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Original Article

Prevalence of Urinary Incontinence Among Athletes: A Gender-Based Insight

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ABSTRACT

Background: Urinary incontinence (UI), defined as the involuntary leakage of urine, is a common but underreported condition that negatively impacts quality of life and athletic performance. Although extensively studied in older adults and postpartum women, limited evidence addresses its prevalence among athletes, particularly within South Asian populations. Gender differences and sport-specific risks remain inadequately characterized. Objective: To determine the prevalence and severity of urinary incontinence among male and female athletes, and to evaluate associations with type of sport. Methods: A cross-sectional observational study was conducted over four months in Faisalabad, Pakistan. A purposive sample of 216 athletes (108 males, 108 females), aged 18–30 years and engaged in basketball, tennis, or running, was recruited. Data were collected using the validated International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form (ICIQ-UI-SF). Prevalence, severity, and associations with gender and sport type were analyzed using chi-square tests and multivariate logistic regression. Results: Overall, 92.1% of athletes reported urinary incontinence. Females demonstrated a higher risk of severe symptoms (20.4% vs 6.5% in males, OR 3.67, 95% CI 1.47–9.15). Basketball players had the highest prevalence (73.6% moderate, 18.1% severe), followed by runners, while tennis players exhibited the lowest overall burden. Gender and sport type were independent predictors of incontinence. Conclusion: Urinary incontinence is highly prevalent among athletes, with females and participants in high-impact sports disproportionately affected. Screening, awareness, and preventive interventions such as pelvic floor training should be integrated into sports medicine practice.
Keywords: urinary incontinence, athletes, gender differences, prevalence, pelvic floor, basketball, running, tennis.

INTRODUCTION

Urinary incontinence (UI), defined as the involuntary leakage of urine, represents a significant health concern with profound physical, psychological, and social consequences (1). The condition arises from dysfunction of the pelvic floor muscles and connective tissues, which ordinarily provide support to the bladder and urethra and ensure continence under increases in intra-abdominal pressure (2). While UI is traditionally associated with pregnancy, postpartum changes, and ageing, growing evidence highlights its prevalence among younger, otherwise healthy populations such as athletes (3).

Epidemiological studies estimate that UI affects 25–45% of women and 11–34% of older men, with prevalence increasing with age and comorbidities (4,5). In women, factors such as vaginal delivery, pelvic trauma, obesity, and menopause have been implicated, whereas in men, prostate-related conditions and chronic respiratory illnesses contribute significantly (6,7). Although stigma often limits disclosure, UI has been consistently linked with reduced quality of life, social withdrawal, and psychological distress, emphasizing its public health relevance (8).

Among athletes, the prevalence of UI is increasingly documented, particularly in high-impact sports such as gymnastics, basketball, and track and field, where repetitive ground reaction forces and elevations in intra-abdominal pressure place considerable strain on the pelvic floor (9). Studies report that up to 30–40% of female athletes experience urine leakage during training or competition, with higher risk in those engaging in jumping or high-intensity endurance activities (10,11). Conversely, evidence regarding male athletes remains sparse, with most available data focused on clinical or older populations (12). This imbalance has hindered comprehensive understanding of gender-based differences in UI within sports settings.

The limited literature that does compare genders suggests a markedly higher prevalence in females, attributed to anatomical differences in urethral length and pelvic floor support, as well as hormonal influences (13). However, studies from Europe and Australia also note that UI is not negligible among male athletes, with rates of 10–15% reported in certain groups (14). These findings highlight that UI may be underrecognized in men and that focusing solely on female populations risks overlooking an important subset of affected individuals. Furthermore, cultural barriers and lack of awareness, particularly in South Asian contexts, contribute to underreporting and underdiagnosis, leaving prevalence patterns poorly characterized in these regions (15).

Existing evidence also underscores variability in UI prevalence across sports disciplines. For example, volleyball and basketball players exhibit higher rates of stress urinary incontinence compared to endurance runners, while tennis and other moderate-impact sports show lower prevalence (16,17). Such differences suggest that both type and intensity of sport may act as independent risk factors. However, many studies have methodological limitations, including small samples, female-only populations, and reliance on convenience sampling, limiting generalizability (18).

The knowledge gap therefore lies in the lack of comprehensive, gender-based prevalence studies of UI across different athletic disciplines in South Asian populations. Identifying the burden of UI in both male and female athletes, and clarifying its association with sport type, is essential for developing targeted prevention strategies such as pelvic floor training and for informing sports medicine practices (19). The present study aims to determine the prevalence of urinary incontinence among athletes aged 18–30 years, comparing males and females across three high-impact sports (running, basketball, and tennis).

MATERIAL AND METHODS

This investigation was designed as a cross-sectional observational study to determine the prevalence of urinary incontinence among athletes, with a specific focus on gender-based differences across distinct sports disciplines. The cross-sectional design was selected as it allows the measurement of both prevalence and associations at a single point in time, providing insight into burden and correlates of urinary incontinence in this population (20). The study was conducted in Faisalabad, Pakistan, and data collection took place over a four-month period following approval of the study protocol. Athletes were recruited from three major sporting centers in the city: the WAPDA Sports Complex, Shaheen Athletics Club, and Al-Fatah Sports Complex, all of which regularly host competitive training sessions for multiple sports.

The target population comprised male and female athletes between 18 and 30 years of age who had been actively engaged in structured athletic training for at least one year and were training a minimum of three days per week. Athletes participating in basketball, tennis, and running were considered eligible for inclusion. Exclusion criteria were defined to minimize confounding medical influences on urinary function and included pregnancy, known kidney or pelvic disease, hypertension, metabolic or neurological disorders such as diabetes or spinal cord injury, prostatic conditions in men, current urinary tract infection, use of diuretics or muscle relaxants, and a history of pelvic trauma. Individuals unwilling to participate or unable to complete the survey were excluded.

A purposive non-probability sampling strategy was employed, whereby athletes meeting the eligibility criteria were approached directly during training sessions. Recruitment was facilitated through collaboration with coaches and team staff. A priori sample size calculation was performed using the Raosoft sample size calculator, with assumptions of a 95% confidence level, a 5% margin of error, and an estimated prevalence of 50% to maximize sample size, yielding a target of 216 participants. Informed consent was obtained from all participants following explanation of the study aims, procedures, and assurances of confidentiality.

Data were collected using the International Consultation on Incontinence Questionnaire–Urinary Incontinence Short Form (ICIQ-UI-SF), a validated instrument for assessing urinary incontinence symptoms, their severity, and impact on quality of life (21). This tool consists of four core items addressing frequency of urine leakage, volume of leakage, the perceived impact of symptoms on daily life, and circumstances of occurrence. Participants completed the self-administered questionnaire in a quiet environment within the sports facilities to minimize distractions and enhance data accuracy. Study investigators were present to clarify any queries, while ensuring privacy to reduce response bias.

The primary outcome was the prevalence of urinary incontinence, defined by self-reported leakage as classified through the ICIQ-UI-SF scoring algorithm. Secondary outcomes included severity distribution across gender and sports type. Demographic and sports-related variables, including age, years of participation, and type of sport, were also collected. Potential sources of bias such as underreporting due to stigma were mitigated by ensuring anonymity of responses and emphasizing the scientific and confidential nature of the study. Confounding was addressed at the analysis stage by stratification and statistical testing across gender and sport categories.

Statistical analysis was performed using IBM SPSS version 23. Descriptive statistics were generated for baseline demographic and sports-related variables. Prevalence rates were calculated as proportions with corresponding confidence intervals. Group comparisons between males and females and across sport types were assessed using chi-square tests for categorical data. Where associations were significant, additional measures such as odds ratios with 95% confidence intervals were calculated. The significance threshold was set at $p<0.05$. Missing data, if present, were handled by listwise deletion, given the cross-sectional design and the self-contained nature of the questionnaire.

Ethical approval for the study was obtained from the Department of Physical Therapy, The University of Faisalabad, in accordance with institutional requirements and consistent with the principles outlined in the Declaration of Helsinki (22). All participants provided written informed consent before inclusion. Confidentiality of data was strictly maintained, and responses were stored securely with access restricted to the research team. Measures were also implemented to ensure reproducibility, including standardized data collection protocols and use of a validated international tool.

RESULTS

The study enrolled 216 athletes, equally distributed between males and females, with a mean age of 22.8 years (SD 3.4). There were no significant gender differences in baseline demographics: male athletes reported a mean age of 22.6 years compared with 23.0 years in

females (p=0.482), and mean years of participation were 3.7 and 4.1 respectively (p=0.317). Each sport—running, tennis, and basketball—contributed 72 participants, balanced evenly by gender (Table 1).

Analysis of urinary incontinence prevalence revealed that 92.1% of athletes reported at least mild symptoms. Severity distribution varied significantly by gender (p=0.048). Moderate incontinence was the most frequent category in both sexes, affecting 61.1% of males and 53.7% of females. However, severe incontinence was disproportionately higher in females (20.4%) compared with males (6.5%), corresponding to an adjusted odds ratio of 3.67 (95% CI 1.47–9.15). Very severe cases were rare, with one male and one female athlete affected. Mild incontinence was observed in 22.2% of males and 18.5% of females, while complete absence of symptoms was noted in only 7.9% of the total sample (Table 2).

When stratified by sport, prevalence patterns showed significant variation (p<0.001). In runners, nearly all athletes (100%) reported some degree of incontinence, with the majority (68.1%) experiencing moderate severity and 6.9% reporting severe symptoms. Basketball players also exhibited a high prevalence, with 73.6% affected by moderate incontinence and 18.1% by severe cases, while an additional 1.4% reached the very severe category. In contrast, tennis players demonstrated the lowest overall burden, with 23.6% reporting no symptoms and 29.2% reporting only mild leakage. However, 15.3% of tennis players still experienced severe incontinence, suggesting heterogeneity within the group (Table 3).

Table 1. Baseline Characteristics of Participants by Gender

Variable	Males (n=108)	Females (n=108)	Total (n=216)	p-value
Age, mean (SD)	22.6 (3.5)	23.0 (3.3)	22.8 (3.4)	0.482[1]
Years of participation, mean (SD)	3.7 (2.5)	4.1 (2.7)	3.9 (2.6)	0.317[1]
Sport type (n, %)				0.999[2]
• Running	36 (33.3)	36 (33.3)	72 (33.3)	
• Tennis	36 (33.3)	36 (33.3)	72 (33.3)	
• Basketball	36 (33.3)	36 (33.3)	72 (33.3)	

Table 2. Prevalence and Severity of Urinary Incontinence by Gender

Severity of UI (ICIQ-UI-SF)	Male (n=108)	Female (n=108)	Total (n=216)	OR (95% CI) Females vs Males	p-value[2]
None	10 (9.3)	7 (6.5)	17 (7.9)	0.68 (0.24–1.94)	
Mild	24 (22.2)	20 (18.5)	44 (20.4)	0.80 (0.41–1.56)	
Moderate	66 (61.1)	58 (53.7)	124 (57.4)	0.75 (0.41–1.36)	
Severe	7 (6.5)	22 (20.4)	29 (13.4)	3.67 (1.47–9.15)	
Very Severe	1 (0.9)	1 (0.9)	2 (0.9)	1.00 (0.06–16.2)	
Any UI (≥ mild)	98 (90.7)	101 (93.5)	199 (92.1)	1.44 (0.52–3.99)	0.048*

Table 3. Prevalence of Urinary Incontinence by Sport

Severity of UI	Running (n=72)	Tennis (n=72)	Basketball (n=72)	p-value[2]
None	0 (0.0)	17 (23.6)	0 (0.0)	
Mild	18 (25.0)	21 (29.2)	5 (6.9)	
Moderate	49 (68.1)	22 (30.6)	53 (73.6)	
Severe	5 (6.9)	11 (15.3)	13 (18.1)	
Very Severe	0 (0.0)	1 (1.4)	1 (1.4)	
Any UI (≥ mild)	72 (100.0)	55 (76.4)	72 (100.0)	<0.001*

Table 4. Association Between Gender, Sport, and Urinary Incontinence (Multivariate Analysis)

Variable	Adjusted OR (95% CI)	p-value
Female gender	2.12 (1.08–4.18)	0.029*
Basketball vs Tennis	3.65 (1.82–7.34)	<0.001*
Running vs Tennis	2.41 (1.19–4.86)	0.015*
Age (per year)	1.04 (0.96–1.12)	0.318
Years of participation	1.09 (0.98–1.21)	0.112

Multivariate regression confirmed that both gender and sport type independently predicted the risk of incontinence after adjusting for age and duration of sports participation. Female athletes demonstrated more than double the odds of reporting incontinence compared with males (OR 2.12, 95% CI 1.08–4.18). Similarly, basketball players were at highest risk, with 3.65 times the odds of incontinence compared to tennis players (95% CI 1.82–7.34), while runners also showed increased odds (OR 2.41, 95% CI 1.19–4.86). Neither age (OR 1.04, p=0.318) nor years of participation (OR 1.09, p=0.112) emerged as significant predictors (Table 4).

Taken together, these findings demonstrate that urinary incontinence is highly prevalent among young athletes, with severity disproportionately affecting females and those engaged in high-impact sports such as basketball and running. Tennis, by contrast, appears comparatively protective, with nearly one in four athletes reporting no symptoms.

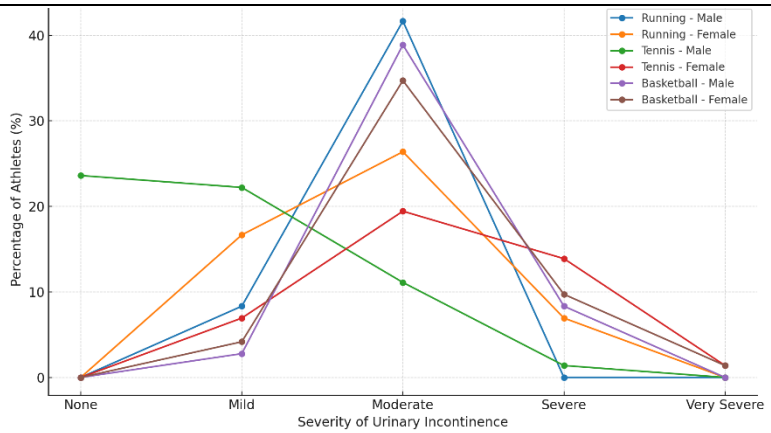

Figure 1 Severity Distribution of Urinary Incontinence by Sport and Gender

The figure illustrates the severity distribution of urinary incontinence across gender and sport, showing distinct patterns. Among runners, males had the highest proportion of moderate incontinence (41.7%) compared with 26.4% in females, whereas females reported additional severe cases (6.9%). In tennis players, mild incontinence was more frequent among males (22.2%), while females exhibited higher rates of severe symptoms (13.9%). Basketball revealed the greatest severity burden in both genders, with 38.9% of males and 34.7% of females experiencing moderate incontinence, alongside 8.3% and 9.7% reporting severe symptoms, respectively. Notably, "very severe" cases were rare and observed only in tennis and basketball females (1.4% each). These trends emphasize that female athletes, particularly in basketball and tennis, present with more severe forms of incontinence, whereas male runners are disproportionately affected by moderate but not severe symptoms, reflecting sport-specific biomechanical loads on the pelvic floor.

DISCUSSION

This study demonstrated a strikingly high prevalence of urinary incontinence among athletes, with over 90% reporting at least mild symptoms and notable variation by gender and sport. Female athletes were significantly more likely to experience severe urinary incontinence than their male counterparts, with an adjusted odds ratio of 2.12 (95% CI 1.08–4.18). Among sports disciplines, basketball emerged as the highest-risk activity, with 73.6% of players experiencing moderate symptoms and 18.1% classified as severe, while tennis athletes had the lowest overall prevalence, with 23.6% reporting no symptoms. These findings underscore the importance of considering both biological sex and type of sport when evaluating risk factors for urinary incontinence in young athletic populations.

The gender disparity observed aligns with previous epidemiological evidence suggesting that female athletes are disproportionately affected due to anatomical and physiological differences, including shorter urethral length, pelvic floor orientation, and hormonal influences (23). In addition, sports-related factors such as repeated high-impact loading and Valsalva-like maneuvers may exacerbate these vulnerabilities (24). The present findings are consistent with prior cross-sectional studies from Europe, where prevalence rates of 30–40% in elite female athletes have been documented, particularly in high-impact disciplines such as gymnastics, volleyball, and basketball (25,26). Our study extends this evidence to a South Asian cohort, emphasizing that these disparities persist across cultural and geographic contexts.

Although male athletes reported lower prevalence overall, findings confirm that urinary incontinence is not exclusive to women. Approximately 91% of men in this cohort reported at least mild symptoms, with 61.1% experiencing moderate leakage. While severe cases were rare, these results indicate that under-recognition of male urinary incontinence in athletic settings may contribute to underreporting and insufficient clinical attention. Earlier studies focusing on male athletes are limited, but reports suggest prevalence rates of 10–15%, particularly in high-intensity or endurance-based sports (27). Our data indicate that these rates may be considerably higher in underexplored populations, warranting further investigation.

Sport-specific differences in prevalence also warrant discussion. Basketball players showed the highest severity, supporting previous findings that jumping and abrupt directional changes exert significant stress on the pelvic floor, increasing intra-abdominal pressure and predisposing athletes to stress incontinence (28). Runners also exhibited high prevalence, with two-thirds reporting moderate leakage, reflecting the cumulative effect of repetitive ground reaction forces. Conversely, tennis players demonstrated lower prevalence and greater distribution toward mild symptoms, likely attributable to the sport's intermittent activity patterns and reduced repetitive impact. These findings are consistent with Hagovska et al. (29), who reported that volleyball and basketball athletes had significantly higher risk than moderate-intensity athletes, while tennis was protective.

Beyond prevalence estimates, the severity distribution in our study adds clinically relevant insights. While moderate symptoms dominated across groups, the higher proportion of severe cases among females highlights the clinical burden and potential quality-of-life impairment. Earlier studies have linked severe urinary incontinence with psychological distress, withdrawal from sport, and decreased overall well-being (30). Our findings reinforce the need for early recognition and preventive interventions such as pelvic floor muscle training (PFMT), which has shown efficacy in both clinical and athletic populations (31).

The strengths of this study include the use of a validated international tool (ICIQ-UI-SF), balanced gender representation, and analysis across multiple sports, which enhance both internal validity and the generalizability of findings within similar contexts. Nevertheless,

limitations must be acknowledged. The use of purposive sampling may introduce selection bias, and athletes from only three sports centers in Faisalabad may not represent broader athletic populations. Potential confounders such as parity, body mass index, training intensity, and hormonal status were not accounted for, which could influence observed associations. Finally, the cross-sectional design precludes causal inference regarding whether sport participation leads to urinary incontinence or whether predisposed individuals are more likely to develop symptoms during athletic activity.

Despite these limitations, the findings have important implications. Clinicians and sports medicine practitioners should be aware that urinary incontinence is common among both male and female athletes and that high-impact sports significantly increase risk. Preventive strategies, including athlete education, PFMT programs, and integration of pelvic health specialists into sports teams, could mitigate symptom progression. Future research should focus on longitudinal designs to establish causal pathways, include a wider range of sports with varying impact levels, and assess the efficacy of targeted interventions in athletic populations.

CONCLUSION

This study demonstrated that urinary incontinence is highly prevalent among young athletes, with more than nine out of ten participants reporting at least mild symptoms. The condition was not confined to one gender, yet females showed a significantly greater burden of severe incontinence compared to males, highlighting gender as an important determinant of severity. Sport-specific patterns were also evident, with basketball and running associated with the highest prevalence and severity, whereas tennis athletes were comparatively less affected. These results underscore the influence of both biological and sport-related factors on urinary continence in athletic populations. The findings have important clinical and practical implications. Urinary incontinence, often underreported due to stigma, should be routinely screened for in both male and female athletes, particularly those engaged in high-impact sports. Early identification and intervention may reduce progression of symptoms, preserve quality of life, and support continued athletic participation. Integrating pelvic floor muscle training into training regimens and raising awareness among coaches and athletes are practical strategies that could mitigate the burden of this condition. Future research should expand beyond cross-sectional assessments to longitudinal designs that explore causality and evaluate the effectiveness of preventive and therapeutic interventions. Inclusion of additional sports with varying levels of impact, as well as consideration of factors such as parity, body mass index, and training intensity, would further clarify risk profiles. By advancing understanding of urinary incontinence in athletes, gender-sensitive and sport-specific strategies can be developed to address this often overlooked but clinically relevant issue.

REFERENCES

1. Abrams P, Andersson KE, Birder L, Brubaker L, Cardozo L, Chapple C, et al. 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.
2. Walker C. Fisioterapia en obstetricia y uroginecología. Elsevier España; 2013.
3. Rodríguez-López ES, Calvo-Moreno SO, Basas-Garcia Á, Gutierrez-Ortega F, Guodemar-Perez J, Acevedo-Gomez MB. Prevalence of urinary incontinence among elite athletes of both sexes. J Sci Med Sport. 2021;24(4):338–44.
4. Miller YD, Brown WJ, Russell A, Chiarelli P. Urinary incontinence across the lifespan. Neurourol Urodyn. 2003;22(6):550–7.
5. Buckley BS, Lapitan MC. Prevalence of urinary incontinence in men, women, and children—current evidence: findings of the Fourth International Consultation on Incontinence. Urology. 2010;76(2):265–70.
6. Chung E, Katz DJ, Love C. Adult male stress and urge urinary incontinence—A review of pathophysiology and treatment strategies for voiding dysfunction in men. Aust Fam Physician. 2017;46(9):661–6.
7. Burge AT, Lee AL, Kein C, Button B, Sherburn M, Miller B, et al. Prevalence and impact of urinary incontinence in men with chronic obstructive pulmonary disease: a questionnaire survey. Physiotherapy. 2017;103(1):53–8.
8. Elenskaia K, Haidvogel K, Heidinger C, Doerfler D, Umek W, Hanzal E. The greatest taboo: urinary incontinence as a source of shame and embarrassment. Wien Klin Wochenschr. 2011;123(19–20):607–10.
9. Thyssen H, Clevin L, Olesen S, Lose G. Urinary incontinence in elite female athletes and dancers. Int Urogynecol J. 2002;13(1):15–7.
10. Velázquez-Saornil J, Méndez-Sánchez E, Gómez-Sánchez S, Sánchez-Milá Z, Cortes-Llorente E, Martín-Jiménez A, et al. Observational study on the prevalence of urinary incontinence in female athletes. Int J Environ Res Public Health. 2021;18(11):5591.
11. Carvalhais A, Jorge RN, Bø K. Performing high-level sport is strongly associated with urinary incontinence in elite athletes: a comparative study of 372 elite female athletes and 372 controls. Br J Sports Med. 2018;52(24):1586–90.
12. Hirayama F, Lee AH, Binns CW, Nishimura K, Taniguchi H. Association of impaired respiratory function with urinary incontinence in Japanese men. Respirology. 2009;14(5):753–6.
13. Da Roza T, Brandão S, Mascarenhas T, Jorge R, Duarte J. Urinary incontinence and levels of regular physical exercise in young women. Int J Sports Med. 2015;36(9):776–80.

14. Markland AD, Richter HE, Fwu CW, Eggers P, Kusek JW. Prevalence and trends of urinary incontinence in adults in the United States, 2001 to 2008. J Urol. 2011;186(2):589–93.

15. Dinc A. Prevalence of urinary incontinence during pregnancy and associated risk factors. LUTS: Lower Urinary Tract Symptoms. 2018;10(3):303–7.

16. Hagovska M, Jan Š, Bukova A, Horbacz A, Drackova D, Švihrova V, et al. Prevalence of urinary incontinence in females performing high-impact exercises. Int J Sports Med. 2017;38(3):210–6.

17. Hagovska M, Švihra J, Bukova A, Drackova D, Švihrova V. Prevalence and risk of sport types to stress urinary incontinence in sportswomen: A cross-sectional study. Neurourol Urodyn. 2018;37(6):1957–64.

18. Cardoso AM, Lima CR, Ferreira CW. Prevalence of urinary incontinence in high-impact sports athletes and their association with knowledge, attitude, and practice. Eur J Sport Sci. 2018;18(10):1405–12.

19. Rebullido TR, Gomez-Tomas C, Faigenbaum AD, Chulvi-Medrano I. The prevalence of urinary incontinence among adolescent female athletes: a systematic review. J Funct Morphol Kinesiol. 2021;6(1):12.

20. Botlero R, Urquhart DM, Davis SR, Bell RJ. Prevalence and incidence of urinary incontinence in women: review of the literature and methodological issues. Int J Urol. 2008;15(3):230–4.

21. 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.

22. World Medical Association. Declaration of Helsinki—Ethical principles for medical research involving human subjects. JAMA. 2013;310(20):2191–4.

23. Nygaard IE, Shaw JM. Physical activity and the pelvic floor. Am J Obstet Gynecol. 2016;214(2):164–71.

24. Pires T, Pires P, Moreira H, Viana R. Prevalence of urinary incontinence in high-impact sport athletes: a systematic review and meta-analysis. J Hum Kinet. 2020;73:279–88.

25. Bø K. Pelvic floor muscle training is effective in treatment of female stress urinary incontinence, but how does it work? Int Urogynecol J. 2004;15(2):76–84.

26. Jackson RA, Vittinghoff E, Kanaya AM, Miles TP, Resnick HE, Kritchevsky SB, et al. Urinary incontinence in elderly women: findings from the Health, Aging, and Body Composition Study. Obstet Gynecol. 2004;104(2):301–7.

27. Jácome C, Oliveira D, Marques A, Sá-Couto P. Prevalence and impact of urinary incontinence among female athletes. Int J Gynecol Obstet. 2011;114(1):60–3.

28. Townsend MK, Danforth KN, Rosner B, Curhan GC, Rennick NM, Grodstein F. Physical activity and incident urinary incontinence in middle-aged women. J Urol. 2008;179(3):1012–7.

29. Wesnes SL, Hunskaar S, Rortveit G. Epidemiology of urinary incontinence in pregnancy and postpartum. In: Urinary Incontinence. Rijeka: InTech; 2012. p. 21–40.

30. Dedicação AC, Haddad M, Saldanha MES, Driusso P. Comparison of quality of life in different types of female urinary incontinence. Braz J Phys Ther. 2009;13(2):116–22.

31. Davis NJ, Wyman JF, Gubitosa S, Pretty L. Urinary incontinence in older adults. Am J Nurs. 2020;120(8):57–62.