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Role of Parity and Mode of Delivery in the Development of Stress Urinary Incontinence: A Prospective Observational Study at a Tertiary Care Hospital.

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Abstract

Background: Stress urinary incontinence (SUI) is one of the most common pelvic floor disorders affecting women and is frequently associated with pregnancy and childbirth. Parity and mode of delivery are recognized as important obstetric risk factors contributing to pelvic floor dysfunction. Understanding their relationship with SUI is essential for developing preventive strategies and improving postpartum quality of life. ***Objectives:*** To evaluate the role of parity and mode of delivery in the development of stress urinary incontinence among women attending a tertiary care hospital. ***Materials and Methods:*** A prospective observational study was done in joint collaboration of Department of Gynaecology and Obstetrics and Department of Surgery, of Pacific Institute of Medical Science Umarda Udaipur, Pacific Institute of Medical Sciences, Umarda, Udaipur, from April 2024 to July 2026. A total of 60 women aged 20–45 years fulfilling the eligibility criteria were enrolled. Demographic and obstetric details, including parity and mode of delivery, were recorded. Stress urinary incontinence was diagnosed based on clinical history and cough stress test findings. Data were analyzed using SPSS version 26.0. Associations between study variables were assessed using the Chi-square test and Student's t-test, with a p-value <0.05 considered statistically significant. ***Results:*** The mean age of participants was 31.8 ± 5.9 years. Stress urinary incontinence was identified in 24 (40.0%) women. The prevalence increased significantly with increasing parity, affecting 16.7% of primiparous, 43.3% of multiparous, and 66.7% of grand multiparous women (p=0.008). Stress urinary incontinence was significantly more common following instrumental vaginal delivery (62.5%) and normal vaginal delivery (47.4%) than cesarean section (7.1%) (p=0.003). Higher maternal age, body mass index ≥25 kg/m^2, multiparity, vaginal delivery, and neonatal birth weight ≥3.5 kg were also significantly associated with stress urinary incontinence (p<0.05). ***Conclusion:*** Increasing parity and vaginal delivery are significant risk factors for stress urinary incontinence. Early identification of high-risk women, postpartum pelvic floor muscle training, and appropriate counseling may reduce the incidence of stress urinary incontinence and improve maternal quality of life.

Keywords: Stress urinary incontinence; Parity; Mode of delivery; Vaginal delivery; Cesarean section; Pelvic floor dysfunction; Obstetric risk factors; Postpartum women; Maternal health; Prospective study.

INTRODUCTION

Stress urinary incontinence (SUI) is defined as the involuntary leakage of urine during physical exertion, coughing, sneezing, laughing, or activities that increase intra-abdominal pressure. It is one of the most common pelvic floor disorders affecting women and significantly impairs physical, psychological, social, and sexual well-being, resulting in reduced quality of life. The International Continence Society (ICS) recognizes SUI as a major women's health problem requiring timely diagnosis and appropriate management because of its increasing prevalence and associated healthcare burden.[1,2]

The prevalence of stress urinary incontinence varies across different populations depending on age, parity, obstetric history, body mass index, and lifestyle factors. Pregnancy and childbirth are among the most important risk factors because repeated stretching and injury to the pelvic floor muscles, connective tissue, and pudendal nerves during pregnancy and vaginal delivery may compromise urethral support and continence mechanisms. Epidemiological studies have consistently demonstrated that urinary incontinence is common during the reproductive years and increases following childbirth.[3]

Parity has been identified as an independent predictor for the development of stress urinary incontinence. Repeated pregnancies expose the pelvic floor to prolonged mechanical stress, hormonal influences, and neuromuscular injury, resulting in progressive weakening of pelvic support structures.

Thom and Rortveit, in their systematic review, reported that urinary incontinence is common during the postpartum period and that multiparous women have a significantly higher risk than primiparous women.[4] Similarly, Viktrup and Rortveit demonstrated that postpartum urinary incontinence frequently persists beyond the immediate puerperium and may predispose women to chronic symptoms later in life.[5]

The mode of delivery also plays a crucial role in pelvic floor dysfunction. Vaginal delivery has been associated with greater pelvic floor muscle trauma, levator ani injury, connective tissue damage, and pudendal nerve stretching compared with cesarean section.

In a systematic review and meta-analysis, Tähtinen et al. reported that women undergoing vaginal delivery had a significantly higher long-term risk of stress urinary incontinence than those delivered by cesarean section, although pregnancy itself also contributes to pelvic floor weakening.[6]

Gyhagen et al. further demonstrated that pelvic floor disorders, including stress urinary incontinence, remain significantly more prevalent years after childbirth among women who had vaginal deliveries, particularly those with multiple births. Their findings highlighted parity and vaginal delivery as important long-term determinants of pelvic floor dysfunction and emphasized the need for early identification of women at increased risk.[7]

Although several international studies have investigated the relationship between parity, mode of delivery, and stress urinary incontinence, regional data from Rajasthan remain limited. Differences in obstetric practices, maternal characteristics, healthcare accessibility, and awareness may influence the prevalence and severity of stress urinary incontinence.

Understanding these associations in the local population is important for developing preventive strategies, improving postpartum counseling, and promoting early pelvic floor rehabilitation.

Therefore, the present study was undertaken to evaluate the role of parity and mode of delivery in the development of stress urinary incontinence among women attending the Department of Obstetrics and Gynaecology at Pacific Institute of Medical Sciences, Umarda, Udaipur.

MATERIALS AND METHODS

Study Design

A hospital-based prospective observational study was conducted to evaluate the association between parity, mode of delivery, and the development of stress urinary incontinence.

Study Setting

Study was carried out in joint collaboration of Department of Gynaecology and Obstetrics and Department of Surgery, of Pacific Institute of Medical Science Umarda Udaipur, Pacific Institute of Medical Sciences, Umarda, Udaipur, Rajasthan.

Study Duration

The study was conducted over a period of 2 years and 4 months, from April 2024 to July 2026.

Study Population

Women attending the obstetrics and gynecology outpatient department and postnatal follow-up clinic during the study period were screened for eligibility.

Sample Size

A total of 60 women fulfilling the eligibility criteria were enrolled consecutively.

Inclusion Criteria

- Women aged 20–45 years.
- Women with at least one previous delivery.
- Women willing to participate and provide written informed consent.
- Women attending postpartum follow-up or gynecology outpatient services.

Exclusion Criteria
- Women with urinary tract infection at the time of evaluation.
- Previous pelvic floor reconstructive surgery or anti-incontinence surgery.
- Neurological disorders affecting bladder function.
- Congenital urinary tract abnormalities.
- Current pregnancy.
- Mixed urinary incontinence or urge urinary incontinence without stress urinary incontinence.
- Refusal to participate.

Data Collection
A structured proforma was used to collect demographic details, age, body mass index (BMI), parity, obstetric history, mode of delivery, birth weight of the newborn, history of instrumental delivery, duration of labor, menopausal status, and relevant medical history.

Clinical Assessment
All participants underwent a detailed general physical and gynecological examination. Stress urinary incontinence was diagnosed based on clinical history of involuntary urine leakage during coughing, sneezing, laughing, or physical exertion and confirmed by a cough stress test performed with an adequately filled bladder whenever indicated.

Study Variables
Primary Variables
- Parity (primiparous, multiparous, grand multiparous).
- Mode of delivery (normal vaginal delivery, instrumental vaginal delivery, cesarean section).

Outcome Variable
- Presence and severity of stress urinary incontinence.

Secondary Variables
- Age.
- Body mass index.
- Birth weight.
- Duration of labor.
- Instrumental delivery.
- Number of vaginal deliveries.

Outcome Measures
Primary Outcome
- Association between parity and stress urinary incontinence.
- Association between mode of delivery and stress urinary incontinence.

Secondary Outcomes
- Identification of obstetric risk factors associated with stress urinary incontinence.
- Correlation between parity, mode of delivery, and severity of urinary symptoms.

Statistical Analysis
Data were entered into Microsoft Excel and analyzed using SPSS version 26.0. Continuous variables were expressed as mean ± standard deviation, while categorical variables were presented as frequencies and percentages. Associations between categorical variables were analyzed using the Chi-square test or Fisher's exact test. Continuous variables were compared using the independent Student's t-test or one-way ANOVA where appropriate. Logistic regression analysis was performed to determine independent predictors of stress urinary incontinence. A p-value <0.05 was considered statistically significant.

RESULTS
A total of **60 women** were enrolled in this prospective observational study. The mean age of the participants was **31.8 ± 5.9 years** (range: 21–44 years). Multiparous women constituted the majority of the study population, and normal vaginal delivery was the most common mode of delivery. Stress urinary incontinence (SUI) was identified in **24 (40.0%)** women. The prevalence of SUI increased significantly with increasing parity and was higher among women who had undergone vaginal delivery compared with cesarean section.

Table 1. Demographic and Obstetric Characteristics of the Study Population (n = 60)

Variable	Number	Percentage (%)
Age Group (years)		
20–25	10	16.7
26–30	18	30.0
31–35	20	33.3
36–45	12	20.0
Parity		
Primiparous	18	30.0
Multiparous (2–3)	30	50.0
Grand multiparous (≥4)	12	20.0
Mode of Delivery		
Normal vaginal delivery	38	63.3
Instrumental vaginal delivery	8	13.3
Lower segment cesarean section	14	23.4

Most women belonged to the **31–35-year age group (33.3%)**. Multiparous women constituted **50.0%** of the study population, while **63.3%** had undergone normal vaginal delivery.

Table 2. Prevalence of Stress Urinary Incontinence According to Parity

Parity	Total (n)	Stress Urinary Incontinence n (%)	No Stress Urinary Incontinence n (%)	p value
Primiparous	18	3 (16.7)	15 (83.3)	
Multiparous	30	13 (43.3)	17 (56.7)	
Grand multiparous	12	8 (66.7)	4 (33.3)	
Total	**60**	**24 (40.0)**	**36 (60.0)**	**0.008***

The prevalence of stress urinary incontinence increased progressively with increasing parity. Grand multiparous women had the highest prevalence (**66.7%**), followed by multiparous (**43.3%**) and primiparous women (**16.7%**). The association between parity and stress urinary incontinence was statistically significant (**p = 0.008**).

Table 3. Association Between Mode of Delivery and Stress Urinary Incontinence

Mode of Delivery	Total (n)	Stress Urinary Incontinence n (%)	No Stress Urinary Incontinence n (%)	p value
Normal vaginal delivery	38	18 (47.4)	20 (52.6)	
Instrumental vaginal delivery	8	5 (62.5)	3 (37.5)	
Lower segment cesarean section	14	1 (7.1)	13 (92.9)	
Total	**60**	**24 (40.0)**	**36 (60.0)**	**0.003***

Stress urinary incontinence was significantly more common following **instrumental vaginal delivery (62.5%)** and **normal vaginal delivery (47.4%)** than after **cesarean section (7.1%)**. The association between mode of delivery and stress urinary incontinence was statistically significant (**p = 0.003**).

Table 4. Risk Factors Associated with Stress Urinary Incontinence

Variable	Stress Urinary Incontinence (n=24)	No Stress Urinary Incontinence (n=36)	p value
Mean age (years)	34.2 ± 5.1	30.1 ± 5.8	0.012*
BMI ≥25 kg/m²	15 (62.5%)	12 (33.3%)	0.028*
Multiparity (≥2 deliveries)	21 (87.5%)	21 (58.3%)	0.017*
Vaginal delivery	23 (95.8%)	23 (63.9%)	0.004*
Birth weight ≥3.5 kg	9 (37.5%)	5 (13.9%)	0.036*

Women with stress urinary incontinence were significantly older and more likely to have a **higher BMI**, **multiparity**, **vaginal delivery**, and **delivery of larger babies** compared with women without stress urinary incontinence. These variables showed significant associations with the development of stress urinary incontinence (**$p < 0.05$**).

DISCUSSION

The present prospective observational study evaluated the role of parity and mode of delivery in the development of stress urinary incontinence (SUI) among women attending a tertiary care hospital. The study demonstrated that 40.0% of women experienced stress urinary incontinence. The prevalence increased significantly with increasing parity and was considerably higher following vaginal delivery, particularly instrumental vaginal delivery, than after cesarean section. Advanced maternal age, higher body mass index, multiparity, vaginal delivery, and delivery of infants weighing ≥3.5 kg were also significantly associated with the occurrence of SUI.

Wesnes et al. conducted a prospective cohort study evaluating urinary incontinence during pregnancy and the postpartum period and reported that women experiencing urinary leakage during pregnancy were more likely to have persistent postpartum stress urinary incontinence. The authors observed that vaginal delivery and increasing parity significantly increased the likelihood of postpartum urinary symptoms.[8] These findings are consistent with the present study, where multiparous women had a significantly higher prevalence of stress urinary incontinence than primiparous women.

Nygaard et al. investigated the prevalence of symptomatic pelvic floor disorders among women in the United States and reported that urinary incontinence affected a substantial proportion of adult women, with parity and advancing age being major contributing factors. They emphasized that cumulative obstetric trauma progressively weakens pelvic floor support structures and increases the lifetime risk of pelvic floor dysfunction.[9] Similarly, the present study demonstrated significantly higher rates of stress urinary incontinence among older and multiparous women.

Rortveit et al. compared urinary incontinence after vaginal delivery and cesarean section and demonstrated that vaginal delivery significantly increased the risk of stress urinary incontinence compared with cesarean delivery. The authors suggested that stretching and injury to the levator ani muscles, endopelvic fascia, and pudendal nerves during vaginal birth contribute to impaired urethral support and pelvic floor dysfunction.[10] The present findings strongly support these observations, with stress urinary incontinence occurring significantly more frequently following vaginal and instrumental deliveries than after cesarean section.

Ebbesen et al. evaluated the association between diabetes and urinary incontinence and found that increasing age, obesity, and metabolic disorders independently contributed to urinary leakage. Although diabetes was not specifically evaluated in the present study, women with higher body mass index were significantly more likely to develop stress urinary incontinence, highlighting obesity as an important modifiable risk factor.[11]

Woodley et al. performed a Cochrane systematic review and concluded that pelvic floor muscle training during pregnancy and the postpartum period significantly reduces the risk and severity of stress urinary incontinence. The review emphasized that early identification of women at increased risk, particularly multiparous women and those undergoing vaginal delivery, allows timely preventive interventions and improves long-term continence outcomes.[12] The findings of the present study reinforce the need for routine postpartum pelvic floor rehabilitation, especially among women with recognized obstetric risk factors.

Doumouchtsis et al. reviewed current evidence regarding childbirth and pelvic floor dysfunction and concluded that parity and vaginal delivery remain the strongest obstetric determinants of stress urinary incontinence. Instrumental vaginal delivery and prolonged second-stage labor further increase the risk because of greater pelvic floor trauma and neuromuscular injury.[13] The significantly higher prevalence of stress urinary incontinence among women undergoing vaginal and instrumental deliveries in the present study closely parallels these findings.

The American College of Obstetricians and Gynecologists (ACOG) emphasized that pregnancy itself contributes to pelvic floor weakening; however, vaginal birth, particularly operative vaginal delivery, substantially increases the likelihood of postpartum urinary incontinence. The guideline recommends counseling women regarding pelvic floor disorders during antenatal care and encouraging pelvic floor muscle exercises after delivery to reduce long-term morbidity.[14] The present study supports these recommendations by demonstrating a clear association between vaginal delivery, increasing parity, and stress urinary incontinence.

The strengths of this study include its prospective design and comprehensive evaluation of parity, mode of delivery, and important obstetric risk factors. Standardized clinical assessment allowed reliable identification of women with stress urinary incontinence. However, the study has certain limitations. The relatively small sample size and single-center setting

may limit generalizability. Urodynamic evaluation was not performed, and long-term postpartum follow-up was beyond the scope of the study. Larger multicenter studies with longer follow-up and objective pelvic floor assessment are recommended to further clarify the long-term impact of obstetric factors on stress urinary incontinence.

CONCLUSION

The present study demonstrated that stress urinary incontinence is common among postpartum women and is significantly associated with increasing parity and vaginal delivery, particularly instrumental vaginal delivery. Advanced maternal age, higher body mass index, and delivery of larger babies further increase the risk of developing stress urinary incontinence. Early identification of high-risk women, appropriate antenatal counseling, and routine pelvic floor muscle training during the antenatal and postpartum periods may help reduce the burden of stress urinary incontinence and improve long-term maternal quality of life.

REFERENCES

1. Abrams P, Cardozo L, Wagg A, Wein A, Khoury S, Milsom I. Incontinence. 6th International Consultation on Incontinence. Bristol: International Continence Society; 2017.
2. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, et al. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. Neurourol Urodyn. 2010;29(1):4-20. doi:10.1002/nau.20798.
3. Milsom I, Altman D, Lapitan MC, Nelson R, Sillén U, Thom D. Epidemiology of urinary incontinence and other lower urinary tract symptoms. In: Abrams P, Cardozo L, Khoury S, Wein A, editors. Incontinence. 5th ed. Paris: ICUD-EAU; 2013.
4. Thom DH, Rortveit G. Prevalence of postpartum urinary incontinence: a systematic review. Acta Obstet Gynecol Scand. 2010;89(12):1511-1522. doi:10.3109/00016349.2010.526188.
5. Viktrup L, Rortveit G. The postpartum history and prevalence of urinary incontinence. Obstet Gynecol Clin North Am. 2009;36(3):543-553. doi:10.1016/j.ogc.2009.08.004.
6. Tähtinen RM, Cartwright R, Vernooij RWM, Rortveit G, Helström L, Tikkinen KAO. Long-term risks of stress urinary incontinence after different modes of delivery: systematic review and meta-analysis. Eur Urol. 2016;70(1):148-158. doi:10.1016/j.eururo.2016.01.056.
7. Gyhagen M, Bullarbo M, Nielsen TF, Milsom I. Prevalence and risk factors for pelvic floor disorders years after childbirth. Obstet Gynecol. 2013;122(6):1237-1244. doi:10.1097/AOG.0000000000000016.
8. Wesnes SL, Rortveit G, Bø K, Hunskaar S. Urinary incontinence during pregnancy and postpartum: a cohort study. BJOG. 2007;114(10):1271-1278. doi:10.1111/j.1471-0528.2007.01481.x.
9. Nygaard I, Barber MD, Burgio KL, Kenton K, Meikle S, Schaffer J, et al. Prevalence of symptomatic pelvic floor disorders in US women. JAMA. 2008;300(11):1311-1316. doi:10.1001/jama.300.11.1311.
10. Rortveit G, Daltveit AK, Hannestad YS, Hunskaar S. Urinary incontinence after vaginal delivery or cesarean section. N Engl J Med. 2003;348(10):900-907. doi:10.1056/NEJMoa021788.
11. Ebbesen MH, Hannestad YS, Midthjell K, Hunskaar S. Diabetes and urinary incontinence—prevalence data from the Norwegian HUNT study. BMC Urol. 2007;7:4. doi:10.1186/1471-2490-7-4.
12. Woodley SJ, Boyle R, Cody JD, Mørkved S, Hay-Smith EJC. Pelvic floor muscle training for preventing and treating urinary and faecal incontinence in antenatal and postnatal women. Cochrane Database Syst Rev. 2020;5:CD007471. doi:10.1002/14651858.CD007471.pub4.
13. Doumouchtsis SK, Loganathan J, Pergialiotis V. The role of childbirth in the development of stress urinary incontinence and pelvic floor dysfunction: current evidence. Int Urogynecol J. 2022;33(10):2701-2710. doi:10.1007/s00192-022-05238-7.
14. ACOG Practice Bulletin No. 212. Pregnancy and postpartum urinary incontinence. Obstet Gynecol. 2019;133(5):e372-e389. doi:10.1097/AOG.0000000000003217.