

EVALUATION OF LOWER URINARY TRACT SYMPTOMS (LUTS) IN POSTMENOPAUSAL WOMEN AND RESPONSE TO MEDICAL TREATMENT

Deepshikha¹, Shruti Verma¹, Lata Shukla Dwivedy²

¹Senior Resident, Department of OBS and Gynae, ANMMCH, Gaya, Bihar, India

²Professor and HOD, Department of OBS and Gynae, ANMMCH, Gaya, Bihar, India

Received : 02/03/2024
Received in revised form : 10/05/2024
Accepted : 25/05/2024

Keywords:
Lower Urinary Tract Symptoms (LUTS), Postmenopausal Women

Corresponding Author:
Dr. Shruti Verma,
Email: shruti.nmch@gmail.com

DOI: 10.47009/jamp.2024.6.4.187

Source of Support: Nil,
Conflict of Interest: None declared

Int J Acad Med Pharm
2024; 6 (4); 956-961



Abstract

Background: The prevalence of LUTS, particularly stress urinary incontinence (SUI) and OAB, increases with pelvic organ prolapse. In many cases, correction of pelvic organ prolapse reduces LUTS symptoms. LUTS impacts women of all ages, and an indepth study of LUTS is necessary to develop an individualized treatment protocol. **Materials and Methods:** Type of investigation – observational. Cross-sectional research design. The study took place at Department of Obs. And Gynae, ANMMCH, Gaya, Bihar India. This research was conducted over the course from July 2022 to March 2024. Females of any age attending the hospital's gynecology outpatient department (OPD) were designated as the study population. The number of samples is 354. For the evaluation, a standardized, pretested, structured Bristol's female LUTS-SF questionnaire containing sociodemographic information and clinical history for LUTS symptoms was utilized. The data was entered into SPSS version 25 and expressed in frequency and percentage form for analysis. **Result:** 177 participants were recruited for the study. The Bristol Female LUTS-SF questionnaire was used to assess LUTS in women who met the study's inclusion criteria. The sociodemographic information is provided in Table 1. Presented data are n (%); N=354. In our investigation, the majority of the population was between the ages of 21 and 40, i.e., between 21 and 40 years old i.e., 161 (46.5%) demonstrated. In our study, elderly women were more likely to experience LUTS than their younger counterparts. The prevalence of severe LUTS increased significantly after the age of 41; in the 81-100 age group, 93.3% (14/15) of participants had severe LUTS, 88.0% (22/25) in the 61-80 age group, and 86.4% (70/81) in the 41-60 age group, which is highly significant (p value < 0.005) demonstrated. **Conclusion:** Although LUTS are prevalent in the population, its impact has received less attention. It has evolved into a major issue affecting the quality of life. The majority of investigations on LUTS have focused on the general population.

INTRODUCTION

Lower Urinary Tract Symptoms (LUTS) are prevalent conditions that can affect men and women of all ages and clinical specialties. These symptoms have extensive human and social repercussions, causing distress, shame, and loss of self-esteem. In recent years, there has been a growing interest in various LUTS due to improved diagnostic and treatment options, as well as an increased awareness of the symptomatology and its negative influence on daily life. According to current standards recommended by the International Continence Society (ICS), LUTS are divided into three groups: storage, voiding, and post-micturition. The symptoms of excessive storage are an overactive bladder (OAB) and urinary incontinence (UI). The

symptoms of voiding include a feeble or sluggish stream, hesitancy, and terminal dribbling. The posturination symptoms include incomplete voiding and post-urination dribbling. LUTS comprises symptoms related to sexual activity, as well as genital and lower urinary tract pain.^[1,2] The prevalence of lower urinary tract symptoms is high and tends to rise with age. Pregnancy, childbirth, and obesity are also major risk factors. Other risk factors for urinary incontinence include smoking, diabetes, chronic obstructive airway disease and neurological disorders, and previous significant pelvic surgery such as hysterectomy.^[2] Menopause has been identified as a risk factor for urinary incontinence. Menopause may have a distinct association with stress urinary incontinence than with urge incontinence, according to available evidence.

In one study, the prevalence of urodynamic stress incontinence decreased from 21% to 12% after menopause, while the prevalence of detrusor overactivity increased from 9% to 19%.^[3] There has been concern that hysterectomy may be associated with development of urinary incontinence via damage to the pelvic nerves and pelvic support structures.^[4] A study found that LUTS appears to be more common following vaginal than abdominal hysterectomy.^[5]

Consequently, a validated instrument with extended questions for LUTS quantification was added to the Gynae OPD register.^[6] However, the majority of prospective studies have failed to discover an association between hysterectomy and subsequent incontinence, whereas several epidemiologic studies have reported an association. Hormone replacement therapy has been extensively used to treat LUTS for many years. In the HERS study, however, it was discovered that urinary incontinence intensifies in older postmenopausal women taking daily estrogen plus progestin therapy compared to those women who were on placebo.^[7] The prevalence of LUTS, particularly stress urinary incontinence (SUI) and OAB, increases with pelvic organ prolapse. In many cases, correction of pelvic organ prolapse reduces LUTS symptoms.

Before corrective surgery, it is necessary to have a solid understanding of the co-occurrence of LUTS and pelvic organ prolapse.^[8] LUTS impacts women of all ages, and an indepth study of LUTS is necessary to develop an individualized treatment protocol.

MATERIALS AND METHODS

Type of Investigation: observational. Cross-sectional research design. The study took place at Department of Obs. And Gynae, ANMMCH, Gaya, Bihar India. This research was conducted over the course from July 2022 to March 2024. Females of any age attending the hospital's gynecology outpatient department (OPD) were designated as the study population.

Sample Size^[8]- Sample size = $z^2 \times p \times (1-p) / d^2$ Z = degree of assurance

P= anticipated frequency or percentage D= precision $n = 3.84 \times 35.9 \times (100 - 35.9) / 5 \times 5 = 354$ The number of samples is 354.

Inclusion Criteria

Women of any age attending the gynecology OPD who were presumably healthy and willing to participate in the study met the inclusion criteria for the study.

Exclusion Criteria

- Female with known kidney disease and undergoing any uro-gynecological procedures;
- Females during the menstrual cycle;
- Females with identified urinary tract abnormalities;
- Those who were expectant;
- Not interested in participating.

For the evaluation, a standardized, pretested, structured Bristol's female LUTS-SF questionnaire containing sociodemographic information and clinical history for LUTS symptoms was utilized. The symptoms of LUTS were classified as storage, voiding, and tension. Each response received a score between 0 and 4. Patients were categorized into no/minimal LUTS (score,1–7), moderate LUTS (score,8–19), and severe LUTS (score,>20).

The data was entered into SPSS version 25 and expressed in frequency and percentage form for analysis.

Statistical Analysis: The Chi-Square test and multiple regression analysis will be utilized for qualitative data analysis.

RESULTS

177 participants were recruited for the study. The Bristol Female LUTS-SF questionnaire was used to assess LUTS in women who met the study's inclusion criteria. The sociodemographic information is provided in [Table 1]. Presented data are n (%); N=354. In our investigation, the majority of the population was between the ages of 21 and 40, i.e., between 21 and 40 years old i.e., 161 (46.5%) demonstrated in [Figure 1 and Table 3]. The participant's average age was 35.5 years.

In every age group, nocturia is the most prevalent symptom, followed by voiding complaints as demonstrated in [Figure 2]. The prevalence of nocturia in different age groups is approximately 58% below 20 years, 44% in the age group 21-40 years, 53% in the age group 41-60 years, 71% in the age group 61-80 years, and 48% in the age group 81-100 years.

In our study, elderly women were more likely to experience LUTS than their younger counterparts. The prevalence of severe LUTS increased significantly after the age of 41; in the 81-100 age group, 93.3% (14/15) of participants had severe LUTS, 88.0% (22/25) in the 61-80 age group, and 86.4% (70/81) in the 41-60 age group, which is highly significant (p value < 0.005) demonstrated in [Table 6].

While evaluating the parity history, it has been observed that Nulliparous women have no LUTS at all. There were 18(10.1%) women were nulliparous; 58(32.76%) women were with parity =1; 54 (30.50%) women were with parity =2; 37 (20.90%) women were with parity =3; 10(5.64%) women were with parity = 4; 9 (5.08%) women were with parity = 5; and 2(1.12%) women were with parity = 6 as demonstrated in [Table 8].

The proportion of LUTS were high in women with parity more than >2 (p< 0.005). In our study, 48.02% (85/177) of the women had vaginal births. Compared to caesarean section, however, women who delivered vaginally were more prone to develop LUTS (48.02% versus 51.97%) as demonstrated in [Table 9].

In this study the severity of LUTS increases with increasing BMI. There were 11 women who had BMI 26 >30 and 8 women of them are suffering from severe LUTS. There were 17 women who has BMI >30 and all of them are suffering from severe LUTS. There were 107 women who has BMI ≤ 20 Kg/m²

and only 8 had severe LUTS as demonstrated in [Table 10]. Among all the participants 61 women had pelvic organ prolapse and 28 had LUTS. The Odds Ratio calculated is 4.63 which is statistically significant, demonstrated in [Table 11].

Table 1: Distribution of patients according to age.

Age Group	No.of cases	Percentage
<20	18	9.60%
21-40	80	45.19%
41-60	60	33.9%
60-80	11	7.1%
80-100	8	4.51%
Total	177	100%

Table 2: Distribution of patients according to education

Education	No.of cases	Percentage
Illiterate	28	15.8%
Primary	78	44.51%
Secondary	44	24.9%
Post graduation	15	8.5%
Graduation	12	6.7%
Total	177	100%

Table 3: Distribution of patients according to marital status.

Marital Status	No.of cases	Percentage
Single	27	15.25%
Married	102	57.6%
Divorced	25	14.12%
Widow	23	12.99%
Total	177	100%

Table 4: Distribution of patients according to occupation.

Occupation	No.of cases	Percentage
Housewife	75	42.37%
Working	75	42.37%
Student	15	8.47%
Retired	12	6.77%
Others	0	0.0%
Total	177	100%

Table 5: Distribution of patients according to co-morbidities.

	No.of cases	Percentage
Diabetes	27	15.2%
Hypertension	77	43.5%
Smoking	7	4%
Abdominal hysterectomy	2	1.1%
Total	113	63.84%

Table 6: The proportion of LUTS according to severity.

	No.of cases	Percentage
No LUTS	92	52%
Mild LUTS	10	5.6%
Moderate LUTS	37	20.90%
Severe LUTS	37	20.90%
Proportion LUTS		

Table 7: Demonstrate severity of LUTS with age.

Age group	No LUTS	Mild LUTS	Moderate LUTS	Severe LUTS	P-value
<20 years	16	1	0	0	0.000
21-40 years	76	3	1	0	
41-60 years	0	6	35	19	
61-80 years	0	0	2	11	
81-100 years	0	0	1	7	

Table 8: Demonstrates severity of LUTS with parity.

Parity.	No LUTS	Mild LUTS	Moderate LUTS	Severe LUTS	P-value
Nulliparous	18	0	0	0	0.000
1	54	2	1	1	
2	20	6	14	4	
3	0	2	17	17	
4	0	0	4	6	
5	0	0	1	8	
6	0	0	0	2	

Table 9: Relation of LUTS with Mode of Delivery.

Mode of Delivery	LUTS present	Percentage	LUTS absent	Percentage	P-value
Vaginal	54	30.50%	34	19.20%	0.000
CS	31	17.51%	58	32.76%	
Total	85	48.02%	92	51.97%	

Table 10: Demonstrates the severity of LUTS with BMI.

BMI	No LUTS	Mild LUTS	Moderate LUTS	Severe LUTS	P-value
≤20 kg/m ²	57	9	33	8	0.000
21-25 kg/m ²	37	1	3	4	
26-30 kg/m ²	0	0	3	8	
>30 kg/m ²	0	0	0	17	

Table 11: Demonstrates the presence of LUTS in Pelvicorgan prolapse.

Prolapse	LUTS present	LUTS absent	Odd's Ratio
Present	28	7	OR = 4.63
Absent	61	85	

DISCUSSION

In earlier studies, the prevalence of LUTS in women in the out-of-hospital population ranged from 45.2% to 76.3%.^[28] The EPIC study which was the first largescale, multinational, cross-sectional study estimated the prevalence of LUTS, which is 64.3% in general population using the recent ICS definition (2002) and 66.6% of women were affected by one or more LUTS.^[9] The prevalence of LUTS in women in China was 57.7%. Storage symptoms (frequency) were present in all women with LUTS, followed by voiding symptoms in 67% of women and post micturition symptoms in 62% of women.^[29] Our study's higher prevalence of storage symptoms is consistent with previous research. In this study, the majority of participants were between the ages of 21 and 40, but the prevalence of LUTS increased significantly after age 41. The relationship between age and LUTS is consistent with many previous studies.^[9,12,16,27,29] In some studies, it has been found that LUTS symptoms subside after 65 years of age.^[27] The remission of symptoms with increasing age is not well understood. In our study, however, we discovered that as age increases, so do the symptoms, which is statistically significant (p value < 0.005). Our study demonstrates that severe forms of LUTS are more common in people older than 41, with the highest proportion occurring in those aged 81 to 100. Among all of the symptoms of various LUTS, including storage, voiding, and post micturition symptoms, nocturia is the most prevalent, affecting between 44% and 71% of patients across all age categories. This finding of nocturia with or without urgency or frequency indicates a problem with storage LUTS and is the most prevalent symptom,

which is consistent with other studies.^[9,29] The majority of patients in the younger age group did not have LUTS. This may be attributed to the menopausal genitourinary changes. According to recent data, 50% of women in the older age group suffer from urinary incontinence.^[30] This was primarily contributed by muscle injuries, widening of levator hiatus, diminution of reflex pelvic floor activation on coughing, or increased urethral mobility at stress. In older women, the urethral closing pressure and pelvic denervation decrease. In our study, the presence of pelvic organ prolapses and LUTS has a significant association with an OR of 4.63. Similar results were observed in The Boston Area Community Health Survey or BACH survey, an observational cohort study in which the multivariate adjusted OR for the association between uterine prolapse and the progression of LUTS was 3.05.^[31] This study also demonstrates that LUTS are more prevalent in women with >3 children, and as the number of children increases, so does the severity. However, it has been discovered that LUTS are more prevalent in vaginally-delivered women than in those who have undergone caesarean section. In our study, 48.02 % (85/177) of the women had vaginal births. Comparing vaginal delivery to caesarean section, however, women who delivered vaginally were more prone to develop LUTS (48.02% vs. 46.4%). Our study's conclusion regarding the incidence of LUTS in relation to vaginal versus caesarean delivery is statistically significant. In their investigations, Nancy et al. found that women who have had three vaginal births are at a greater risk of developing LUTS.^[31] Throughout the literature, caesarean section has been shown to protect against the development of incontinence. In a prospective Cohort study, Erica et

al, studied the effects of method of delivery on urinary incontinence and found that Caesarean section is associated with a lower absolute risk of developing incontinence as compared to vaginal delivery in the postpartum period 3 months after delivery; urinary incontinence occurred daily in 3.11 percent of patients following vaginal delivery compared to 0.88 percent following caesarean section.^[32] In a number of studies, it was discovered that some degree of LUTS occurs during pregnancy and increases in the postpartum period, but that the symptoms resolve on their own.^[32-34] Many researchers have proposed the reversible trauma hypothesis, which may be due to partial recovery of the pelvic floor muscles.

CONCLUSION

Although LUTS are prevalent in the population, its impact has received less attention. It has evolved into a major issue affecting the quality of life. The majority of investigations on LUTS have focused on the general population. However, we have limited information regarding gynecology OPD patients who may be suffering from LUTS. Few studies have been conducted on the natural history of LUTS in males, while there was few research in the female population. Therefore, establishing a clinical practice of identifying LUTS in the Gynecology OPD will improve the lifestyle outcomes of women attending for other gynecological issues. In our study, we discovered that nearly 48 percent of patients have some degree of LUTS. However, only a small percentage of patients report experiencing LUTS symptoms. This underreporting may be due to a lack of awareness and social stigma in the community. All of the patients we've identified are based on the evaluation of symptomatic questionnaires, but urodynamic testing should be performed to confirm whether these women truly have various types of LUTS.

REFERENCES

1. Haylen BT, de Ridder D, Freeman RM, Swift SE, Berghmans B, Lee J, Monga A, Petri E, Rizk DE, Sand PK, Schaer GN; International Urogynecological Association; International Continence Society. An International Urogynecological Association (IUGA)/International Continence Society (ICS) joint report on the terminology for female pelvic floor dysfunction. *NeuroUroUrodyn.* 2010;29(1):4-20. <https://doi.org/10.1002/nau.20798>
2. Coyne KS, Sexton CC, Irwin DE, Kopp ZS, Kelleher CJ, Milsom I. The impact of overactive bladder, incontinence and other lower urinary tract symptoms on quality of life, work productivity, sexuality and emotional well-being in men and women: results from the EPIC study. *BJU Int.* 2008;101(11):1388-95. <https://doi.org/10.1111/j.1464-410X.2008.07601.x>
3. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z, Herschorn S, Coyne K, Kelleher C, Hampel C, Artibani W, Abrams P. Populationbased survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of the EPIC study. *Eur Urol.* 2006; 50(6):1306-14; discussion 1314-5. <https://doi.org/10.1016/j.eururo.2006.09.019>

4. DeLancey JO. The pathophysiology of stress urinary incontinence in women and its implications for surgical treatment. *World J Urol.* 1997; 15(5):268-74. <https://doi.org/10.1007/BF02202011>
5. Lakeman MM, van der Vaart CH, Roovers JP; HysVA study group. Hysterectomy and lower urinary tract symptoms: a nonrandomized comparison of vaginal and abdominal hysterectomy. *GynecolObstet Invest.* 2010;70(2):100-6. <https://doi.org/10.1159/000297507>
6. Pålsson M, Stjernedahl JH, Granåsen G, Löfgren M, Sundfeldt K. Patient-reported lower urinary tract symptoms after hysterectomy or hysteroscopy: a study from the Swedish Quality Register for Gynecological Surgery. *Int Urogynecol J.* 2017; 28(9):1341-1349. <https://doi.org/10.1007/s00192-017-3268-9>
7. Grady D, Brown JS, Vittinghoff E, Applegate W, Varner E, Snyder T; HERS Research Group. Postmenopausal hormones and incontinence: the Heart and Estrogen/Progestin Replacement Study. *Obstet Gynecol.* 2001; 97(1):116-20. [https://doi.org/10.1016/s0029-7844\(00\)01115-7](https://doi.org/10.1016/s0029-7844(00)01115-7)
8. Lo TS, Uy-Patrimonio MC, Kao CC, Chua S, Huang TX, Wu MP. Urodynamics mixed type urinary incontinence with advanced pelvic organ prolapse, management and outcomes. *Sci Rep.* 2020; 10(1):1944. <https://doi.org/10.1038/s41598-020-58594-3>
9. Irwin DE, Milsom I, Hunskaar S, Reilly K, Kopp Z et al. Population based survey on urinary incontinence, overactive bladder, and other lower urinary tract symptoms in five countries: results of EPIC study. *Eur Urol.* 2006; 50(6):1306-14.
10. Stewart WF, Van Rooyen JB, Cundiff GW, Abrams P, Herzog AR, Corey R, Hunt TL, Wein AJ. Prevalence and burden of overactive bladder in the United States. *World J Urol.* 2003; 20(6):327-36. <https://doi.org/10.1007/s00345-002-0301-4>
11. Irwin DE, Kopp ZS, Agatep B, Milsom I, Abrams P. Worldwide prevalence estimates of lower urinary tract symptoms, overactive bladder, urinary incontinence and bladder outlet obstruction. *BJU Int.* 2011; 108(7):1132-8. <https://doi.org/10.1111/j.1464-410X.2010.09993.x>
12. Coyne KS, Sexton CC, Thompson CL, Milsom I, Irwin D, Kopp ZS, Chapple CR, Kaplan S, Tubaro A, Aiyer LP, Wein AJ. The prevalence of lower urinary tract symptoms (LUTS) in the USA, the UK and Sweden: results from the Epidemiology of LUTS (EpiLUTS) study. *BJU Int.* 2009; 104(3):352-60. <https://doi.org/10.1111/j.1464-410X.2009.08427.x>
13. Heidler S, Deveza C, Temml C, Pohnolzer A, Marszalek M, Berger I, Bluhm A, Madersbacher S. The natural history of lower urinary tract symptoms in females: analysis of a health screening project. *Eur Urol.* 2007; 52(6):1744-50. <https://doi.org/10.1016/j.eururo.2007.08.007>
14. Coyne KS, Wein AJ, Tubaro A, Sexton CC, Thompson CL, Kopp ZS, Aiyer LP. The burden of lower urinary tract symptoms: evaluating the effect of LUTS on health-related quality of life, anxiety and depression: EpiLUTS. *BJU Int.* 2009; 103 Suppl 3:4-11. <https://doi.org/10.1111/j.1464-410X.2009.08371.x>
15. Aoki Y, Brown HW, Brubaker L, Cornu JN, Daly JO, Cartwright R. Urinary incontinence in women. *Nat Rev Dis Primers.* 2017; 3:17042. <https://doi.org/10.1038/nrdp.2017.42>
16. Maserejian NN, Chen S, Chiu GR, Wager CG, Kupelian V, Araujo AB, McKinlay JB. Incidence of lower urinary tract symptoms in a population-based study of men and women. *Urology.* 2013; 82(3):560-4. <https://doi.org/10.1016/j.urology.2013.05.009>
17. Connolly TJ, Litman HJ, Tennstedt SL, Link CL, McKinlay JB. The effect of mode of delivery, parity, and birth weight on risk of urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct.* 2007; 18(9):1033-42. <https://doi.org/10.1007/s00192-006-0286-4>
18. Thom DH, Brown JS, Schembri M, Ragins AI, Creasman JM, Van Den Eeden SK. Parturition events and risk of urinary incontinence in later life. *NeuroUroUrodyn.* 2011; 30(8):1456-61. <https://doi.org/10.1002/nau.21166>
19. Gyhagen M, Bullarbo M, Nielsen TF, Milsom I. The prevalence of urinary incontinence 20 years after childbirth: a national cohort study in singleton primiparae after vaginal or

- caesarean delivery. *BJOG*. 2013; 120(2):144-151. <https://doi.org/10.1111/j.1471-0528.2012.03301.x>
20. Coyne KS, Sexton CC, Bell JA, Thompson CL, Dmochowski R, Bavendam T, Chen CI, Quentin Clemens J. The prevalence of lower urinary tract symptoms (LUTS) and overactive bladder (OAB) by racial/ethnic group and age: results from OAB-POLL. *NeurourolUrodyn*. 2013; 32(3):230-7. <https://doi.org/10.1002/nau.22295>
 21. Danforth KN, Townsend MK, Lifford K, Curhan GC, Resnick NM, Grodstein F. Risk factors for urinary incontinence among middle-aged women. *Am J Obstet Gynecol*. 2006; 194(2):339-45. <https://doi.org/10.1016/j.ajog.2005.07.051>
 22. Litman HJ, Steers WD, Wei JT, Kupelian V, Link CL, McKinlay JB; Boston Area Community Health Survey Investigators. Relationship of lifestyle and clinical factors to lower urinary tract symptoms: results from Boston Area Community Health survey. *Urology*. 2007; 70(5):916-21. <https://doi.org/10.1016/j.urology.2007.06.1117>
 23. Aygen E, Ekmekçioğlu O, Serin S. The relationship between the duration of menopause and lower urinary tract symptoms in women aged 40 to 59. *Int J Fertil Womens Med*. 2001; 46(1):16-22.
 24. Chen GD, Lin TL, Hu SW, Chen YC, Lin LY. Prevalence and correlation of urinary incontinence and overactive bladder in Taiwanese women. *NeurourolUrodyn*. 2003;22(2):109-17. <https://doi.org/10.1002/nau.10010>
 25. Zhang W, Song Y, He X, Xu B, Huang H, He C, Hao L, Li Y. Prevalence and risk factors of lower urinary tract symptoms in Fuzhou Chinese women. *Eur Urol*. 2005; 48(2):309-13. <https://doi.org/10.1016/j.eururo.2005.03.003>
 26. Minassian VA, Lovatsis D, Pascali D, Alarab M, Drutz HP. Effect of childhood dysfunctional voiding on urinary incontinence in adult women. *Obstet Gynecol*. 2006; 107(6):1247-51. <https://doi.org/10.1097/01.AOG.0000190222.12436.38>
 27. Wennberg AL, Molander U, Fall M, Edlund C, Peeker R, Milsom I. A longitudinal population-based survey of urinary incontinence, overactive bladder, and other lower urinary tract symptoms in women. *Eur Urol*. 2009; 55(4):783-91. <https://doi.org/10.1016/j.eururo.2009.01.007>
 28. Moosdorff-Steinhauser H, Rademakers KLJ, Nieman F, van Koeveeringe GA, Berghmans B. A Survey on Voiding Complaints in Women Presenting at a Pelvic Care Center. *Curr Urol*. 2020; 13(1):31-36. <https://doi.org/10.1159/000499297>
 29. Wang JY, Liao L, Liu M, Sumarsono B, Cong M. Epidemiology of lower urinary tract symptoms in a cross-sectional, population-based study: The status in China. *Medicine (Baltimore)*. 2021; 97(34):e11554. <https://doi.org/10.1097/MD.00000000000011554>
 30. Kołodyńska G, Zalewski M, Rożek-Piechura K. Urinary incontinence in postmenopausal women - causes, symptoms, treatment. *PrzMenopauzalny*. 2022; 18(1):46-50. <https://doi.org/10.5114/pm.2019.84157>
 31. Maserejian NN, Curto T, Hall SA, Wittert G, McKinlay JB. Reproductive history and progression of lower urinary tract symptoms in women: results from a population-based cohort study. *Urology*. 2024; 83(4):788-94. <https://doi.org/10.1016/j.urology.2013.12.016>
 32. Eason E, Labrecque M, Marcoux S, Mondor M. Effects of carrying a pregnancy and of method of delivery on urinary incontinence: a prospective cohort study. *BMC Pregnancy Childbirth*. 2024; 4(1):4. <https://doi.org/10.1186/1471-2393-4-4>
 33. Handa VL, Pierce CB, Muñoz A, Blomquist JL. Longitudinal changes in overactive bladder and stress incontinence among parous women. *NeurourolUrodyn*. 2015; 34(4):356-61. <https://doi.org/10.1002/nau.22583>
 34. Fritel X, Ringa V, Quiboef E, Fauconnier A. Female urinary incontinence, from pregnancy to menopause: a review of epidemiological and pathophysiological findings. *Acta ObstetGynecol Scand*. 2024; 91(8):901-10. <https://doi.org/10.1111/j.1600-0412.2012.01419.x>