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Original Research Article

Physical performance, fear of fall and urinary incontinence among premenopausal, perimenopausal and postmenopausal women

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ABSTRACT

Background: The menopausal transition, which occurs when a woman transitions from reproductive to post-reproductive life, is an important turning point in the female life cycle. The prevalence of menopausal symptoms has been shown to vary widely across various Asian research. It's critical to comprehend the connection between menopausal women's health and well-being and physical performance, fear of falling, and urine incontinence in order to design effective therapies.
Methods: The study was approved for conduct by the ethical committee. 195 women in the 45–60 age range participated in this 1.5-year observational analytical study, which was conducted in a community setting.
Results: Statistical package for the social sciences (SPSS) version 20.0 was used to analyze the data, and a significance level of less than 0.05 was regarded as statistically significant.
Conclusions: Transition through menopause is associated with lowered physical performance, high concern fear of fall in postmenopausal compared to premenopausal and perimenopausal while urinary incontinence varies across different stages of menopause.

Keywords: Menopause, Physical performance, Fear of fall, Urinary incontinence

INTRODUCTION

The transition from reproductive to post reproductive life in women is called the menopausal transition which marks a significant milestone in the female life cycle.[1] The gold standard system for characterizing reproductive aging through menopause is STRAW staging system.[2] As per the PAN India survey based on the data collected from 21 cities all over India, natural menopause age of Indian women was determined to be 46.2±4.9 years.[3] There is wide range of reported prevalence of menopausal symptoms from different studies conducted in Asia.[4] According to a study conducted in India prevalence of menopausal symptoms was found to be 87.7%.[5] According to Sudha et al the proportion of menopausal symptoms are significantly high in both rural and urban women. But the severity of symptoms is found more distressing for rural women might be due to financial problems, issues of unemployment or underemployment, discrimination, lack of education, poorer access to health services.[6] Hence, symptoms attributed to menopause vary between individuals and cultures, which has been attributed to general aging, menopausal fluctuations, or socially constructed phenomena.[7]

Significant decrease in estrogen and progesterone production, is responsible for decrease in muscle strength, endurance, and flexibility. Women transitioning through perimenopause to post-menopause had a decline in muscle strength and muscle power on average by 2–3%, suggesting the decline in physical functioning starts accelerating during midlife. Bondarev et al stated that the physical functioning depends on level of physical activity in middle aged women and it has been associated with both positive mental well-being and greater physical performance. Physical performance and physical activity

have a close functional relationship. Despite considerable individual differences in the response to regular physical activity, in general, the higher the intensity and amount of physical activity, the better the physical performance.[8]

The preservation of everyday functioning depends on physical performance. Menopausal women experience changes in body composition, such as an increase in body fat and a decrease in lean muscle mass, which can further impact physical performance. According to Galas et al, in women, the accelerated pattern of decline may start as early as midlife due to hormonal changes that take place throughout the menopausal years.[13]

Studies on the relationship between menopause and physical performance have shown that premenopausal women have better physical function than perimenopausal and postmenopausal women. However, it is unclear whether the associations seen between menopause and performance are independent of the changes in performance brought on by general ageing because there was little variation in muscle strength among women with different menopausal statuses. Physical performance, both the lower and upper extremity can be evaluated by an ability to carry out certain activities, such as chair stand test, walking speed and grip strength. Sit to stand test examines lower extremity strength and grip strength predicts upper limb strength, while walking speed evaluates functional mobility. All these tests are the indicator of physical performance abilities.[14]

Decrease in the physical functioning and mobility are the manifestations of decline in bone density associated with menopause, which also increase the risk of fractures and other musculoskeletal injuries. Further decreased physical function, increased fear of fall become inherent risk factors for falls, in menopause. Menopausal women experience physiological and psychological changes that can increase their risk of falls and contribute to fear of fall, these changes include decreased bone density, decreased muscle mass and changes in balance and gait.[16] In case of postmenopausal women with osteoporosis increased postural sway and imbalance have also been reported predictors of falls and fractures.[19] Postmenopausal women seem to have more difficulty participating in daily activities due to their level of fear of falling.[21]

Santo et al have analysed that, after taking into account possible confounders, increased severity of menopausal symptoms at a somatic level was associated with heightened fear of falling and diminished balance confidence.[22] Therefore, it is crucial to address this issue of fear of falling in menopausal women to prevent its negative consequences.

Peri-menopause is the worst period affecting negatively on quality of life of women. The reason behind is the instability of female hormones, especially estrogen, that exacerbates menopausal manifestations. El Hajj et al had shown that the physical activity correlates inversely with menopausal symptoms; and it impacts the quality of life in women during midlife.[10] Among several menopausal symptoms experienced by a woman, urinary incontinence is common and often a distressing condition affecting women of all ages, but is particularly prevalent during menopausal phase, as reduced estrogen leads to changes in urinary tract and pelvic floor muscles.[24]

Risk of developing only mild incontinence was affected by the menopausal transition. Determining if healthy lifestyle changes and managing medical issues can prevent incontinence is a priority because modifiable factors including anxiety, weight gain, and diabetes are linked to developing incontinence more frequently.[27] Also a strong relationship exists between the body mass index and prevalence of urinary incontinence. Incontinence is related to attitudinal aspects such as physical inactivity, a behaviour that predisposes to developing incontinence.[28] Lower urinary tract symptoms varies across in the different stages of menopause, exhibiting greater frequency in the peri and post menopause period.[30] Studies had shown inconsistent result regarding menopause and urinary incontinence that's why improving our understanding of urinary incontinence in menopausal women and developing effective treatments will help to improve their quality of life.

Understanding the relationship between physical performance, fear of fall, and urinary incontinence is important for developing effective interventions to improve the health and well-being of menopausal women. It is also important to understand how these factors vary across different stages of menopause, including premenopausal, perimenopausal, and postmenopausal stages. Considering the fact that women are navigating through this complicated and difficult stage of life, this topic is of importance for healthcare experts, policy makers, and women themselves. Addressing physical, emotional, social needs of menopausal women can help them maintain independence, mobility, overall quality of life. Objective of this study was to compare physical performance, fear of fall and urinary incontinence among premenopausal, perimenopausal and postmenopausal women.

METHODS

Study type

It was an observational analytical study.

Study place

The study was conducted at community set up (rural areas).

Study period

The study was conducted from May 2022 to December 2023.

Selection criteria

A total 195 women between the age group of 45 to 60 years were included while women having physical problems related to spinal cord injury, stroke, recent fracture, muscle or joint pain, history of antidepressant uses or psychiatric disorders and history of hormonal therapy were excluded from the study.

Procedure

For physical performance; in five times sit to stand test, 17-inch chair with armrest was used. Test started with participant in sitting position then participants were asked to stand up and sit down five times as quickly as possible with arms folded across their chests. Time(sec) was noted from the initial sitting position to the fifth standing position. Grip strength was assessed on the dominant and non-dominant hand with a dynamometer. The participant was positioned in sitting, with the shoulder fully adducted and neutrally rotated, elbow flexed at 90° and the forearm in a neutral position. The participant was asked to squeeze the dynamometer with maximal isometric effort without any other body movement and the reading was taken in kg and for gait speed, a 3-meter walk test was used. Two end points were marked using cones and participant were instructed to walk this distance, at their usual pace. Time taken to cover this distance was noted and speed was calculated in meters per second. Fear of fall was assessed using fall efficacy scale (FES), urinary incontinence was assessed using international consultation on incontinence questionnaire.

RESULTS

Data was analyzed using statistical package for the social sciences (SPSS) version 20.0, where a significance level less than 0.05 was considered statistically significant. Descriptive statistics for all variables were presented according to menopausal status as means and standard deviation, frequency and numbers. Difference between groups was determined by one-way analysis of variance (ANOVA) with post hoc Tukey test.

Table 2 shows a statistically significant difference between groups as determined by one-way ANOVA (p=0.000) which is below 0.05, therefore it is statistically significant.

In post hoc Tukey analysis of chair stand test and grip strength there was no statistically significant difference between the pre and peri menopausal group but significant difference existed between pre and postmenopausal group. Gait speed was statistically significant between the pre, perimenopausal and post-menopausal group.

Figure 1 shows the percentage of fear of fall. It is divided according the score obtained in falls efficacy scale. As per the division into low, moderate and high concern, it was seen that the High percentage of low concern of fall was seen in pre-menopausal group. High concern of fall was seen in postmenopausal group.

Table 1: Baseline characteristics of participants.

Characteristics	Pre-menopausal (mean±SD)	Peri-menopausal (mean±SD)	Post-menopausal (mean±SD)
Age (years)	41.56±2.15	45.84±0.90	56.58±5.05
BMI	24.24±3.07	23.46±1.78	24.98±2.83
Marital status			
Married	61 (94)	65 (100)	43 (66)
Widowed	4 (6)	0	21 (32)
Divorced	0	0	2 (2)
Occupation			
Cook	0	1 (1)	3 (5)
Farmer	32 (49)	38 (59)	33 (51)
Housewife	17 (26)	0	14 (21)
Labor	3 (5)	0	0
Maid	8 (12)	17 (26)	14 (21)
Peon	5 (8)	9 (14)	1 (2)
Morbidities			
Diabetes	0	0	4 (6)
Hypertension	2 (3)	0	16 (25)
Hyperlipidemia	0	0	3 (4)
None	63 (97)	65 (100)	42 (65)
Addiction			
Mishri	14 (21)	9 (14)	11 (15)
Tobacco	5 (8)	9 (14)	9 (14)
None	46 (71)	47 (72)	46 (71)

Table 2: Level of physical performance according to menopausal stage.

Physical performance	Pre-menopausal (mean±SD)	Peri-menopausal (mean±SD)	Post-menopausal (mean±SD)	P value
Grip strength (kg)	17.07±3.48	17.01±3.22	12.89±3.37	0.00
Gait speed (m/s)	0.39±0.07	0.34±0.06	0.30±0.06	0.00
Chair stand test (sec)	12.51±2.49	12.68±3.31	14.88±3.04	0.00

Table 3: Severity of urinary incontinence according to menopausal stage.

Urinary incontinence	Premenopausal (n=65) (%)	Perimenopausal (n=65) (%)	Postmenopausal (n=65) (%)
None	38 (59)	44 (68)	25 (38)
Slight	12 (18)	18 (27)	21 (32)
Moderate	12 (18)	3 (5)	18 (28)
Severe	3 (5)	0	1 (2)
Very severe	0	0	0

Table 3 shows the frequency and number of participants who had urinary incontinence divided according to the stages of menopause. Severity of urinary incontinence is described in terms of scoring as per international consultation on incontinence questionnaire as none, slight, moderate, severe and very severe.

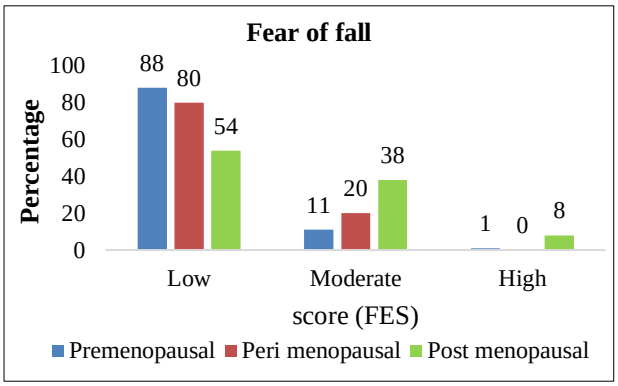

Figure 1: Fear of fall in premenopausal, perimenopausal and postmenopausal women.

DISCUSSION

The results of this study shows that physical performance was lowered in postmenopausal compared to premenopausal and perimenopausal women. Postmenopausal women presented with poor results in grip strength and chair stand test compared to perimenopausal and premenopausal women. Also gait speed was reduced in postmenopausal women. Saionara et al examined the association between menopausal status and physical performance in middle aged women, wherein they have assessed grip strength, gait speed and 5 times chair stands. Weaker grip strength was found in peri and postmenopausal women compared to premenopausal women. There was no relation found between menopausal status with gait speed and chair stand test. However, the mean age of perimenopausal women in this study was 48.43 which is higher as compared to our Indian population, as natural postmenopause age of Indian women is determined to be 46.2±4.9 years. Also mean age of perimenopausal women of our studied population was 45.84±0.90.[14]

Another study by Cooper et al found that postmenopausal women had weaker grip strength than premenopausal women, but this difference was not statistically significant. There was no evidence of variation in physical performance by age at menopause or of associations between menopausal status and the other measures of physical performance, standing balance and chair rise time.[32]

Our study found that the postmenopausal women's performance was lowered particularly in grip strength and chair stand test. Decreased estrogen levels are major contributing factor to not only bone loss and increased skeletal fragility but also muscle weakening and decline in optimal physical performance among women.[15] It has been hypothesized that a loss of ovarian function might have a direct negative effect on muscle tissue. As estradiol signaling through ERα and ERβ favors the binding of myosin to actin during muscle contraction, the loss of estrogen exposure might reduce the intrinsic quality of skeletal muscle whereby muscle fibers have a reduced capacity to generate force, affecting muscle strength.[33]

Gait speed was statistically significant between the premenopausal, perimenopausal postmenopausal group in our study, whereas studies by Saionara and Cooper at al did not find any association of menopausal stage with gait speed. According to Ossowski et al significant positive correlation exists between gait speed and the functional strength of the lower extremities.[34] As previously described loss of ovarian function might have a direct negative effect on muscle tissue compromising muscle strength. Secondly, a greater intensity of menopausal symptoms and worse quality of life are also related with worse physical performance, according to a study by Silva et al.[35] In our studied population we found that common

symptoms experienced by menopausal women were muscle or joint discomfort, tiredness or lethargy, palpitations, headache, depression or anxiety.

After assessing for fear of fall in three different stages of menopause using fall efficacy scale; fear of fall was present in all pre, peri and postmenopausal group. Low concern fear of fall was seen in premenopausal group while high concern fear of fall was seen in postmenopausal group (8%). Menopause is related to some inherent risk factors for falls, such as decreased physical function, increased fear of fall and postural sway, also obesity and muscle dysfunction are risk factors for falls in postmenopausal women.[20]

Fear of falling is significantly associated with the level of activity avoidance in postmenopausal women. Both fear of falling and fall efficacy are independent explanatory factors of fear of fall related activity avoidance in this population.[17] Santo et al stated that increased severity of menopausal symptoms at a somatic level is also associated with lower fall-related self-efficacy, assessed through measurements of balance confidence and fear of falling.[36] In our study a self-structured questionnaire was used for categorizing a woman into stage of menopause as per the symptoms experienced by them. Majority of postmenopausal women experienced muscle or joint discomfort, fatigue and weight gain, which might be possible cofounding factors responsible for presence of fear of fall. In this study we found that eighteen postmenopausal women had higher body mass index and they were having moderate concern of fear of falling. BMI and body fat mass are associated with discrepancy between fear of fall and balance.[37]

Postmenopausal women with a history of fractures and falls, tend to limit their daily activities and simultaneously experience negative emotions and decreased self-confidence. Chronic health disorders have important psychological and physical effects on postmenopausal women. Discomfort caused by chronic health disorders, such as chronic obstructive pulmonary disease and knee osteoarthritis, can reduce mobility and ability to cope with potential fall hazards in the environment, which increase the risk and fear of falling.[17]

In our study we found that four postmenopausal women with diabetes were having moderate concerns in fear of falling. Comorbidities like diabetes, increase prevalence of fear of falling probably by the excess balance and mobility impairments, but may also be related to other relevant variables including obesity, depression and diabetes-related complications.[38]

Urinary incontinence was prevalent in all three stages of menopause in this study, wherein more frequently it was seen in the pre and postmenopausal period with prevalence of 41% and 32% respectively. We have used international consultation on incontinence questionnaire, in which a severity of incontinence was observed specifically in postmenopausal group followed by premenopausal and perimenopausal women.[34]

Menopause is a period of the life cycle characterized by a decline in estrogen production, which leads to a series of bodily changes, including urogenital manifestations. The main symptoms are caused by a deterioration and atrophy of vaginal and periurethral tissues, which may be associated with involuntary urine loss on exertion and increased urinary urgency and frequency during postmenopause. In the study by Abeer et al 76.2% postmenopausal women had urinary incontinence with moderate severity while women with increased age and BMI had more severity on ICIQ scoring, compared to premenopausal women.[39] Our result is line with this study since we found that sixteen women with higher BMI had moderate to severe type of incontinence.

According to Ramalho et al, incontinence varies throughout menopause stages and occurs more frequently during the peri and postmenopausal phases.[30] According to Waetjan et al, menopausal transition stage is associated with developing monthly or more frequent incontinence, and infrequent incontinence symptoms are attributable to the peri-menopause.[27] However our study found more prevalence of incontinence in pre and postmenopausal stage as compared to perimenopause period. Women with higher BMI in pre-menopausal stage had urinary incontinence. Strong associations between obesity and stress urinary incontinence (SUI) in women had been frequently reported in the uro-gynecologic literature.[40]

All four diabetic participants of our study had moderate severity of urinary incontinence in postmenopausal stage. Diabetes is being more significantly related to occurrence of urinary incontinence. Women with diabetes who experience microvascular problems, particularly macroalbuminuria and peripheral neuropathic pain, have a higher likelihood of experiencing weekly incontinence. These connections imply that incontinence may be a microvascular issue as well, presumably as a result of problems with the nerve supply to the urethral sphincter and bladder, which might injure the sphincter and lead to uncontrollable bladder contractions and incontinence.[41]

Women neither come forward seeking medical consultation nor do they discuss about their incontinence openly, and the condition remains underestimated in the society. There are many unreported cases in the population as per several hospital-based studies done in India before. Given the role of women as the key members of family health and transmitting the model of education and promoting a healthy lifestyle to the next generation, acquiring knowledge of this period's symptoms and enhancing their quality of life is of great necessity. Limitation of study is that history of fall, past surgical history or risk factors contributing to urinary incontinence were not taken into consideration. Information was collected by self-reporting questionnaire, for which reporting bias can occur. Identifying different menopausal

effects and its relationship with quality of life is important because it can serve as the foundation for the need to raise awareness of the condition and develop an evidence-based therapy to enhance the health status and menopausal quality of life of women. Interventional strategies targeting physical performance, fear of fall and urinary incontinence can be studied in future.

CONCLUSION

The present study showed that the transition through menopause is associated with lowered physical performance in postmenopausal compared to premenopausal and perimenopausal women, high concern fear of fall was seen in postmenopausal group. Also, this study showed that urinary incontinence varies across different stages of menopause, exhibiting greater frequency in the pre and post menopause stage.

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REFERENCES

1. Santoro N, Roeca C, Peters BA, Neal-Perry G. The Menopause Transition: Signs, Symptoms, and Management Options. J Clin Endocrinol Metab. 2021;106(1):1-15.
2. Harlow SD, Gass M, Hall JE, Lobo R, Maki P, Rebar RW, et al. Executive summary of the Stages of Reproductive Aging Workshop + 10: addressing the unfinished agenda of staging reproductive aging. Menopause N Y N. 2012;19(4):387-95.
3. Ahuja M. Age of menopause and determinants of menopause age: A PAN India survey by IMS. J -Life Health. 2016;7(3):126-31.
4. Islam R, Gartoulla P, Bell R, Fradkin P, Davis S. Prevalence of menopausal symptoms in Asian midlife women: A systematic review. Climacteric J Int Menopause Soc. 2014;18:1-42.
5. Kalhan M, Singhania K, Choudhary P, Verma S, Kaushal P, Singh T. Prevalence of Menopausal Symptoms and its Effect on Quality of Life among Rural Middle Aged Women (40–60 Years) of Haryana, India. Int J Appl Basic Med Res. 2020;10(3):183.
6. Sharma S, Mahajan N. Menopausal symptoms and its effect on quality of life in urban versus rural women: A cross-sectional study. J -Life Health. 2015;6(1):16-20.
7. Yisma E, Eshetu N, Ly S, Dessalegn B. Prevalence and severity of menopause symptoms among perimenopausal and postmenopausal women aged 30-49 years in Gulele sub-city of Addis Ababa, Ethiopia. BMC Womens Health. 2017;17(1):124.
8. Cheng MH, Wang SJ, Yang FY, Wang PH, Fuh JL. Menopause and physical performance--a community-based cross-sectional study. Menopause N Y N. 2009;16(5):892-6.
9. Bondarev D, Sipilä S, Finni T, Kujala UM, Aukee P, Kovanen V, et al. Associations of physical performance and physical activity with mental well-being in middle-aged women. BMC Public Health. 2021;21(1):1448.
10. El Hajj A, Wardy N, Haidar S, Bourgi D, Haddad ME, Chammas DE, et al. Menopausal symptoms, physical activity level and quality of life of women living in the Mediterranean region. PloS One. 2020;15(3):e0230515.
11. Mansikkamäki K, Raitanen J, Malila N, Sarkeala T, Männistö S, Fredman J, et al. Physical activity and menopause-related quality of life - a population-based cross-sectional study. Maturitas. 2015;80(1):69-74.
12. Pal R, Bhadada S, Aggarwal A, Singh T. The prevalence of sarcopenic obesity in community-dwelling healthy Indian adults - The Sarcopenic Obesity-Chandigarh Urban Bone Epidemiological Study (SO-CUBES). Osteoporos Sarcopenia. 2021;7.
13. Dąbrowska-Galas M, Dąbrowska J, Ptaszkowski K, Plinta R. High Physical Activity Level May Reduce Menopausal Symptoms. Med Kaunas Lith. 2019;55(8):E466.
14. da Câmara SMA, Zunzunegui MV, Pirkle C, Moreira MA, Maciel ÁCC. Menopausal status and physical performance in middle aged women: a cross-sectional community-based study in Northeast Brazil. PloS One. 2015;10(3):e0119480.
15. Akpınar P. The evaluation of hand function and bone status in premenopausal versus postmenopausal women. Haydarpasa Numune Med J. 2018;58(2):88-92.
16. MacKay S, Ebert P, Harbidge C, Hogan DB. Fear of Falling in Older Adults: A Scoping Review of Recent Literature. Can Geriatr J. 2021;24(4):379-94.
17. Zhao J, Liang G, Huang H, Zeng L, Yang W, Pan J, et al. Identification of risk factors for falls in postmenopausal women: a systematic review and meta-analysis. Osteoporos Int. 2020;31(10):1895-904.
18. Lee YS, Nichols JF, Domingo A, Kim Y, Park SM, Han G, et al. Balance performance and related soft tissue components across three age groups. Health Care Women Int. 2021;42(1):67-81.
19. Hita-Contreras F, Martínez-López E, González-Matarín P, Mendoza N, Cruz-Díaz D, Ruiz-Ariza A, et al. Association of bone mineral density with postural stability and the fear of falling in Spanish postmenopausal women. Maturitas. 2014;79(3):322-8.
20. Ahn S, Song R. Exploring Fear of Falling Related Activity Avoidance among Postmenopausal Women. Int J Environ Res Public Health. 2021;18(8):4042.
21. Ahn S, Song R. Exploring Fear of Falling Related Activity Avoidance among Postmenopausal Women. Int J Environ Res Public Health. 2021;18(8):4042.
22. Espírito Santo J, Hita-Contreras F, Marques de Loureiro NE, Brandão Loureiro V, Aibar-Almazán A,

Carcelén-Fraile MDC, Ortiz-Quesada R. Associations between the impact of menopausal symptoms and fall-related self-efficacy. Menopause. 2023;30(4):421-6.
23. Yardley L, Beyer N, Hauer K, Kempen G, Piot-Ziegler C, Todd C. Development and initial validation of the Falls Efficacy Scale-International (FES-I). Age Ageing. 2005;34(6):614-9.
24. Hunskaar S, Lose G, Sykes D, Voss S. The prevalence of urinary incontinence in women in four European countries. BJU Int. 2004;93(3):324-30.
25. Islam RM, Bell RJ, Hossain MB, Davis SR. Types of urinary incontinence in Bangladeshi women at midlife: Prevalence and risk factors. Maturitas. 2018;116:18-23.
26. Kołodyńska G, Zalewski M, Rożek-Piechura K. Urinary incontinence in postmenopausal women – causes, symptoms, treatment. Przegląd Menopauzalny Menopause Rev. 2019;18(1):46-50.
27. Waetjen LE, Ye J, Feng WY, Johnson WO, Greendale GA, Sampselle CM, et al. Association between Menopausal Transition Stages and Developing Urinary Incontinence. Obstet Gynecol. 2009;114(5):989-98.
28. Leirós-Rodríguez R, Romo-Pérez V, García-Soidán JL. Prevalence of urinary incontinence and its relation with sedentarism in Spain. Actas Urol Esp. 2017;41(10):624-30.
29. Thangarajah F, Hartmann-Wobbe J, Ratiu D, Pahmeyer C, Radosa JC, Mallmann P, et al. The Onset of Urinary Incontinence in Different Subgroups and its Relation to Menopausal Status: A Hospital-based Study. In Vivo. 2020;34(2):923-8.
30. Varella LRD, Bezerra da Silva R, Eugênia de Oliveira MC, Melo PHA, Maranhão TM de O, Micussi MTABC. Assessment of lower urinary tract symptoms in different stages of menopause. J Phys Ther Sci. 2016;28(11):3116-21.
31. Avery K, Donovan J, Peters TJ, Shaw C, Gotoh M, Abrams P. ICIQ: a brief and robust measure for evaluating the symptoms and impact of urinary incontinence. Neurourol Urodyn. 2004;23(4):322-30.
32. Cooper R, Mishra G, Clennell S, Guralnik J, Kuh D. Menopausal status and physical performance in midlife: findings from a British birth cohort study. Menopause N Y N. 2008;15(6):1079-85.
33. Monteleone P, Mascagni G, Giannini A, Genazzani AR, Simoncini T. Symptoms of menopause - global prevalence, physiology and implications. Nat Rev Endocrinol. 2018;14(4):199-215.
34. Ossowski Z, Wiech M, Ellwart M. Association between gait speed and muscle mass and strength in postmenopausal women. Balt J Health Phys Act. 2022;11(1).
35. Silva RT, Câmara SM, Moreira MA, Nascimento RA, Vieira MC, Morais MS, et al. Correlation of Menopausal Symptoms and Quality of Life with Physical Performance in Middle-Aged Women. Rev Bras Ginecol Obstet. 2016;38(6):266-72.
36. Espírito Santo J, Hita-Contreras F, Marques de Loureiro NE, Brandão Loureiro V, Aibar-Almazán A, Carcelén-Fraile MDC, et al. Associations between the impact of menopausal symptoms and fall-related self-efficacy. Menopause N Y N. 2023;30(4):421-6.
37. Thiamwong L, Xie R, Conner NE, Renziehausen JM, Ojo EO, Stout JR. Body composition, fear of falling and balance performance in community-dwelling older adults. Transl Med Aging. 2023;7:80-6.
38. Bruce D, Hunter M, Peters K, Davis T, Davis W. Fear of falling is common in patients with type 2 diabetes and is associated with increased risk of falls. Age Ageing. 2015;44(4):687-90.
39. Ahmed ASG, Hanafy MM, Saleh DM. Prevalence and risk factors of urinary incontinence among premenopausal and postmenopausal females. Sci J Al-Azhar Med Fac Girls. 2021;5(4):906.
40. Agur W, Rizk DEE. Obesity and urinary incontinence in women: is the black box becoming grayer? Int Urogynecology J. 2011;22(3):257-8.
41. Brown JS, Vittinghoff E, Lin F, Nyberg LM, Kusek JW, Kanaya AM. Prevalence and Risk Factors for Urinary Incontinence in Women with Type 2 Diabetes and Impaired Fasting Glucose. Diabetes Care. 2006;29(6):1307-12.

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