



## Original Article



## Prevalence and Risk Factors of Urinary Dysfunction in Post-Cesarean Patients

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## ABSTRACT

Urinary dysfunction (UD) following cesarean section (CS) is a significant but underexplored maternal health issue. While vaginal delivery is traditionally associated with pelvic floor disorders, emerging evidence suggests cesarean delivery may also pose risks. **Objectives:** To determine the prevalence of UD and its associated risk factors among post-CS women in Peshawar, Pakistan. **Methods:** This cross-sectional study was conducted at Peshawar Institute of Medical Sciences, Peshawar, including 195 postpartum women who underwent CS between January to March 2024. Participants were contacted via telephone and assessed using a standardized proforma, including the International Prostate Symptom Score (IPSS) to evaluate urinary symptoms. Statistical analysis was performed using SPSS version 25.0. To identify the potential risk factors, logistic regression was performed. **Results:** The prevalence of UD was 31 (15.8%). Common symptoms included urgency (74.2%), incomplete bladder emptying (54.8%), and urinary frequency (41.9%). Stress urinary incontinence was observed in 38.7%. Significant risk factors included age >35 years (p<0.001), emergency CS (p=0.001), operating time >60 minutes (p<0.001), baby weight >4 kg (p=0.001), and BMI >30 kg/m<sup>2</sup> (p<0.001). Emergency CS was the strongest predictor (OR=6.31, p<0.001). **Conclusions:** Urinary dysfunction is a notable concern following cesarean delivery. Emergency CS, obesity, and prolonged surgery are key risk factors. Early identification and preventive strategies may improve postpartum care outcomes.

## INTRODUCTION

Urinary dysfunction (UD) has a wide range of symptoms affecting the lower urinary tract. The lower urinary tract symptoms (LUTS) are categorized into storage, voiding, and post-micturition symptoms like nocturia, urgency, increased frequency, incontinence, incomplete bladder emptying, changed urine stream, and post-void dribbling [1]. It is a notable health concern that is frequently observed during pregnancy [2]. The most commonly seen symptom is urinary incontinence (UI) with a prevalence of 18.6% to 75% during pregnancy and 6% to 31% in the postpartum period [3]. The most prevalent type of UI during pregnancy is stress urinary incontinence (SUI), with a mean prevalence of 41% (18.6–60%) and rises with

gestational age. Together with hormonal changes, the expanding uterus and fetal weight put strain on the pelvic floor muscles (PFM), which weakens the PFM and impairs its supporting and sphincteric function. This leads to urethral sphincter incompetence by increasing urethral and bladder neck movement [4]. The meta-analysis of studies published between 1998 to 2020 based on postpartum UI reports a prevalence of 31%. The studies found an initial decline at three months postpartum, but then an increase to 32% during one year of post-delivery. SUI is the frequently reported (54%) postpartum UI [5]. The risk factor for urinary dysfunction, like UI, includes an emergency cesarean section (CS) followed by instrumental



vaginal delivery, vaginal delivery, and elective CS [3]. Studies demonstrate that vaginal deliveries are associated with a longer-term risk of UI and pelvic organ prolapse (POP) than Cesarean sections. Potential risk factors for pelvic floor disorders (PFDs) include urinary incontinence during pregnancy, older age at delivery, high BMI, multiple gestation, and mode of delivery, highlighting the complex interrelation between delivery mode and pelvic floor function [6, 7]. However, some studies reported no significant difference in the prevalence of UI among CS and vaginal delivery [8, 9].

Due to inconsistency in the literature, further research studies are needed to confirm the result. Through prospective evaluation of post-cesarean patients, this study will shed light on the burden of LUTS and its predictors, facilitating a better understanding of postpartum urinary health. The necessity for this research is highlighted by the absence of inclusive, context-related studies on post-cesarean urinary dysfunction, especially in areas such as Peshawar, where accessibility to healthcare and maternal health behaviours differ. Knowledge of the prevalence and determinants of postpartum LUTS will guide clinical recommendations, enhance patient counseling, and assist in creating targeted preventive and therapeutic interventions to improve the quality of life in affected women. This study aimed to assess the prevalence of urinary dysfunction in women in Peshawar, after cesarean delivery and determine risk factors associated with its development.

## METHODS

This cross-sectional study was conducted at the Department of Obstetrics and Gynaecology, Peshawar Institute of Medical Sciences, Peshawar. A total of 195 post-CS patients were included in the study. The sample size was calculated using Open Epi software. The calculation was based on a prevalence of 14.9% for urinary leakage during sneezing or coughing among post-CS women, as reported in a previous study [8]. A 95% confidence level and a 5% margin of error were used to ensure statistical precision. The study was initiated after obtaining approval from the hospital research committee under (Ref# PIMC/DMR/19). The data of 195 women having either emergency or elective CS from January to March 2025 were retrieved from hospital electronic records and included in the study through a consecutive sampling technique based on the inclusion criteria. The inclusion criteria were: women of the postpartum period, aged 18 to 45 years, and no prior history of urinary dysfunction before pregnancy. Women with failed trial of labor leading to CS, history of severe postpartum complications, like sepsis or uncontrolled postpartum hemorrhage, obstetric fistula or known pelvic organ prolapse before pregnancy, neurological conditions

affecting bladder function (e.g., multiple sclerosis, spinal cord injury), or history of recurrent UTIs requiring long-term treatment were excluded. Patients were then contacted telephonically to participate in the study after being identified by the study's criteria. Consent was obtained from each patient after explaining the study's goal. A standardized questionnaire proforma was used to collect data. Baseline demographic information, like age, number of prior births, body mass index (BMI), and whether the cesarean was an emergency or scheduled, was included. The IPSS scale was used to inquire about urinary problems like urgency, leakage, trouble emptying the bladder, weak urine stream, or frequent urination. Data were collected by the researchers themselves. All data were treated with the utmost confidentiality and used exclusively for research. Urinary dysfunction (UD) was defined as difficulty in normal bladder function experienced by women following cesarean section, including a range of symptoms, like frequent urination, urgency, leakage, difficulty in emptying the bladder, weak urine stream, or post-void dribbling. For this study, Urinary Tract Symptoms (UTS) were categorized into storage symptoms (e.g., increased frequency, nocturia, urgency, and urinary leakage), voiding symptoms (e.g., hesitancy, weak stream, straining, and prolonged urination), and post-micturition symptoms (e.g., incomplete bladder emptying and dribbling). Additionally, urinary incontinence was assessed and classified into three types: Stress Urinary Incontinence (SUI), characterized by leakage during physical exertion; Urgency Urinary Incontinence (UUI), marked by sudden, intense urges followed by leakage; and Mixed Urinary Incontinence (MUI), involving features of both SUI and UUI. SPSS version 25.0 was used for analysis purposes. Mean  $\pm$  Standard deviation or Median (IQR) was calculated for the numerical/quantitative variable. Frequencies and percentages were calculated for categorical/qualitative variables. Post-stratification chi-square test or Fisher Exact Test was applied, keeping p-value  $\leq 0.050$  as statistically significant. Binary logistic regression analysis was performed to identify the potential risk factors among all.

## RESULTS

Among 195 post-caesarean postpartum women, 31 (15.8%) developed urinary dysfunction (UD). Key factors significantly associated with UD included age  $>35$  years ( $p < 0.001$ ), emergency CS ( $p = 0.001$ ), operating time  $>60$  minutes ( $p < 0.001$ ), and delivery of a baby weighing more than 4 kg ( $p = 0.001$ ). Obesity (BMI  $>30$ ) was also linked to UD, with significantly higher rates in the affected group ( $p < 0.001$ ) (Table 1).

**Table 1:** Demographics and Clinical Characteristics of Patients

Variables	Urinary Dysfunction (n=31)	Non-Urinary Dysfunction (n=164)	p-Value
Age (Years)	32.8 ± 1.27	29.9 ± 0.91	<0.001
Age ≤35 Years	18 (58.1%)	121 (73.8%)	0.209
Age >35 Years	13 (41.9%)	43 (26.2%)	0.181
BMI (kg/m <sup>2</sup> )	27.7 ± 2.17	28.3 ± 3.31	0.119
BMI ≤30 kg/m <sup>2</sup>	21 (67.7%)	148 (90.2%)	0.002
BMI >30 kg/m <sup>2</sup>	10 (32.3%)	16 (9.8%)	<0.001
Parity	2.48 ± 2.1	1.94 ± 1.5	0.134
Emergency CS	19 (61.3%)	29 (17.7%)	0.001
Blood loss (>800ml)	6 (19.4%)	14 (8.5%)	0.019
Operating time >60 Min	14 (45.2%)	23 (14%)	<0.001
Baby Birth Weight >4g	8 (25.8%)	15 (9.1%)	0.001
Diabetes	11 (35.5%)	8 (4.8%)	0.319
Hypertension	13 (42%)	19 (11.6%)	0.209

Among the 31 women who developed urinary dysfunction after caesarean section during postpartum time, the most commonly reported symptom was urinary urgency, affecting 23 (74.2%) patients. Incomplete bladder emptying was reported by 17 (54.8%) women, while increased urinary frequency (≥8 times/day) was noted in 13 (41.9%) patients. Weak urinary stream occurred in 11 (35.5%), and both nocturia and straining during urination were reported by 9 women each (29.0%). Post-micturition dribbling was also seen in 9 cases (29.0%). Regarding urinary incontinence, stress urinary incontinence (SUI) was present in 12 (38.7%) patients, urgency urinary incontinence (UUI) in 8 (25.8%), and mixed incontinence (both SUI and UUI) in 4 (12.9%) women (Table 2).

**Table 2:** Different Symptoms of Urinary Dysfunction Post CS

Symptoms	Type	(n=31) Frequency (%)
Urine Storage Problems	Urine Frequency ≥8 Times	13 (41.9%)
	Urgency	23 (74.2%)
	Nocturia	9 (29.0%)
Voiding	Straining	9 (29%)
	Weak Stream	11 (35.5%)
Post-Micturition	Incomplete Emptying	17 (54.8%)
	Dribbling	9 (29.0%)
Urinary Incontinence (UI)	Stress UI (SUI)	12 (38.7%)
	Urgency UI (UUI)	8 (25.8%)
	Mixed (SUI + UUI)	4 (12.9%)

Logistic regression analysis identified emergency caesarean section as the strongest independent risk factor for urinary dysfunction, with women undergoing emergency CS having over six times higher odds of developing UD (OR=6.31, p<0.001). Prolonged operating time >60 min was also significantly associated with increased risk (OR=4.11, p=0.023). Although age >35 years (OR=0.651, p=0.051) and BMI >30 kg/m<sup>2</sup> (OR=0.509, p=0.062) did not approach statistical significance. Blood loss over

800 mL was also not significantly associated with UD (OR=0.721, p=0.096) (Table 3).

**Table 3:** Logistic Regression Analyses of Risk Factors for Urinary Dysfunction Post CS

Variables	Odds Ratio (OR)	95% CI	p-Value
Age > 35 Years	0.651	0.322 - 1.230	0.051
BMI > 30 kg/m <sup>2</sup>	0.509	0.222 - 1.161	0.062
Emergency CS	6.31	3.791 - 9.857	<0.001
Blood loss >800ml	0.721	0.193 - 1.357	0.096
Operating time >60 min	4.108	1.835 - 6.029	0.023

## DISCUSSION

This study aimed to assess the prevalence and associated risk factors of UD in women following CS. Among the 195 post-cesarean patients evaluated, 15.8% were found to have developed urinary dysfunction during the postpartum period. These findings offer important insight into a relatively underexplored area of maternal health, especially in the context of CS, a procedure whose effects on pelvic floor integrity and urinary health remain debated. Cesarean delivery has been considered protective against pelvic floor disorders such as urinary incontinence or retention when compared to vaginal delivery. However, some literature challenges this assumption and emphasizes the multifactorial nature of UD [6-10]. This study analyzes the prevalence, types, and associated risk factors for UD among 195 cohort of post-CS women. In this study, the prevalence of UD was 15.8%, with symptoms including urgency (74.2%), incomplete bladder emptying (54.8%), increased urinary frequency (41.9%), and stress urinary incontinence (38.7%). This prevalence is notably higher than figures reported in some large-scale studies. For instance, Dowais *et al.* reported a prevalence of 5.8% in CS patients and 6.9% in vaginal delivery patients, indicating a narrower gap and challenging the perception that CS confers substantial protection against urinary dysfunction [11]. The relatively higher prevalence in our study may be attributed to the inclusion of both elective and emergency CS, and shorter follow-up periods. The most common form of urinary dysfunction observed in our study was urgency, followed by incomplete emptying and frequency, with stress urinary incontinence (SUI) affecting over one-third of the affected patients. Similar findings were in a meta-analysis, which reported that SUI was the predominant symptom in postpartum women regardless of delivery mode (54%) [5]. Additionally, our study observed urgency urinary incontinence (25.8%) and mixed urinary incontinence (12.9%), in line with patterns described in studies on lower urinary tract symptoms (LUTS) [12-15]. Postpartum urinary retention (PUR), a serious yet often underdiagnosed condition, has also been reported in the literature following CS. Warner *et al.* and Zakzouk *et al.* note

a higher prevalence of PUR post-CS, often attributed to intraoperative bladder manipulation, epidural anesthesia, and temporary autonomic dysfunction [16, 17]. Though our study did not quantify PUR independently, many symptoms, like incomplete emptying, likely overlap with this clinical entity. Our findings showed that emergency cesarean section was a significant risk factor for UD, with an odds ratio of 6.31 ( $p < 0.001$ ). This supports earlier findings by Khalil *et al.* and was consistent with the work of Khasanov *et al.* who proposed that emergency interventions may predispose to pelvic floor and nerve trauma, especially following prolonged obstructed labor before surgery [18, 19]. In contrast, Chen *et al.* found no significant difference in pelvic floor dysfunction based on the timing of CS, suggesting that intrapartum versus antepartum factors may not universally influence outcomes [20]. The divergence may reflect population-specific risk profiles, surgical conditions, or perioperative care differences.

This study was limited by its single-center design and relatively short postpartum follow-up period, which may not capture late-onset urinary dysfunction. Additionally, lack of pre-pregnancy baseline urinary status and urodynamic confirmation may have led to misclassification of symptoms. Future studies should include longitudinal, multi-center designs with baseline pelvic floor assessment and objective urodynamic testing to better evaluate the long-term impact of cesarean section on urinary dysfunction.

## CONCLUSIONS

The findings of this study highlight that urinary dysfunction is a common postoperative issue following cesarean delivery, particularly in emergency cases and in patients with identifiable risk factors such as high BMI, prolonged surgery, and macrosomic infants. While cesarean delivery has traditionally been viewed as a protective measure against pelvic floor trauma, this assumption should be re-evaluated in light of evidence showing comparable or even higher UD prevalence in certain CS populations. Future research should focus on preventive strategies, objective diagnostic modalities, and comparative studies between delivery modes. Early screening and postpartum pelvic floor rehabilitation may be key to improving maternal urinary health outcomes.

## Authors' Contribution

Conceptualization: SS

Methodology: SS, SBK

Formal analysis: SS, HH

Writing and Drafting: BA, SS, H, ZI

Review and Editing: BA, SS, H, HH, ZI, SBK

All authors approved the final manuscript and take responsibility for the integrity of the work

## Conflicts of Interest

All the authors declare no conflict of interest.

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