

## **Relationship between mode of delivery and development of urinary incontinence: A possible link is demonstrated**

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### **Abstract**

**Background:** Urinary incontinence is a major problem faced by many mothers and has been traditionally linked to diverse ways of delivery. However, there is still a lack of clinical data, which can corroborate this notion. Thus, the present study was conducted to evaluate the correlation of urinary incontinence developed in women under different modes of delivery that have been used during childbirth. The study was conducted by considering three ways of delivery such as vaginal, cesarean section and the use of instruments during childbirth. The results were compared in each group in terms of number of women that developed or experienced urinary incontinence with those who have no problem at all or have minor problems.

**Methods:** The study was conducted at Qassim University Clinic, and Maternity and Child Hospital Buraidah from Jan-May 2015 as a descriptive cross sectional study. The objective was to determine the core reasons as to why women tend to develop some urinary incontinence after delivery. First 111 women without urinary incontinence and 100 women with urinary incontinence were asked retrospectively about the number of vaginal deliveries they had underwent. Then another group (111 without urinary incontinence and 100 with urinary continence) were asked about the number of instrumental deliveries they had undergone. The same was repeated (111 women without urinary incontinence and 100 with urinary incontinence) for women with cesarean section.

**Results:** Having five or more vaginal births had a significantly ( $p < 0.001$ ) high risk for development of urinary incontinence ( $n = 74$ , 66.67%) as compared to no urinary incontinence ( $n = 8$ , 8.0%). In the group who had no cesarean section, there was a significantly ( $p < 0.001$ ) larger proportion of participants with urinary problems ( $n = 100$ , 90.09%) than those without urinary problems ( $n = 61$ , 61.0%). For participants who have had an instrumental delivery, there was a significantly ( $p = 0.014$ ) larger proportion of participants with urinary problems ( $n = 22$ , 19.82%) than those without urinary problems ( $n = 8$ , 8.0%). However, for participants that have not had an instrumental delivery, there was a significantly larger amount of participants without urinary problems than those with urinary problems ( $p < 0.001$ ).

**Conclusion:** Women with 5 or more vaginal deliveries as well as instrumental deliveries were more liable to develop urinary incontinence in this study. This may be because vaginal deliveries and instrumental deliveries lead to perineal damage. This is further supported by the results of this study showing that women who never had cesarean section were more likely to report urinary incontinence

**Key Words:** Urinary incontinence, Saudi Arabia, Cesarean section, instrumental delivery. Saudi Arabia

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## **Introduction**

Urinary incontinence is defined as the inability to hold urine. <sup>(1)</sup> Various means of delivery have been linked to the chances of the mother to develop urinary incontinence. <sup>(2)</sup> According to Rogers stress incontinence is common in women who have given vaginal birth as it leads to pelvic floor muscle destruction. <sup>(3)</sup> The chances to develop various forms of incontinence like stress incontinence and urge incontinence are higher in women who had vaginal delivery as compared to those who had cesarean section. <sup>(4)</sup> Fritel reported that cesarean section is protective against development of urinary incontinence. <sup>(5)</sup> Cesarean section is when the walls of a mother's womb are cut so that the baby can be delivered through the incision. This is certainly done in order to avoid complications that could lead to losing the mother and/or the baby. Cesarean section is not better than vaginal reproduction since in vaginal reproduction the mother recovers quicker. Instrument delivery is when a tool is used to ensure a swift, safer and less painful delivery. The common instruments that are used include; forceps and a vacuum cap. <sup>(6)</sup>

Having urinary incontinence have a major impact on the quality of life of women. It places the women at risk of depression and social isolation. <sup>(7,8)</sup> This observational study aimed to describe the relationship of the mode of delivery with development of urinary incontinence in women from Saudi Arabia. Urinary incontinence has been traditionally linked to diverse ways of delivery. However, there is still a lack of clinical data, which can corroborate this notion. Thus the present study was conducted to evaluate the correlation of urinary incontinence with different modes of delivery.

## **Methods**

The study was conducted from Jan-May 2015 as a descriptive cross sectional study at Qassim University Clinic and Maternity and Child Hospital, Buraidah. Convenient sampling was used including all women who presented to the Outpatient Clinic for gynecological consultations. First 111 women without urinary incontinence and 100 women with urinary

incontinence were asked retrospectively about the number of vaginal deliveries they had underwent. Then another group (111 without urinary incontinence and 100 with urinary continence) was asked about the number of instrumental deliveries they had undegone. The same was repeated (111 women without urinary incontinence and 100 with urinary incontinence) for women who had cesarean section.

Women who were having any medical disorder as well as those who did not consent were excluded from the study. A self-structured proforma was used to collect the data. Data was kept anonymous for privacy. Each participant was informed about the objectives and consented. Women who willingly participated were included. The study was compacted in accordance with the ethical standards laid down in the Helsinki Declaration of 1975 as revised in 1983.

## **Statistical analysis**

The Statistical Package for the Social Sciences 22 (SPSS 22) was used to conduct proportion z-tests to determine what factors are more likely to be responsible for urinary incontinence. To test the hypothesis, differences between two groups on the factors above were examined. The groups included participants that reported having urinary problems ( $n = 111$ ) and those who do not have urinary problems ( $n = 100$ ).

## **Results**

A total of 633 women were included in the study. They were divided into three groups comprising of 211 women in each group (111 without urinary incontinence and 100 with urinary incontinence). First 111 women without urinary incontinence and 100 women with urinary incontinence were asked retrospectively about the number of vaginal deliveries they had underwent. Then another group (111 without urinary incontinence and 100 with urinary continence) was asked about the number of instrumental deliveries they had undegone. The same was repeated (111 women without urinary incontinence and 100 with urinary incontinence) for women who had cesarean section. (Table-1, 2 and 3)

**Table 1. Cross Tabulation of Number of vaginal births amongst Urinary problem and non-urinary problem Groups**

Number of vaginal births	Group		Total
	With urinary problem	Without any urinary problem	
1-2	17	25	42
3	0	46	46
4	20	21	41
5+	74	8	82
Total	111	100	211

**Table 2. Cross Tabulation of Number of cesarean section amongst Participants with Urinary problem and those without Urinary problem**

Number of cesarean sections	Group		Total
	With urinary problem	Without any urinary problem	
0*	100	61	161
1	6	31	37
2	1	6	7
3	4	1	5
4	0	1	1
Total	111	100	211

0\*=Women who never had cesarean section

**Table 3. Cross Tabulation of Instrumental Delivery amongst Participants with Urinary problems and those without Urinary problems**

Instrumental Delivery	Group		Total
	With urinary problem	Without any urinary problem	
Yes	22	8	30
No	89	92	181
Total	111	100	211

### Number of vaginal births

Proportion z-tests were conducted to determine if any significant differences in the number of vaginal births existed between participants with urinary problems and those without. Number of vaginal births was measured on an interval scale and was then grouped into four groups including those with two or less no of vaginal births, those with 3

vaginal births, those with 4 vaginal births, and those with 5 or more vaginal births—see Table -1 for frequency and percent statistics of participants' number of vaginal births For participants with a urinary problem, the majority (66.67%) had five or more vaginal births ( $n = 74$ ), 18.02% had 4 vaginal births ( $n = 20$ ), and 15.32% had two or less vaginal births ( $n = 17$ ); there were no participants with

a urinary problem with 3 vaginal births ( $n = 0$ ). For participants without a urinary problem, 84.0% had 3 vaginal births ( $n = 46$ ), quarter of the participants (25.0%) had two or less number of vaginal births ( $n = 25$ ), 21.0% had 4 vagina l births ( $n = 21$ ), and the remaining participants had five or more vaginal births ( $n = 8$ ). Displayed in Table -1 is a cross tabulation of urinary problem groups (with and without) by levels of vaginal births.

Results from the proportion z-tests indicated that significant differences in the frequency of urinary problems did exist between levels of vaginal births. That is, for participants with 3 numbers of vaginal births, there were a significantly ( $p < 0.001$ ) larger

proportion of participants without urinary problems ( $n = 46$ , 46.0%) than those with urinary problems ( $n = 0$ , 0.00%). However, for participants with five or more vaginal births, there was a significantly ( $p < 0 .001$ ) larger amount of participants with urinary problems ( $n = 74$ , 66.67%) than those without urinary problems ( $n = 8$ , 8.0%). And for participants with two or less no of vaginal births and those with four vaginal births, there was no significant difference ( $p = 0 .078$  and  $0.582$  respectively) in the proportion of participants with urinary problems as compared to those without urinary problems. A summary of the proportion z-tests is displayed in Table -4.

**Table 4. Summary of Proportion z-Tests between Urinary Problem Groups and Number of vaginal births**

Number of vaginal births	Proportions (%)		Difference (I-J)	Z	Probability (2-tailed)
	With urinary problem (I)	Without any urinary problem (J)			
1-2	15.32	25.00	-9.68	-1.759	0.078
3	0.00	46.00	-46.00	-8.081	<0 .001
4	18.02	21.00	-2.98	-0.547	0.582
5+	66.67	8.00	58.67	8.730	<0 .001

**Number of cesarean sections**

Proportion z-tests were conducted to determine if any significant differences in the number of cesarean section existed between participants with urinary problems and those without. Number of cesarean section was measured on an interval scale identifying the number of cesarean sections. For participants with a urinary problem, nearly all participants (90.09%) had no cesarean sections ( $n = 100$ ), and the remaining 9.91% had between one and three cesarean sections ( $n = 11$ ); Women who had four or more cesarean sections never experienced any urinary problem ( $n = 0$ ). For participants without a urinary problem, 61.0% had no cesarean sections ( $n = 61$ ), 31.0% had one cesarean section ( $n = 31$ ), and the remaining 8.0% had two to four cesarean sections ( $n = 8$ ). Displayed in Table -2 is a cross tabulation of urinary problem groups (with and without) by levels of no of cesarean sections.

Results from the proportion z-tests indicated that significant differences in the frequency of urinary problems did exist between numbers of cesarean sections. That is, for participants with no cesarean sections, there were a significantly ( $p < 0 .001$ ) larger proportion of participants with urinary problems ( $n = 100$ , 90.09%) than those without urinary problems ( $n = 61$ , 61.0%). However, for participants with one or two cesarean sections, there was a significantly ( $p < 0 .001$  and  $p = 0 .038$  respectively) larger amount of participants without urinary problems than those with urinary problems. And there were no significant differences in the number of participants with three or more cesarean sections between those with urinary problems and those without ( $p = 0.215$  and  $0.289$  respectively). A summary of the proportion z-tests is displayed in Table 5.

**Table 5. Summary of Proportion z-Tests between Urinary Problem Groups and No of cesarean sections**

Number of cesarean section	Proportions (%)			Z	Probability (2-tailed)
	With urinary problem (I)	Without any urinary problem (J)	Difference (I-J)		
0*	90.09	61.00	29.09	4.692	<0 .001
1	5.41	31.00	-25.59	-4.882	<0 .001
2	0.90	6.00	-5.10	-2.065	0.038
3	3.60	1.00	2.60	1.242	0.215
4	0.00	1.00	-1.00	-1.056	0.289

0\*= Women who never had cesarean section

### Instrumental Delivery

Proportion z-tests were conducted to determine if a significant difference in the proportion of participants with urinary problems and those without existed between participants' who have had an instrumental delivery and those who have not. For participants with a urinary problem, 80.18% of participants did not have an instrumental delivery ( $n = 89$ ), and the remaining 19.82% did have an instrumental delivery ( $n = 22$ ). For participants without a urinary problem, 92.0% had an instrumental delivery ( $n = 92$ ) and the remaining 8.0% did not have an instrumental delivery ( $n = 8$ ). Displayed in Table-3 is a cross tabulation of urinary problem groups (with and without) by whether or not the participant had an instrumental delivery.

Results from the proportion z-tests indicated that significant differences in the frequency of urinary problems did exist between participants that have had an instrumental delivery and those who have not. That is, for participants who have had an instrumental delivery, there was a significantly ( $p = 0.014$ ) larger proportion of participants with urinary problems ( $n = 22$ , 19.82%) than those without urinary problems ( $n = 8$ , 8.0%). However, for participants that have not had an instrumental delivery, there was a significantly larger amount of participants without urinary problems than those with urinary problems ( $p < 0.001$ ). A summary of the proportion z-tests is displayed in Table 6.

**Table 6. Summary of Proportion z-Tests between Urinary Problem Groups and Instrumental Delivery**

Instrumental Delivery	Proportions (%)			Z	Probability (2-tailed)
	With urinary problem (I)	Without any urinary problem (J)	Difference (I-J)		
Yes	19.82	8.00	11.82	2.455	0.014
No	80.18	92.00	-11.82	-2.455	0.014

## Discussion

Vaginal delivery has always been considered as the primary mode of delivery however concerns have been raised about its association with development of urinary incontinence in the long run. <sup>(9, 10)</sup> In this research it was observed that in women who had five or more births, there was a high probability of developing urinary incontinence. However, there was a minor difference between those who had less than five vaginal births. Although the exact mechanism behind this remains unknown but it has been linked to the nature of a woman's urinary system and childbirth as well as perineal trauma and denervation. <sup>(2)</sup>

Cesarean section is certainly done in order to avoid complications that could lead to losing the mother and/or the baby. Cesarean section is not better than vaginal reproduction since in vaginal reproduction the mother recovers quicker. This method of delivery although associated with complications of anesthesia and surgery has found to be protective against development of urinary incontinence in the long run <sup>(11)</sup>. In this research it was noticed that group of women who reported to have urinary incontinence (90.09%) had no cesarean section (Table-5). This augments the findings that women who had more cesarean sections were less likely to report urinary incontinence in later life. This indicates that cesarean section is protective against urinary incontinence. This is similar to Rortveit et al compared the risk of urinary incontinence in women who had cesarean section with those who were nulliparous and those who had vaginal delivery. He concluded that the urinary incontinence was higher in women who had cesarean section as compared to nulliparous and even further higher in women who had vaginal deliveries. <sup>(11)</sup> Yang X conducted an interview on one thousand primiparous women and reached at the conclusion that cesarean section was protective against urinary incontinence as compared to vaginal delivery. <sup>(12)</sup>

Instrumental delivery is when a tool is used to ensure a swift, safer and less painful delivery. The common instruments that are used includes; forceps and a vacuum cap. In this study participants who had an instrumental delivery, there was a significantly ( $p = 0.014$ ) larger proportion of participants with urinary

problems ( $n = 22$ , 19.82%) than those without urinary problems ( $n = 8$ , 8.0%). The results are similar to Arya et al who reported that risk of urinary incontinence is higher after forceps delivery as compared to spontaneous vaginal delivery. <sup>(13, 14)</sup>

This study forms may form the basis of pioneer study on development of urinary incontinence in Saudi Population. This region has prevalence for obesity and multiparity. Therefore further research is required to study the association of these risk factors on the development of urinary incontinence. The study has limitations of being using a non-probability (Convenient) sampling. Secondly, it is a hospital-based study so results cannot be generalized to whole population. However, Qassim University clinics as well as Maternity and Child Hospital Buraidah are major facilities in the region therefore results may be very close to the prevailing condition in the general population. The strength of the study is the exploration of a topic which has never been touched in detail in this population. Another, strength is correlation of incontinence with the number of vaginal deliveries and number of cesarean sections. Also as the demand for elective cesarean section is increasing now a days there is a need to do further research so as to answer whether or not elective cesarean section can be offered to protect women against development of urinary incontinence in later life.

## Conclusion

Women with Spontaneous vaginal delivery as well as instrumental delivery are more prone to develop urinary incontinence in later life. The present study showed that the vaginal and instrumental deliveries augment the risk of urinary incontinence probably due to the perineal damage during the childbirth through these methods. This is further supported by the observations of the number of cesarean cases and related urinary incontinence reports.

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## Disclosure

Author has no conflict of interest.

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