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## Feather versus non-feather bedding for asthma (Review)

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[Intervention Review]

# Feather versus non-feather bedding for asthma

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## ABSTRACT

### Background

Two recent epidemiological studies have reported that children using non-feather pillows suffered from more frequent episodes of wheeze than those using feather pillows

### Objectives

To evaluate the efficacy of using feather bedding in the control of asthma symptoms.

### Search methods

The Cochrane Airways Group Specialised Register was searched with pre-specified terms. Searches are current to February 2009.

### Selection criteria

Only randomised or controlled clinical trials were to be included.

### Data collection and analysis

No trials met the inclusion criteria for the review.

### Main results

From electronic literature searches a total of 15 studies have been retrieved for scrutiny as full-text papers. However, on review none of them have met the review entry criteria.

### Authors' conclusions

Whilst recent epidemiological studies suggest that feather bedding is associated with less frequent wheeze than man-made fibre fillings, the evidence currently available is insufficient to assess the clinical benefits of feather bedding in the management of asthma.

## PLAIN LANGUAGE SUMMARY

### Feather versus non-feather bedding for asthma

An allergen is the substance that causes an allergic reaction in someone who is hypersensitive to it. A major allergen for asthma is the house dust mite. It is thought that artificial (man-made) fibre fillings for pillows and bedding are less likely to gather allergens than feather-filled pillows and quilts. However, there is some evidence that in fact, feather bedding may in fact be less likely to cause asthma. The review found no trials comparing feathers with man-made fibres, and research is needed to be certain which is better for people with asthma.

### Feather versus non-feather bedding for asthma (Review)

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## BACKGROUND

It is estimated that there are over 150 million people worldwide have asthma (NIH 1995) and there is an accumulating body of evidence from epidemiological surveys suggesting that it is becoming more common (ONS 1998). The rising trend in asthma prevalence and its heavy costs in terms of morbidity, mortality, and upon health services provide a sound rationale for interventions aimed at its primary prevention and reduction in severity of symptoms.

The allergic nature of asthma has led to the pursuance of measures designed to reduce exposure to prevailing inhaled allergens. It has long been recognised that the faecal pellets of house dust mites are the principal source of allergen in house dust and their role in asthma provocation has been further implicated in studies which demonstrated an improvement in mite sensitive children in dust mite free environments. The evidence from this and other work has led some to argue that allergen avoidance should be regarded as a first line anti-inflammatory treatment for asthma.

The highest degrees of infestation have been reported in domestic beds and on upholstered furniture, so mite sensitive subjects are recommended to take measures that will reduce the levels of dust mite allergen. Such measures have included the use of synthetic pillows, duvets, eiderdowns and mattresses in preference for natural fillings such as feather and kapok. This topic has been the subject of another Cochrane Airways Group Review which found no evidence that currently used methods of house dust mite reduction have benefit in asthma (Gotzsche 2008).

The assumption that non-feather bedding is preferable for asthmatics has been challenged by the findings of epidemiological studies (Butland 1997; Strachan 1997). These studies sought to explore changes in the home environment and its relationship with the rising prevalence of childhood wheeze. They found that children using non-feather pillows were more likely to be suffering from more frequent episodes of wheeze than those using feather pillows.

## OBJECTIVES

The purpose of this systematic review was to search for and evaluate the evidence for the use of feather or non-feather bedding and establish whether these are effective in relieving and preventing asthma symptoms, ascertaining how significant the benefit may be which type of patient would benefit.

## METHODS

### Criteria for considering studies for this review

#### Types of studies

To be included the studies had to be randomised. Since double blind trials may be impossible with the intervention being studied, non blinded trials could also be accepted.

#### Types of participants

Participants were to be adults or children with a clinical diagnosis of asthma. Asthmatics with feather allergy would be excluded.

### Types of interventions

Intervention group:

One group would have been given feather pillows

Comparative Intervention group would include one of the following:

1. Pillow encased in an impermeable or semi permeable casing.
2. Pillow with a synthetic filling type.
3. Pillow with kapok filling.

Participants will have been randomised to use either feather pillows or synthetic pillows. If duvets are used these too would correspond in filling type to the pillow.

### Types of outcome measures

Dust mite allergen levels.

Asthma symptom scores

Medication usage

Number of unscheduled visits to a physician/hospital

Forced expiratory volume in one second (FEV1)

Peak expiratory flow rate (PEFR)

Provocative concentration that causes a 20% fall in FEV1 (PC20)

### Search methods for identification of studies

Trials were identified using the Cochrane Airways Group Specialised Register of trials, which is derived from systematic searches of bibliographic databases including the Cochrane Central Register of Controlled Trials (CENTRAL), MEDLINE, EMBASE and CINAHL, and handsearching of respiratory journals and meeting abstracts (please see the [Airways Group Module](#) for further details). All records in the Specialised Register coded as 'asthma' were searched using the following terms:

feather\* or pillow\* or duvet\* or bed\*

The most recent search was conducted in February 2009.

### Data collection and analysis

#### Selection of studies

Two review authors independently selected trials for inclusion using the eligibility form. Data was extracted from the eligible studies again by two reviewers working independently. Disagreement was resolved by consensus.

Retrieve: For retrieval it must have been evident from the title or abstract that the study was an RCT or CCT. The participants must have been asthmatics and the intervention must have involved feather or non-feather bedding.

Possible: Papers where there was insufficient information from the title or abstract to determine whether the retrieval criteria had been met.

Exclude: The reference was not retrieved if it was not an RCT or CCT or if the intervention did not include control of the bedding. It was also excluded at this stage if the participants did not have asthma.

#### Data extraction and management

The following data were extracted from each study:

- Key baseline variables of each group e.g. age and severity of asthma
- Exclusion and inclusion criteria applied in the study
- Numbers in each group
- Description of the intervention and the control or co-intervention including pillow and duvet type, duration of intervention, time of year of intervention, concurrent interventions, concurrent medication usage, size of weave of fabric used for pillow / duvet encasement.
- Outcomes & numerical outcome data

### Assessment of risk of bias in included studies

The methodological quality of each trial was to have been assessed in terms of:

- 1) Randomisation and allocation concealment
- 2) Blinding and in particular blinding at outcome assessment.
- 3) The reporting of withdrawals from studies and intention to treat analysis.
- 4) Evidence of an a priori sample size calculation.

### Measures of treatment effect

The planned comparisons included:

- Feather versus synthetic fibre filled bedding
- Feather versus foam
- Feather versus kapok
- Feather versus feather and impermeable cover
- New bedding versus bedding more than 4 weeks old

### Dealing with missing data

Authors were to have been contacted if data were missing from the reports

### Assessment of heterogeneity

Tests for heterogeneity would have been performed. If identified, differences between studies would have been explored by subgroup and sensitivity analyses, for example children versus adults and concurrent use of steroids versus non use. The influence of publication status and methodological quality on the review's conclusions would have been examined by sensitivity analyses.

### Data synthesis

Data were to have been entered onto the Cochrane RevMan software and analysed using Cochrane MetaView. Results would have been presented with 95% confidence intervals. Summary estimates for dichotomous outcomes would have been reported as odds ratios, and for continuous outcomes, as weighted mean differences or standardised mean differences. A fixed effect model would have been used unless heterogeneity were present in which case the random effect model would have been used.

## RESULTS

### Description of studies

From the first literature search, 126 abstract were identified from the database and 10 were selected for possible inclusion in the review. One abstract (Hallam 1998) was identified from the references in the retrieved papers.

None of the studies were eligible for inclusion in this review and were excluded for the following reasons:

1. not randomised controlled trials (Crane 1997, Hallam 1998, Kemp 1996, Rains 1999, Strachan 1995, Strachan 1997)
2. allocation of a specific bedding type was combined with other dust mite reduction strategies thus preventing analysis of bedding type distinct from the effects of other interventions (Burr 1980, Butland 1997, Gillies 1987, Korsgaard 1983).

An update search in February 2004 identified a further five excluded studies: Holm 2001 (multiple intervention trial); Chan-Yeung 2002 (multiple intervention trial in people with atopic dermatitis); Terreeghorst 2002 (observational study); Nafstad 2002 (prospective cohort study); Carter 2001 (barrier avoidance study, with no distinction made between synthetic and feather bedding). No further studies were identified in subsequent update search in February 2009.

### Risk of bias in included studies

No studies could be assessed.

### Effects of interventions

No results were available.

## DISCUSSION

The suggestion that the use of synthetic pillows is associated with more severe asthma arose from the findings of epidemiological surveys (Strachan 1995, Butland 1997). These studies suggested that even when analysis was adjusted to account for allergic asthmatics choosing synthetic pillows as a means of allergen avoidance, the risk of severe wheezing was two or three times higher than for those using feather pillows.

Prompted by these findings, further research has also served to raise doubts about the benefit of synthetic bedding for asthmatics. Synthetic pillows appear to accumulate dust mite allergen more rapidly than feather pillows (Rains 1999). Synthetic pillows have also been found to contain significantly higher levels of mite allergen than feather pillows (Kemp 1996; Hallam 1998). One explanation for this difference is that feathers are contained within more tightly woven fabrics than synthetic fillings. The close weave may therefore act as a barrier to dust mites and their allergens.

The possibility that the higher levels of dust mite allergen found in synthetic pillows might lead to more severe symptoms of asthma is supported by findings from Hallam 1998. They demonstrated a positive correlation between levels of mite allergen in bed and the clinical activity and severity of asthma in mite-sensitive patients.

The findings outlined above challenge the long held view that asthmatics would be better using a synthetic pillow, but specific recommendations can only be made following appropriate randomised controlled trials.

## AUTHORS' CONCLUSIONS

### Implications for practice

Whilst recent epidemiological studies suggest that feather bedding is associated with less frequent wheeze than man-made fibre filling, the currently available evidence is insufficient to assess the clinical benefits of feather bedding in the management of asthma.

### Implications for research

The current association seen between feather and synthetic bedding and asthma severity requires further investigation and validation. Firstly the mechanisms behind the possible differences in dust mite allergen accumulation in feather and non feather bedding should be the subject of further study. Once the causes behind these differences is established and understood the potential clinical benefit can be ascertained and measured in a

randomised controlled trial. As a preventive measure the use of feather bedding offers an acceptable and inexpensive strategy and as such justifies further exploration.

### ACKNOWLEDGEMENTS

Many thanks to Steve Milan, Anna Bara, Jane Dennis and Toby Lasserson (Cochrane Airways Group) for their help. We are grateful to Dr Kevin Jones who assessed studies for inclusion in the review, and helped to draft the review.

## REFERENCES

### References to studies excluded from this review

#### Burr 1980 {published data only}

\* Burr ML, St. Leger AS, Neale E. Anti-mite measures in mite-sensitive adult asthma. *The Lancet* 1976;**1**(7955):333-5.

#### Butland 1997 {published data only}

\* Butland BK, Strachan DP, Anderson RH. The home environment and asthma symptoms in childhood: two population based case-control studies 13 years apart. *Thorax* 1997;**52**:618-24.

#### Carter 2001 {published data only}

Carter MC, Perzanowski MS, Raymond A, Platts-Mills TA. Home intervention in the treatment of asthma among inner-city children. *Journal of Allergy & Clinical Immunology* 2001;**108**(5):732-7.

#### Chan-Yeung 2002 {published data only}

Chan-Yeung M, Ferguson A, Dimich-Ward H, Watson W, Manfreda J, Becker A. Effectiveness of and compliance to intervention measures in reducing house dust and cat allergen levels. *Annals of Allergy, Asthma and Immunology* 2002;**88**(1):52-8.

#### Crane 1997 {published data only}

\* Crane J, Kemp T, Siebers R, Rains N, Fishwick D, Fitzharris P. Increased house dust mite allergen in synthetic pillows may explain increased wheezing. *BMJ* 1997;**314**:1763-4.

#### Gillies 1987 {published data only}

\* Gillies DRN, Littlewood JM, Sarsfield JK. Controlled trial of house dust mite avoidance in children with mild to moderate asthma. *Clinical Allergy* 1987;**17**:105-11.

#### Hallam 1998 {published data only}

\* Hallam C, Custovic A, Simpson B, Houghton N, Simpson A, Woodcock A. House dust mite allergen in feather and synthetic pillows. *Allergy* 1998;**53**(Suppl 43):27.

#### Holm 2001 {published data only}

Holm L, Öhmann S, Bengtsson A, van Hage-Hamsten M, Scheynius A. Effectiveness of occlusive bedding in the treatment of atopic dermatitis - a placebo-controlled trial of 12 months' duration. *Allergy* 2001;**56**:152-8.

#### Kemp 1996 {published data only}

\* Kemp TJ, Siebers RW, Fishwick D, O'Grady GB, Fitzharris P, Crane J. House dust mite allergen in pillows. *BMJ* 1996;**313**:916.

#### Korsgaard 1983 {published data only}

\* Korsgaard J. Preventive measures in mite asthma. *Allergy* 1983;**38**:93-102.

#### Nafstad 2002 {published data only}

Nafstad P, Nystad W, Jaakola JJK. The use of a feather quilt, childhood asthma and allergic rhinitis: a prospective cohort study. *Clinical Experimental Allergy* 2002;**32**:1150-4.

#### Rains 1999 {published data only}

\* Rains N, Siebers R, Crane J, Fitzharris P. House dust mite allergen (Der p 1) accumulation on new synthetic and feather pillows. *Clinical and Experimental Allergy* 1999;**29**:182-5.

#### Strachan 1995 {published data only}

\* Strachan DP, Carey IM. Home environment and severe asthma in adolescence: a population based case-control study. *BMJ* 1995;**311**:1053-6.

#### Strachan 1997 {published data only}

\* Strachan D, Carey IM. Reduced risk of wheezing in children using feather pillows is confirmed. *BMJ* 1997;**314**:518.

#### Terreeghorst 2002 {published data only}

Terreehorst I, Oosting AJ, Tampels-Pavlica Z, de Monchy JG, Buijnzeel-Koomen CA, Hak E, et al. Prevalence and severity of allergic rhinitis in house dust mite-allergic patients with bronchial asthma or atopic dermatitis. *Clinical Experimental Allergy* 2002;**32**:1160-5.

### Additional references

#### Gotzsche 2008

Gøtzsche PC, Johansen HK, Schmidt LM, Burr ML. House dust mite control measures for asthma (Cochrane review). *Cochrane Database of Systematic Reviews* 2008, Issue 2. [DOI: [10.1002/14651858.CD001187.pub3](https://doi.org/10.1002/14651858.CD001187.pub3)]

#### NIH 1995

National Institutes of Health. <http://www.nih.gov/> 1995.

#### ONS 1998

Office for National Statistics. <http://www.statistics.gov.uk/> 1998.

\* Indicates the major publication for the study

## CHARACTERISTICS OF STUDIES

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

Study	Reason for exclusion
Burr 1980	Intervention exploring the effectiveness of plastic bed covers and not types of filling in bedding.

### Feather versus non-feather bedding for asthma (Review)

Study	Reason for exclusion
<a href="#">Butland 1997</a>	CCT
<a href="#">Carter 2001</a>	Randomised barrier avoidance study, with no distinction made between synthetic and feather bedding.
<a href="#">Chan-Yeung 2002</a>	Antenatal randomisation - multiple interventions used for allergen prevention.
<a href="#">Crane 1997</a>	Observational study
<a href="#">Gillies 1987</a>	A trial comparing multiple house dust mite avoidance measures which included the use of synthetic bedding for the intervention group. Excluded because the effects of the synthetic bedding would be confounded by the other interventions occurring simultaneously.
<a href="#">Hallam 1998</a>	Not a randomised control trial. Did not include participants with asthma.
<a href="#">Holm 2001</a>	Randomised controlled trial assessing the effectiveness of multiple allergen barriers in people with atopic dermatitis
<a href="#">Kemp 1996</a>	Observational study.
<a href="#">Korsgaard 1983</a>	Trial of preventive measures in mite sensitive asthmatics. The intervention did include the replacement of all quilts and pillows with new synthetic quilts and pillows. However this intervention was introduced with other preventive measures and isolating the effects of the synthetic bedding from the other interventions is not possible.
<a href="#">Nafstad 2002</a>	Prospective cohort study.
<a href="#">Rains 1999</a>	Observational study design.
<a href="#">Strachan 1995</a>	CCT
<a href="#">Strachan 1997</a>	CCT
<a href="#">Terreeghorst 2002</a>	Non-randomised observational study in people with atopic disease.

CCT - case control trial

## WHAT'S NEW

Date	Event	Description
18 February 2009	New search has been performed	Literature search run: no new studies identified.

## HISTORY

Protocol first published: Issue 2, 2000

Review first published: Issue 3, 2001

Date	Event	Description
24 July 2008	Amended	Converted to new review format.

### Feather versus non-feather bedding for asthma (Review)

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Date	Event	Description
23 June 2000	New citation required and conclusions have changed	Substantive amendment

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## CONTRIBUTIONS OF AUTHORS

FC: Initiated protocol; assessed studies for inclusion in the review; wrote draft of the review  
PG: Helped to formulate protocol, had input with review

## DECLARATIONS OF INTEREST

Nil

## SOURCES OF SUPPORT

### Internal sources

- NHS Research and Development, UK.

### External sources

- No sources of support supplied

## INDEX TERMS

### Medical Subject Headings (MeSH)

\*Bedding and Linens; Asthma [\*prevention & control]; Controlled Clinical Trials as Topic; Randomized Controlled Trials as Topic

### MeSH check words

Child; Humans