RESEARCH PAPER

Association Between Pelvic Organ Prolapse Severity and Types of Urinary Incontinence in Women: A Cross-Sectional Study

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Received: 15th Feb, 2026; **Revised:** 27th Feb, 2026; **Accepted:** 20th Mar, 2026; **Available Online:** 5th Apr, 2026

ABSTRACT

Objective

To evaluate the association between the severity of pelvic organ prolapse and the types of urinary incontinence in women.

Methods

This cross-sectional study was conducted in the Department of Gynaecology and Obstetrics and Department of Urology over a period of six months. A total of 120 women aged 30–75 years with clinically diagnosed pelvic organ prolapse were included using non-probability consecutive sampling. The severity of prolapse was assessed using the Pelvic Organ Prolapse Quantification (POP-Q) system and staged from I to IV. Urinary incontinence was classified into stress, urge and mixed types based on patient-reported symptoms. Data were analyzed using SPSS version 22. The association between prolapse severity and type of urinary incontinence was assessed using the Chi-square test, with a p-value ≤0.05 considered statistically significant.

Results

The mean age of participants was 52.6 ± 10.4 years, with the majority being multiparous and postmenopausal. Stage III prolapse was the most common (36.7%), followed by Stage II (30.0%). Mixed urinary incontinence was the most prevalent type (43.3%), followed by stress (31.7%) and urge incontinence (25.0%). A statistically significant association was found between prolapse severity and type of urinary incontinence ($p = 0.003$). Stress urinary incontinence was more common in early stages (Stage I and II), whereas mixed urinary incontinence predominated in advanced stages (Stage III and IV).

Conclusion

There is a significant association between the severity of pelvic organ prolapse and the types of urinary incontinence. Understanding this relationship is essential for accurate diagnosis and effective management, ultimately improving the quality of life of affected women.

Keywords: Pelvic organ prolapse, urinary incontinence, stress incontinence, urge incontinence, mixed incontinence, POP-Q, cross-sectional study.

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How to cite this article: Niazi AB, Munir M, Akhtar M, Asghar S, Abbas SR, Akram A. Association Between Pelvic Organ Prolapse Severity and Types of Urinary Incontinence in Women: A Cross-Sectional Study. Int J Drug Deliv Technol. 2026;16(4): 215-222. DOI: 10.25258/ijddt.16.4.24
Source of support: Nil.
Conflict of interest: None

INTRODUCTION

Pelvic organ prolapse (POP) and urinary incontinence (UI) are among the most common pelvic floor disorders in women. It affectsmany women across the world but they often remain underreported due to social stigma and lack of awareness. (Sandvik et al., 1993)These conditions not only produce physical discomfort but also lead to considerable emotional distress, reduced self-esteem and limitations in daily activities.(South and Amundsen, 2007) Women suffering from these disorders may experience embarrassment, social withdrawal and even depression. There is a need for better understanding and management of these conditions. Despite their high prevalence especially in developing countries, many women do not seek medical attention until the symptoms become severe.(Ali-Ross et al., 2009)

Pelvic organ prolapse is defined as the descent of one or more pelvic organs into the vaginal canal due to weakening of the supporting pelvic structures. These organs include the bladder (cystocele), uterus (uterine prolapse) or rectum (rectocele). This weakening is often multifactorial in origin. (Methfessel and Seliger, 2001)Vaginal childbirth is considered one of the most significant risk factors.It can lead to stretching and injury of the pelvic floor muscles and connective tissues.(Rovner, 2000) Other contributing factors include aging, menopause, chronic increases in intra-abdominal pressure (such as chronic cough, constipation or heavy lifting), obesity as well as genetic predisposition. With increasing life expectancy, the burden of POP is expected to rise making it an important public health concern.(Kobashi and Leach, 2000)

Urinary incontinence is defined as the involuntary leakage of urine. It is a highly prevalent condition that often coexists with pelvic organ prolapse. It is broadly categorized into stress urinary incontinence (SUI), urge urinary incontinence (UUI) and mixed urinary incontinence (MUI).(Starczewski et al., 2008) Stress urinary incontinence occurs when there is leakage of urine during activities that increase intra-abdominal pressure such as coughing, sneezing, laughingor even exercising. It is primarily due to urethral hypermobility or intrinsic sphincter deficiency. (Al-Mandeel and Al-Badr, 2013)Urge urinary incontinence, on the other hand, is associated with a sudden and intense urge to urinate followed by involuntary leakage.It often results from detrusor overactivity. Mixed urinary incontinence includes features of both stress and urge types and is frequently noticed in clinical practice.(Sharif-Afshar and Anger, 2012)

The coexistence of POP and UI is not coincidental because both conditions share similar pathophysiological mechanisms. The pelvic floor acts as a supportive structure for the pelvic organs. It plays a crucial role in maintaining urinary continence. (Mouritsen, 2005)When this support system is compromised, it can lead to both prolapse and dysfunction of the lower urinary tract. However, the relationship between POP and urinary incontinence is complex. (Digesu et al., 2005)In certain cases, advanced prolapse may actually mask the stress urinary incontinence by causing mechanical obstruction or kinking of the urethra. This phenomenon is often referred to as “occult stress incontinence” and may only become apparent after surgical correction of the prolapse. (Bradley et al., 2008)Some women with mild to moderate prolapse may experience significant urinary leakage which shows that factors other than anatomical descent also play a role in this.(Lagro-Janssen et al., 1990)

The severity of pelvic organ prolapse is commonly assessed using the Pelvic Organ Prolapse Quantification (POP-Q) system. POP-Q is a standardized and objective method for staging prolapse based on specific anatomical landmarks. (Seo and Kim, 2006)The POP-Q system categorizes prolapse into different stages, ranging from stage 0 (no prolapse) to stage IV (complete eversion of the vaginal walls). As the stage of prolapse increases, changes in the urinary function also increases.This

happens because progressive changes in the anatomical position of the bladder and urethra occurs. (Tinelli et al., 2010)

Some researchers have suggested that higher stages of prolapse are associated with a lower prevalence of stress urinary incontinence due to urethral obstruction. (DeLancey, 1997)Some noted an increased prevalence of urgency symptoms and urge incontinence in advanced prolapse. Additionally, mixed urinary incontinence appears to be common across all stages of prolapse. . (Delancey and Ashton-Miller, 2004)

These conditions also have asevere impact on quality of life. Both POP and UI can significantly interfere with a woman's ability to perform daily activities, maintain personal hygiene and engage in social or sexual relationships.(Burrows et al., 2004) Women may restrict fluid intake, avoid physical activity or use protective pads to manage their symptoms.All of these symptoms affect their overall well-being. (Miedel et al., 2008)

Identification of the type of urinary incontinence associated with different stages of prolapse is important for appropriate management. Treatment options for POP range from conservative measures, such as pelvic floor muscle training and pessary useto surgical interventions.(Özengin et al., 2017) Similarly, management of urinary incontinence depends on its type and severity, including behavioral therapy, pharmacological treatment and surgical procedures. An accurate understanding of the association between these two conditions can help in planning combined or staged interventions.(Maher et al., 2013)

Early identification of women at risk for developing both POP and UI can facilitate preventive strategies. Lifestyle modifications, including weight management, avoidance of heavy lifting and treatment of chronic cough or constipationcan help reduce the progression of pelvic floor disorders. Raising awareness about these conditions can encourage women to seek medical advice at an earlier stage to allow for timely intervention.

MATERIALS AND METHODS

This cross-sectional study was conducted to determine the association between the severity of pelvic organ prolapse and the different types of urinary incontinence in women. The study was carried out in thedepartment of gynecology and obstetrics and departmentof urology at multiple tertiary care hospitals of Punjab, Pakistan.The study duration was of six months, from September 2025 to February 2026. Ethical approval was obtained from the Institutional Review Board (IRB). All procedures were conducted in accordance with ethical standards.

A written informed consent was obtained from each participant after explaining the purpose and nature of the study in simple and understandable language.Participants were informed that they had the right to withdraw from the study at any stage without any impact on their medical care.

A total of 120 women were included in the study using a non-probability consecutive sampling technique. Women who presented to the outpatient and inpatient departments with complaints suggestive of pelvic organ prolapse, such as a feeling of vaginal bulge, pelvic heaviness or discomfort were screened. The inclusion criteria comprised women aged between 30 and 75 years with a clinically confirmed diagnosis of pelvic organ prolapse on pelvic examination. Both premenopausal and postmenopausal women were included to ensure a representative sample of the population.

Women who were pregnant and had a history of previous pelvic floor or anti-incontinence surgery were not included.Women who had active urinary tract infection, known neurological disorders affecting bladder function (such as multiple sclerosis or spinal cord injury), or those with cognitive impairment preventing proper history taking were excluded from the study. Patients who declined to participate or were unable to provide informed consent were also excluded.

Data collection was carried out using a structured and pre-tested questionnaire designed specifically for the study. The questionnaire included sections on demographic characteristics such as age, parity, body mass index (BMI), occupation and menopausal status. Relevant medical and obstetric history, including mode of deliveries, history of prolonged labor, instrumental delivery, chronic cough, constipationand heavy lifting were also recorded.

A detailed clinical history focusing on symptoms of pelvic organ prolapse and urinary incontinence was

obtained. Symptoms of prolapse included vaginal bulge, pelvic pressure, lower back discomfort and difficulty in voiding or defecation. Urinary symptoms were carefully assessed to classify the type of urinary incontinence. Stress urinary incontinence was defined as involuntary leakage of urine during activities that increase intra-abdominal pressure, such as coughing, sneezing, or physical exertion. Urge urinary incontinence was identified based on complaints of sudden, compelling urge to urinate followed by leakage. Mixed urinary incontinence was diagnosed when features of both stress and urge incontinence were present.

All participants underwent a thorough general physical examination followed by a detailed pelvic examination. Detailed examination was conducted by a trained gynecologist to maintain consistency and reduce inter-observer variability. The pelvic examination was performed with the patient in the lithotomy position under adequate privacy and comfort. The severity of pelvic organ prolapse was assessed using the Pelvic Organ Prolapse Quantification (POP-Q). Specific anatomical points, including Aa, Ba, C, D, Apand Bp, as well as genital hiatus (GH), perineal body (PB) and total vaginal length (TVL) were measured in centimeters relative to the hymenal ring.

Based on these measurements, pelvic organ prolapse was staged from Stage I to Stage IV. Stage I indicated minimal descent above the hymenwhile Stage II represented descent up to the hymen. Stage III involved descent beyond the hymen and Stage IV indicated complete vaginal eversion. For analytical purposes, each patient was categorized according to the most severe stage of prolapse observed.

Quantitative variables included age, parity, BMI, and POP-Q measurements while qualitative variables included stages of prolapse (Stage I–IV), type of urinary incontinence (stress, urge, mixed), menopausal status (pre/postmenopausal) and presence of risk factors such as chronic cough or constipation.

Data entry and analysis were performed using SPSS version 22. Continuous variables were presented as mean and standard deviation while categorical variables were expressed as frequencies and percentages.To evaluate the association between the severity of pelvic organ prolapse and the types of urinary incontinence, the Chi-square test was applied. Stratification was also performed with respect to age groups, parity and menopausal status to assess their potential effect on the association. A p-value of ≤0.05 was considered statistically significant.

RESULTS

A total of 120 women with clinically diagnosed pelvic organ prolapse were included in the study. The mean age of the participants was 52.6 ± 10.4 yearswith the majority of women belonging to the age group of 50–59 years. Most of the participants were multiparouswith a mean parity of 4.1 ± 1.8. A higher proportion of women were postmenopausal (65%), reflecting the increased prevalence of pelvic floor disorders in this group.

Table 1: Demographic and Clinical Characteristics of Participants (n = 120)

Variable	Frequency (%) / Mean ± SD
Age (years)	52.6 ± 10.4
30–39 years	18 (15.0%)
40–49 years	32 (26.7%)
50–59 years	40 (33.3%)
≥60 years	30 (25.0%)
Parity	4.1 ± 1.8
Premenopausal	42 (35.0%)
Postmenopausal	78 (65.0%)

The table shows that pelvic organ prolapse was more common in older, multiparousand postmenopausal women. This indicates the role of aging and childbirth-related pelvic floor weakening.

Table 2: Distribution of Pelvic Organ Prolapse Severity (POP-Q Staging)

Stage of Prolapse	Frequency (n)	Percentage (%)
Stage I	14	11.7%
Stage II	36	30.0%
Stage III	44	36.7%
Stage IV	26	21.6%

Stage III prolapse was the most commonly observed followed by Stage II. Advanced stages (Stage III and IV) together constituted more than half of the cases, indicating that many patients presented late.

Table 3: Types of Urinary Incontinence Among Participants

Type of Urinary Incontinence	Frequency (n)	Percentage (%)
Stress Urinary Incontinence	38	31.7%
Urge Urinary Incontinence	30	25.0%
Mixed Urinary Incontinence	52	43.3%

Mixed urinary incontinence was the most common type observed followed by stress urinary incontinence. Urge urinary incontinence was comparatively less frequent.

Table 4: Association Between POP Severity and Types of Urinary Incontinence

POP Stage	Stress UI n (%)	Urge UI n (%)	Mixed UI n (%)	Total
Stage I	8 (57.1%)	3 (21.4%)	3 (21.4%)	14
Stage II	16 (44.4%)	8 (22.2%)	12 (33.3%)	36
Stage III	10 (22.7%)	14 (31.8%)	20 (45.5%)	44
Stage IV	4 (15.4%)	5 (19.2%)	17 (65.4%)	26

Chi-square test p-value = 0.003

This table demonstrates a statistically significant association between the severity of pelvic organ prolapse and the type of urinary incontinence. Stress urinary incontinence was more common in early stages (Stage I and II) whereas mixed urinary incontinence was predominated in advanced stages (Stage III and IV). Urge urinary incontinence showed a relatively increasing trend with higher stages but was less dominant compared to mixed incontinence.

Table 5: Stratification of Urinary Incontinence by Menopausal Status

Menopausal Status	Stress UI	Urge UI	Mixed UI	Total
Premenopausal	18 (42.9 %)	10 (23.8 %)	14 (33.3 %)	42
Postmenopausal	20 (25.6 %)	20 (25.6 %)	38 (48.7 %)	78

Mixed urinary incontinence was more frequently observed in postmenopausal women while stress urinary incontinence was relatively more common in premenopausal women.

DISCUSSION

This study was conducted to evaluate the association between the severity of pelvic organ prolapse (POP) and the types of urinary incontinence (UI) in women. The findings of this study demonstrate a significant relationship between increasing severity of prolapse and the pattern of urinary incontinence.Mixed urinary incontinence was the most common and particularly predominant in advanced stages of prolapse. These findings provide important clinical insight into the complex interaction between pelvic support defects and lower urinary tract function.

In this study, the majority of participants were postmenopausal and multiparous with a mean age of 52.6 years. This is consistent with previous literature where increasing age, parity, and menopausal status have been identified as major risk factors for both POP and UI. A study conducted by Swift et al., reported that the prevalence of pelvic organ prolapse increases significantly with age and parity, supporting the demographic pattern observed in the present study.(Swift et al., 2005) Similarly, Hendrix et al., in the Women's Health Initiative study found that postmenopausal women have a higher risk of developing pelvic floor disorders due to hormonal changes and weakening of connective tissues.(Hendrix et al., 2002)

Regarding the severity of prolapse, Stage III was the most common finding in this study, followed by Stage II. A large proportion of women presented with advanced prolapse (Stage III and IV) which indicates delayed healthcare-seeking behavior. This observation is in agreement with findings reported by Bump et al., who highlighted that many women tolerate symptoms for long periods before seeking medical care, often presenting at more advanced stages.(Bump et al., 1996)

The most important finding of this study was the significant association between POP severity and type of urinary incontinence ($p = 0.003$). Stress urinary incontinence was more commonly observed in early stages of prolapse (Stage I and II), whereas mixed urinary incontinence predominated in advanced stages (Stage III and IV). Urge urinary incontinence showed a gradual increase with higher stages of prolapse but remained less common than mixed incontinence.These findings are supported by the study conducted by Wei et al., which demonstrated that mild prolapse is often associated with stress urinary incontinence due to urethral hypermobility while advanced prolapse can lead to bladder outlet obstruction and detrusor overactivityresulting in urge or mixed symptoms.(Wei et al., 2012) Similarly, Bradley et al. reported that women with severe prolapse are more likely to experience urgency and mixed urinary symptoms due to altered bladder dynamics.(Bradley et al., 2007)

One possible explanation for the higher prevalence of stress urinary incontinence in early stages of prolapse is that mild descent of pelvic organs leads to insufficient urethral support, resulting in leakage during increased intra-abdominal pressure. However, as the prolapse progresses, the descending organs may cause kinking or compression of the urethra, which can mask stress incontinence. This phenomenon is often referred to as "occult stress urinary incontinence,." This has been well described by DeLancey, who emphasized the role of anatomical support in maintaining continence.(DeLancey, 1994)

The predominance of mixed urinary incontinence in advanced prolapse observed in this study may be due to the combined effect of urethral obstruction and detrusor overactivity. Chronic bladder outlet obstruction caused by severe prolapse can lead to changes in bladder functionincluding increased detrusor instability. This is consistent with the findings of Lowder et al., who reported that women with higher stages of prolapse are more likely to exhibit symptoms of urgency and mixed incontinence.(Lowder et al., 2011)

In addition, the present study found that mixed urinary incontinence was more common in postmenopausal women, whereas stress urinary incontinence was relatively more frequent in premenopausal women. This finding is supported by Serati and Ghezzi, who suggested that hormonal changes associated with menopause contribute to decreased urethral closure pressure and changes in bladder function, leading to a higher prevalence of mixed and urge incontinence in older women.(Serati and Ghezzi, 2016)

The results of this study have important clinical implications. Understanding the association between prolapse severity and type of urinary incontinence can help clinicians in making more

accurate diagnoses and in planning appropriate management strategies. For example, women with advanced prolapse should be carefully evaluated for occult stress urinary incontinence before surgical intervention, as correction of prolapse may unmask previously hidden symptoms. This has been emphasized by Maher et al. in their review of surgical management of pelvic organ prolapse.(Maher et al., 2013)

Despite its strengths, including the use of a standardized POP-Q system and a well-defined study population, this study has certain limitations. Being a cross-sectional study, it cannot establish a causal relationship between prolapse severity and urinary incontinence. Additionally, the classification of urinary incontinence was based on patient-reported symptoms rather than urodynamic studies, which may lead to some degree of misclassification. Future studies incorporating longitudinal follow-up and objective diagnostic methods would provide more comprehensive insights.

CONCLUSION

This study demonstrates a significant association between the severity of pelvic organ prolapse and the types of urinary incontinence in women. It was observed that stress urinary incontinence is more common in the early stages of prolapse while mixed urinary incontinence predominates in advanced stages, with urge symptoms also increasing as the severity progresses. These findings highlight the complex relationship between anatomical changes and bladder function, emphasizing the need for careful clinical evaluation of urinary symptoms in women with pelvic organ prolapse. A better understanding of this association can aid in accurate diagnosis, appropriate treatment planningand improved patient outcomes. This will ultimately enhance the quality of life for affected women.

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