

Correlation Between Body Mass Index (BMI) and Type/Severity of Urogynecological Disorders in Women Attending a Tertiary Urogynecology Clinic: A cross sectional study.

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ABSTRACT:

Background:

Urogynecological disorders including pelvic organ prolapse (POP), stress urinary incontinence (SUI), and overactive bladder (OAB) significantly affect women's quality of life, particularly in low-resource settings. Obesity has been proposed as a contributing factor to pelvic floor dysfunction; however, evidence regarding its independent role remains inconsistent, especially in South Asian populations. The aim of the study is to assess the association between body mass index (BMI) and the type and severity of urogynecological disorders among women attending a tertiary urogynecology clinic

Methods:

This cross-sectional study involved women presenting with urogynecological complaints to the Department of Obstetrics and Gynaecology, Jinnah Postgraduate Medical Centre, Karachi, from January 2022 to December 2024. Demographic, obstetric, and clinical data were extracted from medical records. BMI was categorized and analyzed in relation to POP severity, SUI, OAB, and fistula. Associations were assessed using chi-square tests. Univariate and multivariate logistic regression analyses were performed to control for potential confounders.

Results:

Data from 193 women were analyzed; 71.5% had pelvic organ prolapse. Most participants were overweight or obese (80.3%). A significant association was observed between higher BMI and increasing POP severity on unadjusted analysis ($p < 0.03$), with a significant linear trend ($p = 0.009$). However, after adjustment for confounding variables, BMI was not independently associated with POP severity (adjusted OR 0.47, 95% CI: 0.22–1.02; $p = 0.055$). No significant associations were found between BMI and SUI, OAB, or fistula. POP severity showed significant associations with menopausal status, chronic constipation, heavy weight lifting, and mode of delivery.

Conclusion:

BMI was not an independent predictor of urogynecological disorders after adjustment for confounders. These findings highlight the multifactorial nature of pelvic floor dysfunction and emphasize the need for comprehensive risk assessment beyond weight alone.

Keywords:

Body mass index, pelvic organ prolapse, urogynecological disorders, stress urinary incontinence, overactive bladder, pelvic floor dysfunction

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Introduction

Pelvic organ prolapse (POP), stress urinary incontinence (SUI), over active bladder (OAB) among many other urogynaecological disorders adversely impact woman's quality of life especially in low-resource settings where access to healthcare is limited^{1,2}. When disorders are prolonged and if left untreated can lead to long term morbidity such as depression, sexual dysfunction, social withdrawal, skin breakdown from incontinence, recurrent urinary infections, and impaired daily functioning.³

Obesity is increasingly identified as a major contributor to pelvic floor dysfunction. A long-term increase in intra-abdominal pressure caused by a higher Body Mass Index (BMI) may eventually weaken the pelvic floor.^{4,5} This may lead to a significant descent of pelvic floor contents, disrupting bladder function and ultimately resulting in pelvic organ prolapse and voiding dysfunction. The relationship between obesity and SUI is significant, with overweight and obese women experiencing this condition at markedly higher rates.^{6,7}

Research indicates that women with higher BMI exhibit comparatively more severe grades of POP at presentation and experience less favorable outcomes after pelvic floor surgery.^{8,9} Up to 30% increase in pelvic floor disorder was noted for every 5 unit increase in BMI in a study conducted in USA.¹⁰ Differences in parity, dietary and lifestyle habits along with other cultural variations can lead to disparity in findings for South Asian demographics.¹¹

A survey conducted in Pakistan identifies that more than half of the women of reproductive age, living in metropolitan areas, to be above normal BMI.¹² Even with such demographic populations there is still insufficient evidence of how BMI may influence urogynaecological disease course in urban tertiary care hospitals. Urogynecology subspecialty clinics, where women present with issues related to pelvic floor disorders, is an ideal venue to explore these influences and assess disease progression.

With the ever-increasing population size of Pakistan along with increasing disease burden, data obtained from such researches will prove to be beneficial in guiding evidence-based management plans especially in tertiary care urogynaecology centers that manage and treat complex cases. This study addresses a critical gap by examining data from a tertiary urogynecology clinic to evaluate the relationship between BMI and the type and severity of pelvic floor disorders.

2. Objectives

Primary Objective

- To assess the link between BMI and the type of urogynecological disorder diagnosed among women attending a tertiary urogynecology clinic.

Secondary Objectives

- To determine the association between BMI and the severity of pelvic organ prolapse.
- To compare the BMI profiles of women with stress urinary incontinence, overactive bladder, voiding dysfunction, and POP.
- To explore demographic and obstetric variables that may confound the association between BMI and urogynecological morbidity.

3. Materials & Methods:

Study Design and Setting

This cross-sectional study is conducted in Department of Obstetrics & Gynaecology ward-08, Jinnah Postgraduate Medical Centre Karachi from January 2022 to December 2024. Ethical consideration was obtained from Institutional Review Board of Jinnah Postgraduate Medical Centre No.F.2-81/2025-GENL/364-A/JPMC dated 25th June 2025.

Study Population and Sampling

All women presenting to Department of Obstetrics & Gynaecology ward 8 Out patient department with urogynecological complaints – including pelvic organ prolapse, lower urinary tract symptoms, urine incontinence, vesicovaginal/ rectovaginal fistula, perineal trauma/problems) from January 2022 to December 2024 . Their complete demographic details along with clinical record were recorded after consent. Whereas, all patients with incomplete or missing key data were excluded from the study. All eligible women who fulfilled the inclusion criteria during the study period were included. A non-probability consecutive sampling technique was used.

Data Collection Tool and Procedure

Data were collected using a structured data extraction form from manually maintained medical record in record registers, operation theatre, ward admission and out-patient department records. Demographic and clinical variables include age, menopausal status, parity, inter-pregnancy interval, BMI, comorbidities, occupation, history of heavy weight lifting, history of chronic cough/constipation, abdominal mass or distension, history of POP in the family, obstetric history like: history of prolong labor, history of instrumental delivery, history of traumatic delivery.

Statistical Analysis

Data was entered and analyzed using SPSS version 30.0. Categorical variables are represented as frequencies and percentages. Continuous variables are represented as mean and standard deviation.. Chi-square test is used to see the association of BMI and other risk factors with various urogynaecological problems like POP, SUI, OAB and Fistula. Logistic regression: Univariate and Multivariate logistic regression is used to control for confounding variables and identify predictors of severe disease.

Results

Participant Characteristics

A sample of 193 women were analyzed. Descriptive variables are shown in Table 1. Overall, 138 (71.5%) had pelvic organ prolapse (POP) and 55 (28.5%) did not. Out of 193 women, 128 (66.3%) were overweight, 27 (14.0%) obese, 28 (14.5%) normal and 10 (5.2%) underweight. When BMI was dichotomized (underweight/normal vs overweight/obese) 38 (19.7%) were underweight/normal and 155 (80.3%) were overweight/obese.

Table 1: Descriptive variables, frequency and percentages

Variables	Frequency (%)
Age (in years) Mean ± SD	43.93±13.60
Parity	
Nulliparous	5 (2.6%)
Primiparous	2 (1%)
Multiparous	186 (96.4%)
Menopausal status	
Pre-menopausal	92 (47.7%)
Perimenopausal	44 (22.8%)
Postmenopausal	57 (29.5%)
Mode of deliveries	
vaginal delivery only	154 (79.8%)
Both Vaginal delivery + Cesarean section	13 (6.7%)
Never undergone delivery	21 (10.9%)
History of instrumental delivery	55 (28.5%)
Short interpregnancy interval	153 (79.3%)
Inter-pregnancy interval	
Good interpregnancy interval	40 (20.7%)

BMI	Underweight	10 (5.2%)
	Normal BMI	28 (14.5%)
	Overweight	128 (66.3%)
	Obese	27 (14%)
History of diabetes		61 (31.6%)
History of hypertension		32 (16.6%)
History of chronic constipation		85 (44%)
History of heavy weight lifting		81 (42%)
Women having Pelvic organ prolapse		138 (71.5%)
Women having SUI		15 (7.8%)
Women having OAB		23 (11.9%)
Women with fistula (vesicovaginal+ rectovaginal)		12 (6.2%)

Association of BMI with Urogynaecological morbidities.

For cross tabulation, BMI was categorized in two categories: underweight-normal BMI and overweight/obese BMI. Pelvic organ prolapse was also categorized in two categories i.e., minor prolapse (Stage 1 and 2) major prolapse (stage 3 and stage 4/procidientia). Cross-tabulation of BMI categories with

POP showed a statistically significant association (Pearson $\chi^2 = 7.013$, $df = 2$, $p < 0.03$), indicating that BMI category and POP stage were related. The linear-by-linear association test also showed significant trend (linear-by-linear $\chi^2 = 6.787$, $p = 0.009$), showing that as BMI increases from normal/underweight category to overweight/obese, the likelihood of having more severe pelvic organ prolapse also increases.

Cross-tabulation of BMI category with SUI, OAB and fistula showed that there can be a conventional threshold for significance between women with and without fistula ($p=0.048$), linear trend test also showed the same pattern ($p=0.049$). There is no clear link between BMI and SUI ($p= 0.519$) and BMI and OAB established in our data ($p=0.411$). (TABLE: 2)

Table 2: Association of BMI with Urogynaecological morbidities.

Variables	BMI		p-value	
	Underweight & Normal BMI	Overweight & Obese		
POP	No POP	38	17	0.030
	Minor POP	47	11	
	Major POP	70	10	

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SUI	Yes	0	8	0.1
		2	5	32
	No	10	120	
		26	22	
OAB	Yes	0	11	
		6	6	0.0
	No	10	117	49
		22	21	
Fistula	yes	0	7	0.0
		5	0	28
	No	10	121	
		23	27	

Relation of urogynaecological problems with various risk factors:

To assess the relationship of various urogynaecological problems (POP, SUI, OAB, and Fistula) with various other risk factors like history of diabetes, hypertension, heavy weight lifting, chronic constipation, menopausal status, mode of delivery, history of instrumental delivery and inter pregnancy intervals Chi square test was applied. Results are shown in Table: 3.

Table 3: Association of various risk factors with urogynaecological morbidities:

Factors	Pelvic organ prolapse		p-value	Overactive bladder		p-value
	Yes	No		Yes	No	
Mode of deliveries (All vaginal)	21	32	<.001	13	141	.003
All Cesarean	117	13		5	8	
Both vaginal and cesarean		8		16	5	
Not applicable	3	2		5	0	
Interpregnancy interval Short (<24 months)	118	35	<.001	17	136	.499
Good (> 24 months)	20	20		6	34	
History of instrumental deliveries - yes	38	17	.639	4	51	.324
No	100	38		19	119	
Diabetes - Yes	49	12	.065	5	56	.278
No	89	43		18	114	
Hypertension - Yes	22	10	.706	5	27	.478
No	116	45		18	143	
Chronic weight lifting - Yes	62	19	.187	6	75	.100
No	76	36		17	95	
Chronic constipation - Yes	68	17	0.020	6	79	0.065
No	70	38		17	91	
			FISTULA			
			Stress urinary incontinence			
Factors	Yes	No	p-value	Yes	No	p-value
Mode of deliveries (All vaginal)	11	14	.170	5	149	<.001
		3				

All Cesarean	3	10		5	8	
Both vaginal and cesarean	1	20		2	19	
Not applicable	0	5		0	5	
Interpregnancy interval Short (<24 months)	8	14	.010	8	145	.276
Good (> 24 months)	7	33		4	36	
History of instrumental deliveries - yes	6	49	.304	7	48	0.01
No	9	12		5	133	
Diabetes - Yes	4	57	.668	3	58	.756
No	11	12		9	123	
Hypertension - Yes	3	29	.711	2	30	1.00
No	12	14		10	151	
Chronic weight lifting - Yes	7	74	.701	6	75	.560
No	8	10		6	106	
Chronic constipation - Yes	6	79	0.743	5	80	0.864
No	9	99		7	101	

There was significant association seen between Pelvic organ prolapse stages and chronic constipation (p=0.001), heavy weight lifting (p=0.043), menopausal status (p=<0.001) and mode of delivery (p=<0.001). Significant association was also seen between Fistula and mode of deliveries p=<0.001) and instrumental deliveries (p=0.001).

Binary logistic regression analysis

Binary logistic regression analysis (univariate and multivariate analysis) was performed to determine the independent association of BMI with Pelvic organ prolapse, SUI, OAB and Fistula. In unadjusted analysis, BMI >25 had significantly lower odds of pelvic organ prolapse compared to women with BMI <25 (OR 0.40, 95% CI: 0.19 – 0.89; p= 0.015) After adjustment for confounders, the association was not statistically significant. (adjusted OR 0.47, 95% CI: 0.22 – 1.02; p= 0.055). No association was observed between BMI and Stress urinary incontinence, overactive bladder and fistula in unadjusted or adjusted models. (Table: 4)

Table 4: Logistic Regression (univariate and Multivariate analysis) to show the Association of BMI with various urogynaecological problems:

Urogynaecological problems	Unadjusted OR (CI)	p-value	Adjusted OR (CI)	p-value
Pelvic organ prolapse	0.401 (0.192 – 0.838)	0.015	0.469 (0.217 – 1.015)	0.055

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Stress urinary incontinence	0.607 (0.131 – 2.811)	0.523	0.485 (0.100 – 2.347)	0.369
OAB	1.522 (0.556 – 4.167)	0.414	1.321 (0.473 – 3.690)	0.596
Fistula (VVF/RVF)	3.203 (0.957 – 10.722)	0.059	3.053 (0.889 – 10.480)	0.076

DISCUSSION:

This research was conducted to evaluate the correlation between body mass index (BMI) and common urogynaecological disorders. The results obtained did not highlight BMI to have significant association with pelvic organ prolapse (POP), stress urinary incontinence (SUI), or overactive bladder (OAB). While an inverse relationship between POP and BMI was identified initially, after adjusting for other variables this relationship was found to be negligible. This suggests that the observed link was governed by other confounding variables such as past obstetric history, interpregnancy interval, menopausal status and parity.

The link between BMI and pelvic organ prolapse has been noted with varying consistency in studies. While obesity was recognized as an important determinant by multiple publications the relationship seems to diminish when adjustment for confounding variables are made. This highlights the multifactorial nature of POP occurrence and progression^{13,14}. Studies in imaging and biophysics have noted that pelvic floor injuries and age-related factors have a superior role than BMI alone in the development of pelvic organ prolapse.

The study finds no relationship between BMI and SUI or OAB. The results are in line with other publications that identifies continence mechanisms to be complex and governed by multiple factors rather than just BMI. The mechanisms of continence are shaped by various factors, including hormonal levels, age, body proportions, and muscle strength, among others^{15,17}. This study supports the concept of multifactorial and complex nature of lower genitourinary tract dysfunction.¹⁸

While a higher incidence of urogenital fistula were observed among women with increased BMI, this association was found to be insignificant. It is likely due to small number of fistula cases in the study population and hence limits the findings. Larger sample volume are required to study this association.

Recent studies also reinforce the multifactorial nature of pelvic floor dysfunction. Yu et al. found in his meta-analysis 2025 that although BMI initially predicted SUI

after POP surgery, the effect could not be demonstrated after adjustment for age and comorbidities.¹⁹ Similarly Wang et al. showed in his study that middle aged women with obesity had increased risk of SUI primarily when combined with muscle weakness and sedentary habits.²⁰

For overactive bladder, studies suggest that obesity increases intraabdominal pressure but is not an isolated predictor once other variables like psychosocial and hormonal factors are controlled.^{21, 22} Some behavioral studies propose that physical inactivity and poor dietary habits together combine the biomechanical strain associated with BMI. Sedentary women had a 1.8-fold higher risk of POP independent of BMI.²³

Collectively these findings suggest a multifactorial etiology. Elevated intra-abdominal pressure may fasten fascial weakness. Postmenopausal estrogen deficiency worsens tissue elasticity. Instrumental delivery or prolong trial of vaginal delivery along with short interpregnancy interval are direct causes of pelvic injury. Sedentary behavior and chronic constipation also contribute in worsening pelvic floor by exacerbated strain.

Conclusion:

Overall, the findings of this study highlight the diverse and complicated pathogenesis of urogynecological disorders. The study suggest that BMI is not a strong independent determinant for the occurrence of these disorders. Preventive approaches should focus on enhancing and adjusting lifestyle-related risk factors, as well as on the early detection and treatment of pelvic floor disorders. Solely concentrating on weight management may not be sufficient to effectively prevent or mitigate the underlying causes of these disorders.

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