



Original Article

Assessment of lower urinary tract symptoms in different stages of menopause

LARISSA RAMALHO DANTAS VARELLA, MS¹⁾, ROSSÂNIA BEZERRA DA SILVA, PT¹⁾,
MARIA CLARA EUGÊNIA DE OLIVEIRA, PT¹⁾, PRISCYLLA HELLOUYSE ANGELO MELO, PT¹⁾,
TÉCIA MARIA DE OLIVEIRA MARANHÃO, PhD¹⁾,
MARIA THEREZA ALBUQUERQUE BARBOSA CABRAL MICUSSI, PhD¹⁾*

¹⁾ Federal University of Rio Grande do Norte: Av. Sen Salgado Filho, Lagoa Nova, nº 3000, Code: 59078-970, Brazil

Abstract. [Purpose] To assess lower urinary tract symptoms in different stages of menopause and the quality of life of females with incontinence. [Subjects and Methods] The sample consisted of 302 females, aged between 40 and 56 years, divided into three groups: PRE (n= 81), PERI (n= 108) and POST (n= 113). This was a cross-sectional, analytical, observational study. Data were collected by assessment chart and conducting the International Consultation on Incontinence Questionnaire-Short Form. [Results] Most of the women had less than 10 years of schooling and were married. In PERI and POST menopause, the most frequent lower urinary tract symptoms were urinary urgency and stress incontinence. The PRE group did not exhibit nocturia, urge incontinence or urinary urgency, and had the lowest symptoms frequency. In the three stages, stress incontinence was the most prevalent symptom. Of the three menopause stages, PERI had a greater impact on urinary incontinence according to the International Consultation on Incontinence Questionnaire. [Conclusion] The presence of lower urinary tract symptoms can vary across the different stages of menopause and the urinary incontinence was the most frequent complaint. Moreover, it was observed that quality of life was more affected in the perimenopause stage.

Key words: Menopause, Urinary incontinence, Quality of life

(This article was submitted May 27, 2016, and was accepted Jul. 21, 2016)

INTRODUCTION

Menopause is a period characterized by metabolic, hormonal and clinical changes. It is caused by the progressive decline in ovarian activity, and it may also lead to psychosocial alterations. It encompasses the end of the reproductive phase and the onset of senescence, including the aging process in women, and it occurs on average between 45 and 55 years of age, extending up to 65¹⁾. According to the Stages of Reproductive Aging Workshop (STRAW)²⁾, menopause can be divided into three stages: (1) premenopause, corresponding to the late reproductive phase; (2) perimenopause, divided into early and late menopausal transition; and (3) postmenopause, either early or late menopause, whose individualization and duration are not linear. The first stage is characterized by regular menstrual cycles and increasing levels of follicle-stimulating hormone (FSH). The second one is characterized by variability in menstrual cycle length and increased levels of FSH. At this stage women have skipped cycles or amenorrhea of at least 60 days and continued elevation of FSH. The last stage is characterized by high FSH levels and a decline in serum estradiol levels²⁾.

Vasomotor, genitourinary and emotional symptoms arise during this stage. Among the genitourinary symptoms is the presence of lower urinary tract symptoms (LUTS). These are considered subjective indicators of changes perceived by women, classified as storage symptoms (polyuria, nocturia, urinary incontinence, urgency urinary incontinence, mixed urinary in-

*Corresponding author. Maria Thereza Albuquerque Barbosa Cabral Micussi (E-mail: therezamicussi@yahoo.com.br)

©2016 The Society of Physical Therapy Science. Published by IPEC Inc.

This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial No Derivatives (by-nc-nd) License <<http://creativecommons.org/licenses/by-nc-nd/4.0/>>.

continence, urinary exertional incontinence, nocturnal enuresis, and continuous urinary incontinence), urinary symptoms (weak urinary stream, intermittent urinary stream, hesitation, straining and terminal dribble) and post-micturition symptoms (feeling of incomplete emptying and post-micturition dribble), in addition to coitus-related symptoms (dyspareunia and vaginal dryness)^{3, 4}.

Pelvic floor muscle (PFM) weakness may also occur at the same time as LUTS⁵. At around the age of 40 years, there is a decline in hormone levels, primarily estrogens, which tends to decrease in tropism and strength in these muscles. The reduced ability to generate PFM strength will hinder urethral closure and the emergence and/or aggravation of LUTS⁵⁻⁷.

Furthermore, urinary incontinence, in particular, has a negative effect on quality of life⁸. The high prevalence of LUTS over the course of a woman's life, as well as the high cost for the public health system⁹, have prompted studies that had investigated the natural history of urinary disorders, in order to lessen the impact of these symptoms on the quality of life of millions of women. In addition this fact, the lack of information on these symptoms in the different stages of menopause motivates the development of studies seeking to determine the observe emergence or aggravation in a particular stage.

In this respect, it is expected that hormonal and muscle behavior in menopause may be different due to individual characteristics. However, to date there have been no studies on the presence of LUTS in every stage of menopause. In this regard, the present study aimed to assess the presence of LUTS in the different stages of menopause and to assess the quality of life of women with urinary incontinence.

SUBJECTS AND METHODS

This was a cross-sectional, analytical, observational study. The research was approved by the Federal University of Rio Grande do Norte (UFRN) Research Ethics Committee, number 1.042.362, and complied with the guidelines of National Health Council resolution 466/12. All patients signed a consent form agreeing to participate in the research. Data were collected from June 2014 to June 2015.

The final non-probability sample consisted of 302 females. Initially, the sample contained 326 women, but 24 were excluded after refusing to undergo the physical examination. The subjects were divided into three groups according to the Stages of Reproductive Aging Workshop (STRAW)². The PRE group (n=81) was composed of females in the premenopause stage, the PERI (n=108) of females in perimenopause and the POST (n=113) of postmenopausal. The patients were recruited at the Gynecology Clinic of the Maternity School Januário Cicco, Natal, Brazil.

Subjects who met the inclusion criteria were given an explanation of the study and its objectives before being asked for their informed consent. Included were women aged between 40 and 65 years who met STRAW's criteria, including time point of menarche, lengths and frequency of menstrual cycle, who had not undergone prior physical therapy for pelvic dysfunction who were not engaged in specific exercises for pelvic floor muscles were not using hormone drugs and had not undergone hysterectomy/oophorectomy. Those who refused to complete the questionnaire on urinary symptoms or did not agree to undergo the physical examination were excluded.

Assessment was conducted in two stages: 1) the individual assessment chart and physical examination, and 2) the ICIQ-SF. The assessment chart was created by the authors and contained the following data: identification, sociodemographic data, clinical (prior diseases, comorbidities, surgical history, life habits and medication used), gynecologic history (date of last menstruation, time since onset of menopause, gynecological surgeries or interventions, number of pregnancies, number and types of deliveries), menopausal symptoms (hot flashes, mood changes, tiredness, insomnia, intense sweating) and lower urinary tract disorders (urgency, urge incontinence, nocturia, polyuria, dysuria, type of stream, post-micturition dribble, hesitation, incomplete emptying, stress incontinence, mixed urinary incontinence, weak urinary stream, intermittent urinary stream, straining, dyspareunia, vaginal dryness). The distinction between urgency and urge incontinence was made by self-reference of the presence of urine loss. Urge incontinence was considered when there was urgency (sudden need to urinate) associated with urine loss in any amount.

For the physical examination, a metric tape measure was used to measure waist circumference (cm). The measurement was taken between the last floating rib and the anterior superior iliac spine. We also measured body mass index (BMI), defined as weight (kg) divided by the square of height (m), using a balance and stadiometer, respectively. According to the World Health Organization¹⁰, individuals with a normal BMI exhibit values between 18.5 and 24.9 kg/m²; overweight between 25 and 29.9 kg/m² and obese above 30 kg/m².

The International Consultation on Incontinence Questionnaire-Short Form (ICIQ-SF) is a short, simple, self-applicable instrument that assesses the impact of urinary incompetence (UI) on quality of life and qualifies urinary loss. It has been translated into and validated in Portuguese¹¹. It consists of three questions that assess the frequency, severity and impact of UI, in addition to a set of eight self-diagnostic items that evaluate the causes of UI and situations experienced by patients. Only the three questions are scored, with the total ranging between zero and 21 points; the higher the score, the greater the severity and impact of UI on quality of life. The impact on quality of life is determined by the score of the third rated question, as follows: 0 none, 1 to 3 slight, 4 to 6 moderate, 7 to 9 severe and 10 very severe.

Data were analyzed using SPSS 20.0 software and values were considered significant for values of $p < 0.05$. The Kolmogorov-Smirnov test was used to check normality of the variables. Values are presented as descriptive statistics: frequencies, medians, quartiles and standard deviations. ANOVA was used to compare data.

Table 1. Sociodemographic data of the patients (n=302)

	PRE (n=81)	PERI (n=108)	POST (n=113)
Age (years) - mean \pm SD	37.8 \pm 5.6	48.5 \pm 4.1	55.6 \pm 5.0
Schooling (%)			
• Up to 4 years	16.0 (n=13)	13.9 (n=15)	16.8 (n=19)
• 5 to 8 years	35.8 (n=29)	28.7 (n=31)	31.9 (n=36)
• 9 to 11 years	35.8 (n=29)	34.3 (n=37)	34.5 (n=39)
• More than 12 years	12.4 (n=10)	23.2 (n=25)	16.8 (n=19)
Marital status (%)			
• Single	6.2 (n=5)	2.8 (n=3)	1.8 (n=2)
• Common law	38.3 (n=31)	30.6 (n=33)	31.0 (n=35)
• Married	40.4 (n=40)	60.2 (n=65)	55.8 (n=63)
• Widow	0.0 (n=0)	1.9 (n=2)	8.8 (n=10)
• Divorced	6.17 (n=5)	4.6 (n=5)	2.7 (n=3)
• Income (US\$) (mean \pm SD)	596.4 \pm 145.1	567.9 \pm 162.1	682.0 \pm 98.5

Based on the Brazilian minimum wage (R\$ 788,00). % frequency. n: number of women; SD: standard deviation

Table 2. Lower urinary tract symptoms according to the stage of menopause (N=302)

	PRE (n=81)	PERI (n=108)	POST (n=113)
Daytime frequency (mean \pm SD)	5.5 \pm 0.7	6.1 \pm 2.5	5.1 \pm 2.5
Nighttime frequency (mean \pm SD)	0.5 \pm 0.7	0.9 \pm 1.0	0.9 \pm 1.0
Urgency (%*)	0.0 (n=0) [†]	51.9 (n=56) [†]	41.6 (n=47) [†]
Continent (%*)	75.3 (n=61) ^{†,£}	25.0 (n=27) ^{†,α}	3.5 (n=4) ^{£,α}
SI (%*)	17.3 (n=14) ^{†,£}	50.0 (n=54) [†]	48.7 (n=55) [£]
UI (%*)	0.0 (n=0) ^{†,£}	21.6 (n=20) [†]	13.6 (n=12) [£]
MI (%*)	7.4 (n=6) [†]	13.9 (n=15) [£]	30.1 (n=34) ^{†,£}

*Significant difference according to the χ^2 test $p < 0.05$. Same symbols(I, £, α) show a significant difference after statistical test. % frequency. n: number of women; SD: standard deviation; SI: stress incontinence; UI: urge incontinence; MI: mixed incontinence

RESULTS

Sociodemographic analysis showed the homogeneity of all variables ($p > 0.05$) except age. Subjects ranged in age from 40 to 56 years, with a mean of 37.8 \pm 5.6 years in the PRE, 48.5 \pm 4.1 years in the PERI and 55.6 \pm 5.0 years in the POST group. In all of these groups, most women had less than 10 years of schooling and were married (Table 1). No volunteers had diabetes and none took hormonal drugs. There were smokers in the groups: 3 (6.2%) in the PRE, 6 (5.5%) in the PERI and 5 (4.4%) in the POST.

In relation to gynecologic-obstetric history, the postmenopausal group reported 8.3 \pm 7.1 years of menopause. With respect to deliveries, there was no difference among the group medians (Normal delivery – PERI: 2.0 (0–3) and POST: 2.0 (0–3). Any volunteer in the PRE presented normal delivery; Cesarean delivery – Pre: 1.0 (0–2), PERI: 0.0 (0–1), POST: 0.0 (0–1). On physical examination there was no difference in BMI among the groups – Pre: 27.5 \pm 3.4, PERI: 29.9 \pm 5.3 and POST: 29.1 \pm 8.3.

The investigation of urinary history showed no significant differences between daytime and nighttime urinary frequency among the three groups, even though the POST group displayed higher nighttime frequency than that of the PRE group. There was a tendency towards an increased prevalence of urinary urgency in the perimenopausal period. The PRE group exhibited the fewest lower urinary tract symptoms. In terms of stress incontinence, most women leaked urine as a result of exertion: 17.3% in the PRE, 50.0% in the PERI and 48.7% in the POST group (Table 2).

Assessment of the impact of urinary continence on quality of life showed that the perimenopausal group had a statistically significant difference in final ICIQ score ($p = 0.04$) when compared with the pre and postmenopausal groups PRE: 2.7 \pm 3.6, PERI: 7.0 \pm 1.9, POST: 3.7 \pm 0.9. In relation to the percent impact on quality of life, the PERI group showed the

Table 3. Assessment of the impact of urinary incontinence on menopausal women, according to the stage of menopause (N=302)

	PRE (n=81)	PERI (n=108)	POST (n=113)
Total score (mean ± SD)	2.7 ± 3.6	7.0 ± 1.9	3.7 ± 0.9
Classification (%)			
• Absent*	75.3 (n=61) [£]	25.0 (n=27) ^{£,†}	3.5 (n=4) ^{£,†}
• Slight*	23.5 (n=19) [£]	30.6 (n=33) [†]	49.6 (n=56) ^{£,†}
• Moderate*	1.3 (n=1) [£]	27.8 (n=30) ^{£,†}	39.8 (n=45) ^{£,†}
• Severe*	0.0 (n=0) [£]	16.9 (n=18) ^{£,†}	7.1 (n=8) ^{£,†}
Causes of UI (%)			
• lost urine before going to the bathroom	18.5 (n=15)	45.4 (n=49)	48.7 (n=55)
• lost urine when coughing	24.7 (n=20)	81.5 (n=88)	89.4 (n=101)
• lost urine when sleeping	0.0 (n=0)	0.9 (n=1)	0.0 (n=0)
• lost urine during physical exercise	24.7 (n=20)	83.3 (n=90)	89.4 (n=101)
• lost urine when finishing micturition after wearing underwear	1.3 (n=1)	1.8 (n=2)	0.9 (n=1)
• lost urine for no obvious reason	0.0 (n=0)	0.9 (n=1)	2.7 (n=3)
• lose urine all the time	0.0 (n=0)	0.0 (n=0)	0.0 (n=0)
Frequency of urine leakage (%)			
• never	75.3 (n=61)	25.0 (n=27)	3.5 (n=4)
• once a week or less per week	8.6 (n=7)	3.7 (n=4)	6.2 (n=7)
• twice or three times per week	13.6 (n=11)	19.5 (n=21)	31.9 (n=36)
• Once a day	2.5 (n=2)	45.4 (n=49)	26.5 (n=30)
• Several times a day	0.0 (n=0)	6.5 (n=7)	11.5 (n=13)
• All the time	0.0 (n=0)	0.0 (n=0)	0.0 (n=0)

*Significant difference according to the χ^2 test $p < 0.05$. n: number of women; % frequency; SD: standard deviation; Same symbols (£, †) show a significant difference after statistical test.

highest frequency in relation to the PRE and POST groups, with a value of 16.7%, compared to the PRE and POST groups, respectively (0.0% and 7.1%) (Table 3).

DISCUSSION

The results of this study show that lower urinary tract symptoms (LUTS) are more frequent in the peri and postmenopausal period. The literature reports that half of women exhibit urinary symptoms in menopause, evidenced by an increased frequency of daytime, nighttime and urinary incontinence. These symptoms start to appear in the menopause transition period and may worsen over time¹².

In menopause, it is believed that the presence of LUTS is related to a decrease in urethral pressure, caused by a decline in estrogens, in addition to changes resulting from age itself, such as a decrease in blood circulation, insufficient stimulation of alpha-adrenergic receptors and conjunctive tissue atrophy. These changes are also responsible for negative repercussions on the pelvic floor complex, which are aggravated by prior history of traumatic and obstetric injury¹³. Age seems to be the primary cause of urinary disorders, causing decreases in collagen fibers, declines in bladder capacity and low postmenopausal estrogen levels¹⁴⁻¹⁶.

Within LUTS, UI, regardless of type, was the most frequently reported. Aging is known to be the most important risk factor for female UI, affecting menopausal women, with indices of 43% in the 35 to 81 year age group¹⁷. A number of urinary disorders can be caused by decreased bladder capacity in women with more than 10 years since menopause onset compared to those with less than 5 years, decreasing from between 500 and 600 ml to between 250 and 300 ml after menopause. This contributes to the increased urinary frequency and nocturia, due to low estrogen levels that act on proprioception of the bladder, which cannot accommodate larger volumes, in addition to the presence of comorbidities such as chronic diseases and a higher body mass index¹⁸.

Our results also showed a high prevalence of SI symptoms for women in the peri and postmenopause groups, but not the premenopause group, during which most individuals were continent. In relation to type of incontinence, the three groups showed a higher prevalence of stress incontinence. One study conducted in Brazil with incontinent menopausal women aged between 35 and 81 years showed that SI was the most frequent symptom (30.7%), followed by UI (14.2%) and MI (10%)¹⁹. Another investigation showed that the prevalence of urinary symptoms exhibited an increase in SI frequency in women aged between 40 and 55 years and a decline after this age. The authors previously reported that hypoestrogenism, a characteristic

of this phase, has a clear effect on the urinary tract, causing tropic changes that aggravate or trigger SI¹⁸).

Urinary urgency was also a highly frequent symptom (51.85% in the PERI and POST groups). No complaints of urinary urgency were observed in the PRE group. Urgency and urge incontinence are the most common causes of permanent urinary incontinence in elderly patients²⁰. Advancing age, diabetes and urinary tract infections are associated with urge incontinence^{20, 21}).

The most frequent clinical diagnosis in climacteric woman is SI. However, the longer the postmenopausal time, the greater the frequency of urinary urgency²²). This study corroborates our investigation, since, despite the high incidence of irritative urinary symptoms, such as urgency and incontinence, SI was the main urinary disorder in this age group.

In our research, no difference was found between urinary frequencies. Moreover, nocturia did not show a high prevalence of urinary symptoms in these women. Studies demonstrate that there is no difference in daily urinary frequency, UI or urgency in women in menopausal transition or postmenopause, but nocturia may be more prevalent in women during postmenopause. These symptoms result from changes in the urinary system that are related to the hormonal state and are factors aggravating UI during menopause^{18, 20, 23}).

Estrogen receptors are located in the bladder, urethra, mucosa, vagina and support structures, and the decline in this hormone is associated with submucosal thinning and loss of sphincter tonus, and the consequent decrease in urethral closure pressure. These physiological changes are closely related to the emergence of dysfunctions in this complex and UI^{14, 18}). However, one study found a higher prevalence of urinary symptoms in women older than 40 years of age, including nocturia with a significant incidence of 80.95%²³).

Age-related urinary changes, such as urinary incontinence, often lead to severe psychosocial problems that have a negative effect on the quality of life of women^{8, 9, 16}). This study found that the perimenopausal period exerted a greater impact on quality of life in relation to urinary losses. Several studies have demonstrated that UI has a negative influence on the quality of life of women aged between 40 and 65 years, as determined by the ICIQ-SF^{8, 9, 24}). In other words, regardless of the type of urinary loss, quality of life is compromised to some extent. It is important to emphasize that, although it does not limit their daily activities or cause social reclusion, most women recognize that UI affects their health perception and has a negative impact²⁵).

The literature reports that SI affects quality of life more than urge incontinence (79% and 44%, respectively). This is likely due to the larger number of women with complaints of stress incontinence treated by the health services²⁵). On the other hand, another study⁸) found that women with mixed incontinence and urge incontinence exhibited lower quality of life in terms of health aspects when compared to women with SI.

Even though urgency was more prevalent in the perimenopause group, followed by SI, these two symptoms may have a greater impact on the quality of life of these menopausal women. Our present study found that the perimenopause stage had a greater impact on urinary incontinence than the pre and postmenopause stages. This suggests that the marked prevalence in this group results from hormonal changes that culminate in menopause and the onset of LUTS. Furthermore, the POST group showed less discomfort than the PERI group.

This likely occurred because of an accommodation phase to LUTS, the hypoestrogenism state, menopause-related changes and the natural aging process. It is important to highlight that these patients are generally users of Brazil's National Health Service (SUS), and are seldom advised or have access to information on the stage they are in and the specific consequences.

Due to study limitations, it was not possible to continue the research in terms of the perseverance of these symptoms in the lower urinary tract of the women investigated, since the experiment was conducted at a specific time, given that it was a cross-sectional study. Moreover, there is no questionnaire about LUTS that has been validated in the Brazil.

This study showed that LUTS varies across in the different stages of menopause, exhibiting greater frequency in the peri and postmenopause period. Moreover, urgency is the most frequent complication, followed by SI. It was also found that the quality of life score of these menopausal women was very low, indicating a greater negative impact during the perimenopause period. It is important to underscore that this study, different from others, conducted assessments in each stage of menopause, thereby determining the particular characteristics of each period.

REFERENCES

- 1) Takahashi TA, Johnson KM: Menopause. *Med Clin North Am*, 2015, 99: 521–534. [[Medline](#)] [[CrossRef](#)]
- 2) Harlow SD, Gass M, Hall JE, et al. STRAW 10 Collaborative Group: Executive summary of the Stages of Reproductive Aging Workshop + 10: addressing the unfinished agenda of staging reproductive aging. *Menopause*, 2012, 19: 387–395. [[Medline](#)] [[CrossRef](#)]
- 3) Terauchi M, Hirose A, Akiyoshi M, et al.: Prevalence and predictors of storage lower urinary tract symptoms in perimenopausal and postmenopausal women attending a menopause clinic. *Menopause*, 2015, 22: 1084–1090. [[Medline](#)] [[CrossRef](#)]
- 4) Denys MA, Anding R, Tubaro A, et al.: Lower urinary tract symptoms and metabolic disorders: ICI-RS 2014. *Neurourol Urodyn*, 2016, 35: 278–282. [[Medline](#)] [[CrossRef](#)]
- 5) Pierce H, Perry L, Chiarelli P, et al.: A systematic review of prevalence and impact of symptoms of pelvic floor dysfunction in identified workforce groups. *J Adv Nurs*, 2016, 72: 1718–1734. [[Medline](#)] [[CrossRef](#)]
- 6) Sartori DV, Gameiro MO, Yamamoto HA, et al.: Reliability of pelvic floor muscle strength assessment in healthy continent women. *BMC Urol*, 2015, 15: 29.

- [Medline] [CrossRef]
- 7) Calleja-Agius J, Brincat MP: The urogenital system and the menopause. *Climacteric*, 2015, 18: 18–22. [Medline] [CrossRef]
 - 8) Hewison A, McCaughan D, Watt I: Assessing quality of life with incontinence. *Nurs Times*, 2015, 111: 21–23. [Medline]
 - 9) Lang K, Alexander IM, Simon J, et al.: The impact of multimorbidity on quality of life among midlife women: findings from a U.S. nationally representative survey. *J Womens Health (Larchmt)*, 2015, 24: 374–383. [Medline] [CrossRef]
 - 10) World Health Organization: Obesity: preventing and managing the global epidemic. Report. Geneva: WHO, 1997.
 - 11) Tamanini JT, Dambros M, D'Ancona CA, et al.: Validation of the “International Consultation on Incontinence Questionnaire—Short Form” (ICIQ-SF) for Portuguese. *Rev Saude Publica*, 2004, 38: 438–444. [Medline] [CrossRef]
 - 12) Mannella P, Palla G, Bellini M, et al.: The female pelvic floor through midlife and aging. *Maturitas*, 2013, 76: 230–234. [Medline] [CrossRef]
 - 13) Rikard-Bell J, Iyer J, Rane A: Perineal outcome and the risk of pelvic floor dysfunction: a cohort study of primiparous women. *Aust N Z J Obstet Gynaecol*, 2014, 54: 371–376. [Medline] [CrossRef]
 - 14) Robinson D, Toozs-Hobson P, Cardozo L: The effect of hormones on the lower urinary tract. *Menopause Int*, 2013, 19: 155–162. [Medline]
 - 15) Varella LR, Torres VB, Angelo PH, et al.: Influence of parity, type of delivery, and physical activity level on pelvic floor muscles in postmenopausal women. *J Phys Ther Sci*, 2016, 28: 824–830. [Medline] [CrossRef]
 - 16) Ghaderi F, Oskouei AE: Physiotherapy for women with stress urinary incontinence: a review article. *J Phys Ther Sci*, 2014, 26: 1493–1499. [Medline] [CrossRef]
 - 17) Pace G, Silvestri V, Gualá L, et al.: Body mass index, urinary incontinence, and female sexual dysfunction: how they affect female postmenopausal health. *Menopause*, 2009, 16: 1188–1192. [Medline] [CrossRef]
 - 18) Møller LA, Lose G, Jørgensen T: The prevalence and bothersomeness of lower urinary tract symptoms in women 40–60 years of age. *Acta Obstet Gynecol Scand*, 2000, 79: 298–305. [Medline] [CrossRef]
 - 19) Faúndes A, Guarisi T, Pinto Neto AM, et al.: Incontinência urinária entre mulheres climatéricas brasileiras: inquérito domiciliar. *Rev Saude Publica*, 2001, 35: 438–435.
 - 20) Juliato CR, Baccaro LF, Pedro AO, et al.: Subjective urinary urgency in middle age women: a population-based study. *Maturitas*, 2016, 85: 82–87. [Medline] [CrossRef]
 - 21) Wang R, Lefevre R, Hacker MR, et al.: Diabetes, glycemic control, and urinary incontinence in women. *Female Pelvic Med Reconstr Surg*, 2015, 21: 293–297. [Medline] [CrossRef]
 - 22) Coyne KS, Sexton CC, Bell JA, et al.: The prevalence of lower urinary tract symptoms (LUTS) and overactive bladder (OAB) by racial/ethnic group and age: results from OAB-POLL. *Neurourol Urodyn*, 2013, 32: 230–237. [Medline] [CrossRef]
 - 23) Lin TL, Ng SC, Chen YC, et al.: What affects the occurrence of nocturia more: menopause or age? *Maturitas*, 2005, 50: 71–77. [Medline] [CrossRef]
 - 24) Rett MT, Simões JA, Hermann V, et al.: Qualidade de vida em mulheres após tratamento da incontinência urinária de esforço com fisioterapia. *Rev Bras Ginecol Obstet*, 2007, 29: 134–140. [CrossRef]
 - 25) Coyne KS, Zhou Z, Thompson C, et al.: The impact on health-related quality of life of stress, urge and mixed urinary incontinence. *BJU Int*, 2003, 92: 731–735. [Medline] [CrossRef]