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Original Research Article

A Cohort Study from Pakistan Female Population: Does Increased Central Obesity Influence Lower Urinary Tract Symptoms?

Article History:

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Abstract: ***Background:*** Lower urinary tract symptoms (LUTS) are common among women and significantly affect quality of life. Obesity, particularly central obesity, has been proposed as an important modifiable risk factor; however, local data evaluating its association with LUTS in women are limited. ***Objectives:*** To evaluate the association between central obesity and lower urinary tract symptoms in the female population, and to assess the effect of increased body mass index (BMI) on the severity and pattern of LUTS. ***Methodology***: This cross-sectional study was conducted at the Urogynecology Department, Tabba Kidney Institute Hospital, from 1 July 2021 to 15 June 2022. Females aged 20–80 years presenting to the outpatient department were recruited. Lower urinary tract symptoms were assessed using the Bristol Female Lower Urinary Tract Symptoms–Short Form (BFLUTS-SF) questionnaire, comprising voiding (BFLUTS-VS), filling/storage (BFLUTS-FS), and incontinence (BFLUTS-IS) domains. Anthropometric measurements were recorded to assess BMI and central obesity. Data were analyzed using SPSS version 21, and odds ratios (OR) with 95% confidence intervals (CI) were calculated. ***Results:*** A total of 716 women completed the questionnaire and anthropometric assessment. In unadjusted analyses, women with central obesity demonstrated a significantly higher risk of LUTS. Central obesity was associated with an odds ratio of 6.74 (95% CI: 3.85–11.80) for total LUTS, 11.0 (95% CI: 7.53–16.0) for storage symptoms, and 3.37 (95% CI: 2.32–4.90) for voiding symptoms. ***Conclusion:*** Central obesity is significantly associated with an increased risk of lower urinary tract symptoms in women. Increased waist circumference is not only linked to urinary incontinence but is also associated with voiding difficulties, including hesitancy. Targeted weight and waist circumference management strategies may help reduce the burden of LUTS among women.

Keywords: Central obesity; Lower urinary tract symptoms; Body mass index; Women; BFLUTS-SF; Urinary incontinence.

INTRODUCTION

Lower urinary tract symptoms (LUTS) term encloses all disorders of urethral and bladder function comprises voiding storage and postmicturition symptoms. (1) Urinary frequency, urgency, urge incontinence, stress incontinence, pain and nocturia are describe as storage symptoms whereas voiding symptoms include hesitancy, straining, incomplete voiding and postmicturition symptoms include sensation of incomplete void.(2) Symptoms of lower urinary tract are more frequent and may influence all ages of life in both male and females. According to a systemic review, the overall LUTS prevalence was 11.8%-88.5% in women whereas the voiding symptoms, storage and postmicturition individually prevalence was 1.8-51%, 23.6-79% and 0.3-46% respectively. (3) Another study concludes (4) that among symptoms of LUTs storage symptoms urinary frequency and urgency, and nocturia are more common than voiding symptoms. LUTS has attracted worldwide recognition in clinics and clinical community due to its prevalence, pessimistic impact on life of patients

through physical, social or psychological aspects and use of high medical resources. (5)

General Obesity is defined by body mass index (BMI) and central obesity through waist circumference (WC). Because of rising morbidity associated with obesity, it became a public health emergency in current era. Central obesity is a recognized risk factor for many chronic diseases such as hypertension, metabolic syndrome and cardiovascular diseases.(6,7) however popup data points association of central obesity with LUTS. Central obesity identified as the accumulation of fat in the upper body, especially the abdomen, therefore, to diagnose the increase in abdominal fat, the waist circumference (WC) is to be measured.

Different studies (8,9) have shown that LUTs is not only highly prevalent but defining its causative agent is also very difficult. Metabolic syndrome has negative impact on voiding function and studies has proven that proactive strategies for weight loss either through behavioutal modification or barietic surgery do have improve storage symptoms in women.(10)Prior studies more addressing storage symptoms and its association with obesity but multiple studies have shown increased WC as a risk factor for causing voiding dysfunction(11, 12) Most of the studies addressing the relationship of LUTS with central obesity in males whereas LUTS association in women with central obesity, sparse data available. This study aims to provide a comprehensive understanding of central obesity and increased BMI effects upon onset of lower urinary tract symptoms in female population.

METHODOLOGY

Female's range 20 and 80years of age who presented in urogynaecology department, Tabba kidney Institute Hospital from 1stJuly 2021 to 15thJune 2022, were recruited to conduct a prospective cohort study. The women with prior history of medication such as receptor blocker or diuretics that effect genitourinary system, any diagnose psychiatric disease or using any related medications that effects brain and peripheral system, previous history of major pelvic surgery and failed to fill questionnaire were excluded to cut down bias and confounding factors. Female patients, presented in outpatient department with complaints of LUTs were asked to enroll in the study. Informed written consent was taken and study conducted after local ethical committee approval. Sample size was calculated with the help of referenced study (13), conducted in Pakistan *

The questionnaire were filled which summarized individual demographic and medical history. In this study we categorized age into 3 groups which included less than 40, 40 to 59yrs and age 60 and above. The height weight blood pressure and waist circumference were measured through standard protocol by experienced medical staff. Central obesity assessment was based on waist circumference measurements and general obesity through body metabolic index (BMI). The international Diabetes federation (IDF) Criteria of Asian women used for WC measurement less than 80cm for normal and >_80cm for obesity (13) and for BMI (14)18.5-22.9kg/m2 consider as normal 23-24.9kg/m2 as overweight and >25kg/m2 were consider as obese.

The Bristol Female Lower Urinary Tract Symptoms BFLUTS-SF questionnaire (15) was used for assessment of LUTS which comprise of voiding symptoms (BFLUTS-VS), filling symptoms (BFLUTS-FS) and incontinence symptoms (BFLUTS-IS). LUTS questionnaire was further graded as none to mild symptoms (0-12) and moderate to severe symptoms (13-48). Voiding symptoms include hesitancy, intermittency, straining whereas storage symptoms comprised of frequency, urgency, urge incontinence and nocturia. Finally, each Symptom of the (BFLUTS-FS) was categorized into no symptoms (0point), mild symptom (1 point), moderate and severe symptoms (2points), (3–4points) respectively.

Data was analyzed through statistical package of social sciences (SPSS) version 21. The Chi square test has been used for difference between LUTS group for categorical variables. Logistic regression was used to narrate the alliance between central obesity, general obesity and LUTS. Multivariate analysis was done for potential confounding factors. The P-value of <0.005 will be considered significant.

RESULTS

A total of 716 females were included in our study that completed the provided questionnaire and anthropometric measurements. Table no 1 showed traits of the subject. Comparing two groups of LUTS, Age, and Waist circumference were statistically significant. Central obesity was more found in moderate to severe group (85.8%) than in none to mild group (14.2%).

Table:1 LUTS severity and Features of the participants

Variables	None or mild symptoms (n, %)	Moderate or severe symptoms (n,	p-Value

		%)	
Age (yrs)	n=328		n=387
<40	135(41.2%)	112(29%)	0.001
40-60	164(50%)	221(57%)	
>60	29(8.8%)	54(14%)	
BMI			
<22.9	210(64%)	52(13.4%)	<0.05
23-24.9	81(24.7%)	189(48.7%)	
>25	37(11.3%)	147(38%)	
WC			
<80	216(66%)	55(14.2%)	<0.05
>80	112(34%)	333(85.8%)	
Hypertension	155(47%)	229(59%)	<0.02
Dyslipidemia	85(26%)	180(46.4%)	<0.02
hyperglycemia	168(51%)	156(40%)	0.003
Constipation	68(20.7%)	209(53.9%)	<0.05

WC= waist circumference, BMI= body mass index, LUTS=lower urinary tract symptoms

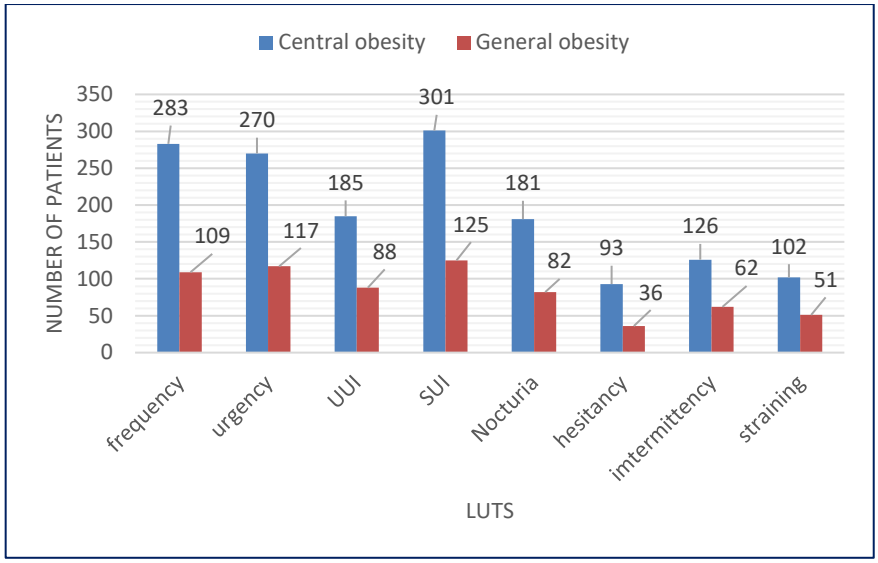
Comparing the individual symptoms of Lower urinary tract, we reported increasingly number 80.4% vs. 31% of frequency, 90% vs. 39% of urgency and 91% vs. 43% of urge incontinence in central obesity vs. generalized obesity as showed in graph 1

Graph 1 Frequency of individuals LUTS symptoms in general obesity vs. central obesity

Table: 2 Univariate and Multivariate analysis for total symptoms, storage symptoms and voiding symptoms, with WC and BMI

LUTS symptoms	Analysis	OR (95%CI) WC< 80	OR (95%CI) WC ≥ 80	OR (95%CI) BMI <22.9	OR (95%CI) BMI 23-24.9	OR (95%CI) BMI>25
Total symptoms	Unadjusted	1	6.7(3.85-11.8)	1	6.45(3.59-11.5)	6.14(3.3-11.35)
	Multivariate adjusted	1	3.9(1.03-14.7)	1	1.89(0.48-7.4)	1.53(0.36-0.41)
Voiding symptoms	Unadjusted	1	3.3(2.32-4.90)	1	2.85(1.89-4.30)	3.9(2.5-6.07)
	Multivariate adjusted	1	2.1(0.75-6.06)	1	1.30(0.44-3.80)	1.55(0.49-4.90)
Storage symptoms	Unadjusted	1	11.0(7.5-16.0)	1	9.6(6.37-14.5)	12.6(7.97-19.9)
	Multivariate adjusted	1	4.15(1.6-10.7)	1	2.91(1.07-7.92)	4.25(1.4-12.89)

Multivariate adjusted for: hypertension, hyperglycemia, dyslipidemia, constipation and age WC=Waist circumference, lower urinary tract symptoms =LUTS, BMI= body mass index



UUI= urge urinary incontinence, LUTS= lower urinary tract symptoms SUI= stress urinary incontinence

The odd ratio was calculated for total symptoms, storage symptoms and voiding symptoms. Central obesity group showed alliance with OR of 6.74 (95% CI = 3.85–11.8) for total symptoms, 11.0 (95% CI = 7.53-16.0) for storage symptoms and 3.37(95% CI 2.32-4.90) for voiding symptoms in unadjusted analyses. However after multivariate analysis, central obesity and voiding symptoms were not associated. Multivariate analysis with generalized obesity, storage symptoms showed association as shown in table 2

Table 3 represents the individual symptoms of LUTS association with WC and BMI. The risk of UUI (OR = 10.0, 95% CI = 5.98–16.72), nocturia (OR = 4.33, 95% CI =2.92-6.43) and hesitancy (OR = 2.71, 95% CI = 1.68-4.38) rise in the central obesity group after unadjusted analysis. Multivariate analysis showed that the relationship of central obesity with UUI was not statistically significant. But the relationship of central obesity with hesitancy (OR = 3.14, 95% CI = 1.44–6.82) and nocturia (OR = 5.91, 95% CI = 1.74–20.0) remained statistically significant in multivariate analysis. No association was observed between WC intermittency and straining after controlling confounder factors. Apart of UUI (OR=15.0, 95%CI = 8.3-27.3) which was statistical significant after multivariate analysis in BMI group rest symptoms were not significant statistically.

Table: 3 Univariate and Multivariate Adjustment for individual LUTS symptoms based on WC and BMI

Individual LUTS symptoms	OR (95%CI) WC＜80	OR (95%CI) WC ≥ 80	OR (95%CI) BMI <22.9	OR (95%CI) BMI 23-24.9	OR (95%CI) BMI>25
Frequency					
Unadjusted	1	5.11(3.66-7.14)	1	5.4(3.75-7.91)	4.2(2.8-6.3)
Multivariate adjusted	1	4.29(1.70-10.8)	1	1.18(0.45-3.03)	0.96(0.34-2.69)
Urgency					
Unadjusted	1	12.39(8.10-18.94)	1	10.6(6.76-16.8)	14.0(8.6-22.8)
Multivariate adjusted	1	5.42(1.94-15.0)	1	1.9(0.68-5.81)	2.36(0.747-7.45)
UUI					
Unadjusted	1	10.0(5.98-16.72)	1	9.6(5.4-17.2)	15.0(8.3-27.3)
Multivariate adjusted	1	1.85(0.62-5.53)	1	5.29(1.62-17.2)	7.55(2.15-26.49)
SUI					
Unadjusted	1	10.4(7.20-15.2)	1	10.3(6.8-15.6)	11.0(7.05-17.4)
Multivariate adjusted	1	3.82(1.5-9.7)	1	2.57(0.97-6.81)	3.7(1.25-11.0)
Nocturia					

Unadjusted	1	4.3(2.92-6.43)	1	3.2(2.10-4.8)	4.5(2.9-7.19)
Multivariate adjusted	1	5.91(1.74-20.0)	1	0.82(0.23-2.86)	1.67(0.45-6.19)
hesitency					
Unadjusted	1	2.71(1.68-4.38)	1	2.48(1.48-4.1)	2.3(1.3-3.9)
Multivariate adjusted	1	3.14(1.44-6.82)	1	0.74(0.19-2.94)	0.71(0.16-2.99)
Intermittency					
Unadjusted	1	3.05(1.99-4.68)	1	2.31(1.45-3.67)	3.78(2.3-6.14)
Multivariate adjusted	1	2.44(0.71-8.34)	1	0.95(0.27-3.38)	1.29(0.34-4.88)
Straining					
Unadjusted	1	2.92(1.83-4.66)	1	2.2(1.32-3.68)	3.63(2.15-6.13)
Multivariate adjusted	1	1.98(0.54-7.24)	1	1.65(0.43-6.27)	2.7(0.67-11.23)

Multivariate adjusted for: age, hypertension, hyperglycemia, dyslipidemia, constipation WC=waist circumference, LUTS=lower urinary tract symptoms, BMI= body mass index

DISCUSSION

Waist circumference WC extensively used variable of central fat distribution for evaluating and assessing patient wellbeing,. In our study the frequency of central obesity was 53.4% and we found that waist circumference >80cm has high incidence of LUTS as compare to those whose waists were thin and it's supported by our univariate analysis. (16). A Meta-analysis which included 12 studies also showed a positive association of LUTS with waist circumference at an odds ratio of 1.49 (95% CI (1.34-1.64) (17).

We have found through logistic regression analysis that WC>80 was associated with jeopardized symptoms. In systemic studies age is a risk factor of LUTS which harmony with our study. (18) According to Joseph etal (19) Luts is not correlated with central obesity measured through BMI in men whereas a Chinese study (20) in women shows luts associated with odd ratio of overweight 0.059 (95%CI (0.016-0.102) and with obese odd ratio 0.143 (95%CI (0.087-0.198). A multivariable analyses of Cohort Study (21) showed higher odds of storage symptoms (OR=1.248, p=0.003). Whereas our study exhibit that WC>80 had not only storage symptoms but voiding symptoms association after multivariate adjustment. Most of the study showed worsening of voiding symptoms with increased WC in men whereas in women mostly data represent storage symptoms. In contrast our study in women demonstrates through multivariate analysis that central obesity is a predisposing factor for voiding symptoms. An article (22) gave an explanation of the relationship of central obesity with pelvic floor dysfunction and described that the ineffective function is due to weakness and tension in the pelvic floor muscles.

Alliance between individual symptoms of LUTS and WC, unadjusted analysis represented higher risk of UUI with odd ratio 10.0 (95% CI = 5.98–16.72), hesitancy (OR = 2.71, 95% CI = 1.68-4.38), and Nocturia (OR = 4.33, 95% CI =2.92-6.43) in centrally obese participants, indicating positive odds ratio of encountering outcomes after exposure. However, multivariate analysis was not significant in same group as presented in previous studies (21). Lai HH, 2019 (21) indicated similar results with higher indication of LUTs in both sexes reporting central obesity, while Xie L, 2019 (23) has reportedly notified positive association of LUTs with increased waist-hip ratio in elder population (> 70 years of age) as compared to < 40 years population.

Our objective was to demonstrate the association of LUTS which include both storage and voiding symptoms with central obesity which was contrast with other studies which only discourse urinary incontinence with BMI and WC. However there is certain limitation of our study. Our study is cross-sectional and does not show cause affect relationship between LUTS and central obesity. Further its single center study and potential information bias as its self-reported questionnaire.

CONCLUSION

This study demonstrates that central obesity is significantly associated with an increased risk of lower urinary tract symptoms (LUTS) among women. Increased waist circumference was not only linked to urinary incontinence but was also associated with voiding symptoms, including urinary hesitancy. Waist circumference emerged as a more reliable anthropometric measure than general obesity indices for predicting LUTS. A comprehensive understanding of the underlying

causative and associative factors is essential to inform effective strategies for the prevention, early identification, and management of LUTS in women.

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