia-Miguel 2000	4	49	21	50	4.9%	0.19 [0.07 , 0.53]
Harnett 2007	42	79	55	81	13.9%	0.78 [0.61 , 1.01]
Pan 2001	13	54	29	51	9.7%	0.42 [0.25 , 0.72]
Pan 2003	2	20	13	20	3.1%	0.15 [0.04 , 0.60]
Parra-Guiza 2018	35	100	54	100	12.9%	0.65 [0.47 , 0.89]
Sahoo 2012	1	26	7	26	1.5%	0.14 [0.02 , 1.08]
Subtotal (95% CI)		**555**		**556**	**76.7%**	**0.55 [0.41 , 0.73]**
Total events:	159		285			
Heterogeneity: Tau² = 0.10; Chi² = 23.76, df = 8 (P = 0.003); I² = 66%						
Test for overall effect: Z = 4.02 (P < 0.0001)						
1.1.2 Ondansetron - 8 mg						
Pan 1996	5	16	11	16	6.5%	0.45 [0.20 , 1.01]
Subtotal (95% CI)		**16**		**16**	**6.5%**	**0.45 [0.20 , 1.01]**
Total events:	5		11			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.94 (P = 0.05)						
1.1.3 Granisetron - 1 mg						
Kasodekar 2006	16	88	14	88	8.1%	1.14 [0.59 , 2.20]
Subtotal (95% CI)		**88**		**88**	**8.1%**	**1.14 [0.59 , 2.20]**
Total events:	16		14			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.40 (P = 0.69)						
1.1.4 Granisetron 3 mg						
Mohammadi 2015	10	50	30	50	8.7%	0.33 [0.18 , 0.61]
Subtotal (95% CI)		**50**		**50**	**8.7%**	**0.33 [0.18 , 0.61]**
Total events:	10		30			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.60 (P = 0.0003)						
Total (95% CI)		**709**		**710**	**100.0%**	**0.55 [0.42 , 0.71]**
Total events:	190		340			
Heterogeneity: Tau² = 0.11; Chi² = 31.46, df = 11 (P = 0.0009); I² = 65%						
Test for overall effect: Z = 4.47 (P < 0.00001)						
Test for subgroup differences: Chi² = 7.72, df = 3 (P = 0.05), I² = 61.1%						



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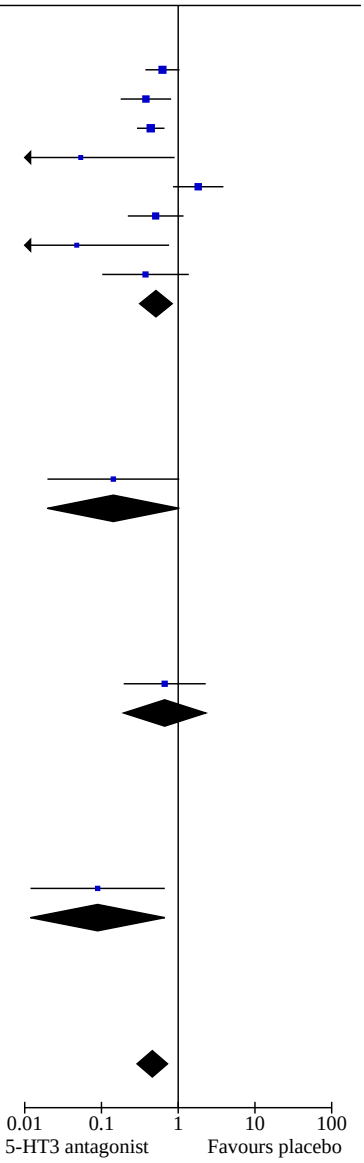
Analysis 1.2. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.2.1 Ondansetron - 4 mg						
Abouleish 1999	13	36	22	38	16.0%	0.62 [0.37 , 1.04]
Cherian 2001	7	41	18	40	12.9%	0.38 [0.18 , 0.81]
El-Deeb 2011a	25	150	57	150	17.2%	0.44 [0.29 , 0.66]
Garcia-Miguel 2000	0	49	9	50	2.3%	0.05 [0.00 , 0.90]
Harnett 2007	16	79	9	81	12.9%	1.82 [0.86 , 3.88]
Pan 2001	7	54	13	51	12.0%	0.51 [0.22 , 1.17]
Pan 2003	0	20	10	20	2.4%	0.05 [0.00 , 0.76]
Parra-Guiza 2018	3	100	8	100	7.7%	0.38 [0.10 , 1.37]
Subtotal (95% CI)		**529**		**530**	**83.5%**	**0.51 [0.31 , 0.84]**
Total events:	71		146			
Heterogeneity: Tau² = 0.25; Chi² = 18.39, df = 7 (P = 0.01); I² = 62%						
Test for overall effect: Z = 2.68 (P = 0.007)						
1.2.2 Ondansetron - 8 mg						
Pan 1996	1	16	7	16	4.2%	0.14 [0.02 , 1.03]
Subtotal (95% CI)		**16**		**16**	**4.2%**	**0.14 [0.02 , 1.03]**
Total events:	1		7			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.93 (P = 0.05)						
1.2.3 Granisetron - 1 mg						
Kasodekar 2006	4	88	6	88	8.2%	0.67 [0.19 , 2.28]
Subtotal (95% CI)		**88**		**88**	**8.2%**	**0.67 [0.19 , 2.28]**
Total events:	4		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.65 (P = 0.52)						
1.2.4 Tropisotron 2 mg						
Voigt 2013	1	71	12	76	4.1%	0.09 [0.01 , 0.67]
Subtotal (95% CI)		**71**		**76**	**4.1%**	**0.09 [0.01 , 0.67]**
Total events:	1		12			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.35 (P = 0.02)						
Total (95% CI)		**704**		**710**	**100.0%**	**0.46 [0.29 , 0.73]**
Total events:	77		171			
Heterogeneity: Tau² = 0.27; Chi² = 23.72, df = 10 (P = 0.008); I² = 58%						
Test for overall effect: Z = 3.33 (P = 0.0009)						
Test for subgroup differences: Chi² = 4.43, df = 3 (P = 0.22), I² = 32.3%						



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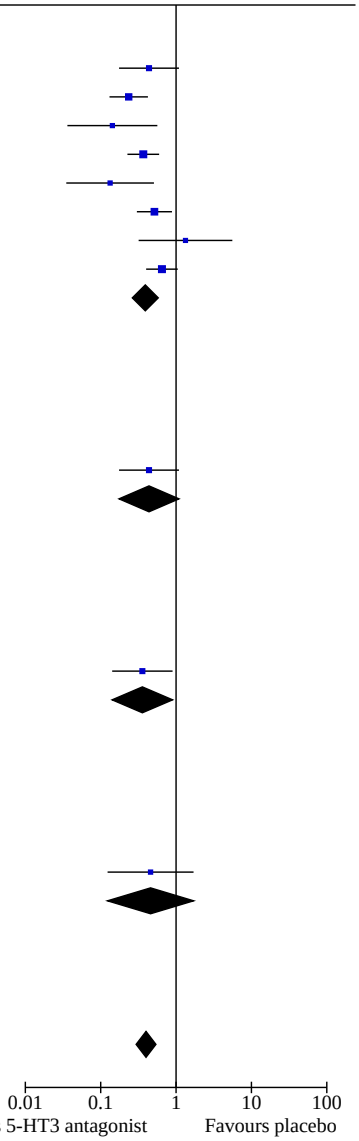
Analysis 1.3. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.3.1 Ondansetron - 4 mg						
Charuluxananan 2003	7	60	8	30	7.8%	0.44 [0.18 , 1.09]
El-Deeb 2011a	12	150	51	150	13.4%	0.24 [0.13 , 0.42]
Koju 2015	2	25	14	25	4.1%	0.14 [0.04 , 0.56]
Pan 2001	14	54	36	51	16.0%	0.37 [0.23 , 0.60]
Pan 2003	2	20	15	20	4.3%	0.13 [0.03 , 0.51]
Parra-Guiza 2018 (1)	16	100	31	100	14.7%	0.52 [0.30 , 0.88]
Peixoto 2006	4	40	3	40	3.8%	1.33 [0.32 , 5.58]
Uerpairojkit 2017 (2)	19	78	30	80	16.1%	0.65 [0.40 , 1.05]
Subtotal (95% CI)		**527**		**496**	**80.1%**	**0.39 [0.26 , 0.58]**
Total events:	76		188			
Heterogeneity: Tau² = 0.16; Chi² = 15.80, df = 7 (P = 0.03); I² = 56%						
Test for overall effect: Z = 4.66 (P < 0.00001)						
1.3.2 Ondansetron - 8 mg						
Charuluxananan 2003	7	60	8	30	7.8%	0.44 [0.18 , 1.09]
Subtotal (95% CI)		**60**		**30**	**7.8%**	**0.44 [0.18 , 1.09]**
Total events:	7		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.77 (P = 0.08)						
1.3.3 Granisetron - 40 mcg/kg						
Dasgupta 2012	5	40	14	40	7.7%	0.36 [0.14 , 0.90]
Subtotal (95% CI)		**40**		**40**	**7.7%**	**0.36 [0.14 , 0.90]**
Total events:	5		14			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.19 (P = 0.03)						
1.3.4 Tropisotron - 2 mg						
Voigt 2013	3	71	7	76	4.4%	0.46 [0.12 , 1.71]
Subtotal (95% CI)		**71**		**76**	**4.4%**	**0.46 [0.12 , 1.71]**
Total events:	3		7			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.16 (P = 0.24)						
Total (95% CI)		**698**		**642**	**100.0%**	**0.40 [0.30 , 0.54]**
Total events:	91		217			
Heterogeneity: Tau² = 0.09; Chi² = 15.89, df = 10 (P = 0.10); I² = 37%						
Test for overall effect: Z = 5.96 (P < 0.00001)						
Test for subgroup differences: Chi² = 0.15, df = 3 (P = 0.99), I² = 0%						



Footnotes

(1) Outcome at 0-2hrs

(2) Early symptoms

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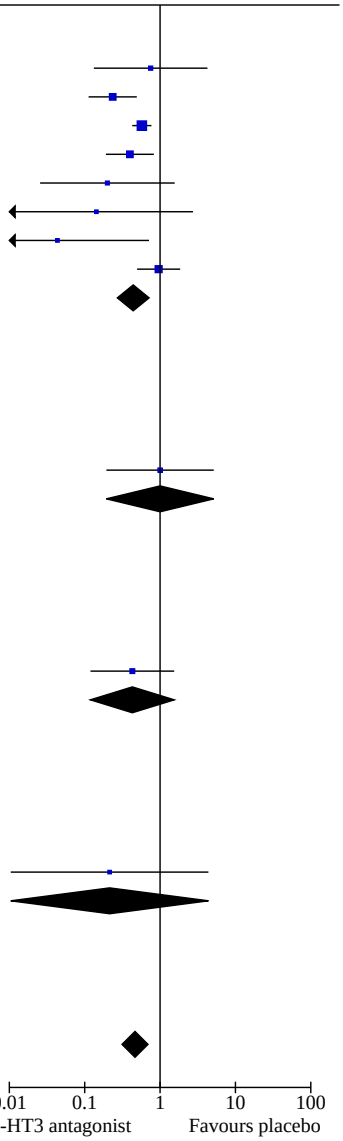
Analysis 1.4. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 4: Vomiting - postoperative

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.4.1 Ondansetron - 4 mg						
Charuluxananan 2003	3	60	2	30	4.5%	0.75 [0.13 , 4.25]
El-Deeb 2011a	8	150	34	150	15.2%	0.24 [0.11 , 0.49]
Harnett 2007	33	79	59	81	27.3%	0.57 [0.43 , 0.77]
Pan 2001	8	54	19	51	15.3%	0.40 [0.19 , 0.83]
Pan 2003	1	20	5	20	3.3%	0.20 [0.03 , 1.56]
Parra-Guiza 2018 (1)	0	100	3	100	1.7%	0.14 [0.01 , 2.73]
Peixoto 2006	0	40	11	40	1.9%	0.04 [0.00 , 0.71]
Uerpairojkit 2017 (2)	14	78	15	80	17.0%	0.96 [0.50 , 1.85]
Subtotal (95% CI)		**581**		**552**	**86.1%**	**0.44 [0.27 , 0.71]**
Total events:	67		148			
Heterogeneity: Tau² = 0.20; Chi² = 14.92, df = 7 (P = 0.04); I² = 53%						
Test for overall effect: Z = 3.32 (P = 0.0009)						
1.4.2 Ondansetron - 8 mg						
Charuluxananan 2003	4	60	2	30	4.9%	1.00 [0.19 , 5.15]
Subtotal (95% CI)		**60**		**30**	**4.9%**	**1.00 [0.19 , 5.15]**
Total events:	4		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.00 (P = 1.00)						
1.4.3 Granisetron - 40 mcg/kg						
Dasgupta 2012	3	40	7	40	7.4%	0.43 [0.12 , 1.54]
Subtotal (95% CI)		**40**		**40**	**7.4%**	**0.43 [0.12 , 1.54]**
Total events:	3		7			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.30 (P = 0.19)						
1.4.4 Tropisotron - 2 mg						
Voigt 2013	0	71	2	76	1.6%	0.21 [0.01 , 4.38]
Subtotal (95% CI)		**71**		**76**	**1.6%**	**0.21 [0.01 , 4.38]**
Total events:	0		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.00 (P = 0.32)						
Total (95% CI)		**752**		**698**	**100.0%**	**0.47 [0.31 , 0.69]**
Total events:	74		159			
Heterogeneity: Tau² = 0.13; Chi² = 15.86, df = 10 (P = 0.10); I² = 37%						
Test for overall effect: Z = 3.79 (P = 0.0001)						
Test for subgroup differences: Chi² = 1.15, df = 3 (P = 0.76), I² = 0%						



Footnotes

(1) Outcome at 0-2hrs

(2) Early symptoms

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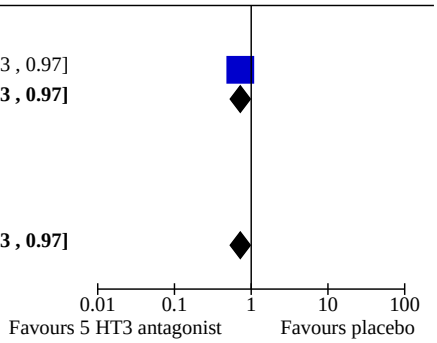
Analysis 1.5. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 5: 'Nausea + Vomiting' - intraoperative (not pre-specified)

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.5.1 Tropisotron - 2 mg						
Voigt 2013	33	71	49	76	100.0%	0.72 [0.53 , 0.97]
Subtotal (95% CI)		**71**		**76**	**100.0%**	**0.72 [0.53 , 0.97]**
Total events:	33		49			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.14 (P = 0.03)						
Total (95% CI)		**71**		**76**	**100.0%**	**0.72 [0.53 , 0.97]**
Total events:	33		49			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.14 (P = 0.03)						
Test for subgroup differences: Not applicable						



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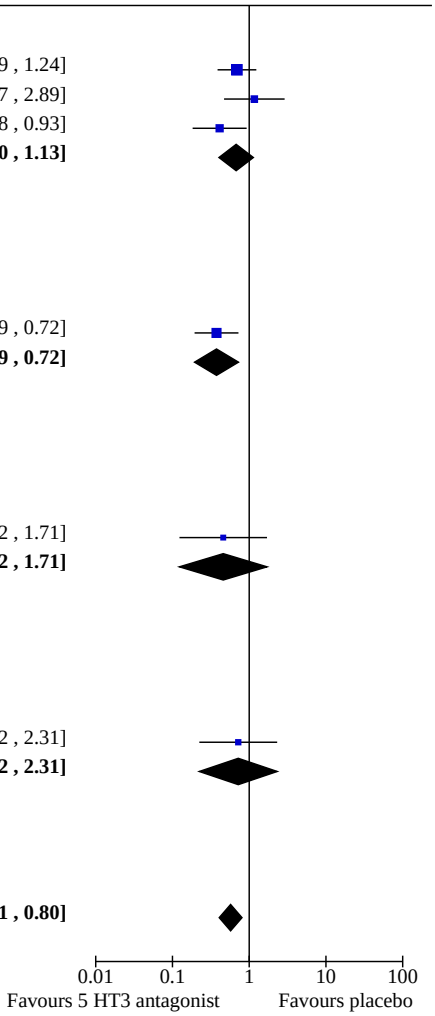
Analysis 1.6. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 6: 'Nausea + Vomiting' - postoperative - (not pre-specified)

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.6.1 Ondansetron - 4 mg						
Kim 1999	9	20	13	20	30.6%	0.69 [0.39 , 1.24]
Munnur 2008	14	60	5	25	13.4%	1.17 [0.47 , 2.89]
Shen 2012	7	65	17	65	16.7%	0.41 [0.18 , 0.93]
Subtotal (95% CI)		**145**		**110**	**60.7%**	**0.68 [0.40 , 1.13]**
Total events:	30		35			
Heterogeneity: Tau² = 0.06; Chi² = 2.85, df = 2 (P = 0.24); I² = 30%						
Test for overall effect: Z = 1.49 (P = 0.14)						
1.6.2 Ondansetron - 8 mg						
Yazigi 2002	9	50	24	50	24.5%	0.38 [0.19 , 0.72]
Subtotal (95% CI)		**50**		**50**	**24.5%**	**0.38 [0.19 , 0.72]**
Total events:	9		24			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.92 (P = 0.003)						
1.6.3 Tropisotron - 2 mg						
Voigt 2013	3	71	7	76	6.6%	0.46 [0.12 , 1.71]
Subtotal (95% CI)		**71**		**76**	**6.6%**	**0.46 [0.12 , 1.71]**
Total events:	3		7			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.16 (P = 0.24)						
1.6.4 Granisetron - 0.1 mg						
Munnur 2008	6	50	4	24	8.3%	0.72 [0.22 , 2.31]
Subtotal (95% CI)		**50**		**24**	**8.3%**	**0.72 [0.22 , 2.31]**
Total events:	6		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.55 (P = 0.58)						
Total (95% CI)		**316**		**260**	**100.0%**	**0.57 [0.41 , 0.80]**
Total events:	48		70			
Heterogeneity: Tau² = 0.01; Chi² = 5.31, df = 5 (P = 0.38); I² = 6%						
Test for overall effect: Z = 3.21 (P = 0.001)						
Test for subgroup differences: Chi² = 2.20, df = 3 (P = 0.53), I² = 0%						



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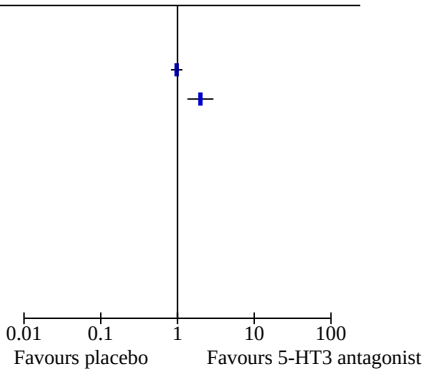
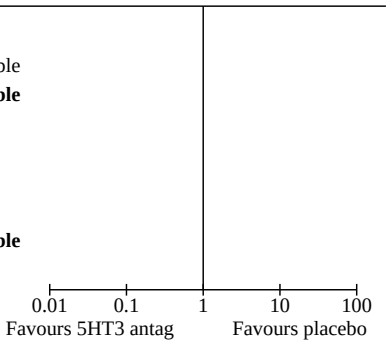
Analysis 1.7. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 7: Maternal satisfaction

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Risk Ratio M-H, Random, 95% CI
1.7.1 Ondansetron - 4 mg					
Cherian 2001	35	41	35	40	0.98 [0.82 , 1.16]
Pan 2001	40	54	19	51	1.99 [1.35 , 2.94]
1.7.2 Ondansetron - 8 mg					
1.7.3 Granisetron - 1 mg					
1.7.4 Granisetron - 3 mg					



Analysis 1.8. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 8: Maternal adverse outcomes

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.8.1 Ondansetron - 8 mg						
Yazigi 2002	0	50	0	50		Not estimable
Subtotal (95% CI)		**50**		**50**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**50**		**50**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



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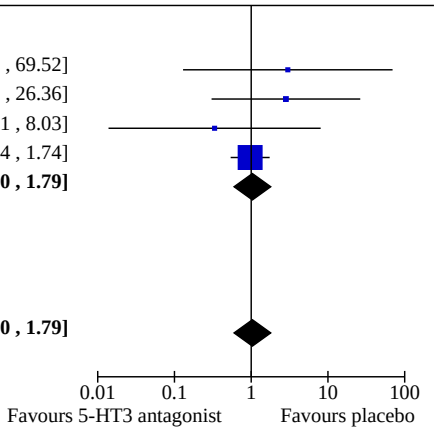
Analysis 1.9. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 9: Headache/dizziness/vertigo

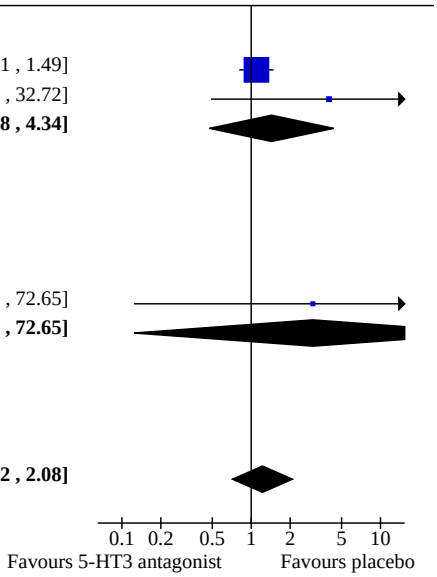
Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.9.1 Ondansetron - 4 mg						
Kim 1999 (1)	1	20	0	20	3.0%	3.00 [0.13 , 69.52]
Pan 2001	3	54	1	51	6.0%	2.83 [0.30 , 26.36]
Shen 2012	0	65	1	65	3.0%	0.33 [0.01 , 8.03]
Uerpairojkit 2017	17	78	18	80	87.9%	0.97 [0.54 , 1.74]
Subtotal (95% CI)		**217**		**216**	**100.0%**	**1.04 [0.60 , 1.79]**
Total events:	21		20			
Heterogeneity: Tau² = 0.00; Chi² = 1.77, df = 3 (P = 0.62); I² = 0%						
Test for overall effect: Z = 0.13 (P = 0.90)						
Total (95% CI)		**217**		**216**	**100.0%**	**1.04 [0.60 , 1.79]**
Total events:	21		20			
Heterogeneity: Tau² = 0.00; Chi² = 1.77, df = 3 (P = 0.62); I² = 0%						
Test for overall effect: Z = 0.13 (P = 0.90)						
Test for subgroup differences: Not applicable						



Footnotes
(1) Headache

Analysis 1.10. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 10: Hypotension

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.10.1 Ondansetron - 4 mg						
Abouleish 1999	26	36	25	38	91.1%	1.10 [0.81 , 1.49]
Pan 2003	4	20	1	20	6.2%	4.00 [0.49 , 32.72]
Subtotal (95% CI)		**56**		**58**	**97.3%**	**1.44 [0.48 , 4.34]**
Total events:	30		26			
Heterogeneity: Tau² = 0.38; Chi² = 1.64, df = 1 (P = 0.20); I² = 39%						
Test for overall effect: Z = 0.64 (P = 0.52)						
1.10.2 Granisetron - 1 mg						
Kasodekar 2006	1	88	0	88	2.7%	3.00 [0.12 , 72.65]
Subtotal (95% CI)		**88**		**88**	**2.7%**	**3.00 [0.12 , 72.65]**
Total events:	1		0			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Total (95% CI)		**144**		**146**	**100.0%**	**1.22 [0.72 , 2.08]**
Total events:	31		26			
Heterogeneity: Tau² = 0.06; Chi² = 2.14, df = 2 (P = 0.34); I² = 7%						
Test for overall effect: Z = 0.74 (P = 0.46)						
Test for subgroup differences: Chi² = 0.18, df = 1 (P = 0.67), I² = 0%						



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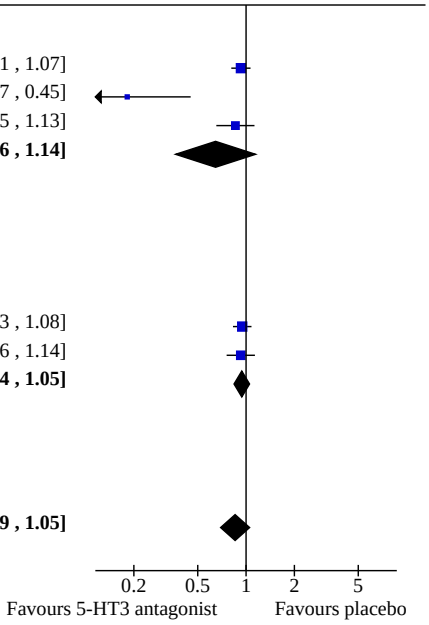
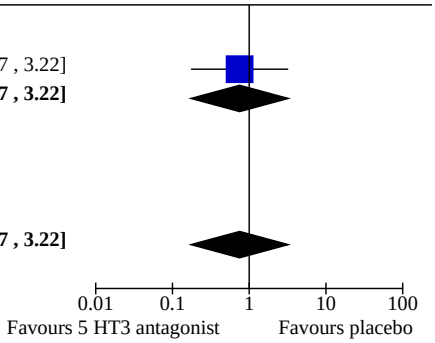
Analysis 1.11. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 11: Pruritus/itching

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.11.1 Ondansetron - 4 mg						
Charuluxananan 2003	52	60	28	30	26.3%	0.93 [0.81 , 1.07]
Koju 2015	4	25	22	25	4.4%	0.18 [0.07 , 0.45]
Uerpairojkit 2017	41	78	49	80	19.6%	0.86 [0.65 , 1.13]
Subtotal (95% CI)		**163**		**135**	**50.3%**	**0.65 [0.36 , 1.14]**
Total events:	97		99			
Heterogeneity: Tau² = 0.20; Chi² = 20.14, df = 2 (P < 0.0001); I² = 90%						
Test for overall effect: Z = 1.50 (P = 0.13)						
1.11.2 Ondansetron - 8 mg						
Charuluxananan 2003	53	60	28	30	26.5%	0.95 [0.83 , 1.08]
Yazigi 2002	38	50	41	50	23.2%	0.93 [0.76 , 1.14]
Subtotal (95% CI)		**110**		**80**	**49.7%**	**0.94 [0.84 , 1.05]**
Total events:	91		69			
Heterogeneity: Tau² = 0.00; Chi² = 0.04, df = 1 (P = 0.85); I² = 0%						
Test for overall effect: Z = 1.08 (P = 0.28)						
Total (95% CI)		**273**		**215**	**100.0%**	**0.85 [0.69 , 1.05]**
Total events:	188		168			
Heterogeneity: Tau² = 0.04; Chi² = 18.88, df = 4 (P = 0.0008); I² = 79%						
Test for overall effect: Z = 1.48 (P = 0.14)						
Test for subgroup differences: Chi² = 1.60, df = 1 (P = 0.21), I² = 37.4%						



Analysis 1.12. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 12: Dry mouth

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.12.1 Ondansetron - 4 mg						
Shen 2012	3	65	4	65	100.0%	0.75 [0.17 , 3.22]
Subtotal (95% CI)		**65**		**65**	**100.0%**	**0.75 [0.17 , 3.22]**
Total events:	3		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.39 (P = 0.70)						
Total (95% CI)		**65**		**65**	**100.0%**	**0.75 [0.17 , 3.22]**
Total events:	3		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.39 (P = 0.70)						
Test for subgroup differences: Not applicable						



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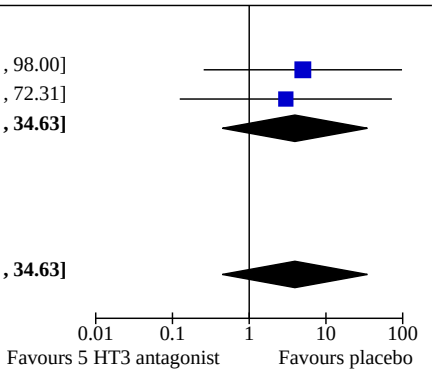
Analysis 1.13. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 13: Drowsiness/sedation

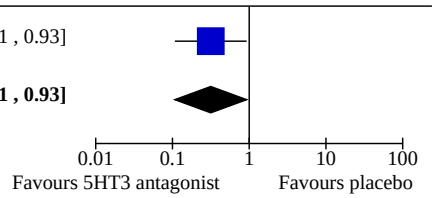
Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
1.13.1 Ondansetron - 4 mg						
Kim 1999 (1)	2	20	0	20	53.4%	5.00 [0.26 , 98.00]
Shen 2012	1	65	0	65	46.6%	3.00 [0.12 , 72.31]
Subtotal (95% CI)		**85**		**85**	**100.0%**	**3.94 [0.45 , 34.63]**
Total events:	3		0			
Heterogeneity: Tau² = 0.00; Chi² = 0.05, df = 1 (P = 0.82); I² = 0%						
Test for overall effect: Z = 1.24 (P = 0.22)						
Total (95% CI)		**85**		**85**	**100.0%**	**3.94 [0.45 , 34.63]**
Total events:	3		0			
Heterogeneity: Tau² = 0.00; Chi² = 0.05, df = 1 (P = 0.82); I² = 0%						
Test for overall effect: Z = 1.24 (P = 0.22)						
Test for subgroup differences: Not applicable						



Footnotes
(1) Sedation

Analysis 1.14. Comparison 1: 5-HT$_3$ antagonists vs placebo, Outcome 14: Rescue antiemetic (not pre-specified)

Study or Subgroup	5-HT3 antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Uerpairojkit 2017 (1)	4	78	13	80	100.0%	0.32 [0.11 , 0.93]
Total (95% CI)		**78**		**80**	**100.0%**	**0.32 [0.11 , 0.93]**
Total events:	4		13			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.10 (P = 0.04)						
Test for subgroup differences: Not applicable						



Footnotes
(1) Metoclopramide - 10mg

Comparison 2. Dopamine antagonists vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1 Nausea - intraoperative	15	1180	Risk Ratio (M-H, Random, 95% CI)	0.38 [0.27, 0.52]
2.1.1 Metoclopramide - 10 mg	10	748	Risk Ratio (M-H, Random, 95% CI)	0.39 [0.24, 0.62]
2.1.2 Metoclopramide - 20 mg	1	100	Risk Ratio (M-H, Random, 95% CI)	0.27 [0.10, 0.75]
2.1.3 Metoclopramide - 0.15 mg/kg	1	67	Risk Ratio (M-H, Random, 95% CI)	0.32 [0.12, 0.90]
2.1.4 Droperidol - 0.5 mg	1	128	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.17, 0.65]
2.1.5 Droperidol - 0.625 mg	1	32	Risk Ratio (M-H, Random, 95% CI)	0.36 [0.15, 0.90]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.1.6 Droperidol - 1.25 mg	1	75	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.17, 1.15]
2.1.7 Droperidol - 5 mg	1	30	Risk Ratio (M-H, Random, 95% CI)	0.30 [0.09, 1.01]
2.2 Vomiting - intraoperative	12	942	Risk Ratio (M-H, Random, 95% CI)	0.41 [0.28, 0.60]
2.2.1 Metoclopramide - 10 mg	8	610	Risk Ratio (M-H, Random, 95% CI)	0.45 [0.27, 0.76]
2.2.2 Metoclopramide - 0.15 mg/kg	1	67	Risk Ratio (M-H, Random, 95% CI)	0.09 [0.01, 1.54]
2.2.3 Droperidol - 0.5 mg	1	128	Risk Ratio (M-H, Random, 95% CI)	0.34 [0.09, 1.23]
2.2.4 Droperidol - 0.625 mg	1	32	Risk Ratio (M-H, Random, 95% CI)	0.29 [0.07, 1.17]
2.2.5 Droperidol - 1.25 mg	1	75	Risk Ratio (M-H, Random, 95% CI)	0.37 [0.10, 1.27]
2.2.6 Droperidol - 5 mg	1	30	Risk Ratio (M-H, Random, 95% CI)	0.13 [0.02, 0.98]
2.3 Nausea - postoperative	7	601	Risk Ratio (M-H, Random, 95% CI)	0.61 [0.48, 0.79]
2.3.1 Metoclopramide - 10 mg	5	454	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.49, 0.80]
2.3.2 Metoclopramide - 0.15 mg/kg	1	67	Risk Ratio (M-H, Random, 95% CI)	0.40 [0.16, 1.02]
2.3.3 Droperidol - 1.25 mg	1	80	Risk Ratio (M-H, Random, 95% CI)	1.67 [0.43, 6.51]
2.4 Vomiting - postoperative	9	860	Risk Ratio (M-H, Random, 95% CI)	0.63 [0.44, 0.92]
2.4.1 Metoclopramide - 10 mg	6	653	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.44, 1.20]
2.4.2 Metoclopramide - 0.15 mg/kg	1	67	Risk Ratio (M-H, Random, 95% CI)	0.32 [0.12, 0.90]
2.4.3 Droperidol - 1.25 mg	2	140	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.32, 0.94]
2.5 'Nausea + vomiting' - intraoperative (not pre-specfied)	1	98	Risk Ratio (M-H, Random, 95% CI)	0.12 [0.02, 0.88]
2.5.1 Metoclopramide - 10 mg	1	98	Risk Ratio (M-H, Random, 95% CI)	0.12 [0.02, 0.88]
2.6 'Nausea + vomiting' - postoperative (not pre-specified)	3	450	Risk Ratio (M-H, Random, 95% CI)	0.23 [0.05, 1.02]
2.6.1 Metoclopramide - 10 mg	3	360	Risk Ratio (M-H, Random, 95% CI)	0.20 [0.02, 1.71]
2.6.2 Droperidol - 0.625 mg	1	90	Risk Ratio (M-H, Random, 95% CI)	0.30 [0.12, 0.75]
2.7 Maternal satisfaction	1	102	Risk Ratio (M-H, Random, 95% CI)	1.42 [0.91, 2.21]
2.7.1 Metoclopramide - 10 mg	1	102	Risk Ratio (M-H, Random, 95% CI)	1.42 [0.91, 2.21]
2.8 Anxiety	1	50	Risk Ratio (M-H, Random, 95% CI)	4.00 [0.48, 33.33]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
2.8.1 Metoclopramide - 10 mg	1	50	Risk Ratio (M-H, Random, 95% CI)	4.00 [0.48, 33.33]
2.9 Headache/dizziness	1	102	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.01, 8.00]
2.9.1 Metoclopramide - 10 mg	1	102	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.01, 8.00]
2.10 Hypotension	6	563	Risk Ratio (M-H, Random, 95% CI)	1.08 [0.90, 1.30]
2.10.1 Metoclopramide - 10 mg	4	278	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.77, 1.28]
2.10.2 Metoclopramide - 0.15 mg/kg	1	67	Risk Ratio (M-H, Random, 95% CI)	1.62 [0.66, 3.95]
2.10.3 Droperidol - 0.5 mg	1	128	Risk Ratio (M-H, Random, 95% CI)	1.13 [0.80, 1.60]
2.10.4 Droperidol - 0.625 mg	1	90	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.69, 2.25]
2.11 Rescue antiemetics (not pre-specified)	1	98	Risk Ratio (M-H, Random, 95% CI)	0.26 [0.03, 2.25]
2.12 Sedation	2	220	Risk Ratio (M-H, Random, 95% CI)	5.54 [2.78, 11.06]
2.12.1 Metoclopramide - 10 mg	2	130	Risk Ratio (M-H, Random, 95% CI)	4.24 [1.73, 10.41]
2.12.2 Droperidol - 0.625 mg	1	90	Risk Ratio (M-H, Random, 95% CI)	8.17 [2.77, 24.05]
2.13 Pruritus/itching	3	504	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.93, 1.03]
2.13.1 Metoclopramide - 10 mg	2	429	Risk Ratio (M-H, Random, 95% CI)	0.98 [0.93, 1.03]
2.13.2 Droperidol - 1.25 mg	1	75	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.55, 1.53]

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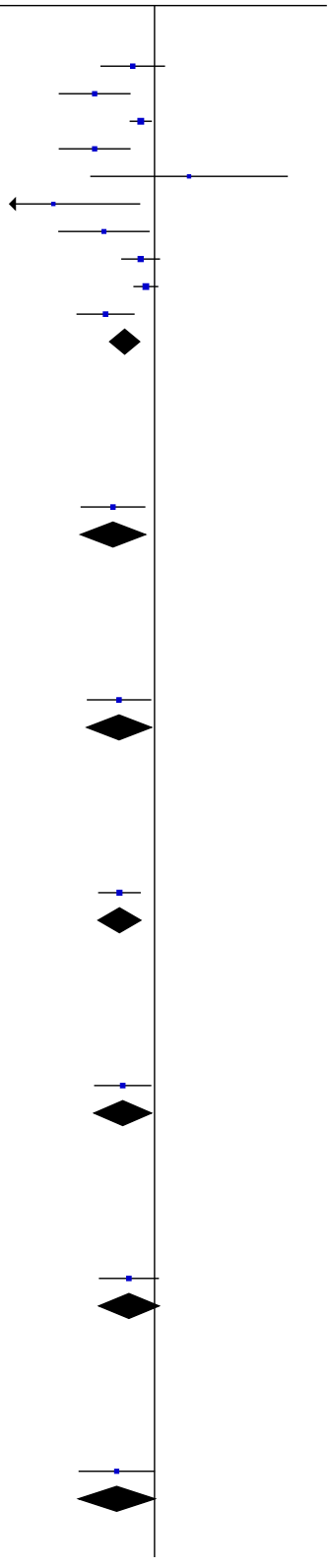
Analysis 2.1. Comparison 2: Dopamine antagonists vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.1.1 Metoclopramide - 10 mg						
Biswas 2003	4	20	8	20	5.8%	0.50 [0.18 , 1.40]
Garcia-Miguel 2000	3	48	21	50	5.1%	0.15 [0.05 , 0.47]
Habib 2013	31	99	49	101	12.1%	0.65 [0.45 , 0.92]
Khalayleh 2005	3	48	21	50	5.1%	0.15 [0.05 , 0.47]
Kim 1999	1	20	0	20	1.0%	3.00 [0.13 , 69.52]
Lussos 1992	0	21	12	21	1.2%	0.04 [0.00 , 0.63]
Maranhao 1988	2	20	5	10	3.7%	0.20 [0.05 , 0.86]
Mokini 2014	9	24	14	24	9.4%	0.64 [0.35 , 1.19]
Pan 2001	22	51	29	51	11.7%	0.76 [0.51 , 1.13]
Stein 1997	4	25	19	25	6.6%	0.21 [0.08 , 0.53]
Subtotal (95% CI)		**376**		**372**	**61.8%**	**0.39 [0.24 , 0.62]**
Total events:	79		178			
Heterogeneity: Tau² = 0.31; Chi² = 27.72, df = 9 (P = 0.001); I² = 68%						
Test for overall effect: Z = 3.91 (P < 0.0001)						
2.1.2 Metoclopramide - 20 mg						
Huang 1992	4	50	15	50	5.8%	0.27 [0.10 , 0.75]
Subtotal (95% CI)		**50**		**50**	**5.8%**	**0.27 [0.10 , 0.75]**
Total events:	4		15			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.51 (P = 0.01)						
2.1.3 Metoclopramide - 0.15 mg/kg						
Chestnut 1987	4	34	12	33	5.9%	0.32 [0.12 , 0.90]
Subtotal (95% CI)		**34**		**33**	**5.9%**	**0.32 [0.12 , 0.90]**
Total events:	4		12			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.16 (P = 0.03)						
2.1.4 Droperidol - 0.5 mg						
Mandell 1992	9	67	25	61	8.7%	0.33 [0.17 , 0.65]
Subtotal (95% CI)		**67**		**61**	**8.7%**	**0.33 [0.17 , 0.65]**
Total events:	9		25			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.22 (P = 0.001)						
2.1.5 Droperidol - 0.625 mg						
Pan 1996	4	16	11	16	6.7%	0.36 [0.15 , 0.90]
Subtotal (95% CI)		**16**		**16**	**6.7%**	**0.36 [0.15 , 0.90]**
Total events:	4		11			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.18 (P = 0.03)						
2.1.6 Droperidol - 1.25 mg						
Tzeng 2000	5	38	11	37	6.3%	0.44 [0.17 , 1.15]
Subtotal (95% CI)		**38**		**37**	**6.3%**	**0.44 [0.17 , 1.15]**
Total events:	5		11			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.67 (P = 0.09)						
2.1.7 Droperidol - 5 mg						
Maranhao 1988	3	20	5	10	4.7%	0.30 [0.09 , 1.01]
Subtotal (95% CI)		**20**		**10**	**4.7%**	**0.30 [0.09 , 1.01]**
Total events:	3		5			
Heterogeneity: Not applicable						



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Analysis 2.1. (Continued)

Total events: 3 5

Heterogeneity: Not applicable

Test for overall effect: Z = 1.94 (P = 0.05)

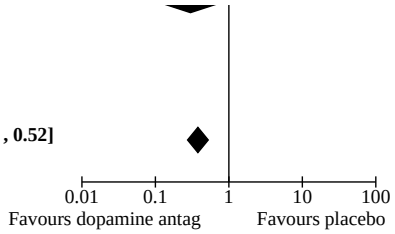
Total (95% CI) **601** **579** **100.0%** **0.38 [0.27 , 0.52]**

Total events: 108 257

Heterogeneity: Tau² = 0.19; Chi² = 32.66, df = 15 (P = 0.005); I² = 54%

Test for overall effect: Z = 5.88 (P < 0.00001)

Test for subgroup differences: Chi² = 0.79, df = 6 (P = 0.99), I² = 0%



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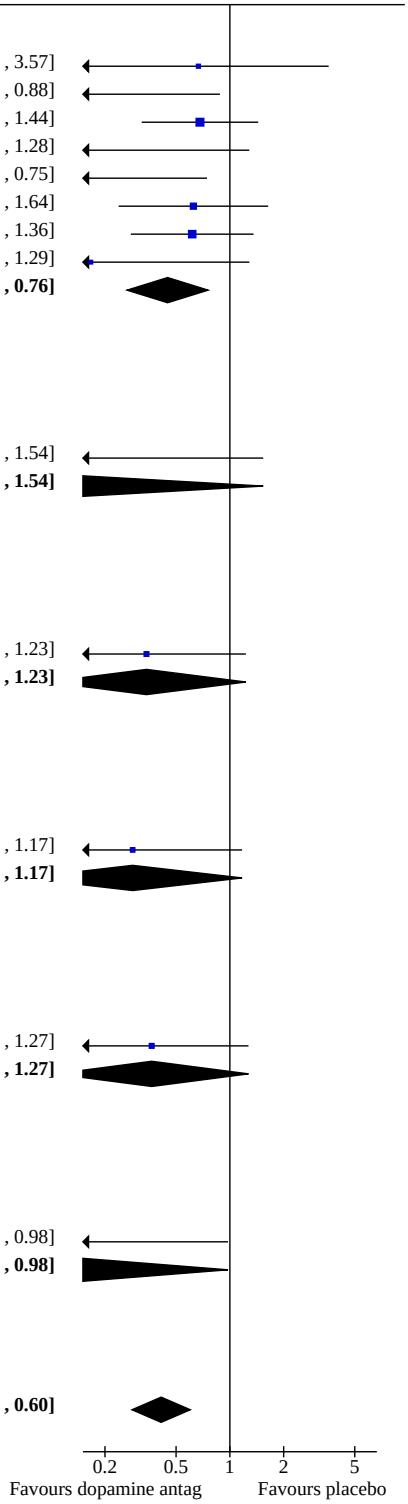
Analysis 2.2. Comparison 2: Dopamine antagonists vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.2.1 Metoclopramide - 10 mg						
Biswas 2003	2	20	3	20	4.8%	0.67 [0.12 , 3.57]
Garcia-Miguel 2000	1	48	9	50	3.4%	0.12 [0.02 , 0.88]
Habib 2013	10	99	15	101	21.5%	0.68 [0.32 , 1.44]
Lussos 1992	0	21	6	21	1.8%	0.08 [0.00 , 1.28]
Maranhao 1988	1	20	5	10	3.4%	0.10 [0.01 , 0.75]
Mokini 2014	5	24	8	24	13.8%	0.63 [0.24 , 1.64]
Pan 2001	8	51	13	51	19.6%	0.62 [0.28 , 1.36]
Stein 1997	1	25	6	25	3.3%	0.17 [0.02 , 1.29]
Subtotal (95% CI)		**308**		**302**	**71.6%**	**0.45 [0.27 , 0.76]**
Total events:	28		65			
Heterogeneity: Tau² = 0.12; Chi² = 9.07, df = 7 (P = 0.25); I² = 23%						
Test for overall effect: Z = 3.02 (P = 0.003)						
2.2.2 Metoclopramide - 0.15 mg/kg						
Chestnut 1987	0	34	5	33	1.7%	0.09 [0.01 , 1.54]
Subtotal (95% CI)		**34**		**33**	**1.7%**	**0.09 [0.01 , 1.54]**
Total events:	0		5			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.67 (P = 0.10)						
2.2.3 Droperidol - 0.5 mg						
Mandell 1992	3	67	8	61	8.1%	0.34 [0.09 , 1.23]
Subtotal (95% CI)		**67**		**61**	**8.1%**	**0.34 [0.09 , 1.23]**
Total events:	3		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.64 (P = 0.10)						
2.2.4 Droperidol - 0.625 mg						
Pan 1996	2	16	7	16	6.8%	0.29 [0.07 , 1.17]
Subtotal (95% CI)		**16**		**16**	**6.8%**	**0.29 [0.07 , 1.17]**
Total events:	2		7			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.74 (P = 0.08)						
2.2.5 Droperidol - 1.25 mg						
Tzeng 2000	3	38	8	37	8.5%	0.37 [0.10 , 1.27]
Subtotal (95% CI)		**38**		**37**	**8.5%**	**0.37 [0.10 , 1.27]**
Total events:	3		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.58 (P = 0.11)						
2.2.6 Droperidol - 5 mg						
Maranhao 1988	1	20	4	10	3.3%	0.13 [0.02 , 0.98]
Subtotal (95% CI)		**20**		**10**	**3.3%**	**0.13 [0.02 , 0.98]**
Total events:	1		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.98 (P = 0.05)						
Total (95% CI)		**483**		**459**	**100.0%**	**0.41 [0.28 , 0.60]**
Total events:	37		97			
Heterogeneity: Tau² = 0.02; Chi² = 12.62, df = 12 (P = 0.40); I² = 5%						
Test for overall effect: Z = 4.62 (P < 0.00001)						
Test for subgroup differences: Chi² = 2.70, df = 5 (P = 0.75), I² = 0%						



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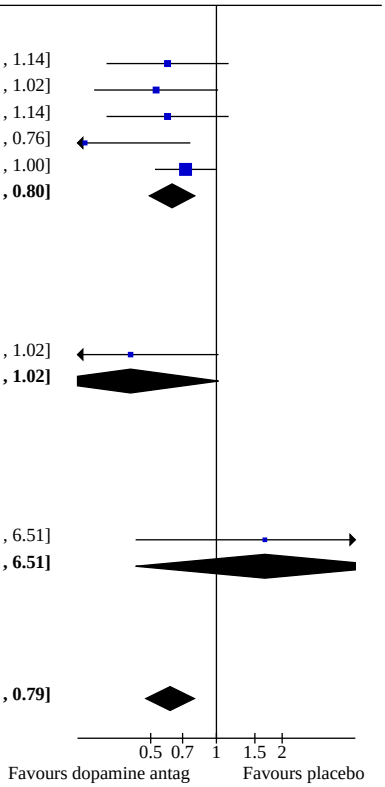
Analysis 2.3. Comparison 2: Dopamine antagonists vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.3.1 Metoclopramide - 10 mg						
Apiliogullari 2007	11	58	20	63	14.1%	0.60 [0.31 , 1.14]
Direkvand-Moghadam 2013	9	34	17	34	13.7%	0.53 [0.28 , 1.02]
Duman 2010	11	58	20	63	14.1%	0.60 [0.31 , 1.14]
Lussos 1992	3	21	12	21	5.1%	0.25 [0.08 , 0.76]
Pan 2001	26	51	36	51	42.4%	0.72 [0.52 , 1.00]
Subtotal (95% CI)		**222**		**232**	**89.4%**	**0.63 [0.49 , 0.80]**
Total events:	60		105			
Heterogeneity: Tau² = 0.00; Chi² = 3.92, df = 4 (P = 0.42); I² = 0%						
Test for overall effect: Z = 3.85 (P = 0.0001)						
2.3.2 Metoclopramide - 0.15 mg/kg						
Chestnut 1987	5	34	12	33	7.2%	0.40 [0.16 , 1.02]
Subtotal (95% CI)		**34**		**33**	**7.2%**	**0.40 [0.16 , 1.02]**
Total events:	5		12			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.91 (P = 0.06)						
2.3.3 Droperidol - 1.25 mg						
Peixoto 2006	5	40	3	40	3.4%	1.67 [0.43 , 6.51]
Subtotal (95% CI)		**40**		**40**	**3.4%**	**1.67 [0.43 , 6.51]**
Total events:	5		3			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.73 (P = 0.46)						
Total (95% CI)		**296**		**305**	**100.0%**	**0.61 [0.48 , 0.79]**
Total events:	70		120			
Heterogeneity: Tau² = 0.01; Chi² = 6.68, df = 6 (P = 0.35); I² = 10%						
Test for overall effect: Z = 3.74 (P = 0.0002)						
Test for subgroup differences: Chi² = 2.84, df = 2 (P = 0.24), I² = 29.5%						



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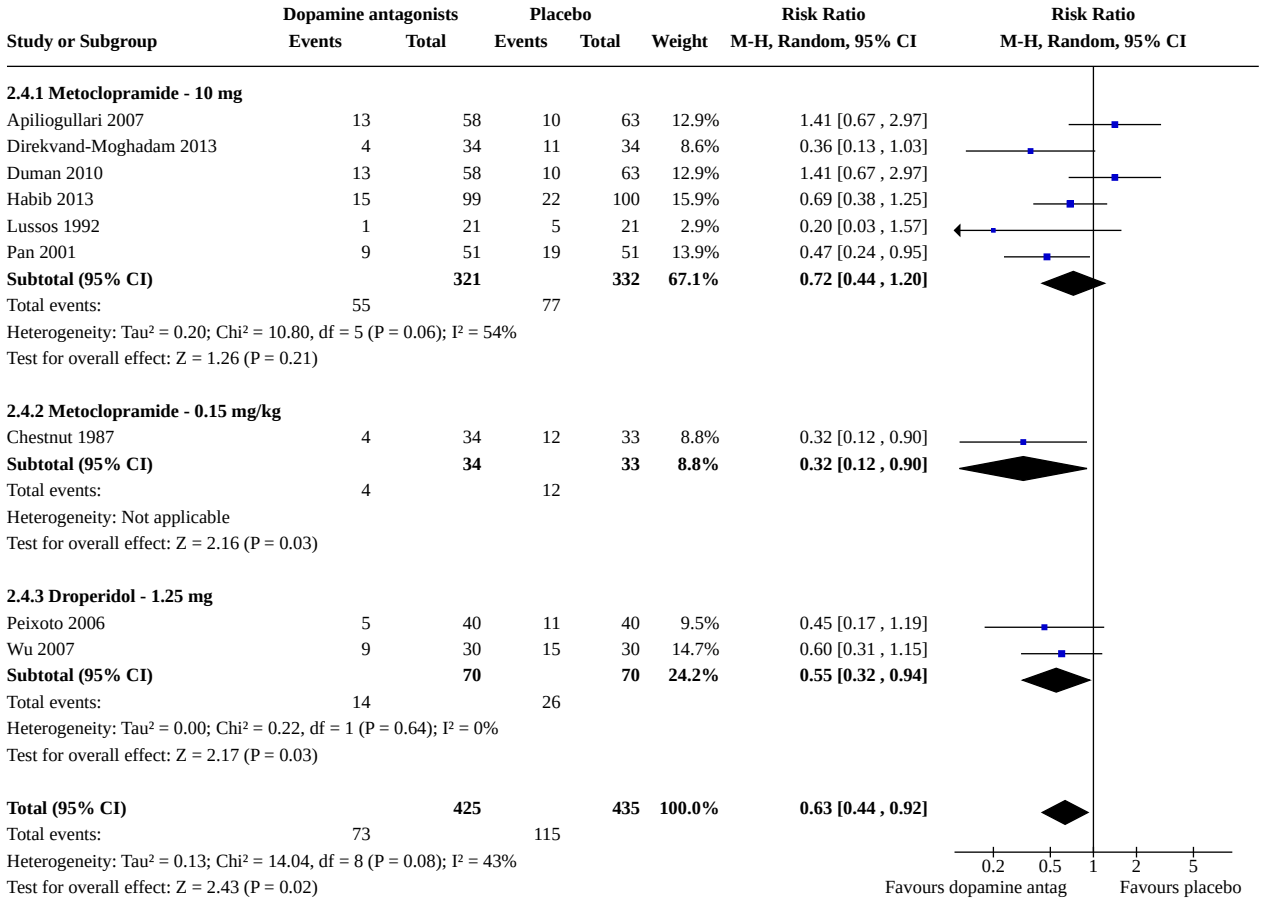
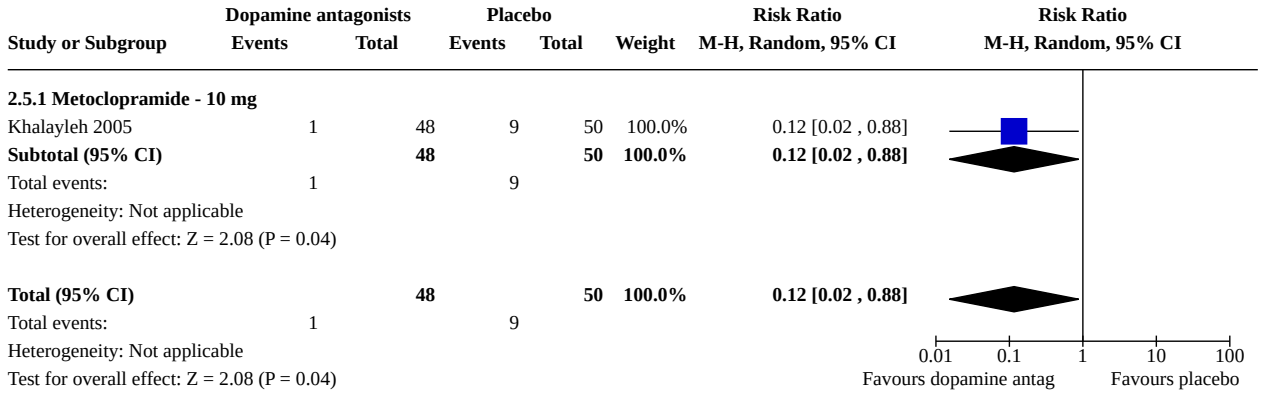
Analysis 2.4. Comparison 2: Dopamine antagonists vs placebo, Outcome 4: Vomiting - postoperative



Analysis 2.5. Comparison 2: Dopamine antagonists vs placebo, Outcome 5: 'Nausea + vomiting' - intraoperative (not pre-specfied)



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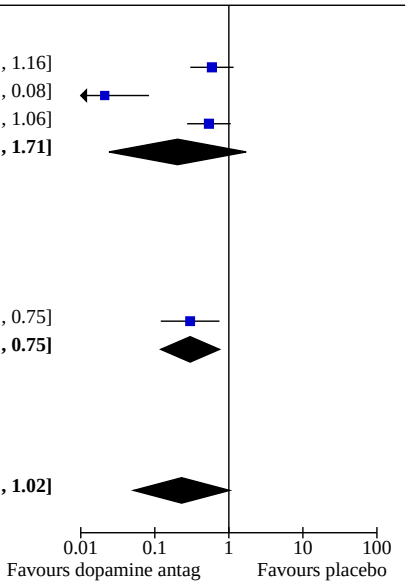
Analysis 2.6. Comparison 2: Dopamine antagonists vs placebo, Outcome 6: 'Nausea + vomiting' - postoperative (not pre-specified)

Study or Subgroup	Dopamine antagonist Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.6.1 Metoclopramide - 10 mg						
Choi 1999 (1)	13	60	11	30	26.2%	0.59 [0.30 , 1.16]
Kampo 2019 (2)	2	115	95	115	22.4%	0.02 [0.01 , 0.08]
Kim 1999	7	20	13	20	26.2%	0.54 [0.27 , 1.06]
Subtotal (95% CI)		**195**		**165**	**74.9%**	**0.20 [0.02 , 1.71]**
Total events:	22		119			
Heterogeneity: Tau² = 3.32; Chi² = 38.93, df = 2 (P < 0.00001); I² = 95%						
Test for overall effect: Z = 1.47 (P = 0.14)						
2.6.2 Droperidol - 0.625 mg						
Choi 1999 (1)	6	60	10	30	25.1%	0.30 [0.12 , 0.75]
Subtotal (95% CI)		**60**		**30**	**25.1%**	**0.30 [0.12 , 0.75]**
Total events:	6		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.59 (P = 0.010)						
Total (95% CI)		**255**		**195**	**100.0%**	**0.23 [0.05 , 1.02]**
Total events:	28		129			
Heterogeneity: Tau² = 2.09; Chi² = 37.12, df = 3 (P < 0.00001); I² = 92%						
Test for overall effect: Z = 1.93 (P = 0.05)						
Test for subgroup differences: Chi² = 0.11, df = 1 (P = 0.74), I² = 0%						



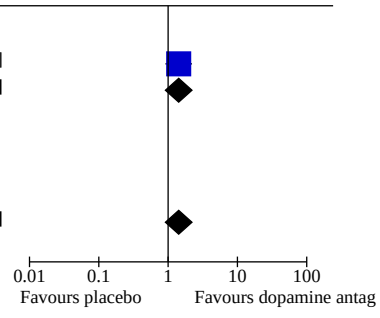
Footnotes

(1) We pooled data from women with epidural and spinal anaesthesias

(2) Outcome at 0-4 hours. This looks to be a very extreme result

Analysis 2.7. Comparison 2: Dopamine antagonists vs placebo, Outcome 7: Maternal satisfaction

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.7.1 Metoclopramide - 10 mg						
Pan 2001	27	51	19	51	100.0%	1.42 [0.91 , 2.21]
Subtotal (95% CI)		**51**		**51**	**100.0%**	**1.42 [0.91 , 2.21]**
Total events:	27		19			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.56 (P = 0.12)						
Total (95% CI)		**51**		**51**	**100.0%**	**1.42 [0.91 , 2.21]**
Total events:	27		19			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.56 (P = 0.12)						
Test for subgroup differences: Not applicable						



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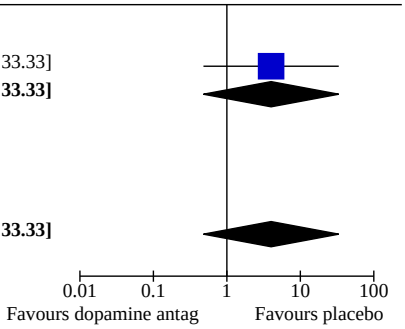
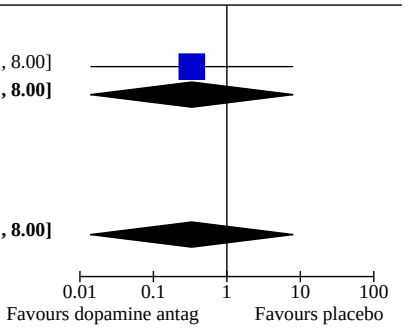
Analysis 2.8. Comparison 2: Dopamine antagonists vs placebo, Outcome 8: Anxiety

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.8.1 Metoclopramide - 10 mg						
Stein 1997	4	25	1	25	100.0%	4.00 [0.48 , 33.33]
Subtotal (95% CI)		**25**		**25**	**100.0%**	**4.00 [0.48 , 33.33]**
Total events:	4		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.28 (P = 0.20)						
Total (95% CI)		**25**		**25**	**100.0%**	**4.00 [0.48 , 33.33]**
Total events:	4		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.28 (P = 0.20)						
Test for subgroup differences: Not applicable						



Analysis 2.9. Comparison 2: Dopamine antagonists vs placebo, Outcome 9: Headache/dizziness

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.9.1 Metoclopramide - 10 mg						
Pan 2001	0	51	1	51	100.0%	0.33 [0.01 , 8.00]
Subtotal (95% CI)		**51**		**51**	**100.0%**	**0.33 [0.01 , 8.00]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Total (95% CI)		**51**		**51**	**100.0%**	**0.33 [0.01 , 8.00]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Test for subgroup differences: Not applicable						



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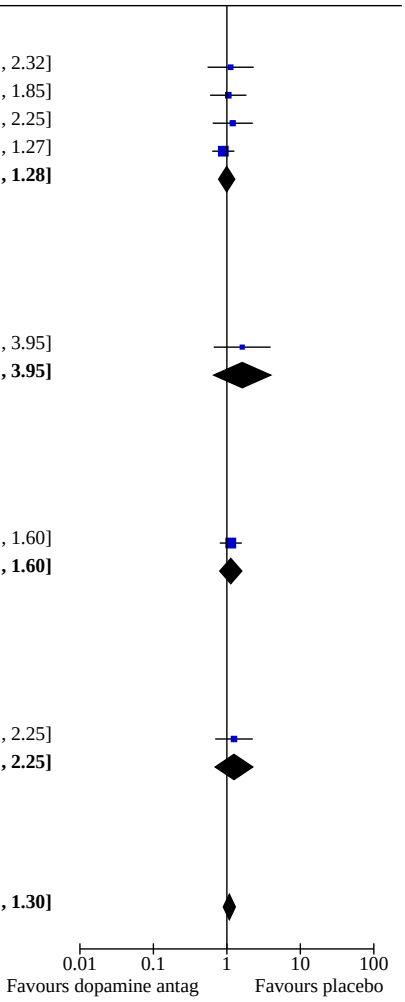
Analysis 2.10. Comparison 2: Dopamine antagonists vs placebo, Outcome 10: Hypotension

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.10.1 Metoclopramide - 10 mg						
Biswas 2003	9	20	8	20	6.7%	1.13 [0.55 , 2.32]
Choi 1999 (1)	23	60	11	30	10.9%	1.05 [0.59 , 1.85]
Khalayleh 2005	15	48	13	50	8.9%	1.20 [0.64 , 2.25]
Stein 1997	17	25	19	25	29.2%	0.89 [0.63 , 1.27]
Subtotal (95% CI)		**153**		**125**	**55.7%**	**0.99 [0.77 , 1.28]**
Total events:	64		51			
Heterogeneity: Tau² = 0.00; Chi² = 0.98, df = 3 (P = 0.81); I² = 0%						
Test for overall effect: Z = 0.05 (P = 0.96)						
2.10.2 Metoclopramide - 0.15 mg/kg						
Chestnut 1987	10	34	6	33	4.4%	1.62 [0.66 , 3.95]
Subtotal (95% CI)		**34**		**33**	**4.4%**	**1.62 [0.66 , 3.95]**
Total events:	10		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.06 (P = 0.29)						
2.10.3 Droperidol - 0.5 mg						
Mandell 1992	36	67	29	61	29.7%	1.13 [0.80 , 1.60]
Subtotal (95% CI)		**67**		**61**	**29.7%**	**1.13 [0.80 , 1.60]**
Total events:	36		29			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.70 (P = 0.49)						
2.10.4 Droperidol - 0.625 mg						
Choi 1999 (2)	25	60	10	30	10.2%	1.25 [0.69 , 2.25]
Subtotal (95% CI)		**60**		**30**	**10.2%**	**1.25 [0.69 , 2.25]**
Total events:	25		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.74 (P = 0.46)						
Total (95% CI)		**314**		**249**	**100.0%**	**1.08 [0.90 , 1.30]**
Total events:	135		96			
Heterogeneity: Tau² = 0.00; Chi² = 2.56, df = 6 (P = 0.86); I² = 0%						
Test for overall effect: Z = 0.81 (P = 0.42)						
Test for subgroup differences: Chi² = 1.51, df = 3 (P = 0.68), I² = 0%						



Footnotes

(1) We pooled data from women with epidural and spinal anaesthesias

(2) We pooled data from women with epidural and spinal anaesthesia

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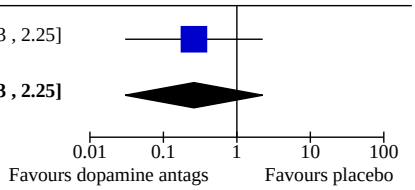
Analysis 2.11. Comparison 2: Dopamine antagonists vs placebo, Outcome 11: Rescue antiemetics (not pre-specified)

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Khalayleh 2005 (1)	1	48	4	50	100.0%	0.26 [0.03 , 2.25]
Total (95% CI)		**48**		**50**	**100.0%**	**0.26 [0.03 , 2.25]**
Total events:	1		4			

Heterogeneity: Not applicable
Test for overall effect: Z = 1.22 (P = 0.22)
Test for subgroup differences: Not applicable



Footnotes
(1) Metoclopramide - 10mg

Analysis 2.12. Comparison 2: Dopamine antagonists vs placebo, Outcome 12: Sedation

Study or Subgroup	Dopamine antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
2.12.1 Metoclopramide - 10 mg						
Choi 1999	35	60	4	30	54.3%	4.38 [1.71 , 11.17]
Kim 1999	1	20	0	20	4.8%	3.00 [0.13 , 69.52]
Subtotal (95% CI)		**80**		**50**	**59.1%**	**4.24 [1.73 , 10.41]**
Total events:	36		4			

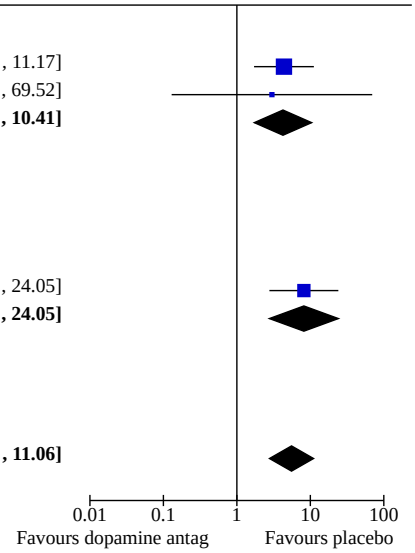
Heterogeneity: Tau² = 0.00; Chi² = 0.05, df = 1 (P = 0.82); I² = 0%
Test for overall effect: Z = 3.15 (P = 0.002)

2.12.2 Droperidol - 0.625 mg						
Choi 1999	49	60	3	30	40.9%	8.17 [2.77 , 24.05]
Subtotal (95% CI)		**60**		**30**	**40.9%**	**8.17 [2.77 , 24.05]**
Total events:	49		3			

Heterogeneity: Not applicable
Test for overall effect: Z = 3.81 (P = 0.0001)

Total (95% CI)		**140**		**80**	**100.0%**	**5.54 [2.78 , 11.06]**
Total events:	85		7			

Heterogeneity: Tau² = 0.00; Chi² = 0.91, df = 2 (P = 0.63); I² = 0%
Test for overall effect: Z = 4.86 (P < 0.00001)
Test for subgroup differences: Chi² = 0.84, df = 1 (P = 0.36), I² = 0%



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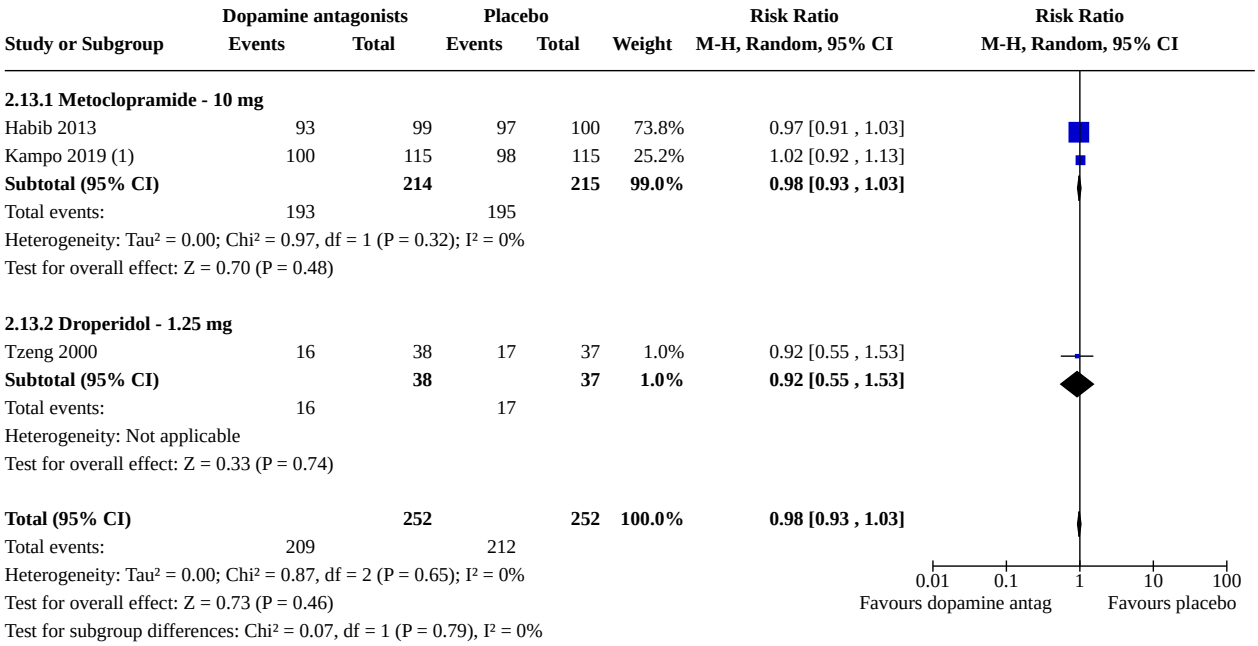
Analysis 2.13. Comparison 2: Dopamine antagonists vs placebo, Outcome 13: Pruritus/itching



Footnotes

(1) Outcome at 0-4 hours

Comparison 3. Corticosteroids vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.1 Nausea - intraoperative	6	609	Risk Ratio (M-H, Random, 95% CI)	0.56 [0.37, 0.83]
3.1.1 Dexamethasone - 4 mg IV	1	200	Risk Ratio (M-H, Random, 95% CI)	0.89 [0.68, 1.17]
3.1.2 Dexamethasone - 4 mg IT	1	62	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.15, 0.75]
3.1.3 Dexamethasone - 8 mg IV	5	347	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.37, 0.82]
3.2 Vomiting - intraoperative	6	609	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.31, 0.87]
3.2.1 Dexamethasone - 4 mg IV	1	200	Risk Ratio (M-H, Random, 95% CI)	0.88 [0.33, 2.32]
3.2.2 Dexamethasone - 4 mg IT	1	62	Risk Ratio (M-H, Random, 95% CI)	0.24 [0.02, 2.47]
3.2.3 Dexamethasone - 8 mg IV	5	347	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.23, 0.83]
3.3 Nausea - postoperative	6	733	Risk Ratio (M-H, Random, 95% CI)	0.59 [0.49, 0.73]
3.3.1 Dexamethasone - 2.5 mg IV	1	58	Risk Ratio (M-H, Random, 95% CI)	0.56 [0.19, 1.63]
3.3.2 Dexamethasone - 4 mg IV	1	200	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.30, 0.88]
3.3.3 Dexamethasone - 5 mg IV	1	59	Risk Ratio (M-H, Random, 95% CI)	0.43 [0.13, 1.38]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.3.4 Dexamethasone - 8 mg IV	2	168	Risk Ratio (M-H, Random, 95% CI)	0.82 [0.60, 1.13]
3.3.5 Dexamethasone - 8 mg IT	1	120	Risk Ratio (M-H, Random, 95% CI)	0.54 [0.39, 0.74]
3.3.6 Dexamethasone - 10 mg IV	2	128	Risk Ratio (M-H, Random, 95% CI)	0.43 [0.26, 0.69]
3.4 Vomiting - postoperative	7	793	Risk Ratio (M-H, Random, 95% CI)	0.68 [0.49, 0.95]
3.4.1 Dexamethasone - 2.5 mg IV	1	58	Risk Ratio (M-H, Random, 95% CI)	0.74 [0.22, 2.49]
3.4.2 Dexamethasone - 4 mg IV	1	200	Risk Ratio (M-H, Random, 95% CI)	0.14 [0.01, 2.73]
3.4.3 Dexamethasone - 5 mg IV	1	59	Risk Ratio (M-H, Random, 95% CI)	0.34 [0.08, 1.51]
3.4.4 Dexamethasone - 8 mg IV	3	228	Risk Ratio (M-H, Random, 95% CI)	1.01 [0.79, 1.31]
3.4.5 Dexamethasone - 8 mg IT	1	120	Risk Ratio (M-H, Random, 95% CI)	0.50 [0.31, 0.81]
3.4.6 Dexamethasone - 10 mg IV	2	128	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.27, 0.73]
3.5 'Nausea + Vomiting' - intraoperative (not pre-specified)	1	108	Risk Ratio (M-H, Random, 95% CI)	1.65 [0.96, 2.84]
3.5.1 Dexamethasone - 8 mg IV	1	108	Risk Ratio (M-H, Random, 95% CI)	1.65 [0.96, 2.84]
3.6 'Nausea + Vomiting' - postoperative - (not pre-specified)	1	108	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.79, 1.12]
3.6.1 Dexamethasone - 8 mg IV	1	108	Risk Ratio (M-H, Random, 95% CI)	0.94 [0.79, 1.12]
3.7 Hypotension	1	124	Risk Ratio (M-H, Random, 95% CI)	0.62 [0.34, 1.12]
3.7.1 Dexamethasone - 4 mg IT	1	62	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.25, 0.78]
3.7.2 Dexamethasone - 8 mg IV	1	62	Risk Ratio (M-H, Random, 95% CI)	0.80 [0.53, 1.22]
3.8 Bradycardia	1	124	Risk Ratio (M-H, Random, 95% CI)	0.58 [0.30, 1.16]
3.8.1 Dexamethasone - 4 mg IT	1	62	Risk Ratio (M-H, Random, 95% CI)	0.40 [0.14, 1.15]
3.8.2 Dexamethasone - 8 mg IV	1	62	Risk Ratio (M-H, Random, 95% CI)	0.77 [0.32, 1.87]
3.9 Shivering	1	124	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.41, 1.05]
3.9.1 Dexamethasone - 4 mg IT	1	62	Risk Ratio (M-H, Random, 95% CI)	0.53 [0.26, 1.09]
3.9.2 Dexamethasone - 8 mg IV	1	62	Risk Ratio (M-H, Random, 95% CI)	0.77 [0.42, 1.40]
3.10 Rescue antiemetics (not pre-specified)	1	108	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.53, 1.57]

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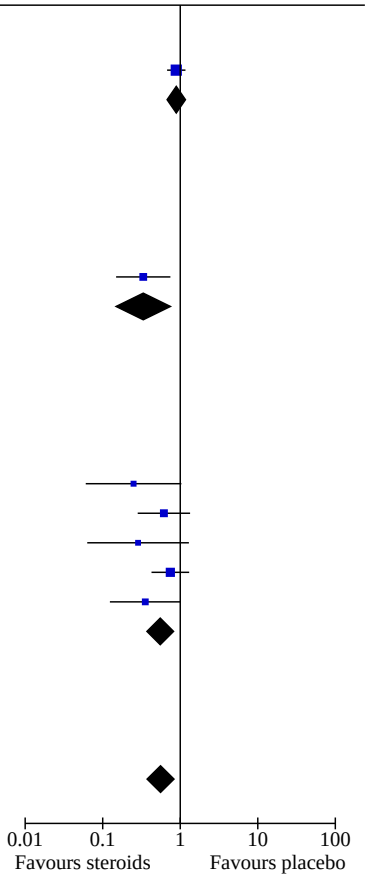
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
3.10.1 Dexamethasone 8 mg IV	1	108	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.53, 1.57]

Analysis 3.1. Comparison 3: Corticosteroids vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Steroids Events	Steroids Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
3.1.1 Dexamethasone - 4 mg IV						
Parra-Guiza 2018	48	100	54	100	28.8%	0.89 [0.68 , 1.17]
Subtotal (95% CI)		**100**		**100**	**28.8%**	**0.89 [0.68 , 1.17]**
Total events:	48		54			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.85 (P = 0.40)						
3.1.2 Dexamethasone - 4 mg IT						
Tkachenko 2019 (1)	7	42	10	20	14.1%	0.33 [0.15 , 0.75]
Subtotal (95% CI)		**42**		**20**	**14.1%**	**0.33 [0.15 , 0.75]**
Total events:	7		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.67 (P = 0.008)						
3.1.3 Dexamethasone - 8 mg IV						
Biswas 2003	2	20	8	20	6.4%	0.25 [0.06 , 1.03]
Hassanein 2015	8	45	13	45	14.7%	0.62 [0.28 , 1.34]
Jaafarpour 2008	2	40	7	40	5.8%	0.29 [0.06 , 1.29]
Tkachenko 2019 (2)	16	41	11	21	20.1%	0.75 [0.43 , 1.30]
Tzeng 2000	4	38	11	37	10.1%	0.35 [0.12 , 1.01]
Subtotal (95% CI)		**184**		**163**	**57.1%**	**0.55 [0.37 , 0.82]**
Total events:	32		50			
Heterogeneity: Tau² = 0.01; Chi² = 4.10, df = 4 (P = 0.39); I² = 2%						
Test for overall effect: Z = 2.95 (P = 0.003)						
Total (95% CI)		**326**		**283**	**100.0%**	**0.56 [0.37 , 0.83]**
Total events:	87		114			
Heterogeneity: Tau² = 0.12; Chi² = 12.01, df = 6 (P = 0.06); I² = 50%						
Test for overall effect: Z = 2.87 (P = 0.004)						
Test for subgroup differences: Chi² = 7.54, df = 2 (P = 0.02), I² = 73.5%						



Footnotes

(1) Administered intrathecially

(2) Admnstered intravenously

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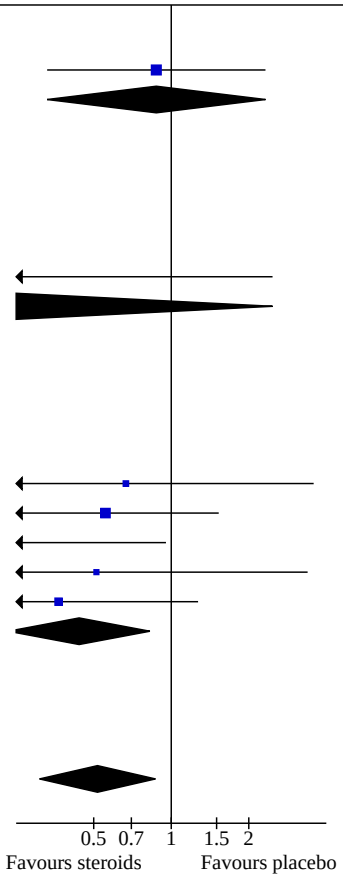
Analysis 3.2. Comparison 3: Corticosteroids vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Steroids Events	Steroids Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
3.2.1 Dexamethasone - 4 mg IV						
Parra-Guiza 2018	7	100	8	100	28.2%	0.88 [0.33 , 2.32]
Subtotal (95% CI)		**100**		**100**	**28.2%**	**0.88 [0.33 , 2.32]**
Total events:	7		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.27 (P = 0.79)						
3.2.2 Dexamethasone - 4 mg IT						
Tkachenko 2019 (1)	1	42	2	20	4.9%	0.24 [0.02 , 2.47]
Subtotal (95% CI)		**42**		**20**	**4.9%**	**0.24 [0.02 , 2.47]**
Total events:	1		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.20 (P = 0.23)						
3.2.3 Dexamethasone - 8 mg IV						
Biswas 2003	2	20	3	20	9.5%	0.67 [0.12 , 3.57]
Hassanein 2015	5	45	9	45	26.2%	0.56 [0.20 , 1.53]
Jaafarpour 2008	1	40	8	40	6.5%	0.13 [0.02 , 0.95]
Tkachenko 2019 (2)	2	41	2	21	7.5%	0.51 [0.08 , 3.38]
Tzeng 2000	3	38	8	37	17.2%	0.37 [0.10 , 1.27]
Subtotal (95% CI)		**184**		**163**	**66.9%**	**0.44 [0.23 , 0.83]**
Total events:	13		30			
Heterogeneity: Tau² = 0.00; Chi² = 2.10, df = 4 (P = 0.72); I² = 0%						
Test for overall effect: Z = 2.55 (P = 0.01)						
Total (95% CI)		**326**		**283**	**100.0%**	**0.52 [0.31 , 0.87]**
Total events:	21		40			
Heterogeneity: Tau² = 0.00; Chi² = 3.89, df = 6 (P = 0.69); I² = 0%						
Test for overall effect: Z = 2.50 (P = 0.01)						
Test for subgroup differences: Chi² = 1.80, df = 2 (P = 0.41), I² = 0%						



Footnotes

(1) Administered imtrathecially

(2) Administered intravenously

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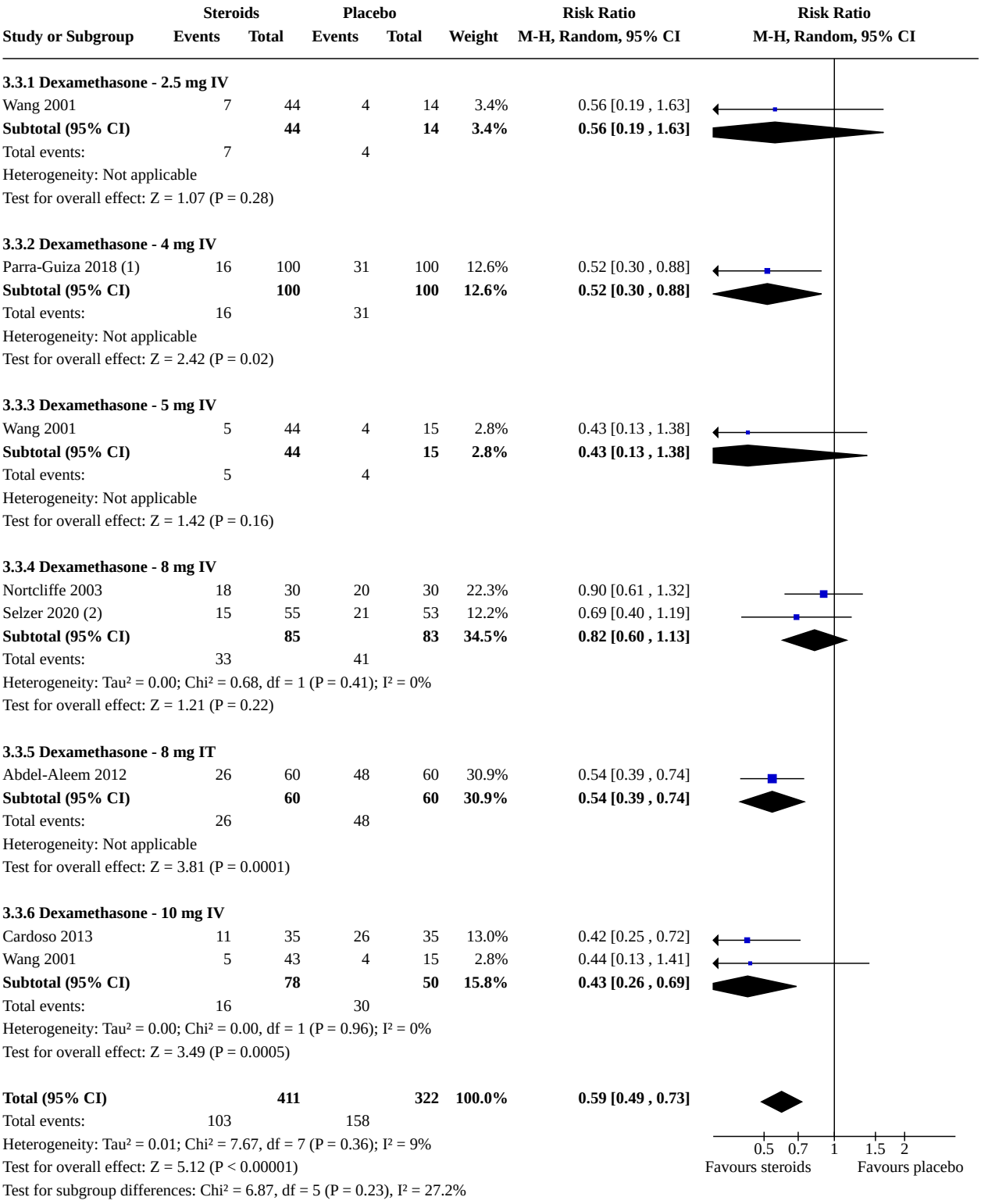
Analysis 3.3. Comparison 3: Corticosteroids vs placebo, Outcome 3: Nausea - postoperative



Footnotes

(1) Outcome at 0-2hrs

(2) Throughout the 48 hour period

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Analysis 3.3. (Continued)

(1) Outcome at 0-2hrs
(2) Throughout the 48 hour period

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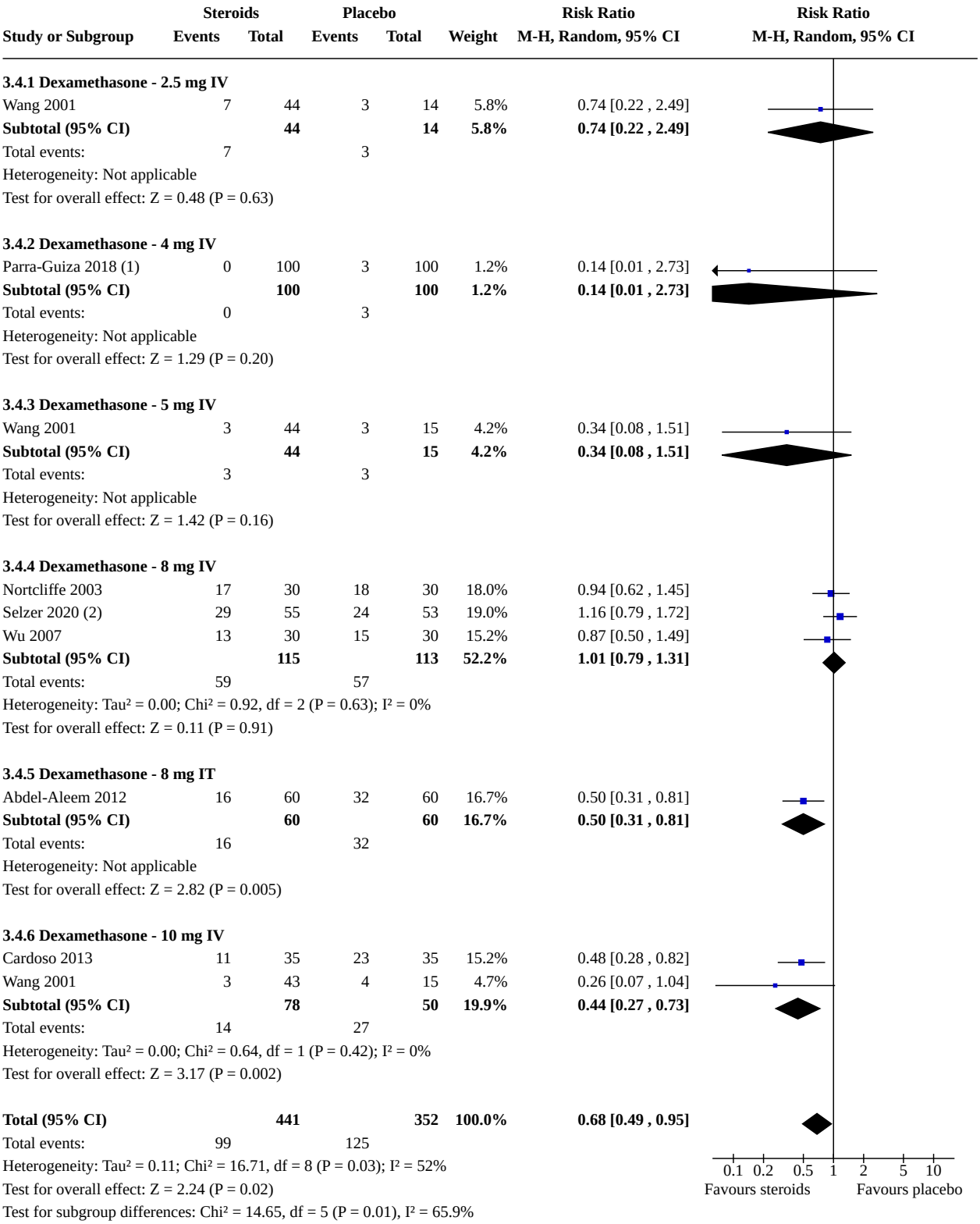
Analysis 3.4. Comparison 3: Corticosteroids vs placebo, Outcome 4: Vomiting - postoperative



Footnotes

(1) Outcome at 0-2hrs

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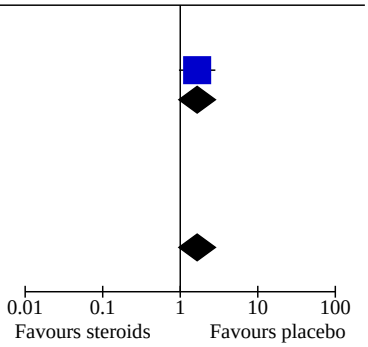
Analysis 3.4. (Continued)

Footnotes
(1) Outcome at 0-2hrs
(2) Throughout the 48 hour period

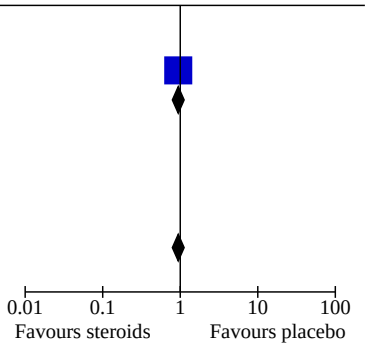
Analysis 3.5. Comparison 3: Corticosteroids vs placebo, Outcome 5: 'Nausea + Vomiting' - intraoperative (not pre-specified)

Study or Subgroup	Steroids Events	Steroids Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
3.5.1 Dexamethasone - 8 mg IV						
Selzer 2020	24	55	14	53	100.0%	1.65 [0.96 , 2.84]
Subtotal (95% CI)		**55**		**53**	**100.0%**	**1.65 [0.96 , 2.84]**
Total events:	24		14			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.82 (P = 0.07)						
Total (95% CI)		**55**		**53**	**100.0%**	**1.65 [0.96 , 2.84]**
Total events:	24		14			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.82 (P = 0.07)						
Test for subgroup differences: Not applicable						



Analysis 3.6. Comparison 3: Corticosteroids vs placebo, Outcome 6: 'Nausea + Vomiting' - postoperative - (not pre-specified)

Study or Subgroup	Steroids Events	Steroids Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
3.6.1 Dexamethasone - 8 mg IV						
Selzer 2020	44	55	45	53	100.0%	0.94 [0.79 , 1.12]
Subtotal (95% CI)		**55**		**53**	**100.0%**	**0.94 [0.79 , 1.12]**
Total events:	44		45			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.67 (P = 0.50)						
Total (95% CI)		**55**		**53**	**100.0%**	**0.94 [0.79 , 1.12]**
Total events:	44		45			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.67 (P = 0.50)						
Test for subgroup differences: Not applicable						



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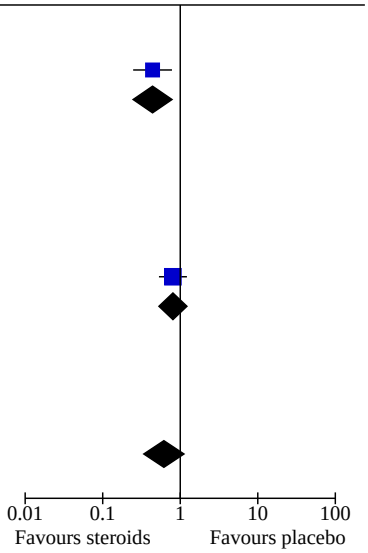
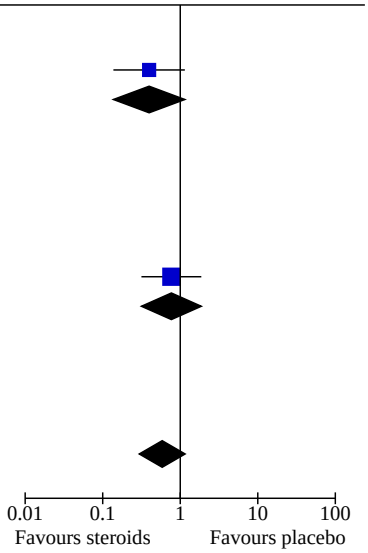
Analysis 3.7. Comparison 3: Corticosteroids vs placebo, Outcome 7: Hypotension

Study or Subgroup	Steroids Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
3.7.1 Dexamethasone - 4 mg IT						
Tkachenko 2019	12	42	13	20	44.4%	0.44 [0.25 , 0.78]
Subtotal (95% CI)		**42**		**20**	**44.4%**	**0.44 [0.25 , 0.78]**
Total events:	12		13			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.80 (P = 0.005)						
3.7.2 Dexamethasone - 8 mg IV						
Tkachenko 2019	22	41	14	21	55.6%	0.80 [0.53 , 1.22]
Subtotal (95% CI)		**41**		**21**	**55.6%**	**0.80 [0.53 , 1.22]**
Total events:	22		14			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.02 (P = 0.31)						
Total (95% CI)		**83**		**41**	**100.0%**	**0.62 [0.34 , 1.12]**
Total events:	34		27			
Heterogeneity: Tau² = 0.12; Chi² = 2.85, df = 1 (P = 0.09); I² = 65%						
Test for overall effect: Z = 1.60 (P = 0.11)						
Test for subgroup differences: Chi² = 2.79, df = 1 (P = 0.10), I² = 64.1%						



Analysis 3.8. Comparison 3: Corticosteroids vs placebo, Outcome 8: Bradycardia

Study or Subgroup	Steroids Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
3.8.1 Dexamethasone - 4 mg IT						
Tkachenko 2019	5	42	6	20	41.3%	0.40 [0.14 , 1.15]
Subtotal (95% CI)		**42**		**20**	**41.3%**	**0.40 [0.14 , 1.15]**
Total events:	5		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.71 (P = 0.09)						
3.8.2 Dexamethasone - 8 mg IV						
Tkachenko 2019	9	41	6	21	58.7%	0.77 [0.32 , 1.87]
Subtotal (95% CI)		**41**		**21**	**58.7%**	**0.77 [0.32 , 1.87]**
Total events:	9		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.58 (P = 0.56)						
Total (95% CI)		**83**		**41**	**100.0%**	**0.58 [0.30 , 1.16]**
Total events:	14		12			
Heterogeneity: Tau² = 0.00; Chi² = 0.88, df = 1 (P = 0.35); I² = 0%						
Test for overall effect: Z = 1.54 (P = 0.12)						
Test for subgroup differences: Chi² = 0.88, df = 1 (P = 0.35), I² = 0%						



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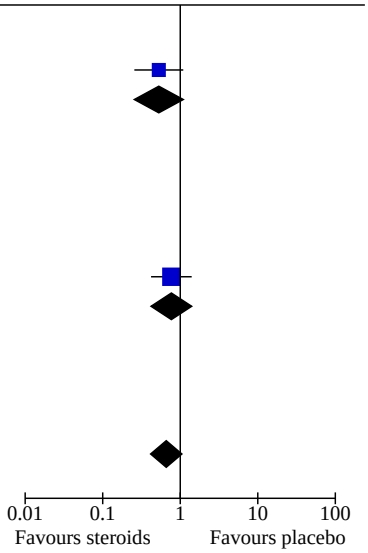
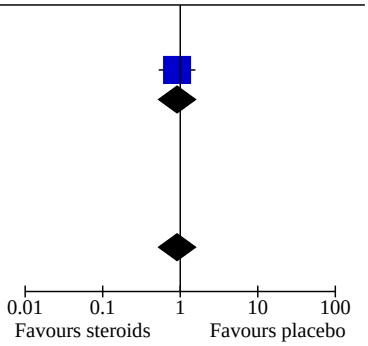
Analysis 3.9. Comparison 3: Corticosteroids vs placebo, Outcome 9: Shivering

Study or Subgroup	Steroids Events	Steroids Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
3.9.1 Dexamethasone - 4 mg IT						
Tkachenko 2019	10	42	9	20	40.8%	0.53 [0.26 , 1.09]
Subtotal (95% CI)		**42**		**20**	**40.8%**	**0.53 [0.26 , 1.09]**
Total events:	10		9			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.72 (P = 0.09)						
3.9.2 Dexamethasone - 8 mg IV						
Tkachenko 2019	15	41	10	21	59.2%	0.77 [0.42 , 1.40]
Subtotal (95% CI)		**41**		**21**	**59.2%**	**0.77 [0.42 , 1.40]**
Total events:	15		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.86 (P = 0.39)						
Total (95% CI)		**83**		**41**	**100.0%**	**0.66 [0.41 , 1.05]**
Total events:	25		19			
Heterogeneity: Tau² = 0.00; Chi² = 0.60, df = 1 (P = 0.44); I² = 0%						
Test for overall effect: Z = 1.76 (P = 0.08)						
Test for subgroup differences: Chi² = 0.60, df = 1 (P = 0.44), I² = 0%						



Analysis 3.10. Comparison 3: Corticosteroids vs placebo, Outcome 10: Rescue antiemetics (not pre-specified)

Study or Subgroup	Steroids Events	Steroids Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
3.10.1 Dexamethasone 8 mg IV						
Selzer 2020	17	55	18	53	100.0%	0.91 [0.53 , 1.57]
Subtotal (95% CI)		**55**		**53**	**100.0%**	**0.91 [0.53 , 1.57]**
Total events:	17		18			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.34 (P = 0.73)						
Total (95% CI)		**55**		**53**	**100.0%**	**0.91 [0.53 , 1.57]**
Total events:	17		18			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.34 (P = 0.73)						
Test for subgroup differences: Not applicable						



Comparison 4. Antihistamines vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4.1 Nausea - intraoperative	1	149	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.47, 2.11]
4.1.1 Dimenhydrinate - 25 mg	1	149	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.47, 2.11]
4.2 Vomiting - intraoperative	1	149	Risk Ratio (M-H, Random, 95% CI)	Not estimable
4.2.1 Dimenhydrinate - 25 mg	1	149	Risk Ratio (M-H, Random, 95% CI)	Not estimable

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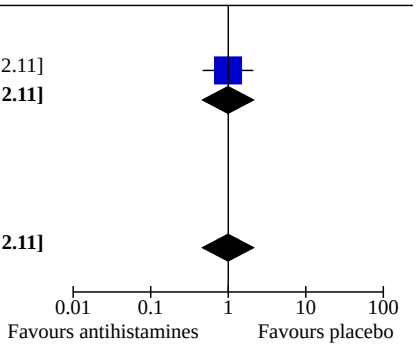
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
4.3 Nausea - postoperative	4	514	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.30, 0.64]
4.3.1 Dimenhydrinate - 25 mg	1	149	Risk Ratio (M-H, Random, 95% CI)	0.68 [0.31, 1.52]
4.3.2 Dimenhydrate - 50 mg	2	215	Risk Ratio (M-H, Random, 95% CI)	0.38 [0.21, 0.69]
4.3.3 Dimenhydrate - 100 mg	1	90	Risk Ratio (M-H, Random, 95% CI)	0.17 [0.05, 0.57]
4.3.4 Cyclizine - 50 mg	1	60	Risk Ratio (M-H, Random, 95% CI)	0.50 [0.28, 0.88]
4.4 Vomiting - postoperative	3	333	Risk Ratio (M-H, Random, 95% CI)	0.48 [0.29, 0.81]
4.4.1 Dimenhydrinate - 25 mg	1	149	Risk Ratio (M-H, Random, 95% CI)	0.13 [0.01, 2.48]
4.4.2 Dimenhydrate - 50 mg	1	124	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.19, 1.42]
4.4.3 Cyclizine - 50 mg	1	60	Risk Ratio (M-H, Random, 95% CI)	0.50 [0.27, 0.93]
4.5 Hypotension	1	149	Risk Ratio (M-H, Random, 95% CI)	1.47 [0.90, 2.40]
4.5.1 Dimenhydrinate - 25 mg	1	149	Risk Ratio (M-H, Random, 95% CI)	1.47 [0.90, 2.40]

Analysis 4.1. Comparison 4: Antihistamines vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Antihistamines Events	Antihistamines Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
4.1.1 Dimenhydrinate - 25 mg						
Carvalho 2010	12	78	11	71	100.0%	0.99 [0.47 , 2.11]
Subtotal (95% CI)		**78**		**71**	**100.0%**	**0.99 [0.47 , 2.11]**
Total events:	12		11			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.02 (P = 0.99)						
Total (95% CI)		**78**		**71**	**100.0%**	**0.99 [0.47 , 2.11]**
Total events:	12		11			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.02 (P = 0.99)						
Test for subgroup differences: Not applicable						



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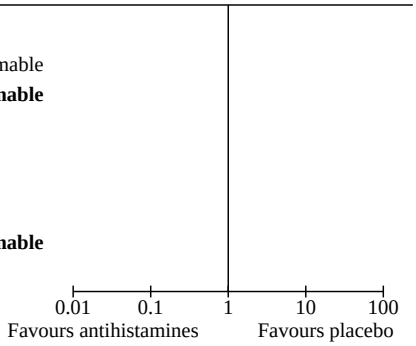
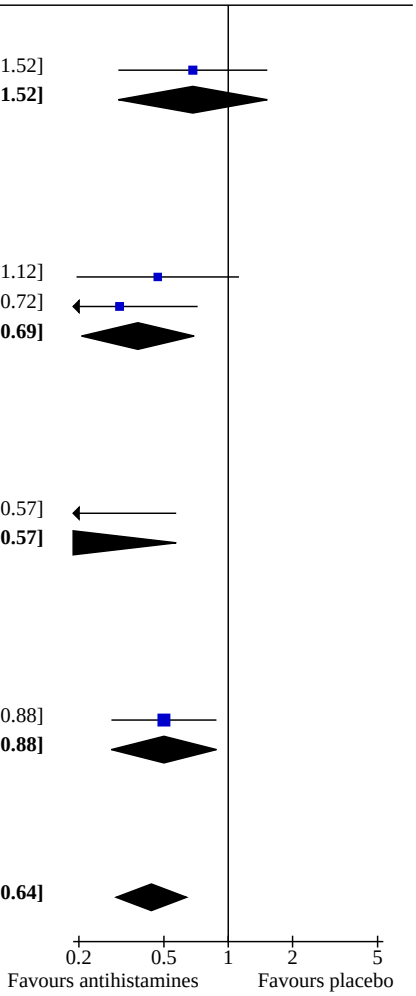
Analysis 4.2. Comparison 4: Antihistamines vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Antihistamines Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
4.2.1 Dimenhydrinate - 25 mg						
Carvalho 2010	0	78	0	71		Not estimable
Subtotal (95% CI)		**78**		**71**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**78**		**71**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 4.3. Comparison 4: Antihistamines vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	Antihistamines Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
4.3.1 Dimenhydrinate - 25 mg						
Carvalho 2010	9	78	12	71	19.9%	0.68 [0.31 , 1.52]
Subtotal (95% CI)		**78**		**71**	**19.9%**	**0.68 [0.31 , 1.52]**
Total events:	9		12			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.93 (P = 0.35)						
4.3.2 Dimenhydrate - 50 mg						
Apiliogullari 2007	8	62	8	29	17.0%	0.47 [0.19 , 1.12]
Duman 2010	6	61	20	63	18.2%	0.31 [0.13 , 0.72]
Subtotal (95% CI)		**123**		**92**	**35.2%**	**0.38 [0.21 , 0.69]**
Total events:	14		28			
Heterogeneity: Tau² = 0.00; Chi² = 0.45, df = 1 (P = 0.50); I² = 0%						
Test for overall effect: Z = 3.15 (P = 0.002)						
4.3.3 Dimenhydrate - 100 mg						
Apiliogullari 2007	3	60	9	30	9.0%	0.17 [0.05 , 0.57]
Subtotal (95% CI)		**60**		**30**	**9.0%**	**0.17 [0.05 , 0.57]**
Total events:	3		9			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.85 (P = 0.004)						
4.3.4 Cyclizine - 50 mg						
Nortcliffe 2003	10	30	20	30	35.9%	0.50 [0.28 , 0.88]
Subtotal (95% CI)		**30**		**30**	**35.9%**	**0.50 [0.28 , 0.88]**
Total events:	10		20			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.40 (P = 0.02)						
Total (95% CI)		**291**		**223**	**100.0%**	**0.44 [0.30 , 0.64]**
Total events:	36		69			
Heterogeneity: Tau² = 0.02; Chi² = 4.48, df = 4 (P = 0.34); I² = 11%						
Test for overall effect: Z = 4.29 (P < 0.0001)						
Test for subgroup differences: Chi² = 3.98, df = 3 (P = 0.26), I² = 24.6%						



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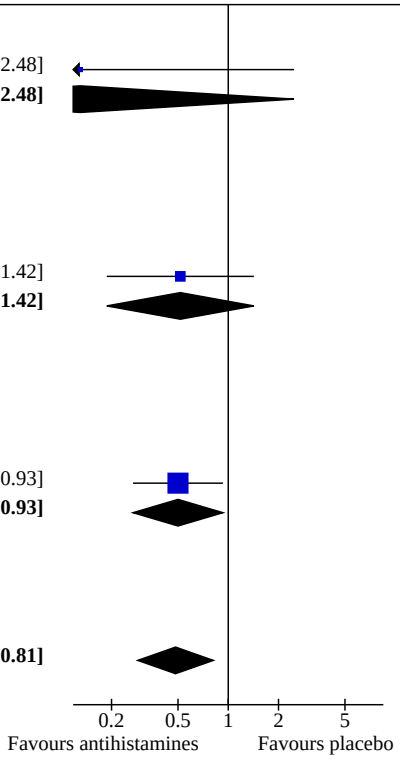
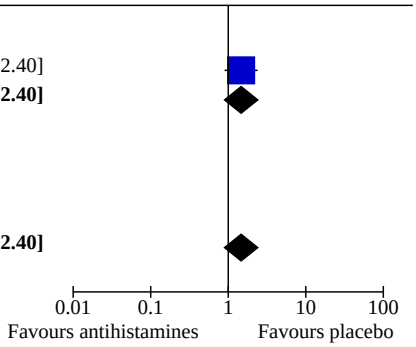
Analysis 4.4. Comparison 4: Antihistamines vs placebo, Outcome 4: Vomiting - postoperative

Study or Subgroup	Antihistamines Events	Antihistamines Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
4.4.1 Dimenhydrinate - 25 mg						
Carvalho 2010	0	78	3	71	3.1%	0.13 [0.01 , 2.48]
Subtotal (95% CI)		**78**		**71**	**3.1%**	**0.13 [0.01 , 2.48]**
Total events:	0		3			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.36 (P = 0.17)						
4.4.2 Dimenhydrate - 50 mg						
Duman 2010	5	61	10	63	26.3%	0.52 [0.19 , 1.42]
Subtotal (95% CI)		**61**		**63**	**26.3%**	**0.52 [0.19 , 1.42]**
Total events:	5		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.28 (P = 0.20)						
4.4.3 Cyclizine - 50 mg						
Nortcliffe 2003	9	30	18	30	70.5%	0.50 [0.27 , 0.93]
Subtotal (95% CI)		**30**		**30**	**70.5%**	**0.50 [0.27 , 0.93]**
Total events:	9		18			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.19 (P = 0.03)						
Total (95% CI)		**169**		**164**	**100.0%**	**0.48 [0.29 , 0.81]**
Total events:	14		31			
Heterogeneity: Tau² = 0.00; Chi² = 0.82, df = 2 (P = 0.66); I² = 0%						
Test for overall effect: Z = 2.74 (P = 0.006)						
Test for subgroup differences: Chi² = 0.79, df = 2 (P = 0.67), I² = 0%						



Analysis 4.5. Comparison 4: Antihistamines vs placebo, Outcome 5: Hypotension

Study or Subgroup	Antihistamines Events	Antihistamines Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
4.5.1 Dimenhydrinate - 25 mg						
Carvalho 2010 (1)	29	78	18	71	100.0%	1.47 [0.90 , 2.40]
Subtotal (95% CI)		**78**		**71**	**100.0%**	**1.47 [0.90 , 2.40]**
Total events:	29		18			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.52 (P = 0.13)						
Total (95% CI)		**78**		**71**	**100.0%**	**1.47 [0.90 , 2.40]**
Total events:	29		18			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.52 (P = 0.13)						
Test for subgroup differences: Not applicable						



Footnotes

(1) Postoperative

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Comparison 5. Anticholinergics vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.1 Nausea - intraoperative	4	453	Risk Ratio (M-H, Random, 95% CI)	0.67 [0.51, 0.87]
5.1.1 Glycopyrrolate - 0.2 mg	2	89	Risk Ratio (M-H, Random, 95% CI)	0.49 [0.22, 1.09]
5.1.2 Scopolamine patch	2	364	Risk Ratio (M-H, Random, 95% CI)	0.71 [0.51, 0.97]
5.2 Vomiting - intraoperative	4	453	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.40, 1.54]
5.2.1 Glycopyrrolate - 0.2 mg	2	89	Risk Ratio (M-H, Random, 95% CI)	0.45 [0.12, 1.62]
5.2.2 Scopolamine patch	2	364	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.36, 2.59]
5.3 Nausea - postoperative	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
5.4 Vomiting - postoperative	1	161	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.41, 0.74]
5.4.1 Scopolamine patch	1	161	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.41, 0.74]
5.5 'Nausea + Vomiting' - intraoperative (not pre-specified)	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
5.6 'Nausea + vomiting' - postoperative (not pre-specified)	2	334	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.25, 0.85]
5.6.1 Atropine - 100 mcg IT	1	105	Risk Ratio (M-H, Random, 95% CI)	0.27 [0.14, 0.52]
5.6.2 Atropine - 100 mcg IV	1	99	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.45, 1.15]
5.6.3 Scopolamine 0.3 mg	1	130	Risk Ratio (M-H, Random, 95% CI)	0.47 [0.22, 1.01]
5.7 Blurred vision	2	407	Risk Ratio (M-H, Random, 95% CI)	0.84 [0.21, 3.40]
5.7.1 Scopolamine patch	1	203	Risk Ratio (M-H, Random, 95% CI)	1.98 [0.37, 10.57]
5.7.2 Atropine - 100 mcg intrathecal	1	105	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.18, 4.76]
5.7.3 Atropine - 100 mcg intravenous	1	99	Risk Ratio (M-H, Random, 95% CI)	0.10 [0.00, 1.96]
5.8 Anxiety/Disorientation	2	407	Risk Ratio (M-H, Random, 95% CI)	0.95 [0.35, 2.58]
5.8.1 Scopolamine patch	1	203	Risk Ratio (M-H, Random, 95% CI)	2.97 [0.12, 72.08]
5.8.2 Atropine - 100 mcg intrathecal	1	105	Risk Ratio (M-H, Random, 95% CI)	0.76 [0.19, 3.01]
5.8.3 Atropine - 100 mcg intravenous	1	99	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.18, 4.95]
5.9 Dizziness	2	333	Risk Ratio (M-H, Random, 95% CI)	0.91 [0.37, 2.24]
5.9.1 Scopolamine patch	1	203	Risk Ratio (M-H, Random, 95% CI)	0.99 [0.39, 2.54]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
5.9.2 Scopolamine 0.3 mg/5 mL IV	1	130	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.01, 8.03]
5.10 Hypotension	3	293	Risk Ratio (M-H, Random, 95% CI)	0.81 [0.58, 1.13]
5.10.1 Glycopyrrolate - 0.2 mg	2	89	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.50, 1.26]
5.10.2 Atropine - 100 mcg intrathecal	1	105	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.07, 3.11]
5.10.3 Atropine - 100 mcg intravenous	1	99	Risk Ratio (M-H, Random, 95% CI)	0.96 [0.09, 10.15]
5.11 Pruritus/itching	2	407	Risk Ratio (M-H, Random, 95% CI)	0.87 [0.65, 1.18]
5.11.1 Scopolamine patch	1	203	Risk Ratio (M-H, Random, 95% CI)	0.92 [0.66, 1.28]
5.11.2 Atropine - 100 mcg intrathecal	1	105	Risk Ratio (M-H, Random, 95% CI)	0.53 [0.19, 1.47]
5.11.3 Atropine - 100 mcg intravenous	1	99	Risk Ratio (M-H, Random, 95% CI)	0.88 [0.36, 2.16]
5.12 Xerostomia/dry mouth	2	334	Risk Ratio (M-H, Random, 95% CI)	0.82 [0.53, 1.27]
5.12.1 Atropine - 100 mcg intrathecal	1	105	Risk Ratio (M-H, Random, 95% CI)	0.82 [0.43, 1.59]
5.12.2 Atropine - 100 mcg intravenous	1	99	Risk Ratio (M-H, Random, 95% CI)	0.72 [0.36, 1.41]
5.12.3 Scopolamine 0.3 mg/5 mL IV	1	130	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.35, 4.45]
5.13 Drowsiness	1	130	Risk Ratio (M-H, Random, 95% CI)	3.00 [0.12, 72.31]
5.13.1 Scopolamine 0.3 mg/5 mL IV	1	130	Risk Ratio (M-H, Random, 95% CI)	3.00 [0.12, 72.31]

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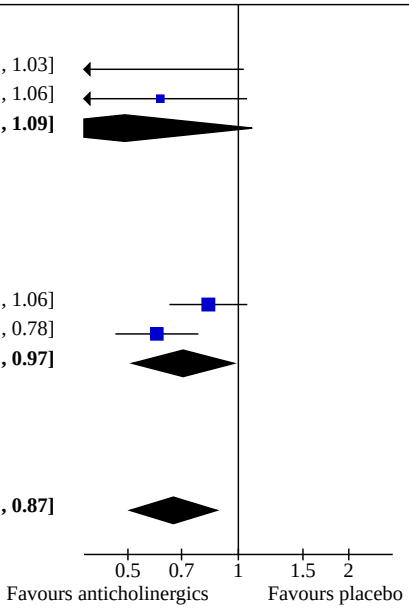
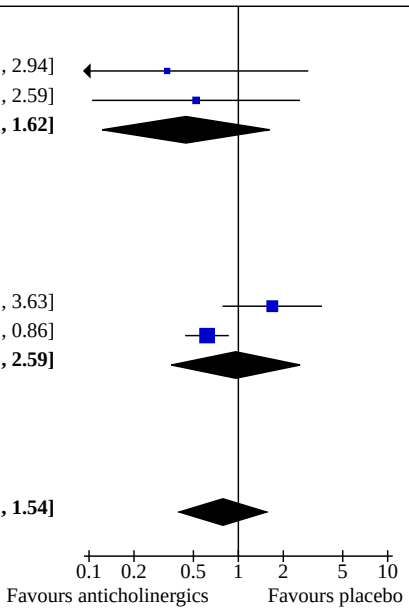
Analysis 5.1. Comparison 5: Anticholinergics vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.1.1 Glycopyrrolate - 0.2 mg						
Biswas 2003	2	20	8	20	3.5%	0.25 [0.06 , 1.03]
Ure 1999	10	24	17	25	17.6%	0.61 [0.36 , 1.06]
Subtotal (95% CI)		**44**		**45**	**21.1%**	**0.49 [0.22 , 1.09]**
Total events:	12		25			
Heterogeneity: Tau² = 0.14; Chi² = 1.48, df = 1 (P = 0.22); I² = 32%						
Test for overall effect: Z = 1.75 (P = 0.08)						
5.1.2 Scopolamine patch						
Harnett 2007	45	80	55	81	40.3%	0.83 [0.65 , 1.06]
Kotelko 1989	43	102	71	101	38.6%	0.60 [0.46 , 0.78]
Subtotal (95% CI)		**182**		**182**	**78.9%**	**0.71 [0.51 , 0.97]**
Total events:	88		126			
Heterogeneity: Tau² = 0.04; Chi² = 3.19, df = 1 (P = 0.07); I² = 69%						
Test for overall effect: Z = 2.13 (P = 0.03)						
Total (95% CI)		**226**		**227**	**100.0%**	**0.67 [0.51 , 0.87]**
Total events:	100		151			
Heterogeneity: Tau² = 0.03; Chi² = 5.61, df = 3 (P = 0.13); I² = 47%						
Test for overall effect: Z = 2.93 (P = 0.003)						
Test for subgroup differences: Chi² = 0.70, df = 1 (P = 0.40), I² = 0%						



Analysis 5.2. Comparison 5: Anticholinergics vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.2.1 Glycopyrrolate - 0.2 mg						
Biswas 2003	1	20	3	20	8.1%	0.33 [0.04 , 2.94]
Ure 1999	2	24	4	25	13.2%	0.52 [0.10 , 2.59]
Subtotal (95% CI)		**44**		**45**	**21.3%**	**0.45 [0.12 , 1.62]**
Total events:	3		7			
Heterogeneity: Tau² = 0.00; Chi² = 0.11, df = 1 (P = 0.75); I² = 0%						
Test for overall effect: Z = 1.23 (P = 0.22)						
5.2.2 Scopolamine patch						
Harnett 2007	15	80	9	81	31.5%	1.69 [0.78 , 3.63]
Kotelko 1989	33	102	53	101	47.1%	0.62 [0.44 , 0.86]
Subtotal (95% CI)		**182**		**182**	**78.7%**	**0.96 [0.36 , 2.59]**
Total events:	48		62			
Heterogeneity: Tau² = 0.43; Chi² = 5.71, df = 1 (P = 0.02); I² = 82%						
Test for overall effect: Z = 0.08 (P = 0.94)						
Total (95% CI)		**226**		**227**	**100.0%**	**0.79 [0.40 , 1.54]**
Total events:	51		69			
Heterogeneity: Tau² = 0.22; Chi² = 6.26, df = 3 (P = 0.10); I² = 52%						
Test for overall effect: Z = 0.69 (P = 0.49)						
Test for subgroup differences: Chi² = 0.86, df = 1 (P = 0.35), I² = 0%						



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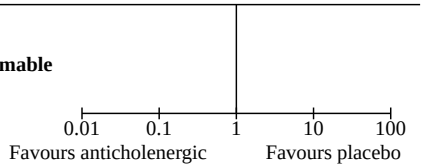
Analysis 5.3. Comparison 5: Anticholinergics vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	Anticholinergics Events	Anticholinergics Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

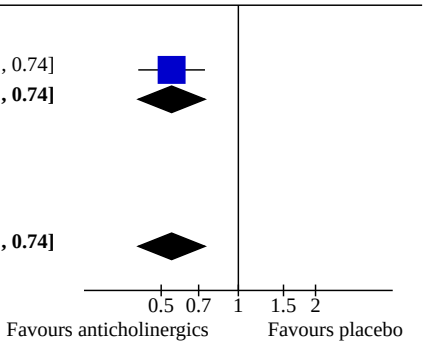
Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



Analysis 5.4. Comparison 5: Anticholinergics vs placebo, Outcome 4: Vomiting - postoperative

Study or Subgroup	Anticholinergics Events	Anticholinergics Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
5.4.1 Scopolamine patch						
Harnett 2007	32	80	59	81	100.0%	0.55 [0.41 , 0.74]
Subtotal (95% CI)		**80**		**81**	**100.0%**	**0.55 [0.41 , 0.74]**
Total events:	32		59			
Total (95% CI)		**80**		**81**	**100.0%**	**0.55 [0.41 , 0.74]**
Total events:	32		59			

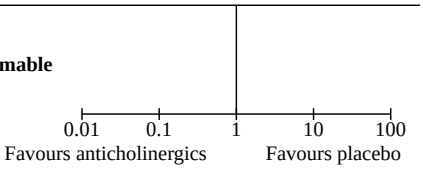
Heterogeneity: Not applicable
Test for overall effect: Z = 3.92 (P < 0.0001)
Heterogeneity: Not applicable
Test for overall effect: Z = 3.92 (P < 0.0001)
Test for subgroup differences: Not applicable



Analysis 5.5. Comparison 5: Anticholinergics vs placebo, Outcome 5: 'Nausea + Vomiting' - intraoperative (not pre-specified)

Study or Subgroup	Anticholinergics Events	Anticholinergics Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			

Heterogeneity: Not applicable
Test for overall effect: Not applicable
Test for subgroup differences: Not applicable



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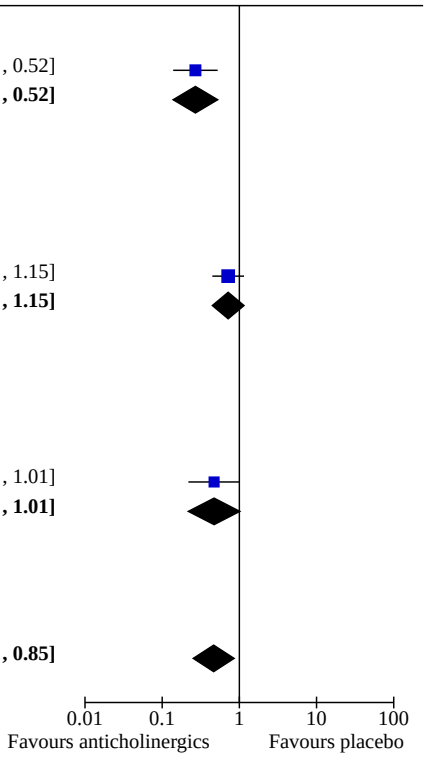
Analysis 5.6. Comparison 5: Anticholinergics vs placebo, Outcome 6: 'Nausea + vomiting' - postoperative (not pre-specified)

Study or Subgroup	Anticholinergics Events	Anticholinergics Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
5.6.1 Atropine - 100 mcg IT						
Baciarello 2011	10	72	17	33	32.1%	0.27 [0.14 , 0.52]
Subtotal (95% CI)		**72**		**33**	**32.1%**	**0.27 [0.14 , 0.52]**
Total events:	10		17			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.87 (P = 0.0001)						
5.6.2 Atropine - 100 mcg IV						
Baciarello 2011	24	67	16	32	39.5%	0.72 [0.45 , 1.15]
Subtotal (95% CI)		**67**		**32**	**39.5%**	**0.72 [0.45 , 1.15]**
Total events:	24		16			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.38 (P = 0.17)						
5.6.3 Scopolamine 0.3 mg						
Shen 2012	8	65	17	65	28.4%	0.47 [0.22 , 1.01]
Subtotal (95% CI)		**65**		**65**	**28.4%**	**0.47 [0.22 , 1.01]**
Total events:	8		17			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.93 (P = 0.05)						
Total (95% CI)		**204**		**130**	**100.0%**	**0.46 [0.25 , 0.85]**
Total events:	42		50			
Heterogeneity: Tau² = 0.19; Chi² = 5.66, df = 2 (P = 0.06); I² = 65%						
Test for overall effect: Z = 2.47 (P = 0.01)						
Test for subgroup differences: Chi² = 5.58, df = 2 (P = 0.06), I² = 64.1%						



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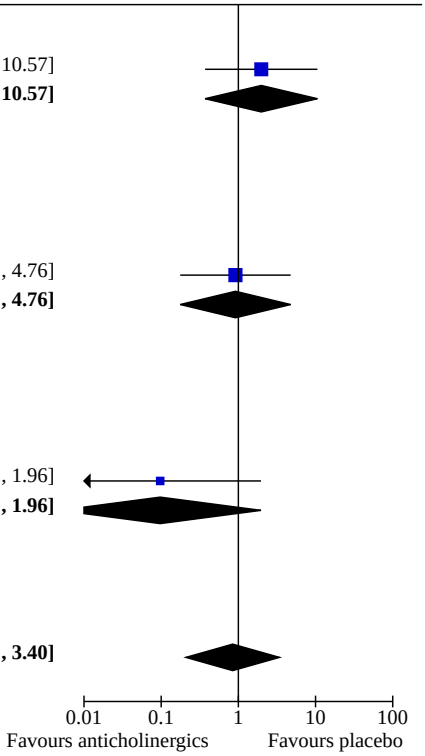
Analysis 5.7. Comparison 5: Anticholinergics vs placebo, Outcome 7: Blurred vision

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.7.1 Scopolamine patch						
Kotelko 1989	4	102	2	101	40.8%	1.98 [0.37 , 10.57]
Subtotal (95% CI)		**102**		**101**	**40.8%**	**1.98 [0.37 , 10.57]**
Total events:	4		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.80 (P = 0.42)						
5.7.2 Atropine - 100 mcg intrathecal						
Baciarello 2011	4	72	2	33	41.6%	0.92 [0.18 , 4.76]
Subtotal (95% CI)		**72**		**33**	**41.6%**	**0.92 [0.18 , 4.76]**
Total events:	4		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.10 (P = 0.92)						
5.7.3 Atropine - 100 mcg intravenous						
Baciarello 2011	0	67	2	32	17.7%	0.10 [0.00 , 1.96]
Subtotal (95% CI)		**67**		**32**	**17.7%**	**0.10 [0.00 , 1.96]**
Total events:	0		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.52 (P = 0.13)						
Total (95% CI)		**241**		**166**	**100.0%**	**0.84 [0.21 , 3.40]**
Total events:	8		6			
Heterogeneity: Tau² = 0.51; Chi² = 3.00, df = 2 (P = 0.22); I² = 33%						
Test for overall effect: Z = 0.24 (P = 0.81)						
Test for subgroup differences: Chi² = 2.95, df = 2 (P = 0.23), I² = 32.2%						



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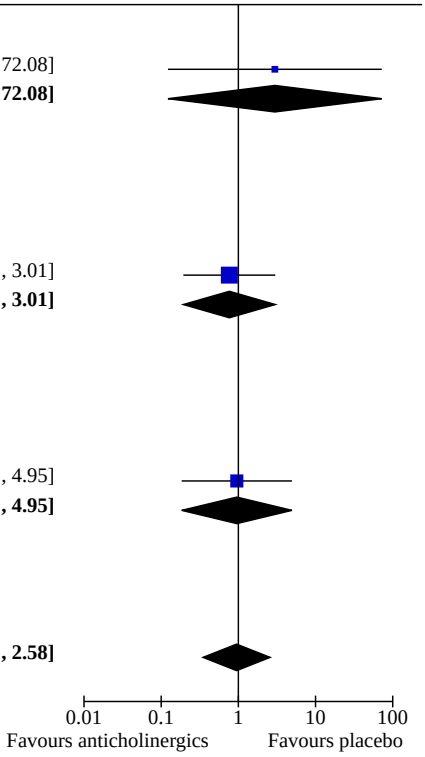
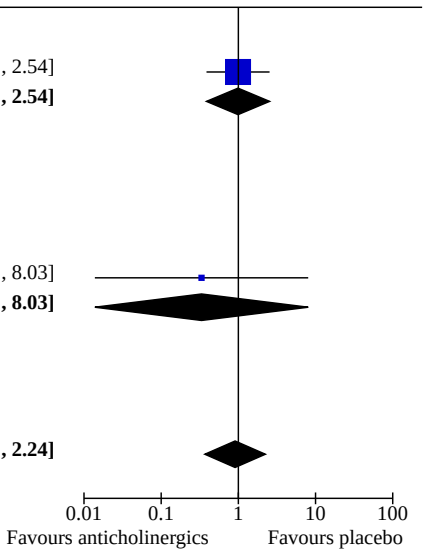
Analysis 5.8. Comparison 5: Anticholinergics vs placebo, Outcome 8: Anxiety/Disorientation

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.8.1 Scopolamine patch						
Kotelko 1989	1	102	0	101	9.8%	2.97 [0.12 , 72.08]
Subtotal (95% CI)		**102**		**101**	**9.8%**	**2.97 [0.12 , 72.08]**
Total events:	1		0			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.67 (P = 0.50)						
5.8.2 Atropine - 100 mcg intrathecal						
Baciarello 2011	5	72	3	33	53.2%	0.76 [0.19 , 3.01]
Subtotal (95% CI)		**72**		**33**	**53.2%**	**0.76 [0.19 , 3.01]**
Total events:	5		3			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.39 (P = 0.70)						
5.8.3 Atropine - 100 mcg intravenous						
Baciarello 2011	4	67	2	32	37.0%	0.96 [0.18 , 4.95]
Subtotal (95% CI)		**67**		**32**	**37.0%**	**0.96 [0.18 , 4.95]**
Total events:	4		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.05 (P = 0.96)						
Total (95% CI)		**241**		**166**	**100.0%**	**0.95 [0.35 , 2.58]**
Total events:	10		5			
Heterogeneity: Tau² = 0.00; Chi² = 0.59, df = 2 (P = 0.74); I² = 0%						
Test for overall effect: Z = 0.10 (P = 0.92)						
Test for subgroup differences: Chi² = 0.59, df = 2 (P = 0.75), I² = 0%						



Analysis 5.9. Comparison 5: Anticholinergics vs placebo, Outcome 9: Dizziness

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.9.1 Scopolamine patch						
Kotelko 1989	8	102	8	101	92.0%	0.99 [0.39 , 2.54]
Subtotal (95% CI)		**102**		**101**	**92.0%**	**0.99 [0.39 , 2.54]**
Total events:	8		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.02 (P = 0.98)						
5.9.2 Scopolamine 0.3 mg/5 mL IV						
Shen 2012	0	65	1	65	8.0%	0.33 [0.01 , 8.03]
Subtotal (95% CI)		**65**		**65**	**8.0%**	**0.33 [0.01 , 8.03]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.68 (P = 0.50)						
Total (95% CI)		**167**		**166**	**100.0%**	**0.91 [0.37 , 2.24]**
Total events:	8		9			
Heterogeneity: Tau² = 0.00; Chi² = 0.42, df = 1 (P = 0.52); I² = 0%						
Test for overall effect: Z = 0.21 (P = 0.83)						
Test for subgroup differences: Chi² = 0.41, df = 1 (P = 0.52), I² = 0%						



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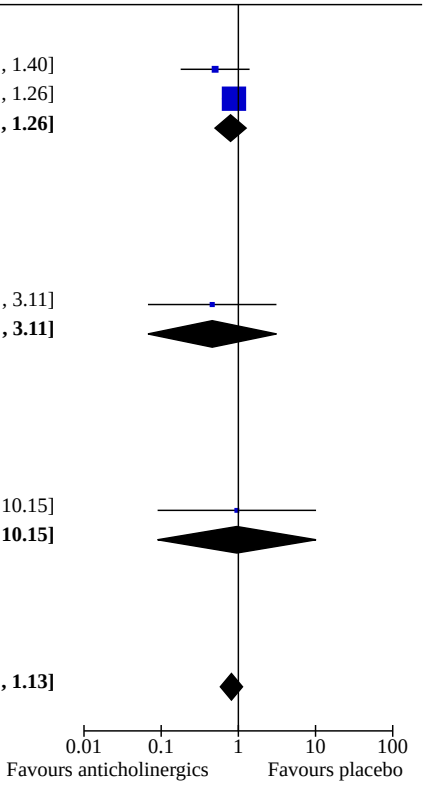
Analysis 5.10. Comparison 5: Anticholinergics vs placebo, Outcome 10: Hypotension

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.10.1 Glycopyrrolate - 0.2 mg						
Biswas 2003	4	20	8	20	10.3%	0.50 [0.18 , 1.40]
Ure 1999	16	24	19	25	84.8%	0.88 [0.61 , 1.26]
Subtotal (95% CI)		**44**		**45**	**95.1%**	**0.79 [0.50 , 1.26]**
Total events:	20		27			
Heterogeneity: Tau² = 0.03; Chi² = 1.23, df = 1 (P = 0.27); I² = 18%						
Test for overall effect: Z = 0.98 (P = 0.33)						
5.10.2 Atropine - 100 mcg intrathecal						
Baciarello 2011	2	72	2	33	3.0%	0.46 [0.07 , 3.11]
Subtotal (95% CI)		**72**		**33**	**3.0%**	**0.46 [0.07 , 3.11]**
Total events:	2		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.80 (P = 0.42)						
5.10.3 Atropine - 100 mcg intravenous						
Baciarello 2011	2	67	1	32	2.0%	0.96 [0.09 , 10.15]
Subtotal (95% CI)		**67**		**32**	**2.0%**	**0.96 [0.09 , 10.15]**
Total events:	2		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.04 (P = 0.97)						
Total (95% CI)		**183**		**110**	**100.0%**	**0.81 [0.58 , 1.13]**
Total events:	24		30			
Heterogeneity: Tau² = 0.00; Chi² = 1.67, df = 3 (P = 0.64); I² = 0%						
Test for overall effect: Z = 1.23 (P = 0.22)						
Test for subgroup differences: Chi² = 0.33, df = 2 (P = 0.85), I² = 0%						



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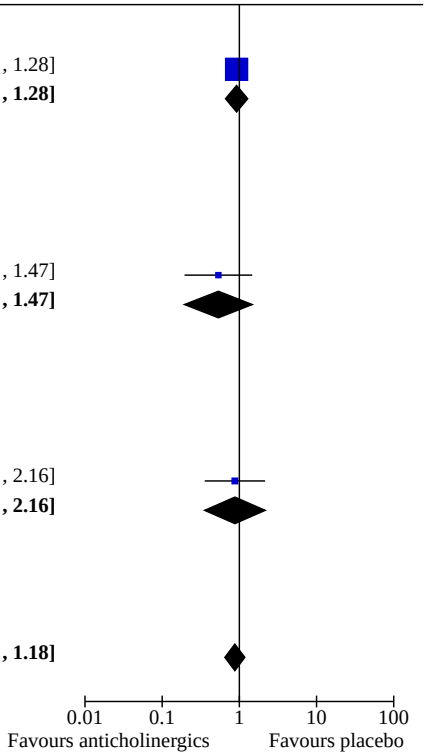
Analysis 5.11. Comparison 5: Anticholinergics vs placebo, Outcome 11: Pruritus/itching

Study or Subgroup	Anticholinergics Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
5.11.1 Scopolamine patch						
Kotelko 1989	40	102	43	101	80.5%	0.92 [0.66 , 1.28]
Subtotal (95% CI)		**102**		**101**	**80.5%**	**0.92 [0.66 , 1.28]**
Total events:	40		43			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.49 (P = 0.63)						
5.11.2 Atropine - 100 mcg intrathecal						
Baciarello 2011	7	72	6	33	8.7%	0.53 [0.19 , 1.47]
Subtotal (95% CI)		**72**		**33**	**8.7%**	**0.53 [0.19 , 1.47]**
Total events:	7		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.22 (P = 0.22)						
5.11.3 Atropine - 100 mcg intravenous						
Baciarello 2011	11	67	6	32	10.9%	0.88 [0.36 , 2.16]
Subtotal (95% CI)		**67**		**32**	**10.9%**	**0.88 [0.36 , 2.16]**
Total events:	11		6			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.29 (P = 0.77)						
Total (95% CI)		**241**		**166**	**100.0%**	**0.87 [0.65 , 1.18]**
Total events:	58		55			
Heterogeneity: Tau² = 0.00; Chi² = 1.02, df = 2 (P = 0.60); I² = 0%						
Test for overall effect: Z = 0.89 (P = 0.37)						
Test for subgroup differences: Chi² = 1.01, df = 2 (P = 0.60), I² = 0%						



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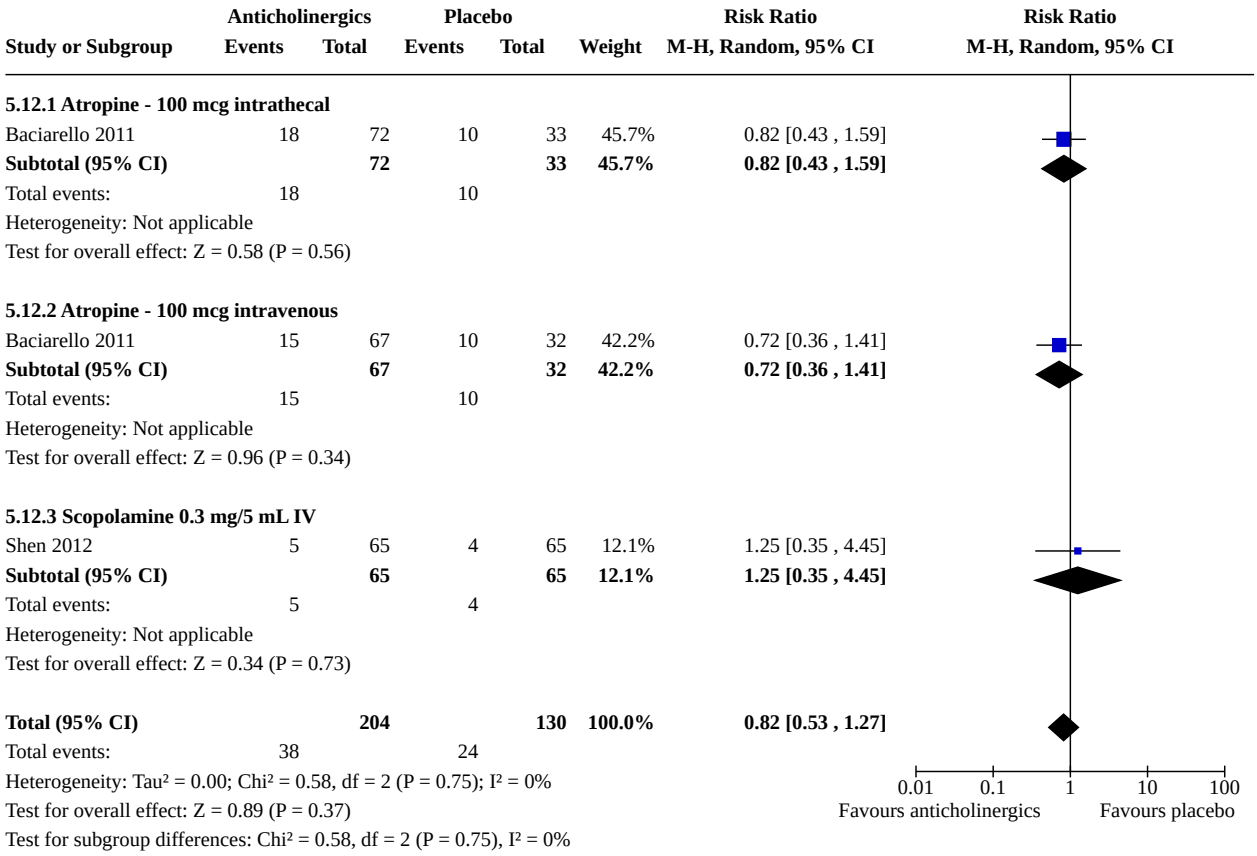
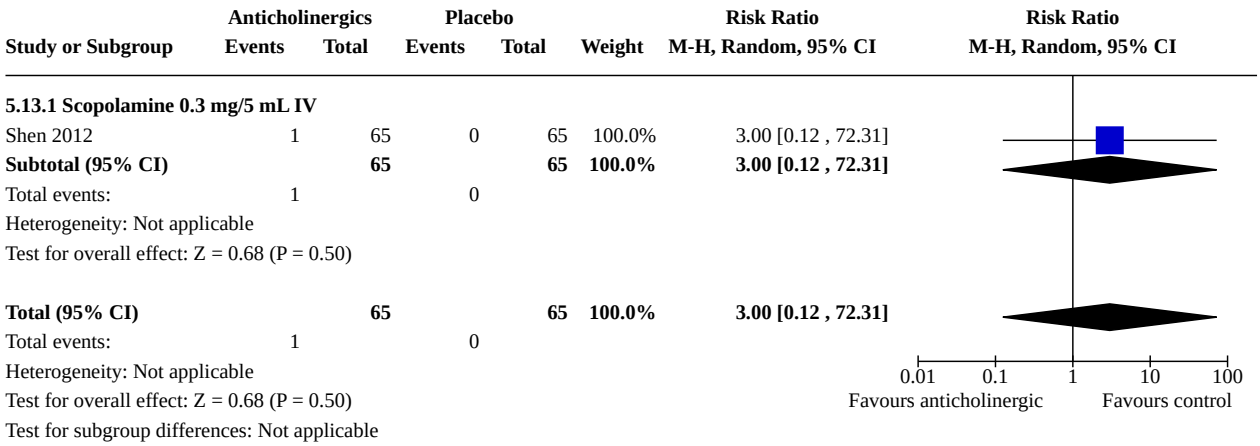
Analysis 5.12. Comparison 5: Anticholinergics vs placebo, Outcome 12: Xerostomia/dry mouth



Analysis 5.13. Comparison 5: Anticholinergics vs placebo, Outcome 13: Drowsiness



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Comparison 6. Sedatives vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.1 Nausea - intraoperative	8	593	Risk Ratio (M-H, Random, 95% CI)	0.65 [0.51, 0.82]
6.1.1 Propofol - 0.5 mg/kg/hr	1	26	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.19, 2.93]
6.1.2 Propofol - 1.0 mg/kg/hr	3	135	Risk Ratio (M-H, Random, 95% CI)	0.56 [0.26, 1.20]
6.1.3 Propofol - 1.5 mg/kg/hr	1	27	Risk Ratio (M-H, Random, 95% CI)	0.35 [0.09, 1.35]
6.1.4 Propofol - 10 mg IV - single dose	1	57	Risk Ratio (M-H, Random, 95% CI)	1.19 [0.39, 3.67]
6.1.5 Propofol - 20 mg + 1.0 mg/kg/hr	2	89	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.47, 1.32]
6.1.6 Propofol TCI target 1 ug/ml	1	80	Risk Ratio (M-H, Random, 95% CI)	0.42 [0.23, 0.75]
6.1.7 Midazolam - 1.0 mg + 1.0 mg/hr	2	89	Risk Ratio (M-H, Random, 95% CI)	0.76 [0.48, 1.20]
6.1.8 Ketamine 0.4.mg/kg	1	90	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.19, 1.11]
6.1.9 Intrathecal midazolam 2 mg vs placebo	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
6.2 Vomiting - intraoperative	8	593	Risk Ratio (M-H, Random, 95% CI)	0.35 [0.24, 0.52]
6.2.1 Propofol - 0.5 mg/kg/hr	1	26	Risk Ratio (M-H, Random, 95% CI)	0.90 [0.24, 3.35]
6.2.2 Propofol - 1.0 mg/kg/hr	3	135	Risk Ratio (M-H, Random, 95% CI)	0.31 [0.15, 0.65]
6.2.3 Propofol - 1.5 mg/kg/hr	1	27	Risk Ratio (M-H, Random, 95% CI)	0.23 [0.05, 1.12]
6.2.4 Propofol - 10 mg IV - single dose	1	57	Risk Ratio (M-H, Random, 95% CI)	0.60 [0.06, 6.21]
6.2.5 Propofol - 20 mg + 1.0 mg/kg/hr	2	89	Risk Ratio (M-H, Random, 95% CI)	0.17 [0.05, 0.65]
6.2.6 Propofol TCI target 1 ug/ml	1	80	Risk Ratio (M-H, Random, 95% CI)	0.33 [0.10, 1.14]
6.2.7 Midazolam - 1.0 mg + 1.0 mg/hr	2	89	Risk Ratio (M-H, Random, 95% CI)	0.18 [0.01, 3.86]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.2.8 Ketamine 0.4 mg/kg	1	90	Risk Ratio (M-H, Random, 95% CI)	0.44 [0.15, 1.34]
6.2.9 Intrathecal midazolam 2 mg vs placebo	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
6.3 Nausea - postoperative	2	145	Risk Ratio (M-H, Random, 95% CI)	0.25 [0.09, 0.71]
6.3.1 Propofol - 10 mg IV - single dose	1	57	Risk Ratio (M-H, Random, 95% CI)	2.38 [0.23, 24.83]
6.3.2 Propofol - 20 mg + 1.0 mg/kg/hr	1	44	Risk Ratio (M-H, Random, 95% CI)	0.16 [0.06, 0.40]
6.3.3 Midazolam - 1.0 mg + 1.0 mg/hr	1	44	Risk Ratio (M-H, Random, 95% CI)	0.18 [0.08, 0.40]
6.4 Vomiting - postoperative	2	145	Risk Ratio (M-H, Random, 95% CI)	0.09 [0.03, 0.28]
6.4.1 Propofol - 10 mg IV - single dose	1	57	Risk Ratio (M-H, Random, 95% CI)	0.40 [0.02, 9.31]
6.4.2 Propofol - 20 mg + 1.0 mg/kg/hr	1	44	Risk Ratio (M-H, Random, 95% CI)	0.02 [0.00, 0.37]
6.4.3 Midazolam - 1.0 mg + 1.0 mg/hr	1	44	Risk Ratio (M-H, Random, 95% CI)	0.09 [0.02, 0.37]
6.5 'Nausea + vomiting' - intraoperative (not pre-specified)	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
6.6 'Nausea + vomiting' - postoperative (not pre-specified)	2	348	Risk Ratio (M-H, Random, 95% CI)	0.06 [0.02, 0.22]
6.6.1 Propofol - 0.5 mg/kg	1	230	Risk Ratio (M-H, Random, 95% CI)	0.02 [0.01, 0.08]
6.6.2 Propofol TCI target 1 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.05 [0.00, 0.93]
6.6.3 Propofol TCI target 1.5 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.17 [0.04, 0.80]
6.6.4 Propofol TCI target 2 ug/ml	1	40	Risk Ratio (M-H, Random, 95% CI)	0.08 [0.01, 0.66]
6.7 Pruritis/itching	2	348	Risk Ratio (M-H, Random, 95% CI)	0.04 [0.02, 0.12]
6.7.1 Propofol - 0.5 mg/kg	1	230	Risk Ratio (M-H, Random, 95% CI)	0.03 [0.01, 0.09]

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Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
6.7.2 Propofol TCI target 1 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.12 [0.01, 2.78]
6.7.3 Propofol TCI target 1.5 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.12 [0.01, 2.78]
6.7.4 Propofol TCI target 2 ug/ml	1	40	Risk Ratio (M-H, Random, 95% CI)	0.12 [0.01, 2.69]
6.8 Hypotension	2	198	Risk Ratio (M-H, Random, 95% CI)	1.29 [0.86, 1.93]
6.8.1 Propofol TCI target 1 ug/ml	2	119	Risk Ratio (M-H, Random, 95% CI)	1.30 [0.83, 2.03]
6.8.2 Propofol TCI target 1.5 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.20, 3.76]
6.8.3 Propofol TCI target 2 ug/ml	1	40	Risk Ratio (M-H, Random, 95% CI)	1.67 [0.44, 6.36]
6.9 Shivering	1	118	Risk Ratio (M-H, Random, 95% CI)	0.24 [0.08, 0.72]
6.9.1 Propofol TCI target 1 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.34 [0.06, 2.14]
6.9.2 Propofol TCI target 1.5 ug/ml	1	39	Risk Ratio (M-H, Random, 95% CI)	0.17 [0.02, 1.70]
6.9.3 Propofol TCI target 2 ug/ml	1	40	Risk Ratio (M-H, Random, 95% CI)	0.22 [0.04, 1.15]
6.10 Apgar score < 7 at 5 mins	1	80	Risk Ratio (M-H, Random, 95% CI)	Not estimable
6.10.1 Propofol TCI target 1 ug/ml	1	80	Risk Ratio (M-H, Random, 95% CI)	Not estimable
6.11 Initiation of breastfeeding	1	80	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.95, 1.05]
6.11.1 Propofol TCI target 1 ug/ml	1	80	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.95, 1.05]

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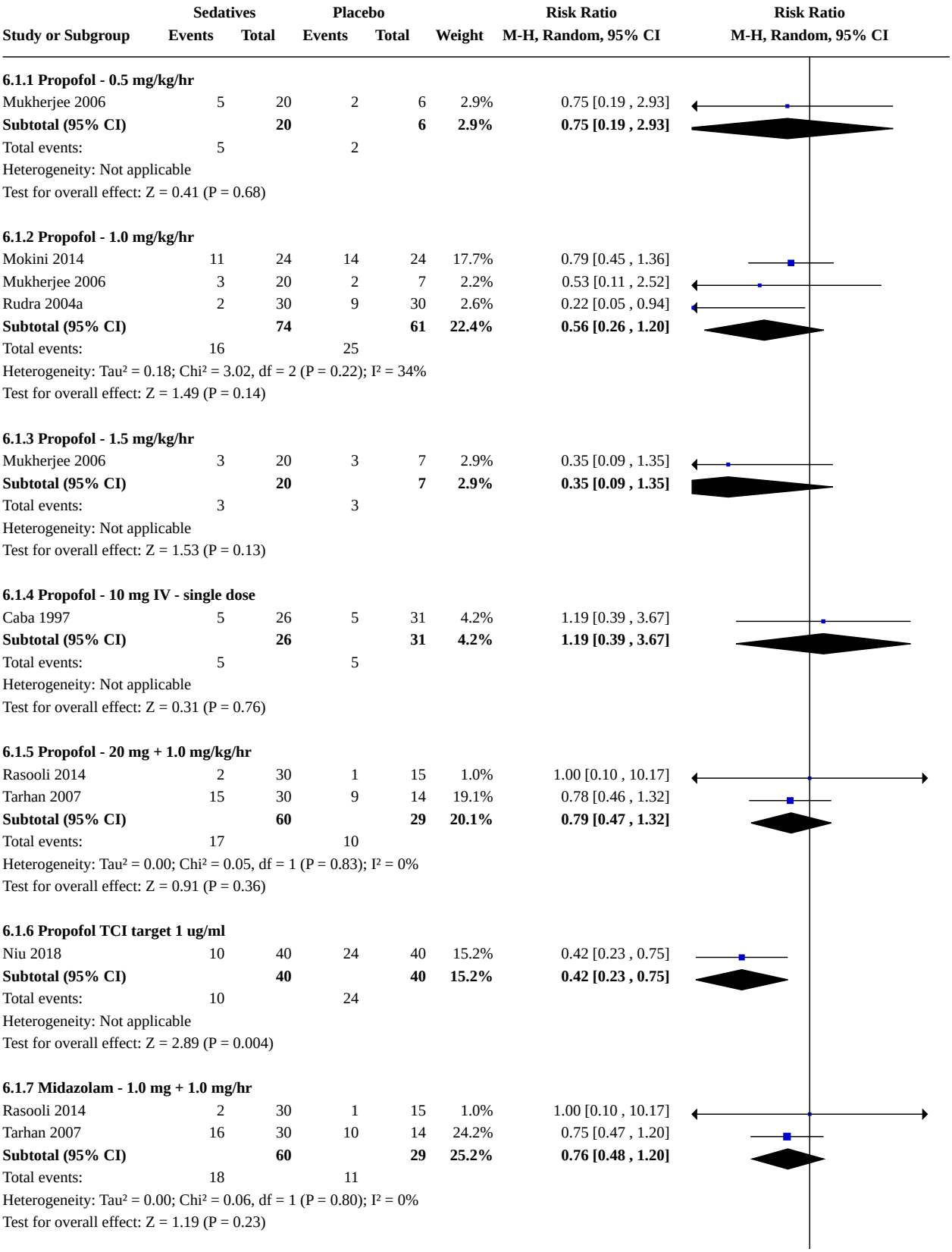
Analysis 6.1. Comparison 6: Sedatives vs placebo, Outcome 1: Nausea - intraoperative



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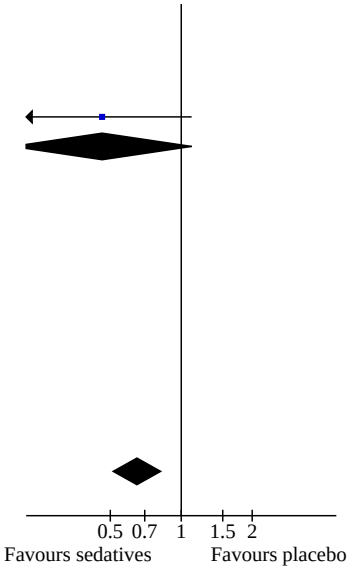
Analysis 6.1. (Continued)

Test for overall effect: Z = 1.19 (P = 0.23)						
6.1.8 Ketamine 0.4.mg/kg						
Hassanein 2015	6	45	13	45	7.0%	0.46 [0.19 , 1.11]
Subtotal (95% CI)		**45**		**45**	**7.0%**	**0.46 [0.19 , 1.11]**
Total events:	6		13			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.73 (P = 0.08)						
6.1.9 Intrathecal midazolam 2 mg vs placebo						
Subtotal (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**345**		**248**	**100.0%**	**0.65 [0.51 , 0.82]**
Total events:	80		93			
Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 8.81$, df = 11 (P = 0.64); $I^2 = 0\%$						
Test for overall effect: Z = 3.67 (P = 0.0002)						
Test for subgroup differences: $Chi^2 = 5.78$, df = 7 (P = 0.57), $I^2 = 0\%$						



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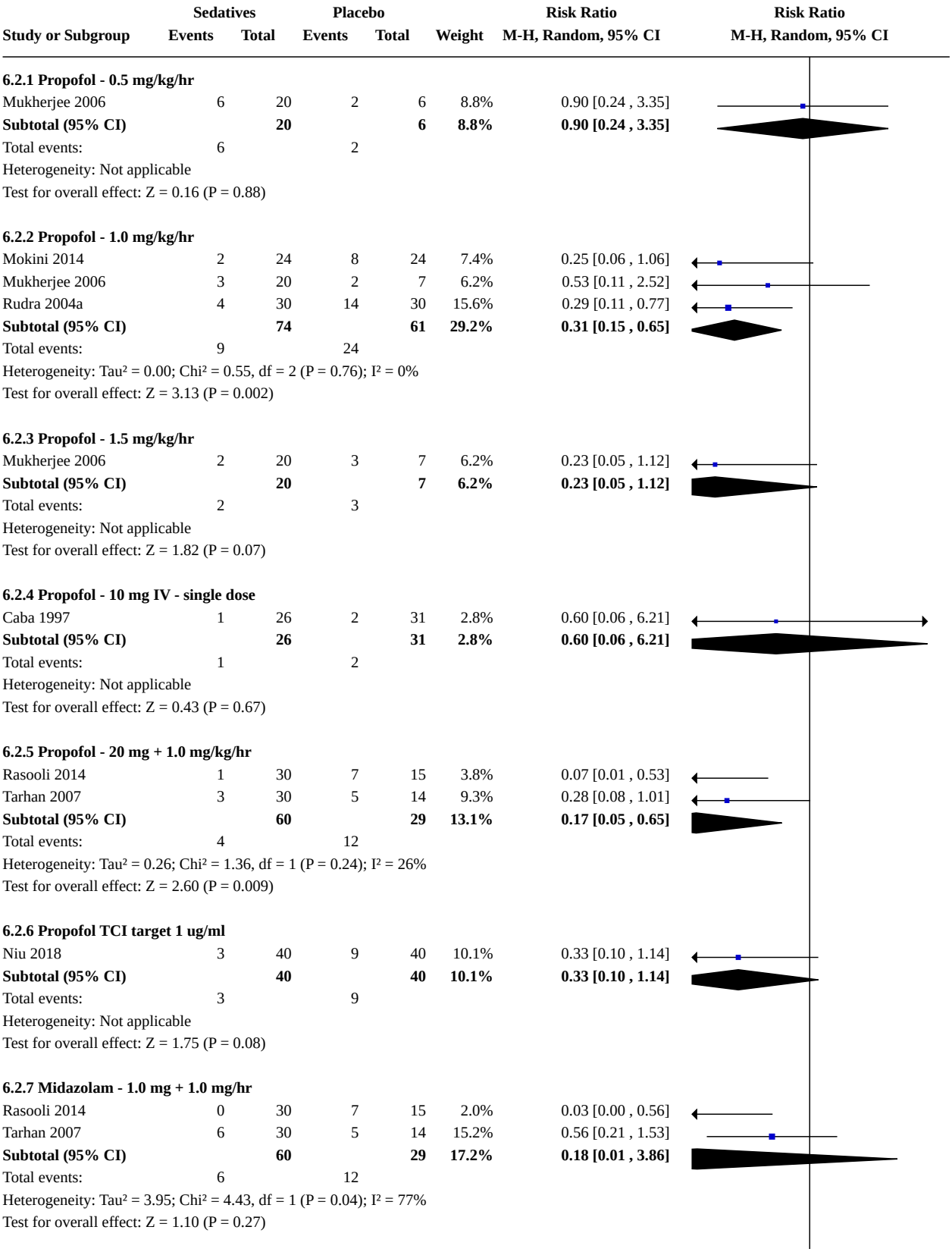
Analysis 6.2. Comparison 6: Sedatives vs placebo, Outcome 2: Vomiting - intraoperative



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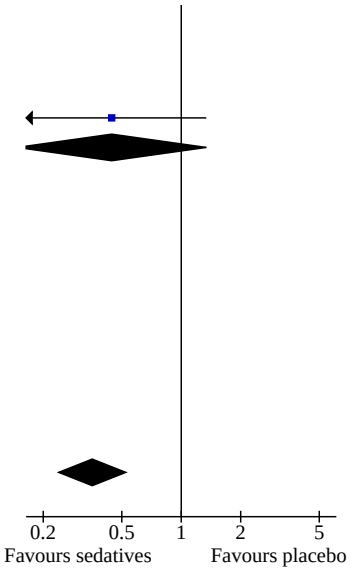
Analysis 6.2. (Continued)



Test for overall effect: Z = 1.10 (P = 0.27)

6.2.8 Ketamine 0.4 mg/kg

Hassanein 2015	4	45	9	45	12.6%	0.44 [0.15 , 1.34]	
Subtotal (95% CI)		**45**		**45**	**12.6%**	**0.44 [0.15 , 1.34]**	
Total events:	4		9				

Heterogeneity: Not applicable

Test for overall effect: Z = 1.44 (P = 0.15)

6.2.9 Intrathecal midazolam 2 mg vs placebo

Subtotal (95% CI)		**0**		**0**		**Not estimable**	
Total events:	0		0				

Heterogeneity: Not applicable

Test for overall effect: Not applicable

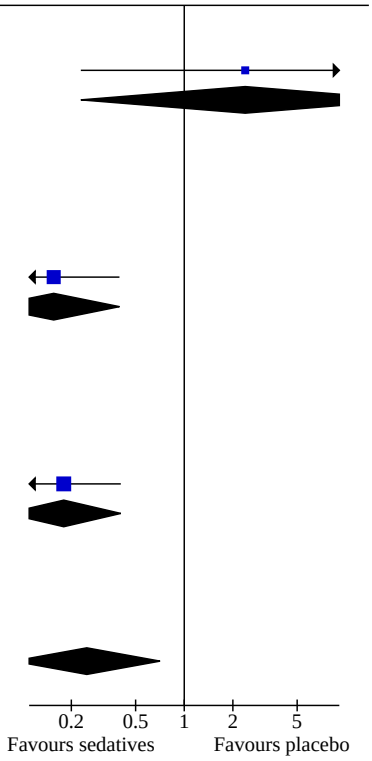
Total (95% CI)		**345**		**248**	**100.0%**	**0.35 [0.24 , 0.52]**	
Total events:	35		73				

Heterogeneity: $Tau^2 = 0.00$; $Chi^2 = 9.77$, df = 11 (P = 0.55); $I^2 = 0\%$

Test for overall effect: Z = 5.20 (P < 0.00001)

Test for subgroup differences: $Chi^2 = 3.97$, df = 7 (P = 0.78), $I^2 = 0\%$

Analysis 6.3. Comparison 6: Sedatives vs placebo, Outcome 3: Nausea - postoperative



Study or Subgroup	Sedatives Events	Sedatives Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
6.3.1 Propofol - 10 mg IV - single dose						
Caba 1997	2	26	1	31	15.0%	2.38 [0.23 , 24.83]
Subtotal (95% CI)		**26**		**31**	**15.0%**	**2.38 [0.23 , 24.83]**
Total events:	2		1			

Heterogeneity: Not applicable

Test for overall effect: Z = 0.73 (P = 0.47)

6.3.2 Propofol - 20 mg + 1.0 mg/kg/hr

Tarhan 2007	4	30	12	14	40.7%	0.16 [0.06 , 0.40]
Subtotal (95% CI)		**30**		**14**	**40.7%**	**0.16 [0.06 , 0.40]**
Total events:	4		12			

Heterogeneity: Not applicable

Test for overall effect: Z = 3.89 (P < 0.0001)

6.3.3 Midazolam - 1.0 mg + 1.0 mg/hr

Tarhan 2007	5	30	13	14	44.3%	0.18 [0.08 , 0.40]
Subtotal (95% CI)		**30**		**14**	**44.3%**	**0.18 [0.08 , 0.40]**
Total events:	5		13			

Heterogeneity: Not applicable

Test for overall effect: Z = 4.14 (P < 0.0001)

Total (95% CI)		**86**		**59**	**100.0%**	**0.25 [0.09 , 0.71]**
Total events:	11		26			

Heterogeneity: $Tau^2 = 0.47$; $Chi^2 = 4.80$, df = 2 (P = 0.09); $I^2 = 58\%$

Test for overall effect: Z = 2.61 (P = 0.009)

Test for subgroup differences: $Chi^2 = 4.64$, df = 2 (P = 0.10), $I^2 = 56.9\%$

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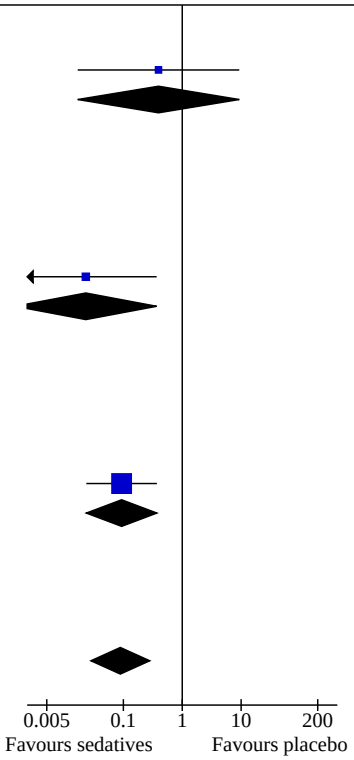
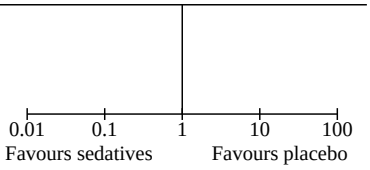
Analysis 6.4. Comparison 6: Sedatives vs placebo, Outcome 4: Vomiting - postoperative

Study or Subgroup	Sedatives Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
6.4.1 Propofol - 10 mg IV - single dose						
Caba 1997	0	26	1	31	13.2%	0.40 [0.02 , 9.31]
Subtotal (95% CI)		**26**		**31**	**13.2%**	**0.40 [0.02 , 9.31]**
Total events:	0		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.58 (P = 0.56)						
6.4.2 Propofol - 20 mg + 1.0 mg/kg/hr						
Tarhan 2007	0	30	10	14	17.2%	0.02 [0.00 , 0.37]
Subtotal (95% CI)		**30**		**14**	**17.2%**	**0.02 [0.00 , 0.37]**
Total events:	0		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.67 (P = 0.008)						
6.4.3 Midazolam - 1.0 mg + 1.0 mg/hr						
Tarhan 2007	2	30	10	14	69.5%	0.09 [0.02 , 0.37]
Subtotal (95% CI)		**30**		**14**	**69.5%**	**0.09 [0.02 , 0.37]**
Total events:	2		10			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.37 (P = 0.0008)						
Total (95% CI)		**86**		**59**	**100.0%**	**0.09 [0.03 , 0.28]**
Total events:	2		21			
Heterogeneity: Tau² = 0.00; Chi² = 1.88, df = 2 (P = 0.39); I² = 0%						
Test for overall effect: Z = 4.13 (P < 0.0001)						
Test for subgroup differences: Chi² = 1.77, df = 2 (P = 0.41), I² = 0%						



Analysis 6.5. Comparison 6: Sedatives vs placebo, Outcome 5: 'Nausea + vomiting' - intraoperative (not pre-specified)

Study or Subgroup	Sedatives Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



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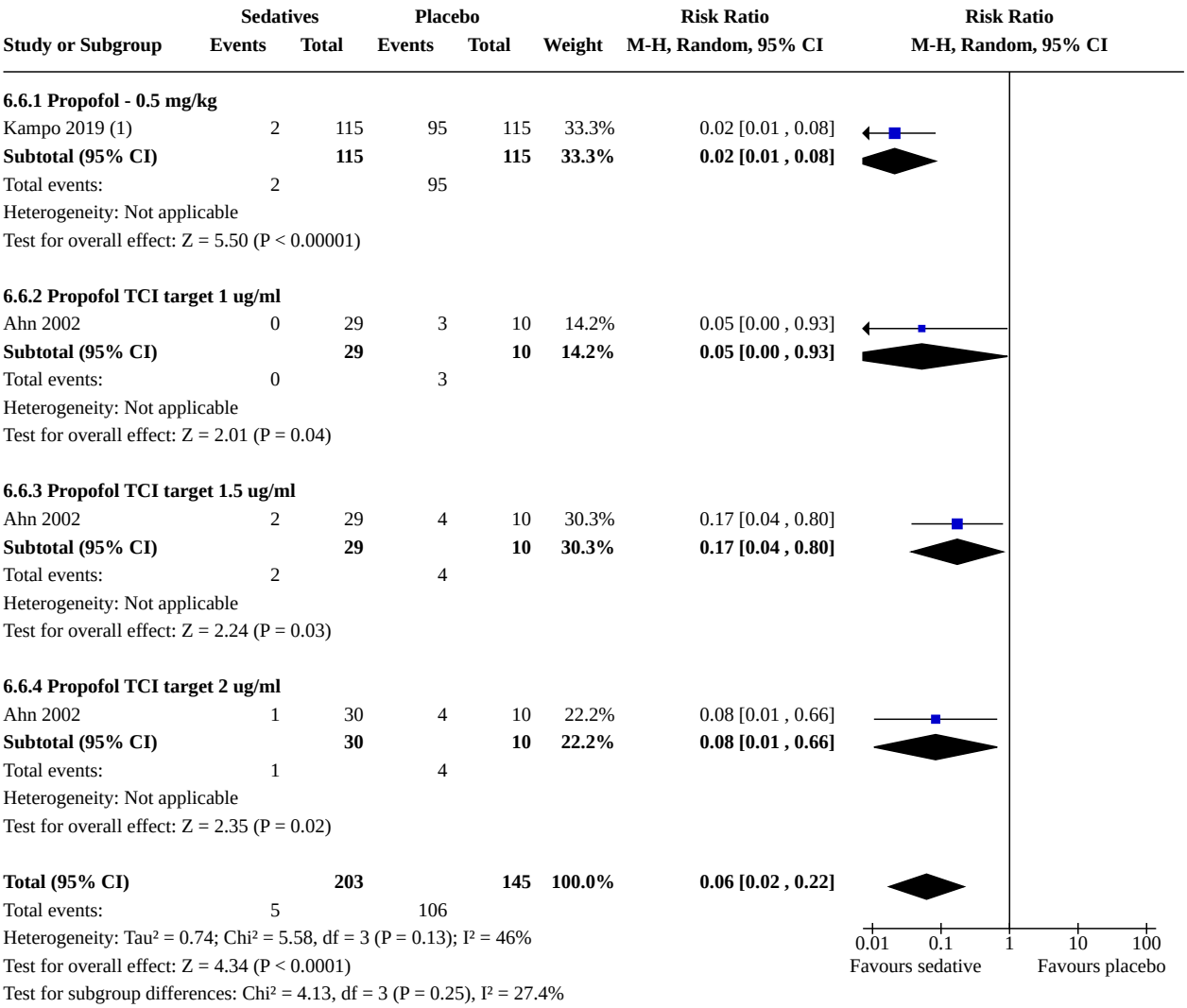
Analysis 6.6. Comparison 6: Sedatives vs placebo, Outcome 6: 'Nausea + vomiting' - postoperative (not pre-specified)



Footnotes

(1) Outcome at 0-4 hours. This looks to be a very extreme result.

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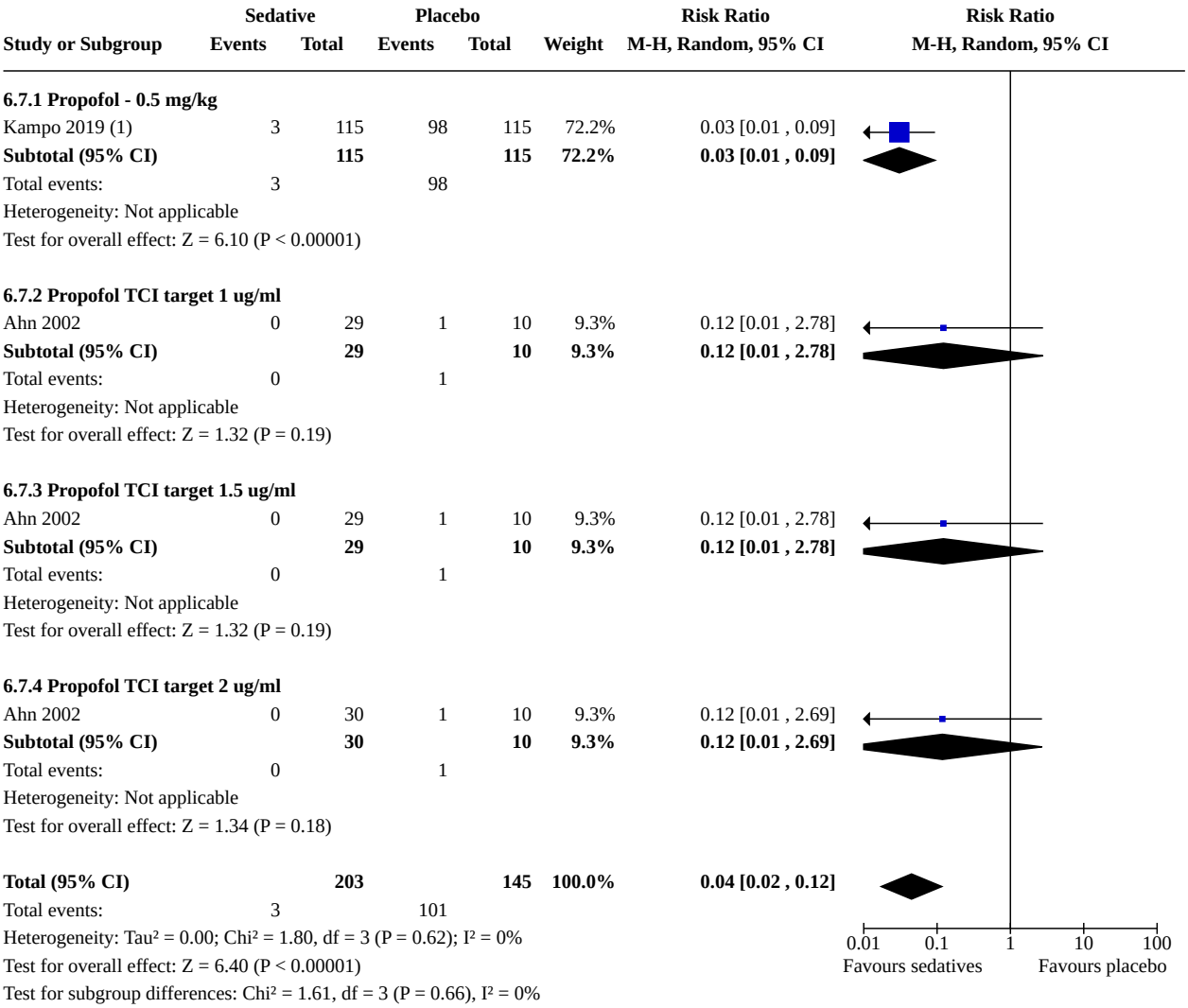
Analysis 6.7. Comparison 6: Sedatives vs placebo, Outcome 7: Pruritis/itching



Footnotes

(1) Outcome at 0-4 hours

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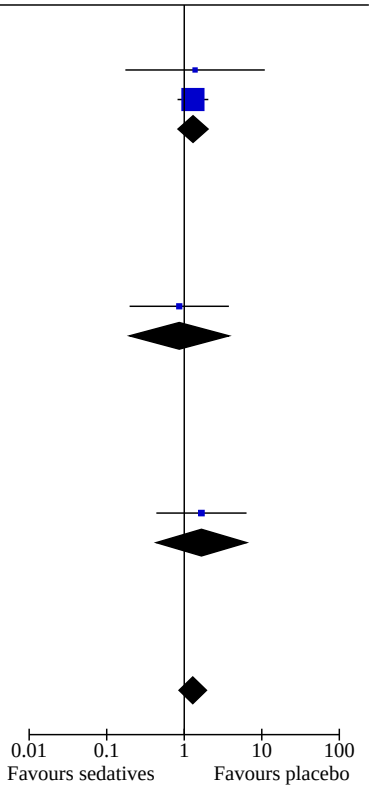
Analysis 6.8. Comparison 6: Sedatives vs placebo, Outcome 8: Hypotension

Study or Subgroup	Sedatives Events	Sedatives Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
6.8.1 Propofol TCI target 1 ug/ml						
Ahn 2002	4	29	1	10	3.9%	1.38 [0.17 , 10.93]
Niu 2018 (1)	22	40	17	40	79.3%	1.29 [0.82 , 2.04]
Subtotal (95% CI)		**69**		**50**	**83.2%**	**1.30 [0.83 , 2.03]**
Total events:	26		18			
Heterogeneity: Tau² = 0.00; Chi² = 0.00, df = 1 (P = 0.95); I² = 0%						
Test for overall effect: Z = 1.15 (P = 0.25)						
6.8.2 Propofol TCI target 1.5 ug/ml						
Ahn 2002	5	29	2	10	7.6%	0.86 [0.20 , 3.76]
Subtotal (95% CI)		**29**		**10**	**7.6%**	**0.86 [0.20 , 3.76]**
Total events:	5		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.20 (P = 0.84)						
6.8.3 Propofol TCI target 2 ug/ml						
Ahn 2002	10	30	2	10	9.2%	1.67 [0.44 , 6.36]
Subtotal (95% CI)		**30**		**10**	**9.2%**	**1.67 [0.44 , 6.36]**
Total events:	10		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.75 (P = 0.45)						
Total (95% CI)		**128**		**70**	**100.0%**	**1.29 [0.86 , 1.93]**
Total events:	41		22			
Heterogeneity: Tau² = 0.00; Chi² = 0.43, df = 3 (P = 0.93); I² = 0%						
Test for overall effect: Z = 1.22 (P = 0.22)						
Test for subgroup differences: Chi² = 0.43, df = 2 (P = 0.81), I² = 0%						



Footnotes

(1) Used post-birth data

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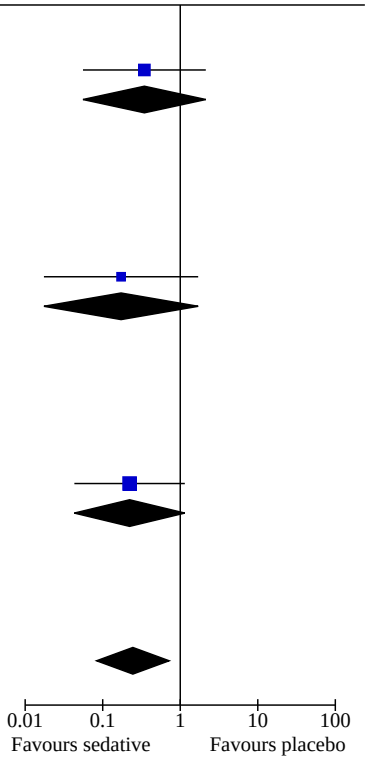
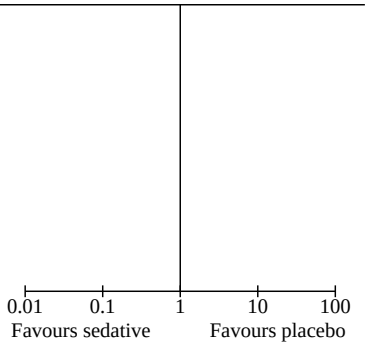
Analysis 6.9. Comparison 6: Sedatives vs placebo, Outcome 9: Shivering

Study or Subgroup	Sedatives Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
6.9.1 Propofol TCI target 1 ug/ml						
Ahn 2002	2	29	2	10	34.8%	0.34 [0.06 , 2.14]
Subtotal (95% CI)		**29**		**10**	**34.8%**	**0.34 [0.06 , 2.14]**
Total events:	2		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.14 (P = 0.25)						
6.9.2 Propofol TCI target 1.5 ug/ml						
Ahn 2002	1	29	2	10	22.1%	0.17 [0.02 , 1.70]
Subtotal (95% CI)		**29**		**10**	**22.1%**	**0.17 [0.02 , 1.70]**
Total events:	1		2			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.50 (P = 0.13)						
6.9.3 Propofol TCI target 2 ug/ml						
Ahn 2002	2	30	3	10	43.1%	0.22 [0.04 , 1.15]
Subtotal (95% CI)		**30**		**10**	**43.1%**	**0.22 [0.04 , 1.15]**
Total events:	2		3			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.80 (P = 0.07)						
Total (95% CI)		**88**		**30**	**100.0%**	**0.24 [0.08 , 0.72]**
Total events:	5		7			
Heterogeneity: Tau² = 0.00; Chi² = 0.24, df = 2 (P = 0.89); I² = 0%						
Test for overall effect: Z = 2.56 (P = 0.01)						
Test for subgroup differences: Chi² = 0.24, df = 2 (P = 0.89), I² = 0%						



Analysis 6.10. Comparison 6: Sedatives vs placebo, Outcome 10: Apgar score < 7 at 5 mins

Study or Subgroup	Sedative Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
6.10.1 Propofol TCI target 1 ug/ml						
Niu 2018	0	40	0	40		Not estimable
Subtotal (95% CI)		**40**		**40**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Total (95% CI)		**40**		**40**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



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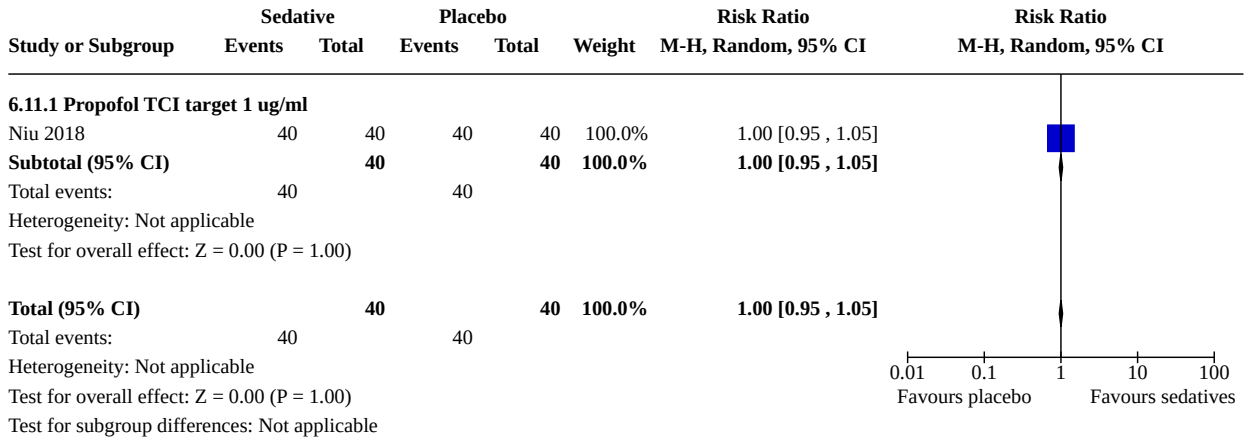
Analysis 6.11. Comparison 6: Sedatives vs placebo, Outcome 11: Initiation of breastfeeding



Comparison 7. Opioid antagonist/partial agonist vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
7.1 Nausea - intraoperative	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
7.2 Vomiting - intraoperative	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
7.3 Nausea - postoperative	1	120	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.39, 1.45]
7.3.1 Nalbuphine - 4 mg	1	120	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.39, 1.45]
7.4 Vomiting - postoperative	1	120	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.35, 4.43]
7.4.1 Nalbuphine - 4 mg	1	120	Risk Ratio (M-H, Random, 95% CI)	1.25 [0.35, 4.43]
7.5 'Nausea + vomiting' - intraoperative (not pre-specified)	0	0	Risk Ratio (M-H, Random, 95% CI)	Not estimable
7.6 'Nausea + vomiting' - postoperative (not pre-specified)	1	77	Risk Ratio (M-H, Random, 95% CI)	0.09 [0.02, 0.37]
7.6.1 Nalbuphine - 0.5 mg	1	77	Risk Ratio (M-H, Random, 95% CI)	0.09 [0.02, 0.37]
7.7 Pruritus/itching	2	197	Risk Ratio (M-H, Random, 95% CI)	0.34 [0.02, 5.27]
7.7.1 Nalbuphine - 0.5 mg	1	77	Risk Ratio (M-H, Random, 95% CI)	0.13 [0.04, 0.39]
7.7.2 Nalbuphine - 4 mg	1	120	Risk Ratio (M-H, Random, 95% CI)	0.86 [0.74, 0.99]

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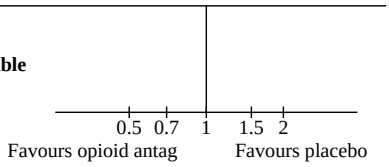
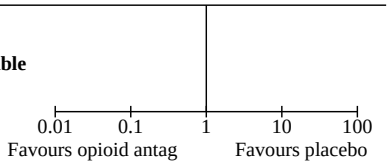
Analysis 7.1. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Opioid antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



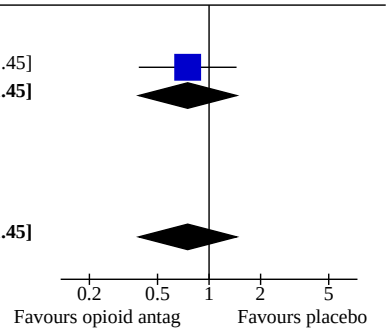
Analysis 7.2. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Opioid antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 7.3. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	Opioid antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
7.3.1 Nalbuphine - 4 mg						
Charuluxananan 2003	12	60	16	60	100.0%	0.75 [0.39 , 1.45]
Subtotal (95% CI)		**60**		**60**	**100.0%**	**0.75 [0.39 , 1.45]**
Total events:	12		16			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.86 (P = 0.39)						
Total (95% CI)		**60**		**60**	**100.0%**	**0.75 [0.39 , 1.45]**
Total events:	12		16			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.86 (P = 0.39)						
Test for subgroup differences: Not applicable						



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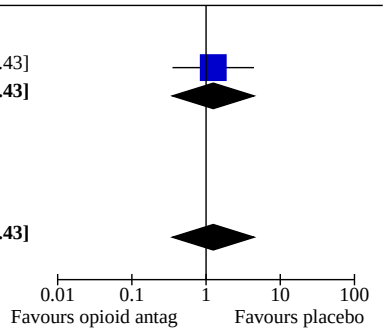
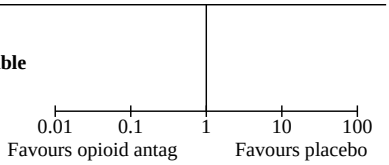
Analysis 7.4. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 4: Vomiting - postoperative

Study or Subgroup	Opioid antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
7.4.1 Nalbuphine - 4 mg						
Charuluxananan 2003	5	60	4	60	100.0%	1.25 [0.35 , 4.43]
Subtotal (95% CI)		**60**		**60**	**100.0%**	**1.25 [0.35 , 4.43]**
Total events:	5		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.35 (P = 0.73)						
Total (95% CI)		**60**		**60**	**100.0%**	**1.25 [0.35 , 4.43]**
Total events:	5		4			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.35 (P = 0.73)						
Test for subgroup differences: Not applicable						



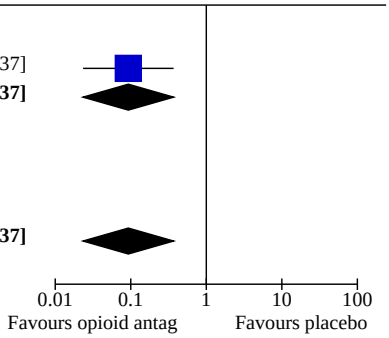
Analysis 7.5. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 5: 'Nausea + vomiting' - intraoperative (not pre-specified)

Study or Subgroup	Opioid antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Total (95% CI)		**0**		**0**		**Not estimable**
Total events:	0		0			
Heterogeneity: Not applicable						
Test for overall effect: Not applicable						
Test for subgroup differences: Not applicable						



Analysis 7.6. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 6: 'Nausea + vomiting' - postoperative (not pre-specified)

Study or Subgroup	Opioid antagonists Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
7.6.1 Nalbuphine - 0.5 mg						
Ibrahim 2019	2	39	21	38	100.0%	0.09 [0.02 , 0.37]
Subtotal (95% CI)		**39**		**38**	**100.0%**	**0.09 [0.02 , 0.37]**
Total events:	2		21			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.38 (P = 0.0007)						
Total (95% CI)		**39**		**38**	**100.0%**	**0.09 [0.02 , 0.37]**
Total events:	2		21			
Heterogeneity: Not applicable						
Test for overall effect: Z = 3.38 (P = 0.0007)						
Test for subgroup differences: Not applicable						



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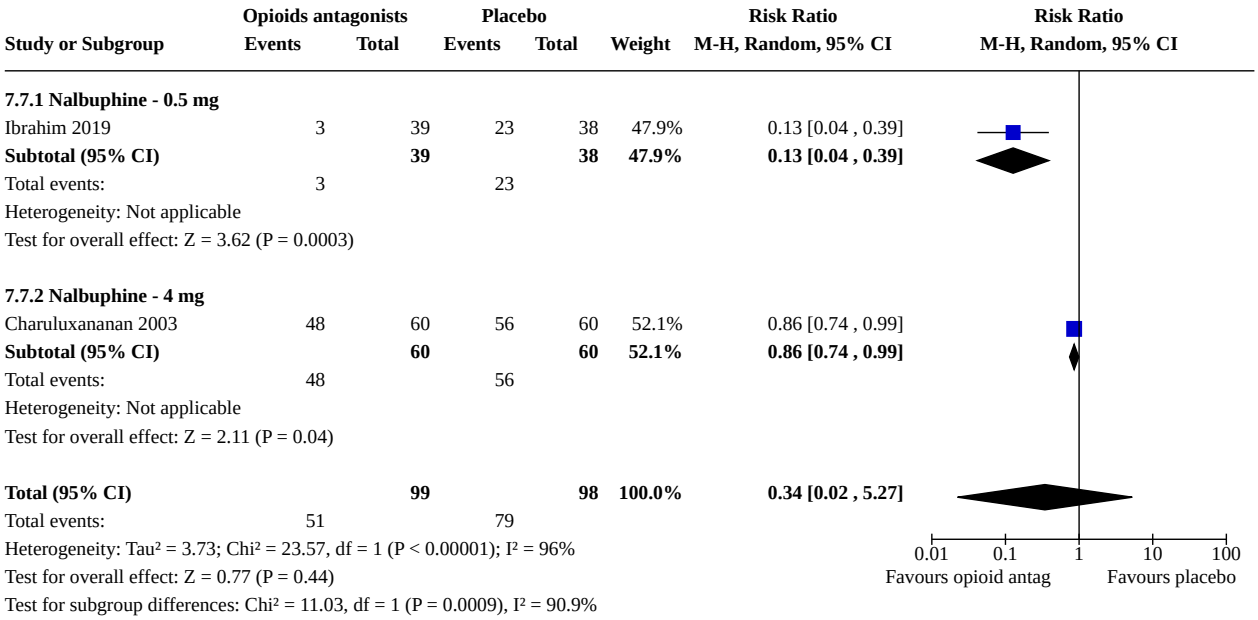
Analysis 7.7. Comparison 7: Opioid antagonist/partial agonist vs placebo, Outcome 7: Pruritus/itching



Comparison 8. Acupressure/acupuncture vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.1 Nausea - intraoperative	9	1221	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.41, 0.74]
8.1.1 Acupressure	9	1221	Risk Ratio (M-H, Random, 95% CI)	0.55 [0.41, 0.74]
8.2 Vomiting - intraoperative	9	1221	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.33, 0.80]
8.2.1 Acupressure	9	1221	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.33, 0.80]
8.3 Nausea - postoperative	7	1069	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.27, 0.75]
8.3.1 Acupressure	7	1069	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.27, 0.75]
8.4 Vomiting - postoperative	7	1069	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.34, 0.79]
8.4.1 Acupressure	7	1069	Risk Ratio (M-H, Random, 95% CI)	0.52 [0.34, 0.79]
8.5 Anxiety	1	50	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.07, 15.12]
8.5.1 Acupressure	1	50	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.07, 15.12]
8.6 Dizziness	1	60	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.07, 15.26]
8.6.1 Acupressure	1	60	Risk Ratio (M-H, Random, 95% CI)	1.00 [0.07, 15.26]

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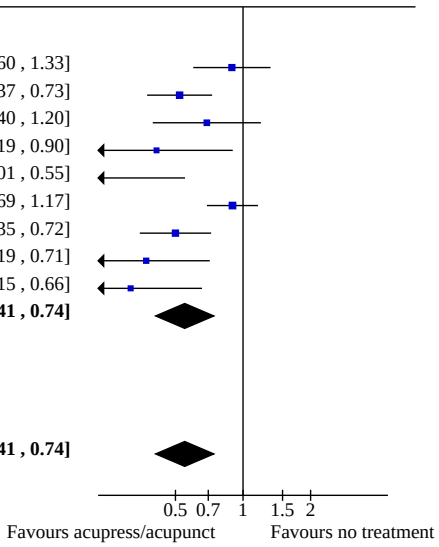
Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
8.7 Hypotension	1	50	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.54, 1.16]
8.7.1 Acupressure	1	50	Risk Ratio (M-H, Random, 95% CI)	0.79 [0.54, 1.16]
8.8 Pruritus/itching	3	395	Risk Ratio (M-H, Random, 95% CI)	1.15 [0.85, 1.55]
8.8.1 Acupressure	3	395	Risk Ratio (M-H, Random, 95% CI)	1.15 [0.85, 1.55]
8.9 Rescue antiemetic (not pre-specified)	2	240	Risk Ratio (M-H, Random, 95% CI)	0.50 [0.36, 0.71]

Analysis 8.1. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.1.1 Acupressure						
Duggal 1998	33	122	37	122	14.0%	0.89 [0.60 , 1.33]
El-Deeb 2011a	36	150	69	150	15.1%	0.52 [0.37 , 0.73]
Habib 2006	14	47	19	44	11.3%	0.69 [0.40 , 1.20]
Harmon 2000	7	47	17	47	8.2%	0.41 [0.19 , 0.90]
Ho 1996	1	30	13	30	2.0%	0.08 [0.01 , 0.55]
Ho 2006	35	55	39	55	16.3%	0.90 [0.69 , 1.17]
Levin 2019	22	60	44	60	14.5%	0.50 [0.35 , 0.72]
Noroozinia 2013	10	76	27	76	9.8%	0.37 [0.19 , 0.71]
Stein 1997	6	25	19	25	8.8%	0.32 [0.15 , 0.66]
Subtotal (95% CI)		**612**		**609**	**100.0%**	**0.55 [0.41 , 0.74]**
Total events:	164		284			
Heterogeneity: Tau² = 0.12; Chi² = 26.17, df = 8 (P = 0.0010); I² = 69%						
Test for overall effect: Z = 3.93 (P < 0.0001)						
Total (95% CI)		**612**		**609**	**100.0%**	**0.55 [0.41 , 0.74]**
Total events:	164		284			
Heterogeneity: Tau² = 0.12; Chi² = 26.17, df = 8 (P = 0.0010); I² = 69%						
Test for overall effect: Z = 3.93 (P < 0.0001)						
Test for subgroup differences: Not applicable						



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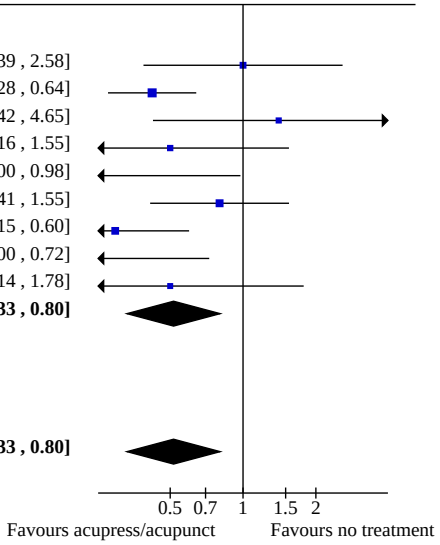
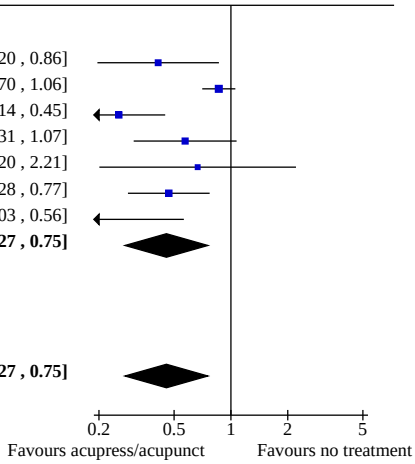
Analysis 8.2. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.2.1 Acupressure						
Duggal 1998	8	122	8	122	12.2%	1.00 [0.39 , 2.58]
El-Deeb 2011a	24	150	57	150	22.2%	0.42 [0.28 , 0.64]
Habib 2006	6	47	4	44	9.2%	1.40 [0.42 , 4.65]
Harmon 2000	4	47	8	47	9.9%	0.50 [0.16 , 1.55]
Ho 1996	0	30	8	30	2.3%	0.06 [0.00 , 0.98]
Ho 2006	12	55	15	55	17.1%	0.80 [0.41 , 1.55]
Levin 2019	8	60	27	60	16.3%	0.30 [0.15 , 0.60]
Noroozinia 2013	0	76	11	76	2.3%	0.04 [0.00 , 0.72]
Stein 1997	3	25	6	25	8.5%	0.50 [0.14 , 1.78]
Subtotal (95% CI)		**612**		**609**	**100.0%**	**0.52 [0.33 , 0.80]**
Total events:	65		144			
Heterogeneity: Tau² = 0.18; Chi² = 15.22, df = 8 (P = 0.05); I² = 47%						
Test for overall effect: Z = 2.92 (P = 0.003)						
Total (95% CI)		**612**		**609**	**100.0%**	**0.52 [0.33 , 0.80]**
Total events:	65		144			
Heterogeneity: Tau² = 0.18; Chi² = 15.22, df = 8 (P = 0.05); I² = 47%						
Test for overall effect: Z = 2.92 (P = 0.003)						
Test for subgroup differences: Not applicable						



Analysis 8.3. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.3.1 Acupressure						
Direkvand-Moghadam 2013	7	34	17	34	14.2%	0.41 [0.20 , 0.86]
Duggal 1998	69	122	80	122	19.8%	0.86 [0.70 , 1.06]
El-Deeb 2011a	13	150	51	150	16.3%	0.25 [0.14 , 0.45]
Habib 2006	11	47	18	44	15.5%	0.57 [0.31 , 1.07]
Harmon 2000	4	47	6	47	9.5%	0.67 [0.20 , 2.21]
Li 2012	15	60	32	60	17.0%	0.47 [0.28 , 0.77]
Noroozinia 2013	2	76	15	76	7.7%	0.13 [0.03 , 0.56]
Subtotal (95% CI)		**536**		**533**	**100.0%**	**0.46 [0.27 , 0.75]**
Total events:	121		219			
Heterogeneity: Tau² = 0.32; Chi² = 31.08, df = 6 (P < 0.0001); I² = 81%						
Test for overall effect: Z = 3.05 (P = 0.002)						
Total (95% CI)		**536**		**533**	**100.0%**	**0.46 [0.27 , 0.75]**
Total events:	121		219			
Heterogeneity: Tau² = 0.32; Chi² = 31.08, df = 6 (P < 0.0001); I² = 81%						
Test for overall effect: Z = 3.05 (P = 0.002)						
Test for subgroup differences: Not applicable						



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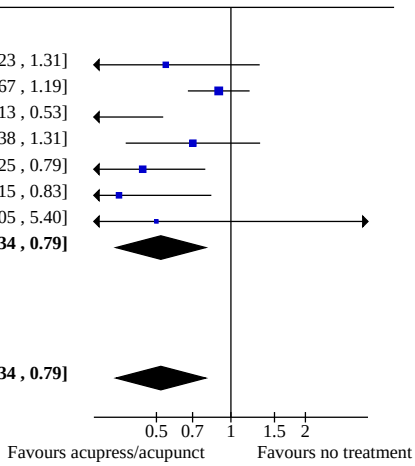
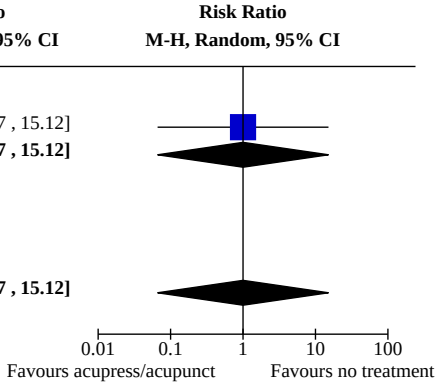
Analysis 8.4. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 4: Vomiting - postoperative

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.4.1 Acupressure						
Direkvand-Moghadam 2013	6	34	11	34	12.2%	0.55 [0.23 , 1.31]
Duggal 1998	50	122	56	122	23.4%	0.89 [0.67 , 1.19]
El-Deeb 2011a	9	150	34	150	15.2%	0.26 [0.13 , 0.53]
Habib 2006	12	47	16	44	16.6%	0.70 [0.38 , 1.31]
Harmon 2000	11	47	25	47	17.4%	0.44 [0.25 , 0.79]
Li 2012	6	60	17	60	12.4%	0.35 [0.15 , 0.83]
Noroozinia 2013	1	76	2	76	2.8%	0.50 [0.05 , 5.40]
Subtotal (95% CI)		**536**		**533**	**100.0%**	**0.52 [0.34 , 0.79]**
Total events:	95		161			
Heterogeneity: Tau² = 0.17; Chi² = 15.87, df = 6 (P = 0.01); I² = 62%						
Test for overall effect: Z = 3.07 (P = 0.002)						
Total (95% CI)		**536**		**533**	**100.0%**	**0.52 [0.34 , 0.79]**
Total events:	95		161			
Heterogeneity: Tau² = 0.17; Chi² = 15.87, df = 6 (P = 0.01); I² = 62%						
Test for overall effect: Z = 3.07 (P = 0.002)						
Test for subgroup differences: Not applicable						



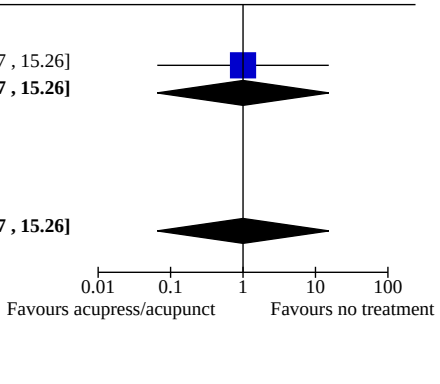
Analysis 8.5. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 5: Anxiety

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.5.1 Acupressure						
Stein 1997	1	25	1	25	100.0%	1.00 [0.07 , 15.12]
Subtotal (95% CI)		**25**		**25**	**100.0%**	**1.00 [0.07 , 15.12]**
Total events:	1		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.00 (P = 1.00)						
Total (95% CI)		**25**		**25**	**100.0%**	**1.00 [0.07 , 15.12]**
Total events:	1		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.00 (P = 1.00)						
Test for subgroup differences: Not applicable						



Analysis 8.6. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 6: Dizziness

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.6.1 Acupressure						
Ho 1996	1	30	1	30	100.0%	1.00 [0.07 , 15.26]
Subtotal (95% CI)		**30**		**30**	**100.0%**	**1.00 [0.07 , 15.26]**
Total events:	1		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.00 (P = 1.00)						
Total (95% CI)		**30**		**30**	**100.0%**	**1.00 [0.07 , 15.26]**
Total events:	1		1			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.00 (P = 1.00)						
Test for subgroup differences: Not applicable						



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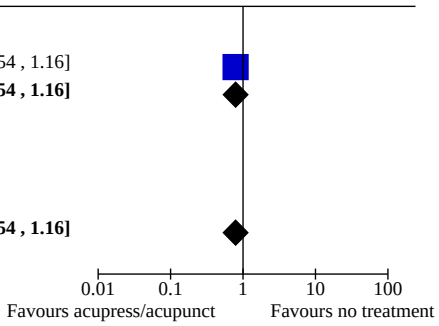
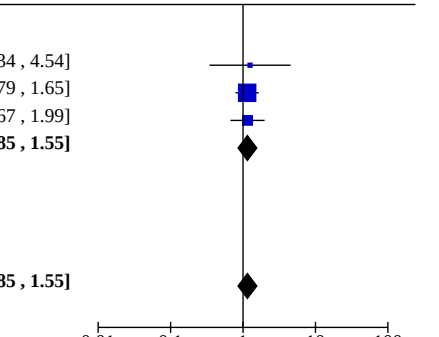
Analysis 8.7. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 7: Hypotension

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.7.1 Acupressure						
Stein 1997	15	25	19	25	100.0%	0.79 [0.54 , 1.16]
Subtotal (95% CI)		**25**		**25**	**100.0%**	**0.79 [0.54 , 1.16]**
Total events:	15		19			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.19 (P = 0.23)						
Total (95% CI)		**25**		**25**	**100.0%**	**0.79 [0.54 , 1.16]**
Total events:	15		19			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.19 (P = 0.23)						
Test for subgroup differences: Not applicable						



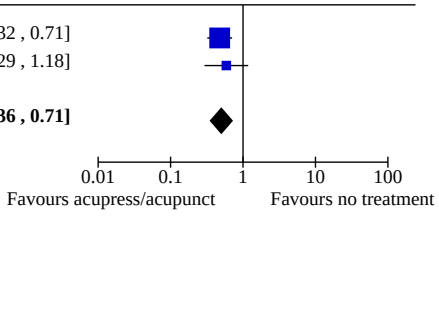
Analysis 8.8. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 8: Pruritus/itching

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
8.8.1 Acupressure						
Duggal 1998	5	122	4	122	5.3%	1.25 [0.34 , 4.54]
Habib 2006	28	47	23	44	65.0%	1.14 [0.79 , 1.65]
Ho 1996	15	30	13	30	29.7%	1.15 [0.67 , 1.99]
Subtotal (95% CI)		**199**		**196**	**100.0%**	**1.15 [0.85 , 1.55]**
Total events:	48		40			
Heterogeneity: Tau² = 0.00; Chi² = 0.02, df = 2 (P = 0.99); I² = 0%						
Test for overall effect: Z = 0.92 (P = 0.36)						
Total (95% CI)		**199**		**196**	**100.0%**	**1.15 [0.85 , 1.55]**
Total events:	48		40			
Heterogeneity: Tau² = 0.00; Chi² = 0.02, df = 2 (P = 0.99); I² = 0%						
Test for overall effect: Z = 0.92 (P = 0.36)						
Test for subgroup differences: Not applicable						



Analysis 8.9. Comparison 8: Acupressure/acupuncture vs placebo, Outcome 9: Rescue antiemetic (not pre-specified)

Study or Subgroup	Acupress/acupunct Events	Total	Placebo Events	Total	Weight	Risk Ratio M-H, Random, 95% CI
Levin 2019 (1)	20	60	42	60	75.6%	0.48 [0.32 , 0.71]
Li 2012 (2)	10	60	17	60	24.4%	0.59 [0.29 , 1.18]
Total (95% CI)		**120**		**120**	**100.0%**	**0.50 [0.36 , 0.71]**
Total events:	30		59			
Heterogeneity: Tau² = 0.00; Chi² = 0.28, df = 1 (P = 0.60); I² = 0%						
Test for overall effect: Z = 3.95 (P < 0.0001)						
Test for subgroup differences: Not applicable						



Footnotes

(1) Mteoclopramide (10mg IV) or ondansetron (4mg IV)

(2) Metoclopramide

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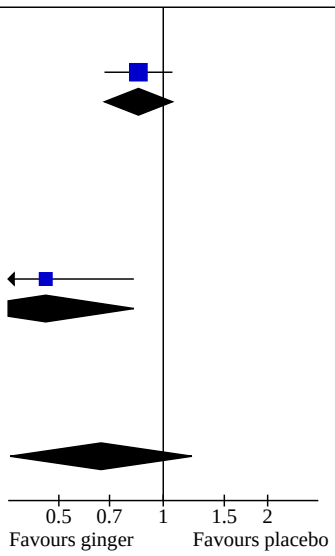
Comparison 9. Ginger vs placebo

Outcome or subgroup title	No. of studies	No. of participants	Statistical method	Effect size
9.1 Nausea - intraoperative	2	331	Risk Ratio (M-H, Random, 95% CI)	0.66 [0.36, 1.21]
9.1.1 Ginger - 1 g oral	1	239	Risk Ratio (M-H, Random, 95% CI)	0.85 [0.68, 1.06]
9.1.2 Ginger - 25 drops oral	1	92	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.26, 0.82]
9.2 Vomiting - intraoperative	2	331	Risk Ratio (M-H, Random, 95% CI)	0.62 [0.38, 1.00]
9.2.1 Ginger 1 g oral	1	239	Risk Ratio (M-H, Random, 95% CI)	0.75 [0.52, 1.10]
9.2.2 Ginger - 25 drops oral	1	92	Risk Ratio (M-H, Random, 95% CI)	0.46 [0.26, 0.82]
9.3 Nausea - postoperative	1	92	Risk Ratio (M-H, Random, 95% CI)	0.62 [0.22, 1.77]
9.3.1 Ginger - 25 drops oral	1	92	Risk Ratio (M-H, Random, 95% CI)	0.62 [0.22, 1.77]
9.4 Vomiting - postoperative	1	92	Risk Ratio (M-H, Random, 95% CI)	0.20 [0.02, 1.65]
9.4.1 Ginger - 25 drops oral	1	92	Risk Ratio (M-H, Random, 95% CI)	0.20 [0.02, 1.65]

Analysis 9.1. Comparison 9: Ginger vs placebo, Outcome 1: Nausea - intraoperative

Study or Subgroup	Ginger Events	Ginger Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
9.1.1 Ginger - 1 g oral						
Kalava 2013	60	116	75	123	59.6%	0.85 [0.68 , 1.06]
Subtotal (95% CI)		**116**		**123**	**59.6%**	**0.85 [0.68 , 1.06]**
Total events:	60		75			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.43 (P = 0.15)						
9.1.2 Ginger - 25 drops oral						
Zeraati 2016	11	46	24	46	40.4%	0.46 [0.26 , 0.82]
Subtotal (95% CI)		**46**		**46**	**40.4%**	**0.46 [0.26 , 0.82]**
Total events:	11		24			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.61 (P = 0.009)						
Total (95% CI)		**162**		**169**	**100.0%**	**0.66 [0.36 , 1.21]**
Total events:	71		99			
Heterogeneity: Tau² = 0.15; Chi² = 3.85, df = 1 (P = 0.05); I² = 74%						
Test for overall effect: Z = 1.34 (P = 0.18)						
Test for subgroup differences: Chi² = 3.70, df = 1 (P = 0.05), I² = 73.0%						



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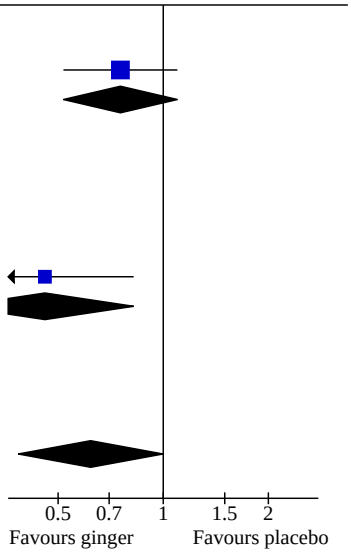
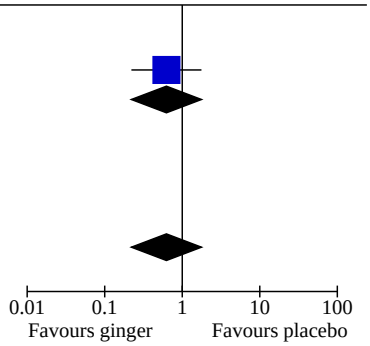
Analysis 9.2. Comparison 9: Ginger vs placebo, Outcome 2: Vomiting - intraoperative

Study or Subgroup	Ginger Events	Ginger Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
9.2.1 Ginger 1 g oral						
Kalava 2013	32	116	45	123	60.6%	0.75 [0.52 , 1.10]
Subtotal (95% CI)		**116**		**123**	**60.6%**	**0.75 [0.52 , 1.10]**
Total events:	32		45			
Heterogeneity: Not applicable						
Test for overall effect: Z = 1.47 (P = 0.14)						
9.2.2 Ginger - 25 drops oral						
Zeraati 2016	11	46	24	46	39.4%	0.46 [0.26 , 0.82]
Subtotal (95% CI)		**46**		**46**	**39.4%**	**0.46 [0.26 , 0.82]**
Total events:	11		24			
Heterogeneity: Not applicable						
Test for overall effect: Z = 2.61 (P = 0.009)						
Total (95% CI)		**162**		**169**	**100.0%**	**0.62 [0.38 , 1.00]**
Total events:	43		69			
Heterogeneity: Tau² = 0.06; Chi² = 1.97, df = 1 (P = 0.16); I² = 49%						
Test for overall effect: Z = 1.97 (P = 0.05)						
Test for subgroup differences: Chi² = 1.97, df = 1 (P = 0.16), I² = 49.2%						



Analysis 9.3. Comparison 9: Ginger vs placebo, Outcome 3: Nausea - postoperative

Study or Subgroup	Ginger Events	Ginger Total	Placebo Events	Placebo Total	Weight	Risk Ratio M-H, Random, 95% CI
9.3.1 Ginger - 25 drops oral						
Zeraati 2016	5	46	8	46	100.0%	0.63 [0.22 , 1.77]
Subtotal (95% CI)		**46**		**46**	**100.0%**	**0.63 [0.22 , 1.77]**
Total events:	5		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.89 (P = 0.38)						
Total (95% CI)		**46**		**46**	**100.0%**	**0.63 [0.22 , 1.77]**
Total events:	5		8			
Heterogeneity: Not applicable						
Test for overall effect: Z = 0.89 (P = 0.38)						
Test for subgroup differences: Not applicable						



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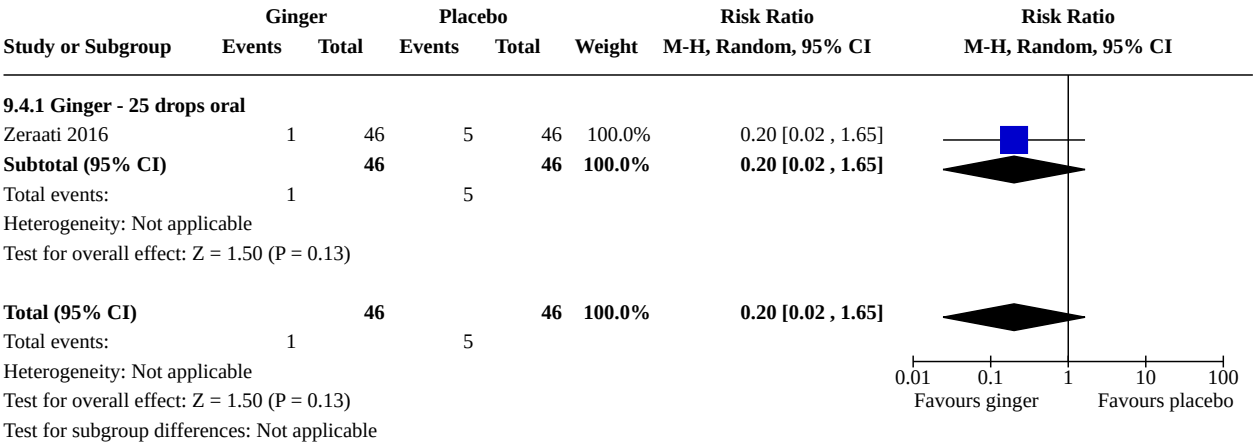
Analysis 9.4. Comparison 9: Ginger vs placebo, Outcome 4: Vomiting - postoperative



APPENDICES

Appendix 1. ICTRP and ClinicalTrials.gov - search methods

ICTRP

Each line was run separately.

nausea AND cesarean

nausea AND caesarean

vomiting AND cesarean

vomiting AND caesarean

antiemetics AND cesarean

antiemetics AND caesarean

ClinicalTrials.gov

Advanced search

cesarean section | Interventional studies | vomiting

cesarean section | Interventional studies | nausea

cesarean section | Interventional studies | antiemetics

WHAT'S NEW

Date	Event	Description
16 April 2020	New search has been performed	Due to the increasing complexity of the review, we are now restricting the scope of the review to interventions compared with placebo or no treatment only. We have removed intervention versus intervention comparisons and studies investigating combinations of treatments. We have separated the blinding assessment for performance and detection bias to separate assessments of performance bias and detection bias as per Cochrane updated methodology.

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Date	Event	Description
		We have assessed the certainty of evidence using GRADE criteria and now have nine 'Summary of findings' tables in this update. Clarified definition of a primary outcome: When a study reported postoperative data into multiple time epochs, we have extracted the earliest postoperative data for inclusion in our review. When overall data were provided, we have used this to reflect intraoperative data. We removed comparisons where no identified study published usable data on that comparison
16 April 2020	New citation required and conclusions have changed	Search updated and 218 new trial reports assessed, plus 204 trial reports from the previous version of this review have been reassessed due to the change in scope. This update includes a total of 84 studies, with 69 providing data. In addition to the effective interventions identified in the previous version, in this update, corticosteroids were found to be effective in all our primary outcomes.

HISTORY

Protocol first published: Issue 1, 2009
Review first published: Issue 9, 2012

CONTRIBUTIONS OF AUTHORS

Shantini Paranjothy (SP) wrote the first drafts of the combined protocol (*Drugs at caesarean section for preventing nausea, vomiting and aspiration pneumonitis*) with input from Eugene Liu (EL), Heather Brown (HB) and Jane Thomas (JT). SP combined the drafts for editorial consideration with input from EL, HB and JT. The revisions in response to the editorial feedback were made by SP, EL, HB, and JT commented on the revised version. In 2007, James Griffiths (JG), Gill Gyte (GG) and Hannah Broughton (HKB) joined the review team. After the initial searches and papers were assessed for eligibility, it was agreed to split the primary review into two separate reviews. JG was appointed as contact person on the nausea and vomiting review. SP remained contact person for the aspiration pneumonitis review (Paranjothy 2014).

For this review, JG drafted the Background section with comments and input from other authors. In 2016, Phil Popham (PP) and Kacey Williams (KW) joined the review team. In this 2020 update, JG and PP revised and updated the background section; JG, GG, SP, HKB, KW, PP and JT contributed to data extraction, both extracting data and checking. JG, PP and GG entered the data and JG and GG analysed the data and prepared the first draft of this review. GG and JG checked data entry. All authors contributed to the interpretation of the data and the final draft of the review.

DECLARATIONS OF INTEREST

James D Griffiths: none known.

Gillian ML Gyte: GG received royalties from John Wiley & Sons in respect of 'A Cochrane Pocketbook – Pregnancy and Childbirth' Hofmeyr GJ et al. 2008.

Phil A Popham: none known.

Kacey Williams: none known.

Shantini Paranjothy: none known.

Hannah K Broughton: none known.

Jane Thomas: none known.

Heather C Brown: none known.

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SOURCES OF SUPPORT

Internal sources

- The University of Liverpool, UK

External sources

- National Institute for Health Research, UK

  NIHR NHS Cochrane Collaboration Programme Grant Scheme award for NHS-prioritised centrally-managed, pregnancy and childbirth systematic reviews: CPGS02

DIFFERENCES BETWEEN PROTOCOL AND REVIEW

1. We have changed the outcomes of 'Maternal adverse effects' and 'Neonatal morbidity' from being primary outcomes to secondary outcomes.
2. We have modified the wording in the methods sections for Assessment of heterogeneity, Assessment of reporting biases and Data synthesis to update them with the new methods being used by the group, developed in conjunction with the group's statistician, Simon Gates, and Richard Riley. We have used these new methods in the review.
3. We have added alternative therapies such as ginger or peppermint to the list of interventions.
4. We have clarified that this review is specifically assessing the efficacy of interventions for the prevention (rather than treatment) of nausea and vomiting. Treatment interventions will be assessed in a subsequent review.
5. We have changed the title of the review from that of the protocol which was '*Interventions for reducing nausea and vomiting at caesarean section'*. We have done this to clarify for readers that we are looking at prevention and not treatment interventions. Also we have determined that this review should only assess studies where the caesarean section was performed under regional anaesthesia. Studies where general anaesthesia was performed will be assessed in a separate subsequent review.
6. We are now including subgroup analyses bases on type and doses of drugs used.
7. We have clarified the time-frame over which postoperative symptoms will be assessed.
8. For the 2020 update, we added in a search of ClinicalTrials.gov and the WHO International Clinical Trials Registry Platform (ICTRP).
9. For the 2020 update, due to the increasing complexity of the review, we have revised the scope to include studies comparing interventions with placebo or no treatment, and have removed intervention versus intervention comparisons which will be better assessed in a network meta-analysis. We also excluded reviews of combination interventions.
10. For the 2020 update we have added data on the outcomes 'Nausea plus vomiting' and 'Rescue antiemetic'.

INDEX TERMS

Medical Subject Headings (MeSH)

Acupressure; Adrenal Cortex Hormones [therapeutic use]; Anesthesia, Conduction [*adverse effects]; Bias; *Cesarean Section; Dopamine Antagonists [therapeutic use]; Elective Surgical Procedures; Hypnotics and Sedatives [therapeutic use]; Intraoperative Complications [*prevention & control]; Nausea [*prevention & control]; Postoperative Nausea and Vomiting [prevention & control]; Pregnancy Complications [*prevention & control]; Randomized Controlled Trials as Topic; Serotonin Antagonists [therapeutic use]; Vomiting [*prevention & control]

MeSH check words

Female; Humans; Pregnancy

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