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Prevalence and Determinants of Urinary Incontinence among Women Attending a Tertiary Care Centre: A Cross-Sectional Study

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ABSTRACT

Background: Urinary incontinence (UI), defined as involuntary urine leakage, is a major public health problem affecting women's physical, psychological, and social well-being. It is often underreported due to stigma and misconceptions that it is an unavoidable outcome of childbirth or ageing. Understanding the prevalence and determinants of UI in tertiary-care outpatient settings is essential.

Methods: A cross-sectional study was conducted in the Department of Obstetrics and Gynaecology from October 2023 to March 2025. Four hundred women aged ≥30 years attending the outpatient clinic who consented were enrolled consecutively. Exclusion criteria were pregnancy, pelvic surgery within the last three months, known neurological disease, and acute urinary retention. Data were collected using a pretested semi-structured proforma covering sociodemographic factors, obstetric history, comorbidities, and lifestyle habits. UI was assessed using the International Consultation on Incontinence Questionnaire–Short Form (ICIQ-SF). BMI was calculated from measured height and weight. Data were analysed using SPSS v26; chi-square tests and multivariable logistic regression identified independent predictors, with $p<0.05$ considered significant.

Results: UI prevalence was 34.5% (138/400). Stress UI was most common (49.3%), followed by urge (30.4%) and mixed UI (20.3%). Significant associations were observed with increasing age, vaginal delivery, prolonged labour, higher parity, chronic cough, constipation, recurrent UTI, and diabetes. Independent predictors were chronic cough, constipation, history of vaginal delivery, and prolonged labour.

Conclusion: UI affects nearly one in three women in this tertiary-care setting. Obstetric factors and modifiable clinical conditions were key determinants, underscoring the need for routine screening and preventive interventions.

Key-words: Urinary incontinence; Prevalence; Women; Risk factors; ICIQ-SF

INTRODUCTION

Urinary incontinence (UI), defined by the International Continence Society as any involuntary leakage of urine, is a common condition in adult women worldwide and represents a significant but frequently underrecognized public health problem [1]. Its prevalence varies by age group, study population, and methodology, with global point estimates for adult women typically reported between 25% and 45%, but with a wide range across community- and hospital-based studies [2,3]. In India, the reported prevalence is heterogenous, reflecting regional, cultural, and methodological differences; published Indian series show prevalence figures ranging from the mid-20s to over one-third among selected populations [4–7]. The heterogeneity of estimates is partially attributable to differences in definitions used, age bands included, recruitment settings (community versus clinic), and data collection methods (self-administered questionnaires versus interviewer-administered tools) [8].

Three clinical subtypes are conventionally described: stress urinary incontinence (SUI), characterized by leakage associated with increased intra-abdominal pressure, such as coughing or exertion; urgency urinary

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incontinence (UUI), leakage associated with a sudden compelling desire to void; and mixed urinary incontinence (MUI), which presents with symptoms of both stress and urgency components [9]. The pathophysiology varies between subtypes but commonly involves pelvic floor muscle dysfunction, urethral support deficiency, detrusor instability, or combinations thereof, often exacerbated by obstetric trauma, age-related tissue changes and comorbid systemic disease [10,11].

Several non-modifiable and modifiable risk factors have been implicated in UI. Non-modifiable risks include increasing age, parity, vaginal childbirth, and connective tissue laxity. Modifiable risks include obesity, chronic cough (e.g., COPD, chronic bronchitis, tobacco-related cough), constipation and recurrent urinary tract infections; metabolic diseases such as diabetes also contribute through possible neuropathic bladder dysfunction [12–15]. Obstetric events—especially vaginal delivery, prolonged second stage, instrumental delivery and macrosomic infants—are commonly associated with pelvic floor injury and later UI [16–18]. Cultural and behavioral factors such as delayed voiding, pelvic floor disuse, and low health-seeking behavior contribute to persistence and under-treatment of UI in many settings [19].

UI leads to significant impairment of quality of life, with physical limitations, reduced participation in social and sexual activities, psychological distress and increased health-care costs due to pads, recurrent infections and treatment-seeking [20,21]. In many Indian communities, there is additional stigma and normalization of UI as 'part of aging' or a consequence of childbirth; this leads to underreporting and late presentation [22]. Hospital-based studies in India provide important opportunities to quantify the burden and identify determinants among women who present to tertiary care centers for other gynaecologic complaints, thereby establishing targeted screening and referral pathways [4,6].

Despite multiple regional studies, published data are scarce from some populous Northern districts, and regional differences in obstetric practices, parity patterns, and comorbidity prevalence may influence the local epidemiology of UI. The tertiary care gynaecology OPD at F.H. Medical College, Agra, receives patients from urban, semi-urban and rural catchments where socio-demographic and obstetric features common to North India prevail; therefore, systematic measurement of prevalence and associated risk factors in this setting is important to inform local clinical practice and community-level preventive strategies [23–25].

This study was designed to determine the prevalence of urinary incontinence among women aged 30 years and above attending the gynaecology outpatient department of F.H. Medical College, Agra, and to examine the association of UI with sociodemographic factors, obstetric history, and common comorbid conditions (including chronic cough, constipation, diabetes and recurrent urinary tract infection) using a validated symptom score (ICIQ-SF). By identifying independent determinants, the study aims to provide actionable data to strengthen screening, counselling and preventive interventions tailored to the Indian context.

MATERIALS AND METHODS

Study Design and Setting- This hospital-based cross-sectional study was carried out in the Department of Obstetrics and Gynaecology, F.H. Medical College, Agra, between January 2024 and June 2025, following approval from the Institutional Ethics Committee (IEC/FHMC/2024/OBG/115).

Study Population and Eligibility Criteria- Women aged 30 years and above attending the gynaecology outpatient clinic were consecutively approached and invited to participate. Exclusion criteria included pregnancy, postpartum status within the last three months, pelvic or gynaecological surgery within the preceding three months, neurologic conditions known to cause bladder dysfunction, such as spinal cord lesions or multiple sclerosis, active urinary retention, and refusal to provide consent.

Sample Size- A target sample size of 400 women was determined based on anticipated prevalence estimates from regional studies and feasibility considerations to ensure adequate precision for prevalence assessment and multivariable modelling.

Data Collection Procedure- After obtaining informed written consent, trained female research staff administered a pretested semi-structured questionnaire in a private setting. Information was collected on sociodemographic characteristics (age, education, occupation, socioeconomic status), anthropometric measurements (height and weight for BMI), obstetric

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history (parity, mode of delivery, prolonged labour >12 hours, instrumental delivery, and prior incontinence or prolapse surgery), medical comorbidities (diabetes mellitus, hypertension), lifestyle factors, and symptoms of chronic cough, constipation (history >3 months or requiring laxatives), and recurrent urinary tract infections (≥2 episodes in 6 months or ≥3 in 12 months). Urinary symptoms were assessed using the International Consultation on Incontinence Questionnaire–Short Form (ICIQ-SF), which quantified frequency, amount of leakage, and impact on quality of life. Stress, urge, or mixed urinary incontinence was classified using standard ICIQ-SF item responses. Daily data quality checks were performed.

Statistical Analysis- Data were entered into Microsoft Excel and exported to SPSS version 26 for analysis. Descriptive statistics were used to summarize participant characteristics and the prevalence of urinary incontinence. Associations between categorical variables and urinary incontinence were assessed using chi-square tests, while continuous variables were analysed using t-tests or non-parametric tests as appropriate. Variables with $p<0.10$ in univariate analysis were entered into a multivariable logistic regression model to identify independent predictors of urinary incontinence. Adjusted odds ratios (AORs) with 95% confidence intervals (CI) were reported, and $p<0.05$ was considered statistically significant.

RESULTS

A total of 432 women were approached, of whom 400 consented and completed the questionnaire (response rate 92.6%). Tables 1–5 present sociodemographic distribution, prevalence and types of UI, associations with clinical and obstetric factors, and multivariable regression results.

The sample comprised predominantly middle-aged women (41–50 years), with three-fourths homemakers; over 40% were overweight or obese (BMI≥25), a plausible modifiable risk factor for UI in this population (Table 1 and Fig. 1).

Table 1: Distribution of participants according to sociodemographic characteristics (n = 400)

Variable	Frequency (%)
Age (years)	
30–40	118 (29.5)
41–50	146 (36.5)
51–60	94 (23.5)
>60	42 (10.5)
Education	
Illiterate	72 (18.0)
Up to High School	188 (47.0)
Graduate	112 (28.0)
Postgraduate	28 (7.0)
Occupation	
Homemaker	298 (74.5)
Employed	102 (25.5)
BMI (kg/m²)	
<18.5	18 (4.5)
18.5–24.9	212 (53.0)
25–29.9	126 (31.5)
≥30	44 (11.0)

Overall UI prevalence was 34.5%. Among women with UI (n=138), SUI accounted for 49.3%, UUI 30.4% and MUI 20.3%, indicating predominance of stress-type symptoms in this tertiary-care OPD population (Table 2).

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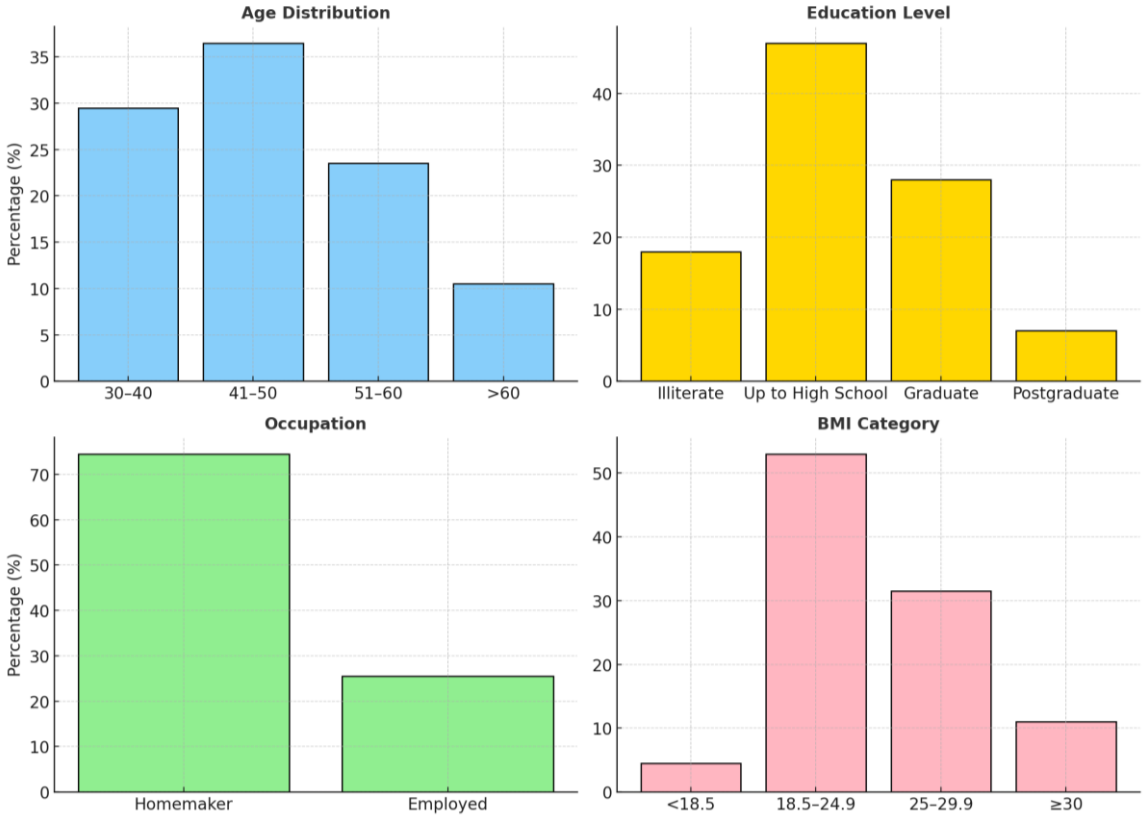

Fig. 1: Distribution of participants according to sociodemographic characteristics in the study population (n = 400)

Table 2: Prevalence and types of urinary incontinence (n = 400)

Types	Frequency (%)
No incontinence	262 (65.5)
Stress incontinence (SUI)	68 (17.0)
Urge incontinence (UUI)	42 (10.5)
Mixed incontinence (MUI)	28 (7.0)
Total UI	138 (34.5)

Chronic cough, constipation and recurrent UTI showed significant associations with UI on univariate analysis, while diabetes showed a moderate association; hypertension did not reach statistical significance (Table 3).

Table 3: Association of urinary incontinence with clinical factors

Clinical factors	UI present n (%)	UI absent n (%)	p-value
Diabetes mellitus	38 (43.1)	50 (56.9)	0.032*
Hypertension	56 (40.6)	82 (59.4)	0.076
Chronic cough	32 (76.1)	10 (23.9)	<0.001*
Constipation	42 (45.7)	50 (54.3)	0.015*
Recurrent UTI	24 (52.2)	22 (47.8)	0.041*

Vaginal delivery, prolonged labour, and higher parity were significantly associated with UI on univariate testing; menopause showed a non-significant trend (Table 4).

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Table 4: Association of urinary incontinence with obstetric factors

Obstetric factor	UI present n (%)	UI absent n (%)	p-value
Vaginal delivery	110 (40.7)	160 (59.3)	0.004*
Caesarean delivery (only)	18 (19.8)	72 (80.2)	0.008*
Prolonged labour (>12 hrs)	26 (55.3)	21 (44.7)	0.021*
Parity ≥3	54 (46.6)	62 (53.4)	0.019*
Menopausal status	64 (39.0)	100 (61.0)	0.122

After adjusting for confounders, chronic cough, constipation, history of vaginal delivery, and prolonged labour remained independent predictors of UI. Diabetes lost significance in multivariable modelling (Table 5).

Table 5: Multivariable logistic regression for predictors of urinary incontinence

Variable	Adjusted Odds Ratio (AOR)	95% CI	p-value
Chronic cough	8.6	3.1–17.9	<0.001*
Constipation	1.9	1.1–3.4	0.021*
Vaginal delivery (history)	1.7	1.05–2.7	0.029*
Prolonged labour	2.3	1.2–4.2	0.016*
Diabetes mellitus	1.4	0.8–2.2	0.128

DISCUSSION

This cross-sectional study at a tertiary gynaecology outpatient department in Agra found that urinary incontinence affects approximately one-third (34.5%) of women aged 30 years and above, with stress urinary incontinence being the most prevalent subtype. The observed prevalence is consistent with several Indian hospital-based studies and lies within the broad range reported in regional literature. For instance, Mathew *et al.* reported a 37% prevalence among women attending a tertiary centre in Kerala, closely matching our figure [1]; Biswas et al. reported 27.7% in a West Bengal cohort [2], whereas Sharma *et al.* reported 36.2% in a Delhi outpatient population [3]. These variations illustrate the influence of age composition, sampling frame and obstetric history on prevalence estimates.

Our finding that SUI is the most common subtype (49.3% of UI cases) resonates with multiple Indian series where stress symptoms predominate [1,4]. Ajith *et al*. and other southern Indian cohorts similarly documented predominance of SUI over urge and mixed types, attributing this to obstetric pelvic floor trauma and high rates of vaginal deliveries [4,5]. Conversely, some studies from other regions and specific cohorts have reported higher proportions of UUI or MUI, reflecting heterogeneity in population risk profiles, bladder overactivity prevalence, and differences in instruments used to classify UI [6,7].

The age distribution in our study showed a higher prevalence among middle-aged and older women, peaking between 41 and 60 years. This is biologically plausible due to cumulative obstetric exposure, age-related connective tissue changes, and perimenopausal estrogen decline, which affect the supporting structures of the lower urinary tract [8]. Similar age-related trends have been reported in other Indian and international studies [1,9].

Chronic cough emerged as the strongest independent predictor (AOR 8.6). This finding is consistent with Mathew *et al*., who reported a high odds ratio for chronic cough [1], and with several international cohorts, in which cough and respiratory disease markedly increase the risk of SUI by repeated transient rises in intra-abdominal pressure, causing progressive pelvic floor strain [10,11]. In practical terms, chronic respiratory disease management and smoking cessation programs may indirectly reduce UI burden; clinicians evaluating women for UI should enquire about cough and smoking history.

Constipation was also independently associated (AOR 1.9). This mirrors the observations of Biswas et al. and Al Kiyumi et al., who noted that chronic straining and fecal loading increase intra-abdominal pressure and may distort pelvic anatomy, thereby predisposing to UI [2,12]. Addressing bowel habits—through dietary fiber, hydration and appropriate laxative use—presents a

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modifiable target to mitigate UI symptoms in affected women.

Obstetric history was a key determinant: a history of vaginal delivery (AOR 1.7) and prolonged labour (AOR 2.3) significantly predicted UI. Prior Indian research repeatedly links vaginal childbirth and prolonged second stage with pelvic floor nerve and muscle injury, leading to urethral support defects and SUI later in life [4,5,13]. Ajith *et al.* found a similar magnitude of association in Kerala [4], while global literature corroborates the biological plausibility that childbirth-related trauma is a major driver of female UI [14]. Conversely, women with only cesarean deliveries had lower UI prevalence in our series, consistent with the protective association reported in several studies. However, cesarean section is not a recommended primary preventive strategy solely for UI prevention due to other maternal and neonatal risks [15].

Higher parity (≥3) was associated with UI on univariate analysis and showed a signal on multivariable testing, though it did not reach statistical significance after covariate adjustment. This pattern aligns with earlier studies suggesting that the first vaginal birth causes the majority of the biomechanical pelvic floor injury. At the same time, subsequent deliveries confer a more negligible incremental risk, particularly if the inter-delivery interval and infant sizes are similar [16]. Instrumental delivery rates were low in our cohort, limiting the ability to detect specific effects.

Diabetes showed an association in univariate analysis but lost significance in the multivariable model. This mixed finding is echoed across the literature. At the same time, microvascular and neuropathic complications of diabetes can disrupt bladder innervation, leading to incontinence. The effect size and independence of diabetes as a risk factor vary between studies and are often confounded by age, obesity and other comorbidities [17,18].

Our results have direct implications for practice in tertiary and primary care. The substantial prevalence indicates the need for routine enquiry about continence in gynecologic consultations, particularly for women with the identified risk profile (vaginal births, prolonged labour, chronic cough, constipation). Use of the ICIQ-SF provides a standardized, validated approach to symptom quantification and can guide referral for pelvic floor therapy, bladder training, or specialist urogynaecology assessment. Preventive strategies might include counselling for pelvic floor muscle training during antenatal and postpartum periods, interventions to reduce chronic cough (e.g., smoking cessation, COPD management), and programs to improve bowel health.

Limitations of this study deserve mention. The cross-sectional design precludes causal inference; associations may reflect reverse causality in some cases. Being hospital-based, the sample may over-represent symptomatic women and those with comorbidities compared to community samples, potentially upwardly biasing prevalence estimates. Self-report instruments carry a risk of recall and reporting biases despite interviewer training and privacy. Urodynamic testing was not performed due to resource constraints; thus, symptom-based classification was used, which is standard in epidemiological work but lacks physiologic confirmation. Nevertheless, strengths include the use of a validated questionnaire (ICIQ-SF), consecutive participant recruitment, measured anthropometry and multivariable modelling to adjust for key confounders, and focus on a North Indian tertiary-care population where published data were previously limited.

Comparing our findings with regional studies: Mathew *et al.* found a UI prevalence of 37% with chronic cough and prolonged labour as significant predictors, consonant with our results [1]. Biswas *et al.* reported a lower prevalence (27.7%) but also noted obstetric risk factors and constipation as important associations [2]. Ajith *et al*. and Sharma *et al.* reported SUI predominance and an association with vaginal deliveries and parity, again aligning with the current series [3,4]. Internationally, Xie *et al.* documented cough and obesity as significant determinants of UI in an extensive population study, reinforcing the global relevance of modifiable risk factors [11].

This study confirms that UI is standard among women attending a tertiary gynaecology clinic in Agra, with stress type predominance, and underscores chronic cough, constipation and obstetric history as key determinants. Targeted screening and preventive measures—particularly pelvic floor rehabilitation and management of cough and bowel dysfunction—should be integrated into women's health services.

LIMITATIONS

This cross-sectional hospital-based study may not fully represent the community prevalence due to selection

bias toward women seeking gynaecologic care. Symptom classification relied on the ICIQ-SF without urodynamic confirmation. Recall bias for obstetric events and prior infections is possible. Instrumental delivery and some obstetric subgroups had small numbers, limiting subgroup analyses.

STRENGTHS

The study used a validated symptom tool (ICIQ-SF), measured anthropometry, employed consecutive recruitment, and used multivariable adjustment to identify independent predictors in a North Indian tertiary-care setting where published data are limited.

RECOMMENDATIONS

Healthcare providers in gynaecology and primary care should include simple screening for UI in routine history-taking, especially for women with chronic cough, constipation or obstetric risk factors. Antenatal and postpartum pelvic floor education, integration of bowel health counseling, and linkages to pelvic floor physiotherapy services should be prioritized. Future community-based longitudinal studies with urodynamic evaluation are warranted to confirm causal relationships and evaluate the effectiveness of screening and prevention programs.

CONCLUSIONS

Urinary incontinence affected one in three women attending the gynaecology outpatient department at F.H. Medical College, Agra, with stress incontinence being the most common subtype; chronic cough, constipation, a history of vaginal delivery and prolonged labour were independent predictors. These findings underscore the importance of routine screening for UI among women with obstetric or chronic medical risk factors, and the need for integrated preventive strategies, including pelvic floor muscle training, management of chronic cough, and optimization of bowel function, to reduce the burden of UI in the Indian context.

CONTRIBUTION OF AUTHORS

All authors have equally contributed to this article.

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