

## The analysis of risk factors associated with women's urinary incontinence; literature review

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# The analysis of risk factors associated with women's urinary incontinence; literature review

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## ABSTRACT



Urinary incontinence (UI) is a common condition among women. Approximately 50% of them had an involuntary loss of urine at least once in their lifetime. It can be present during sexual activity, contributing to sexual dysfunction and often associated with anxiety or even depression, thus having a negative impact on the quality of life. The incidence of UI is related to the existence of predisposing factors. The best known are: age, weight, family history, race/ ethnicity, number of pregnancies and mode of birth, history of genitourinary interventions and factors related to ordinary habits: smoking, caffeine consumption, oral contraceptives. Studies on middle-aged women have revealed that BMI, parity, age, hysterectomy, smoking, race/ ethnicity and diabetes are factors often associated with urinary incontinence. Future studies are needed to further explore the risk factors for urinary incontinence.

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## Introduction

Urinary incontinence (UI) is common and mainly undertreated [1,2]. About 50% of adult women suffer from this condition, but only some of them require medical care [3-5]. The overall prevalence of urinary incontinence among non-pregnant women over the age of 20 has been reported to range from 10 to 17% [6]. Prevalence rates above 50% have been reported in women over 65 years of age [7].

However, not all women who develop urinary incontinence will have symptoms indefinitely. In a longitudinal cohort study of 4,127 middle-aged women, the annual incidence rate of urinary incontinence was 3.3% and the annual remission rate was 6.2%. Factors associated with persistent (unresolved) symptoms were weight gain and menopause [8].

Urinary incontinence can combine anxiety and depression, thus having a negative impact on the quality of life [9, 10]. It can be present during sexual activity (coital incontinence), contributing to sexual dysfunction related to incontinence [11]. Medical morbidities associated with this

condition include perineal infections caused by moisture and irritation. Urinary incontinence is not associated with increased mortality [12].

Risk factors for urinary incontinence are [13-17]:

- Age – it is the most important risk factor; the prevalence and severity of incontinence increase with age.
- Obesity - its presence increases 3 times the risk of urinary incontinence.
- Parity - increased parity favors incontinence and genital prolapse.
- Birth mode - vaginal birth, compared to Cesarean sections, more often associates stress urinary incontinence.
- Family history
- Ethnicity/ race
- Other factors - smoking, caffeine use, diabetes, stroke, depression, fecal incontinence, menopausal urinary tract syndrome/ vaginal atrophy, hormone replacement therapy, genitourinary surgery (e.g. hysterectomy) and radiotherapy.

Depending on the mechanism of occurrence, urinary incontinence is classified as [18-23]:

- Stress urinary incontinence - involuntary leakage of urine that occurs with increasing intra-abdominal pressure (e.g. exertion, sneezing, coughing, laughing) outside of bladder contraction. It occurs frequently in women with prior births at an early age, with the highest incidence between 45 and 49 years.
- Urgent urinary incontinence - incontinence felt in the form of an urgent need to empty the bladder; it contracts involuntarily, and the urethral orifice opens, excreting urine; this may be secondary to neurological disorders (spinal cord injury), bladder abnormalities, growth or change in the microbial flora of the bladder, or it may be idiopathic.
- Mixed urinary incontinence - has symptoms of stress and urgent incontinence; may occur after surgery (hysterectomy, Cesarean section).

Another classification of urinary incontinence differentiates two more types:

- Urinary incontinence due to overflow - continuous urinary discharge or urinary dribbling during the incomplete emptying of the bladder. Associated symptoms include weak or intermittent urinary flow, nocturia, frequent and hesitant urination [24]. When the bladder is full, stressful urinary leakage may occur or small-amplitude bladder contractions may be triggered. Overflow incontinence is caused by the hypomotility of the detrusor or bladder obstruction. Studies suggest that the contractility and effectiveness of the detrusor decrease with age [25]. Severe detrusor hypomotility occurs in approximately 5-10% of older adults [26]. The etiology of detrusor hypomotility include damage to smooth muscles from acute, chronic or severe bladder over-distension, Fowler syndrome, fibrosis, low estrogen levels [27].
- Neurogenic (reflex) urinary incontinence - bladder dysfunction due to a neurological disorder affecting the brain or spinal cord: multiple sclerosis or stroke, peripheral neuropathy (secondary to diabetes, vitamin B12 deficiency or alcoholism), spinal lesions [28-30].

## Discussions

In comprehensive surveys on groups of non-pregnant women, urinary incontinence was present in 3% of adult women under the age of 35, 7% for the 55-64 age group and 38% for women over the age of 60 [31]. However, studies reveal that age cannot be an independent risk factor for incontinence [28-32].

Reducing body weight in obese patients is associated with improving and resolving urinary incontinence, especially stress urinary incontinence (SUI). Several

observational studies have reported a reduction of over 50% in stress urinary incontinence after bariatric surgery-induced weight loss [33-36].

Although multiparity is considered a risk factor, nulliparous people report disturbing urinary incontinence [37,38].

The mode of birth influences the occurrence of incontinence, but multicentered studies have shown that Cesarean deliveries does not protect women from urinary incontinence [39-43].

The family history of incontinence was analyzed by Hannestad YS et al. who found that the risk was increased for both the daughters and sisters of women with urinary incontinence [22, 44].

Other studies have looked into the relationship between race/ ethnicity and the occurrence of urinary incontinence. The results showed a higher prevalence among non-Hispanic white women compared to African American women [45-49]. Other studies do not report differences between racial/ ethnic groups [50-53].

O'Halloran T et al. analyzed the rate of UI among nulliparous women, the impact on the quality of life and its association with certain risk factors. They selected a sample of nulliparous Australian women aged 16 to 30 years and conducted a cross-sectional, self-administered study based on questionnaires applied in medical clinics and university campuses [6]. Out of the 1,620 questionnaires, 1,002 provided analyzable data. The average age of the participants was 22.5 years. UI rates varied depending on the sexual activity and the use of combined oral contraceptives (COCs). Women with UI reported significantly lower overall well-being than women without UI and associated more frequently with symptoms related to anxiety and depression [54].

Nurses' Health Study II is a project that began in 1989 and was based on questionnaires mailed to women between the ages of 25 and 42 in 14 US states. Follow-up questionnaires are sent every two years to update lifestyle and health information. The urinary incontinence data were first requested in 2001. Tracking remains high, reaching up to 90% nowadays [55-57]. The study was approved by the Institutional Review Board of Brigham and Women's Hospital. The authors defined two groups of cases: a group of women who reported occasional urine loss 1 to 3 times a month and a second group of women with frequent urine loss, at least once a week. They considered severe UI a quantitative (sufficient to wet underwear) and frequent loss of urine. This definition was based on a validated severity index, which correlates well with buffer weights [58-62]. Women who did not meet the definition of the relevant case or control were not included in this analysis. Being a cross-sectional study, the authors tried to reduce the probability of inverse causation by imposing a short delay between the ratio of risk factors and incontinence. A delay period of 2

years was chosen, because it was not desired to assess the risk factors at a distance from the occurrence of UI [63-66]. Parity, the history of the use of oral contraceptives and the consumption of tobacco are data obtained by means of the questionnaires from 1989-1999. The BMI was calculated with self-reported height in 1989 and 1999. Race and ethnicity information was obtained in 1989, when participants were asked to mark one of the answer options "Southern Europe/ Scandinavia/ others", respectively "white/ black/ Hispanic/ Asian/ other race" in the questionnaire. In each questionnaire, participants reported whether they were diagnosed with diabetes or had any history of hysterectomy. The study found that responses to health questionnaires, including those that reported type 2 diabetes, are extremely valid. The results show that 43% of the women had lost urine at least once a month [67-69].

People between the ages of 50 and 54 are twice as likely to develop severe incontinence as those under the age of 40. Chiarelli et al. found a 36% prevalence of UI in a group of 14,070 Australian women aged 45 to 50 years [68]. In a review of 13 general population studies, Hunskaar et al. reported a prevalence of incontinence of 30% to 40% among middle-aged women [69].

White women were more likely to have UI than black women or Asians. No significant differences were found between white and Hispanic women, as observed by other authors [70-74].

The BMI has been strongly associated with incontinence. In a comparison of obese women with BMI  $\geq 30$  kg/ m<sup>2</sup> and those with BMI between 22 and 24 kg/ m<sup>2</sup>, the chances of occasional incontinence were 2 times higher for the first group, increasing 3 times the probability of severe incontinence. Women with a BMI  $< 22$  kg/ m<sup>2</sup> have a significantly reduced chance of incontinence [75]. Noblett et al. found strong correlations between the BMI and intra-abdominal pressure and intravesical pressure, suggesting that obesity may cause a chronic state of increased pressure that is also felt in the pelvic floor [72]. Massive weight loss in women with morbid obesity has been associated with a decrease in stress incontinence (prevalence of 61.2% before bariatric surgery compared to the prevalence of 11.6% after stabilization of weight loss) [76-78].

Type 2 diabetes has been associated with a moderate but statistically significant increase in the possibility of frequent or severe incontinence. Hyperglycemia is correlated with increased urine volume and detrusor overload; microvascular complications of diabetes can affect the innervation of the bladder and alter the muscular function of the detrusor [78].

Parity was positively associated with incontinence. Women with 2 previous births are 67% more likely to develop UI than women with no births [24,36]. Cesarean

delivery can prevent trauma to the muscles and connective tissue in the pelvic floor, pudendal and pelvic nerve injuries that are associated with vaginal birth [70,73].

A history of hysterectomy is associated with a significant increase in incontinence. Hysterectomy could be a marker of pelvic floor dysfunction. In a meta-analysis of 11 observational studies, Brown et al. observed a significant increase in the chances of incontinence after hysterectomy in women over 60 years of age (but not in those under 60 years of age), suggesting that hysterectomy may have long-term effects on UI, but not long-term short [16,20,34,45].

Smoking has statistically significant links with both frequent and severe incontinence. There are many potential ways in which smoking can affect continence: smoker's cough can damage the mechanism of the urethral sphincter, decreased collagen synthesis that is associated with smoking can weaken pelvic support structures, and smoking-related diseases (such as vascular disease, asthma) and obstructive pulmonary disease) may have indirect or direct effects on bladder and urethral functions [31,77,79].

In similar studies performed on young and middle-aged women who used similar definitions of incontinence to the previous study, prevalence reports were consistent with those observed by Kim N. Danforth et al [71].

## Conclusions

Given the lack of epidemiological or biological data on incontinence in different racial or ethnic groups, it is difficult to conclude why the findings on race and ethnicity may vary from study to study. Further research is needed.

Obesity, hysterectomy and type 2 diabetes are the most influential risk factors in most studies.

Studies on middle-aged women have shown that BMI, parity, age, hysterectomy, smoking, race, ethnicity and diabetes are factors often associated with urinary incontinence.

Future studies are needed to further explore the risk factors for incontinence.

## Conflict of interest disclosure

There are no known conflicts of interest in the publication of this article. The manuscript was read and approved by all authors.

## Compliance with ethical standards

Any aspect of the work covered in this manuscript has been conducted with the ethical approval of all relevant bodies and that such approvals are acknowledged within the manuscript.

## References

1. Abrams P, Cardozo L, Fall M, Griffiths D, Rosier P, Ulmsten U, van Kerrebroeck P, Victor A, Wein A; Standardisation Sub-committee of the International Continence Society. The standardisation of terminology of lower urinary tract function: report from the Standardisation Sub-committee of the International Continence Society. *Neurourol Urodyn*. 2002;21(2):167-78. doi: 10.1002/nau.10052
2. Mardon RE, Halim S, Pawlson LG, Haffer SC. Management of urinary incontinence in Medicare managed care beneficiaries: results from the 2004 Medicare Health Outcomes Survey. *Arch Intern Med*. 2006;166(10):1128-33. doi: 10.1001/archinte.166.10.1128
3. Griffiths AN, Makam A, Edwards GJ. Should we actively screen for urinary and anal incontinence in the general gynaecology outpatients setting? A prospective observational study. *J Obstet Gynaecol*. 2006;26(5):442-4. doi: 10.1080/01443610600747272
4. Minassian VA, Yan X, Lichtenfeld MJ, Sun H, Stewart WF. The iceberg of health care utilization in women with urinary incontinence. *Int Urogynecol J*. 2012;23(8):1087-93. doi: 10.1007/s00192-012-1743-x
5. Wu JM, Vaughan CP, Goode PS, Redden DT, Burgio KL, Richter HE, Markland AD. Prevalence and trends of symptomatic pelvic floor disorders in U.S. women. *Obstet Gynecol*. 2014;123(1):141-148. doi: 10.1097/AOG.0000000000000057
6. O'Halloran T, Bell RJ, Robinson PJ, Davis SR. Urinary incontinence in young nulligravid women: a cross-sectional analysis. *Ann Intern Med*. 2012;157(2):87-93. doi: 10.7326/0003-4819-157-2-201207170-00005
7. Tennstedt SL, Link CL, Steers WD, McKinlay JB. Prevalence of and risk factors for urine leakage in a racially and ethnically diverse population of adults: the Boston Area Community Health (BACH) Survey. *Am J Epidemiol*. 2008;167(4):390-9. doi: 10.1093/aje/kwm356
8. Nygaard I, Barber MD, Burgio KL, Kenton K, Meikle S, Schaffer J, Spino C, Whitehead WE, Wu J, Brody DJ; Pelvic Floor Disorders Network. Prevalence of symptomatic pelvic floor disorders in US women. *JAMA*. 2008;300(11):1311-6. doi: 10.1001/jama.300.11.1311
9. Vaughan CP, Markland AD. Urinary Incontinence in Women. *Ann Intern Med*. 2020;172(3):ITC17-ITC32. doi: 10.7326/AITC202002040
10. Legendre G, Ringa V, Panjo H, Zins M, Fritel X. Incidence and remission of urinary incontinence at midlife: a cohort study. *BJOG*. 2015;122(6):816-24. doi: 10.1111/1471-0528.12990
11. 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. doi: 10.1111/j.1464-410X.2008.07601.x
12. Yip SK, Cardozo L. Psychological morbidity and female urinary incontinence. *Best Pract Res Clin Obstet Gynaecol*. 2007;21(2):321-9. doi: 10.1016/j.bpobgyn.2006.12.002
13. Ratner ES, Erekson EA, Minkin MJ, Foran-Tuller KA. Sexual satisfaction in the elderly female population: A special focus on women with gynecologic pathology. *Maturitas*. 2011;70(3):210-5. doi: 10.1016/j.maturitas.2011.07.015
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. doi: 10.1111/j.1464-410X.2009.08371.x
15. Barber MD, Visco AG, Wyman JF, Fantl JA, Bump RC. Continence Program for Women Research Group. Sexual function in women with urinary incontinence and pelvic organ prolapse. *Obstet Gynecol*. 2002;99(2):281-9. doi: 10.1016/s0029-7844(01)01727-6
16. Brown JS, McGhan WF, Chokroverty S. Comorbidities associated with overactive bladder. *Am J Manag Care*. 2000;6(11 Suppl):S574-9.
17. Serati M, Salvatore S, Uccella S, Nappi RE, Bolis P. Female urinary incontinence during intercourse: a review on an understudied problem for women's sexuality. *J Sex Med*. 2009;6(1):40-8. doi: 10.1111/j.1743-6109.2008.01055.x
18. Gray T, Li W, Campbell P, Jha S, Radley S. Evaluation of coital incontinence by electronic questionnaire: prevalence, associations and outcomes in women attending a urogynaecology clinic. *Int Urogynecol J*. 2018;29(7):969-978. doi: 10.1007/s00192-017-3380-x
19. Munaganuru N, Van Den Eeden SK, Creasman J, Subak LL, Strano-Paul L, Huang AJ. Urine leakage during sexual activity among ethnically diverse, community-dwelling middle-aged and older women. *Am J Obstet Gynecol*. 2017;217(4):439.e1-439.e8. doi: 10.1016/j.ajog.2017.05.069
20. Brown JS, Vittinghoff E, Wyman JF, Stone KL, Nevitt MC, Ensrud KE, Grady D. Urinary incontinence: does it increase risk for falls and fractures? Study of Osteoporotic Fractures Research Group. *J Am Geriatr Soc*. 2000;48(7):721-5. doi: 10.1111/j.1532-5415.2000.tb04744.x
21. Herzog AR, Diokno AC, Brown MB, Fultz NH, Goldstein NE. Urinary incontinence as a risk factor for mortality. *J Am Geriatr Soc*. 1994;42(3):264-8. doi: 10.1111/j.1532-5415.1994.tb01749.x

22. Hannestad YS, Rortveit G, Sandvik H, Hunskaar S; Norwegian EPINCONT study. Epidemiology of Incontinence in the County of Nord-Trøndelag. A community-based epidemiological survey of female urinary incontinence: the Norwegian EPINCONT study. *Epidemiology of Incontinence in the County of Nord-Trøndelag. J Clin Epidemiol.* 2000;53(11):1150-7. doi: 10.1016/s0895-4356(00)00232-8
23. Subak LL, Richter HE, Hunskaar S. Obesity and urinary incontinence: epidemiology and clinical research update. *J Urol.* 2009;182(6 Suppl):S2-7. doi: 10.1016/j.juro.2009.08.071
24. Al-Mukhtar Othman J, Åkervall S, Milsom I, Gyhagen M. Urinary incontinence in nulliparous women aged 25-64 years: a national survey. *Am J Obstet Gynecol.* 2017;216(2):149.e1-149.e11. doi: 10.1016/j.ajog.2016.09.104
25. Lawrence JM, Lukacz ES, Liu IL, Nager CW, Lubner KM. Pelvic floor disorders, diabetes, and obesity in women: findings from the Kaiser Permanente Continence Associated Risk Epidemiology Study. *Diabetes Care.* 2007;30(10):2536-41. doi: 10.2337/dc07-0262
26. MacLennan AH, Taylor AW, Wilson DH, Wilson D. The prevalence of pelvic floor disorders and their relationship to gender, age, parity and mode of delivery. *BJOG.* 2000;107(12):1460-70. doi: 10.1111/j.1471-0528.2000.tb11669.x
27. Lukacz ES, Lawrence JM, Contreras R, Nager CW, Lubner KM. Parity, mode of delivery, and pelvic floor disorders. *Obstet Gynecol.* 2006;107(6):1253-60. doi: 10.1097/01.AOG.0000218096.54169.34
28. Rogers RG. Clinical practice. Urinary stress incontinence in women. *N Engl J Med.* 2008;358(10):1029-36. doi: 10.1056/NEJMc0707023
29. Matthews CA, Whitehead WE, Townsend MK, Grodstein F. Risk factors for urinary, fecal, or dual incontinence in the Nurses' Health Study. *Obstet Gynecol.* 2013;122(3):539-45. doi: 10.1097/AOG.0b013e31829efbff
30. Dallosso HM, McGrother CW, Matthews RJ, Donaldson MM, Leicestershire MRC. Incontinence Study Group. The association of diet and other lifestyle factors with overactive bladder and stress incontinence: a longitudinal study in women. *BJU Int.* 2003;92(1):69-77. doi: 10.1046/j.1464-410x.2003.04271.x
31. Tähtinen RM, Auvinen A, Cartwright R, Johnson TM 2nd, Tammela TLJ, Tikkinen KAO. Smoking and bladder symptoms in women. *Obstet Gynecol.* 2011;118(3):643-648. doi: 10.1097/AOG.0b013e318227b7ac
32. Melville JL, Katon W, Delaney K, Newton K. Urinary incontinence in US women: a population-based study. *Arch Intern Med.* 2005;165(5):537-42. doi: 10.1001/archinte.165.5.537
33. Grodstein F, Fretts R, Lifford K, Resnick N, Curhan G. Association of age, race, and obstetric history with urinary symptoms among women in the Nurses' Health Study. *Am J Obstet Gynecol.* 2003;189(2):428-34. doi: 10.1067/s0002-9378(03)00361-2
34. Brown JS, Sawaya G, Thom DH, Grady D. Hysterectomy and urinary incontinence: a systematic review. *Lancet.* 2000;356(9229):535-9. doi: 10.1016/S0140-6736(00)02577-0
35. Ouslander JG. Management of overactive bladder. *N Engl J Med.* 2004;350(8):786-99. doi: 10.1056/NEJMra032662
36. Jackson SL, Scholes D, Boyko EJ, Abraham L, Fihn SD. Urinary incontinence and diabetes in postmenopausal women. *Diabetes Care.* 2005;28(7):1730-8. doi: 10.2337/diacare.28.7.1730
37. Jura YH, Townsend MK, Curhan GC, Resnick NM, Grodstein F. Caffeine intake, and the risk of stress, urgency and mixed urinary incontinence. *J Urol.* 2011;185(5):1775-80. doi: 10.1016/j.juro.2011.01.003
38. Phelan S, Grodstein F, Brown JS. Clinical research in diabetes and urinary incontinence: what we know and need to know. *J Urol.* 2009;182(6 Suppl):S14-7. doi: 10.1016/j.juro.2009.07.087
39. Manson JE, Chlebowski RT, Stefanick ML, et al. Menopausal hormone therapy and health outcomes during the intervention and extended poststopping phases of the Women's Health Initiative randomized trials. *JAMA.* 2013;310(13):1353-68. doi: 10.1001/jama.2013.278040
40. Lawrence JM, Lukacz ES, Nager CW, Hsu JW, Lubner KM. Prevalence and co-occurrence of pelvic floor disorders in community-dwelling women. *Obstet Gynecol.* 2008;111(3):678-85. doi: 10.1097/AOG.0b013e3181660c1b
41. Romero-Talamás H, Unger CA, Aminian A, Schauer PR, Barber M, Brethauer S. Comprehensive evaluation of the effect of bariatric surgery on pelvic floor disorders. *Surg Obes Relat Dis.* 2016;12(1):138-43. doi: 10.1016/j.soard.2015.08.499
42. Whitcomb EL, Horgan S, Donohue MC, Lukacz ES. Impact of surgically induced weight loss on pelvic floor disorders. *Int Urogynecol J.* 2012;23(8):1111-6. doi: 10.1007/s00192-012-1756-5
43. Subak LL, King WC, Belle SH, Chen JY, Courcoulas AP, Ebel FE, Flum DR, Khandelwal S, Pender JR, Pierson SK, Pories WJ, Steffen KJ, Strain GW, Wolfe BM, Huang AJ. Urinary Incontinence Before and After Bariatric Surgery. *JAMA Intern Med.* 2015;175(8):1378-87. doi: 10.1001/jamainternmed.2015.2609
44. Hannestad YS, Lie RT, Rortveit G, Hunskaar S. Familial risk of urinary incontinence in women: population based cross sectional study. *BMJ.* 2004;329(7471):889-91. doi: 10.1136/bmj.329.7471.889

45. Brown JS, Nyberg LM, Kusek JW, Burgio KL, Diokno AC, Foldspang A, Fultz NH, Herzog AR, Hunskar S, Milsom I, Nygaard I, Subak LL, Thom DH; National Institute of Diabetes and Digestive Kidney Diseases International Research Working Group on Bladder Dysfunction. Proceedings of the National Institute of Diabetes and Digestive and Kidney Diseases International Symposium on Epidemiologic Issues in Urinary Incontinence in Women. *Am J Obstet Gynecol.* 2003;188(6):S77-88. doi: 10.1067/mob.2003.353
46. Fenner DE, Trowbridge ER, Patel DA, Fultz NH, Miller JM, Howard D, DeLancey JO. Establishing the prevalence of incontinence study: racial differences in women's patterns of urinary incontinence. *J Urol.* 2008;179(4):1455-60. doi: 10.1016/j.juro.2007.11.051
47. Goode PS, Burgio KL, Redden DT, Markland A, Richter HE, Sawyer P, Allman RM. Population based study of incidence and predictors of urinary incontinence in black and white older adults. *J Urol.* 2008;179(4):1449-53. doi: 10.1016/j.juro.2007.11.069
48. Kupelian V, Wei JT, O'Leary MP, Kusek JW, Litman HJ, Link CL, McKinlay JB; BACH Survey Investigators. Prevalence of lower urinary tract symptoms and effect on quality of life in a racially and ethnically diverse random sample: the Boston Area Community Health (BACH) Survey. *Arch Intern Med.* 2006;166(21):2381-7. doi: 10.1001/archinte.166.21.2381
49. Abrams P, Andersson KE, Birder L, Brubaker L, et al; Members of Committees; Fourth International Consultation on Incontinence. Fourth International Consultation on Incontinence Recommendations of the International Scientific Committee: Evaluation and treatment of urinary incontinence, pelvic organ prolapse, and fecal incontinence. *Neurourol Urodyn.* 2010;29(1):213-40. doi: 10.1002/nau.20870
50. Ferreira CHJ, Driusso P, Haddad JM, Pereira SB, Fernandes ACNL, Porto D, Reis BM, Mascarenhas LR, Brito LGO, Ferreira EAG. A guide to physiotherapy in urogynecology for patient care during the COVID-19 pandemic. *Int Urogynecol J.* 2021;32(1):203-210. doi: 10.1007/s00192-020-04542-8
51. Nygaard IE, Wolpern A, Bardsley T, Egger MJ, Shaw JM. Early postpartum physical activity and pelvic floor support and symptoms 1 year postpartum. *Am J Obstet Gynecol.* 2021;224(2):193.e1-193.e19. doi: 10.1016/j.ajog.2020.08.033
52. Minassian VA, Bazi T, Stewart WF. Clinical epidemiological insights into urinary incontinence. *Int Urogynecol J.* 2017;28(5):687-696. doi: 10.1007/s00192-017-3314-7
53. Nygaard I. Clinical practice. Idiopathic urgency urinary incontinence. *N Engl J Med.* 2010;363(12):1156-62. doi: 10.1056/NEJMc1003849
54. Thomas-White KJ, Hilt EE, Fok C, Pearce MM, Mueller ER, Kliethermes S, Jacobs K, Zilliox MJ, Brincat C, Price TK, Kuffel G, Schreckenberger P, Gai X, Brubaker L, Wolfe AJ. Incontinence medication response relates to the female urinary microbiota. *Int Urogynecol J.* 2016;27(5):723-33. doi: 10.1007/s00192-015-2847-x
55. Pearce MM, Hilt EE, Rosenfeld AB, Zilliox MJ, Thomas-White K, Fok C, Kliethermes S, Schreckenberger PC, Brubaker L, Gai X, Wolfe AJ. The female urinary microbiome: a comparison of women with and without urgency urinary incontinence. *mBio.* 2014;5(4):e01283-14. doi: 10.1128/mBio.01283-14
56. Maria Pană, Romina-Marina Sima, Oana-Denisa Bălălaşu, Anca-Daniela Stănescu, Liana Pleş, Mircea-Octavian Poenaru. The quality of sexual life after vaginal surgical interventions. *J Mind Med Sci.* 2020; 7(2): 201-205. doi: 10.22543/7674.72.P201205
57. Schneeweiss J, Koch M, Umek W. The human urinary microbiome and how it relates to urogynecology. *Int Urogynecol J.* 2016;27(9):1307-12. doi: 10.1007/s00192-016-2944-5
58. Myers DL. Female mixed urinary incontinence: a clinical review. *JAMA.* 2014;311(19):2007-14. doi: 10.1001/jama.2014.4299
59. Oana-Denisa Bălălaşu, Octavian-Gabriel Olaru, Adrian V. Dumitru, Ioana Păunică, Anca Daniela Stănescu. Maternal infections with an increased risk of transmission to the foetus; a literature review. *J Clin Invest Surg.* 2020; 5(2): 66-72. doi: 10.25083/2559.5555/5.2/66.72
60. Smith PP. Aging and the underactive detrusor: a failure of activity or activation? *Neurourol Urodyn.* 2010;29(3):408-12. doi: 10.1002/nau.20765
61. Taylor JA 3rd, Kuchel GA. Detrusor underactivity: Clinical features and pathogenesis of an underdiagnosed geriatric condition. *J Am Geriatr Soc.* 2006;54(12): 1920-32. doi: 10.1111/j.1532-5415.2006.00917.x
62. Panicker JN, Game X, Khan S, Kessler TM, Gonzales G, Elneil S, Fowler CJ. The possible role of opiates in women with chronic urinary retention: observations from a prospective clinical study. *J Urol.* 2012; 188(2):480-4. doi: 10.1016/j.juro.2012.04.011
63. Swinn MJ, Fowler CJ. Isolated urinary retention in young women, or Fowler's syndrome. *Clin Auton Res.* 2001;11(5):309-11. doi: 10.1007/BF02332976
64. Mihnea-Alexandru Găman, Iulia Ursuleac, Daniel Coriu. Paroxysmal nocturnal hemoglobinuria: Pandora's box? *J Mind Med Sci.* 2020;7(2): 245-249. doi: 10.22543/7674.72.P245249
65. Gammie A, Kaper M, Dorrepaal C, Kos T, Abrams P. Signs and Symptoms of Detrusor Underactivity: An Analysis of Clinical Presentation and Urodynamic Tests From a Large Group of Patients Undergoing Pressure Flow Studies. *Eur Urol.* 2016;69(2):361-9. doi: 10.1016/j.eururo.2015.08.014



66. Sandvik H, Hunskaar S, Seim A, Hermstad R, Vanvik A, Bratt H. Validation of a severity index in female urinary incontinence and its implementation in an epidemiological survey. *J Epidemiol Community Health*. 1993;47(6):497-9. doi: 10.1136/jech.47.6.497
67. Carey VJ, Walters EE, Colditz GA, Solomon CG, Willett WC, Rosner BA, Speizer FE, Manson JE. Body fat distribution and risk of non-insulin-dependent diabetes mellitus in women. The Nurses' Health Study. *Am J Epidemiol*. 1997;145(7):614-9. doi: 10.1093/oxfordjournals.aje.a009158
68. Oana-Denisa Bălălău, Nicolae Bacalbaşa, Octavian Gabriel Olaru, Liana Pleş, Daniela Anca Stănescu. Vaginal birth after cesarean section – literature review and modern guidelines. *J Clin Invest Surg*. 2020; 5(1): 13-17. doi: 10.25083/2559.5555/5.1/13.17
69. Hunskaar S, Arnold EP, Burgio K, Diokno AC, Herzog AR, Mallett VT. Epidemiology and natural history of urinary incontinence. *Int Urogynecol J Pelvic Floor Dysfunct*. 2000;11(5):301-19. doi: 10.1007/s001920070021
70. Sampselle CM, Harlow SD, Skurnick J, Brubaker L, Bondarenko I. Urinary incontinence predictors and life impact in ethnically diverse perimenopausal women. *Obstet Gynecol*. 2002;100(6):1230-8. doi: 10.1016/s0029-7844(02)02241-x
71. 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. doi: 10.1016/j.ajog.2005.07.051
72. Noblett KL, Jensen JK, Ostergard DR. The relationship of body mass index to intra-abdominal pressure as measured by multichannel cystometry. *Int Urogynecol J Pelvic Floor Dysfunct*. 1997;8(6):323-6. doi: 10.1007/BF02765589
73. Deitel M, Stone E, Kassam HA, Wilk EJ, Sutherland DJ. Gynecologic-obstetric changes after loss of massive excess weight following bariatric surgery. *J Am Coll Nutr*. 1988;7(2):147-53. doi: 10.1080/07315724.1988.10720232
74. Merlo EM, Stoian AP, Motofei IG, Settineri S. Clinical Psychological Figures in Healthcare Professionals: Resilience and Maladjustment as the "Cost of Care". *Front Psychol*. 2020;11:607783. doi: 10.3389/fpsyg.2020.607783
75. Pleş L, Sima RM, Carp D, Alexăndroaia C, Bălălău DO, Stănescu AD, Olaru OG. The psychosocial impact of vaginal delivery and cesarean section in primiparous women. *J Mind Med Sci*. 2018;5(1):70-74. doi: 10.22543/7674.51.P7074
76. Balalau C, Voiculescu S, Motofei I, Scaunasu RV, Negrei C. Low dose tamoxifen as treatment of benign breast proliferative lesions. *Farmacica*. 2015;63(3):371-375.
77. Hannestad YS, Rortveit G, Daltveit AK, Hunskaar S. Are smoking and other lifestyle factors associated with female urinary incontinence? The Norwegian EPINCONT Study. *BJOG*. 2003;110(3):247-54.
78. Ardeleanu V, Toma A, Pafili K, Papanas N, Motofei I, Diaconu CC, Rizzo M, Stoian AP. Current Pharmacological Treatment of Painful Diabetic Neuropathy: A Narrative Review. *Medicina (Kaunas)*. 2020 Jan 9;56(1):25. doi: 10.3390/medicina56010025. PMID: 31936646; PMCID: PMC7022869.
79. Bump RC, McClish DK. Cigarette smoking and urinary incontinence in women. *Am J Obstet Gynecol*. 1992; 167(5):1213-8. doi: 10.1016/s0002-9378(11)91691-3