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Urinary Incontinence among Female Athletes: A Review of prevalence, prevention and treatment

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ABSTRACT

Introduction: Urinary incontinence, particularly stress urinary incontinence, is prevalent in female athletes competing in high-impact sports because of pelvic floor muscle strain due to repeated pressure on the pelvic floor muscle. Many athletes do not seek help, which affects performance and quality of life. Powerful management strategies are pelvic floor muscle training and core stability exercises. Awareness and precise interventions are required to help impacted athletes. *Aim of the study*: The purpose of this study was to estimate the prevalence of stress urinary incontinence in female athletes. We have also researched risks, quality of life, prevention, and treatment. We were looking to broaden the perspective on this issue, so we could further ensure the best possible care for our patients. *Materials and methods*: The studies are based on scientific articles about urinary incontinence in female athletes, published in the past five years in the PubMed database. Strict inclusion and exclusion criteria were established. AI was used for two reasons in this study: assisting with language patterns and enhancing written English to an academic level. It was used only to improve efficiency of the text, researchers made final interpretations and conclusions. *Conclusions*: There is a high incidence of urinary incontinence (UI) in female athletes, especially among high-impact athletes. High-impact sports are associated with the development of UI and considerable consequences to both physical and mental health, and athletic performance. Patient education, pelvic floor muscle training and holistic management are more effective, necessary, and overall preferred, in comparison with surgery.

Keywords: urinary incontinence, stress urinary incontinence, female athletes, pelvic floor physiotherapy, quality of life

1. INTRODUCTION

Urinary incontinence (UI) and stress urinary incontinence (SUI) are among the most problematic and poorly recognized conditions in female athletes. It impacts a lot of them, especially those engaged in high-impact sports. Urinary incontinence is present in 25-36% of female athletes (Gill et al., 2025; Rebullido et al., 2021; Caylet et

al., 2006), which is related to repetitive elevations of abdominal pressure (Gill et al., 2025; Pires et al., 2020). Although common, symptoms are often not recognized by athletes, therefore not treated, which can potentially lead to poor athletic performance and worsen the quality of life (Rebullido et al., 2021). Understanding the occurrence, causes, and risk factors of urinary incontinence in female athletes is crucial to build optimal preventative measures and management. Physiotherapeutical management (PFMT) can improve continence (Ptak & Szyc, 2024; Caylet et al., 2006; Pires et al., 2020). Surgical treatment of SUI in women athletes is considered only after conservative therapy has not succeded. Such surgical interventions have to be carefully weighed and the operative approach should consider the individual preferences and fears of athletes, for whom the intervention could possibly detract or hinder athletic performance and recovery.

The objective of this essay is to summarise the latest evidence to delineate the methods of prevention, epidemiology, and mechanisms of UI among female athletes, as well as potential therapeutic effects.

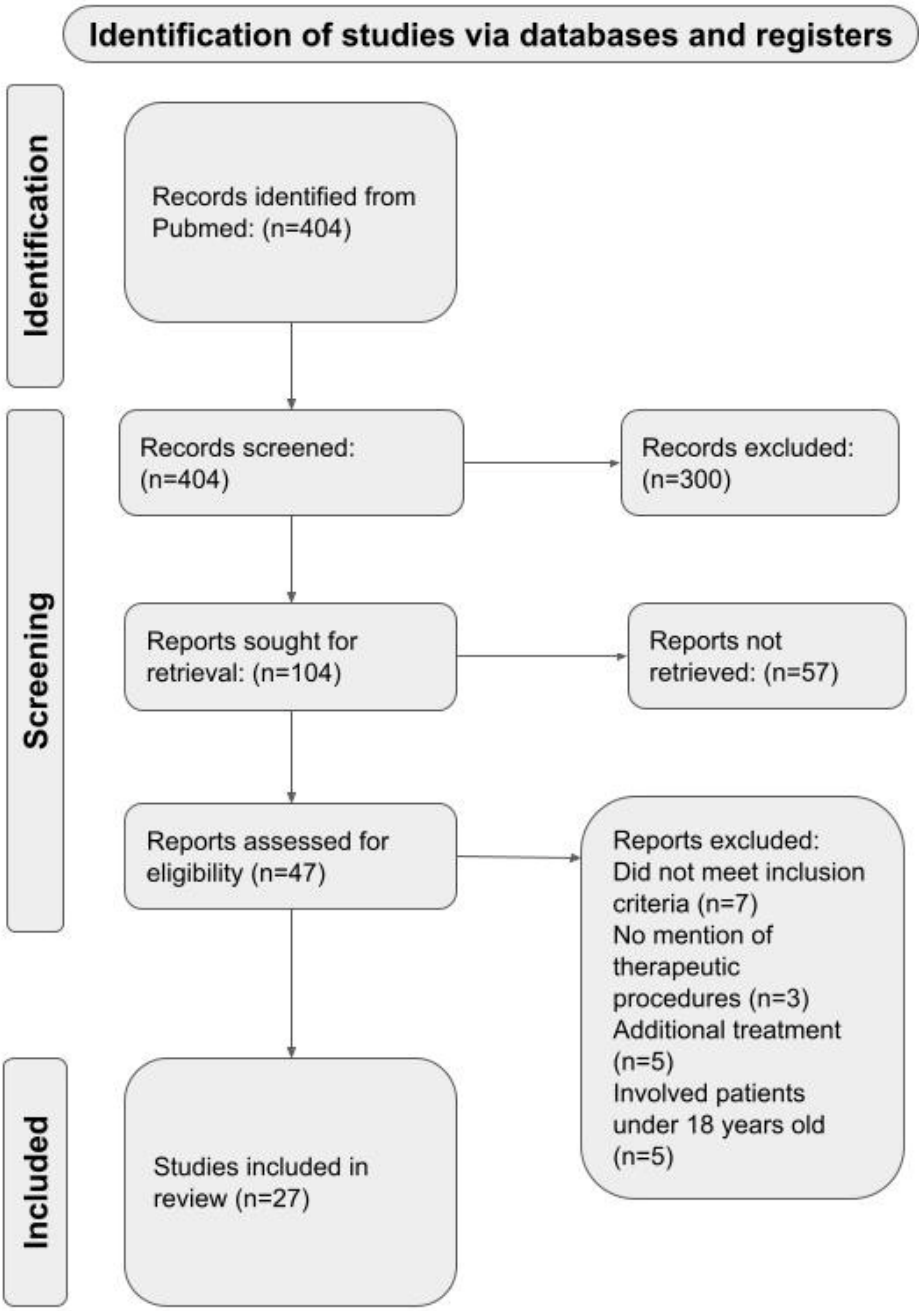

Figure 1. Flow chart

2. REVIEW METHODS

We researched an electronic PubMed database for the purpose of collecting the needed amount of data for this review. The search included words such as: "urinary incontinence", "stress urinary incontinence", "urogynecology", "female athletes", "nulliparous female athletes". Keywords included logical operators "OR" and "AND". The use of the local operator "NOT" excluded phrases such as "men", "animals", "anatomical defects", "spinal cord injury", "parathletes", "diabetics", and "diuretics". The search strategy is presented in Figure 1. Preliminary screening of the papers relied on titles and abstracts. Only works meeting that threshold were considered in detail.

Criteria for inclusion and exclusion

To guarantee reliability and consistency in the overall evaluation of this review, specific inclusion and exclusion criteria were established. The goal was to choose studies that showed highest relevance to preventative and therapeutic management of stress urinary incontinence in female athletes. All studies were published over the past 5 years and were written in English. The studies used for this review were clinical trials, randomized controlled trials, systematic reviews, and meta-analyses and they referred to adult women having definite urinary incontinence symptoms. The data for this review was not based on individual case reports or studies on patients less than 18 years of age. We excluded publications that did not provide a clear description of the therapeutic approaches and the effects thereof. We also excluded papers, in which study participants were given any additional substances to support treatment.

3. RESULTS & DISCUSSION

An extensive meta-analysis of the prevalence of urinary incontinence (UI) among female athletes estimated that about 25.9% of the female population has experienced some form of UI (Yang et al., 2020). Among this group, stress urinary incontinence (SUI) was the most common condition (20.7%). The prevalence of UI found to be much higher in athletes competing in high-impact sports, where volleyball players had the highest prevalence (75.6%) (Yang et al., 2020; Syeda & Pandit, 2024). Furthermore, during high-impact activities, mechanical stress placed on the pelvic floor was an important factor leading to urinary incontinence. Consistent with this phenomenon, 16.5% of 1,000 female athletes aged 15 to 30 years were diagnosed with UI during athletic activity (Whitney et al., 2021). Significantly, it found that women who participated in high-impact sports (e.g., running, cheerleading, and gymnastics) were at 4.5 times greater risk for developing UI comparing with those who engaged in low-impact sports (Whitney et al., 2021).

Other data present nulliparous female soccer players, and 35% of them were found to have developed UI, with stress urinary incontinence responsible for 26% of cases. The incidence of UI was markedly higher in participants who exercised than in participants who were sedentary controls, which shows the influence of heavy physical exertion on the function of the pelvic floor (Sebastian-Rico et al., 2024). It is crucial to raise awareness, establish screening, and focus interventions for the management of pelvic dysfunction in female athletes (Rzymski et al., 2020; Joseph et al., 2021). Conservative management - especially pelvic floor muscle training (PFMT) - was pointed out as key in preventing and treating UI in this population. PFMT also found to positively influence the pelvic floor, making the muscles stronger and less prone to fatigue. This led to symptom reduction and enhanced quality of life of these athletes (Syeda & Pandit, 2024).

Table 1. Intensity of sports responsible for UI

Intensity	Sport
high-impact sports	basketball, volleyball, gymnastics, athletics
low-impact sports	cycling, swimming, pilates

Risk factors and sport-specific considerations

In high-impact sports the rate of urinary incontinence (UI) is much higher than in low-impact sports (Table 1). Women athletes are suspected to have around a threefold increased risk of developing UI compared to non-athletes. Enhanced risk of experiencing SUI due to higher mechanical load on the pelvic floor is due to the increased mechanical stress on the pelvic floor during high-impact activities (Teixeira et al., 2018; Kopyra et al., 2024). Finally, the volume of seepage of urine also seems to be associated with hours of practice,

suggesting that longer training hours could increase the risk of UI. This relationship implies that the joint strain on the pelvic floor muscles during prolonged training could, over time, become a contributory factor in the pathophysiological process (Rzymski et al., 2020; Opara et al., 2022). Another independent risk factor poor nutrition. Undernourished athletes are nearly twice as likely to develop UI (Opara et al., 2022; Niederauer et al., 2023).

Physiotherapy Interventions

Physiotherapy interventions, including pelvic floor muscle training (PFMT), are the most widespread and safe, considering the high prevalence of urinary incontinence (UI) in female athletes. PFMT is the most recommended non-invasive treatment for UI and has good outcomes (Pires et al., 2020). Specifically for athletes' whose intra-abdominal pressure elevates as a result of high-impact activities, specific physiotherapy methods can rebuild pelvic floor functionality and decrease the number of leaky episodes (Pires et al., 2020; Teixeira et al., 2018). PFMT stimulates the muscles of the pelvic floor and can improve the quality of life of the athlete, if only handled with individuality and proper care (Ptak & Szyc, 2024; Opara et al., 2022; Cardoso et al., 2018). Studies also distinguish a large group of women, who are involved in high-impact sports and experiencing UI, and up to 80% of them report never seeking help with the symptoms. This phenomenon highlights the importance of disease awareness and early physiotherapeutic interventions (Opara et al., 2022). Today, guidelines published at international continence meetings continue to emphasize PFMT as a first-line intervention (De Mattos et al., 2018).

Table 2. Effectiveness and invasiveness of procedural treatment

Procedural treatment methods	Effectiveness	Invasiveness
Midurethral sling procedures	moderate	moderate
Burch colposuspension	high	high
Bulking agents	low	low
Laser Therapy	high	low

Common Surgical Methods

Surgical management of SUI seen in female athletes is mainly midurethral sling procedures, and, rarely, Burch colposuspension or bulking agents. Newly emerging laser therapies offer non-invasive alternatives. Due to potential negative effects of surgery and anaesthesia on the pelvic floor and athletic performance, conservative treatments are still the keystone of management. Surgical options are considered when these options do not yield treatment results. Surgical procedures for SUI are usually midurethral slings, which include the retropubic tension-free vaginal tape (TVT) and transobturator tape (TOT or TVT-O). A synthetic mesh tape is placed under the mid-portion of the urethra to provide mechanical support and restore continence by preventing the descent of the urethra, when pelvic pressure increases. The long-term effect lands between 61.6% and 81.3% in the general female population (Rzymski et al., 2020; Călinescu et al., 2023). The use in nulliparous female athletes should be discussed beforehand, as it hasn't been adequately researched. Some researchers find mesh tapes to be an inappropriate management tactic if leaking happens exclusively during sports practice. The reasoning behind this is that tapes won't impact the sport-specific pelvic floor dynamics (e.g. increased intra-abdominal pressure) and may limit the effectiveness of future pelvic floor muscle training (Rzymski et al., 2020). During this procedure, the vaginal wall is suspended on the Cooper's ligament, close to the bladder neck. Despite therapeutic success, it is a much more invasive operation than sling procedures and, due to the time required to recover from surgery, it is of limited usage in athletes (Rzymski et al., 2020). With injectable urethral bulking agents urethral coaptation and muscle resistance improve. They are less invasive than sling procedures, but have a shorter duration of effect. The evidence is sparse, in athletes specifically (Table 2). However, future research may clarify their application (Rzymski et al., 2020). Other non-operative methods like vaginal and urethral erbium-doped yttrium aluminum garnet laser (VEL + UEL) therapies are potential agents in treating elite female athletes with SUI. A case report showed considerable reduction of urinary leakage and increased athletic performance following several laser procedures and PFMT, with significant benefits after 3 years of therapy and no adverse events (Okui et al., 2023; Okui, 2025). This way, the players can still compete, and there is less risk

involved, comparing to surgery. Surgical ways of managing SUI could negatively influence pelvic floor muscle function and therefore compromise future rehabilitation. Follow-up rehabilitation is in the best interest of athletes, who wish to improve their pelvic floor performance. Therefore, conservative treatment with pelvic floor muscle training continues to serve as primary management and surgery is limited to specific circumstances. Other preventive devices, including vaginal tampons or pessaries, can be used to decrease leakage and have no surgical risks (Rzymski et al., 2020). Randomized controlled trials, which explored surgical outcomes in female athletes battling UI, highlight the importance of forming tailored multidisciplinary decision-making groups of professionals, that include urogynecologists, physiotherapists, and sports medicine specialists (Rzymski et al., 2020).

Quality of Life and Recommendations

Urinary incontinence is associated with psychological and social issues and with deteriorating athletic performance (Syeda & Pandit, 2024; Tarczewska et al., 2024; Pisani et al., 2022). UI must be well-recognised and treated early, as first-time intervention is one of the key steps for its prevention (Syeda & Pandit, 2024; Rzymski et al., 2020). It's important to teach pelvic anatomy and to train the pelvic floor muscles in order to decrease symptoms (Syeda & Pandit, 2024; Opara et al., 2022; Tarczewska et al., 2024). Besides that, controlling some of the nutritional factors – namely, the availability of adequate energy – may also decrease the risk of incontinence (Syeda & Pandit, 2024; Rzymski et al., 2020; Gan & Smith, 2022). Despite taking current knowledge into consideration, further research is needed to explore sport-specific risk factors, and to establish more specific ways of prevention and treatment strategies, focusing on the exclusive physiological and anatomical characteristics of female athletes.

Our review of up-to-date studies demonstrates that large numbers of female athletes experience UI. The percentage ranges from 25% to 45%, with higher prevalence in sports like volleyball, rugby, weightlifting, CrossFit, and trampolining, with the highest percentage of 75% (Rebullido et al., 2021; Pires et al., 2020; Opara et al., 2022; Rodríguez-López et al., 2020). All these differences could attribute to differences in sport type, training intensity, and methodological variability across studies. Urinary incontinence develops due to persistent increase in intra-abdominal pressure while performing strenuous exercise, leading PFM to become overloaded and compromised. This, consequently, can lead to the weaker urethral support, and ultimately involuntary urine leak (Pires et al., 2020; Teixeira et al., 2018; Rodríguez-López et al., 2021). Specifically, pelvic floor muscle hypertonicity and low relaxation capacity, in addition to impaired coordination of pelvic floor and abdominal muscles, are frequent features of elite female athletes (Opara et al., 2022; Rodríguez-López et al., 2021), which exacerbates the development of SUI. Additionally, systemic influences, e.g., hormonal changes, primarily through menstrual cycle phases, can impact these biomechanical and neuromuscular factors. This can lead to altered pelvic floor dynamics, although this aspect needs further evaluation (Tarczewska et al., 2024). Psychological and social implications of UI, characterized by lowered self-esteem, anxiety, and diminished athletic performance, underscore wider effects of the condition on quality of life (Rebullido et al., 2021; Opara et al., 2022). One of the researched studies, found that UI symptoms might shift according to changing menstrual cycle phases (Tarczewska et al., 2024). Athletes have reported that they have incontinence accidents during training more often than during a competition. This phenomenon might have an answer in increased catecholamine levels and higher sympathetic activity during competition, which drives the urethral neural pathways to contract the urethral muscles and potentially decrease the number of leakage episodes (Rodríguez-López et al., 2021). Athletes display symptoms that vary in nature, from sudden gushes to slow dribbling. These can reflect multiple underlying pelvic floor disorders or differences in neuromuscular control (Teixeira et al., 2018).

These results emphasize the need for athletes, coaches, and clinical practitioners to become more familiar with targeted education for the purpose of destigmatizing UI, reporting UI and intervention. Using programs that focus on awareness of the pelvic floor muscles and making strengthening and relaxation exercises a part of regular training are key components of precaution, and subsequent treatment (Pires et al., 2020; Teixeira et al., 2018; Rodríguez-López et al., 2021). The use of physiotherapeutic interventions, mostly individualized pelvic floor muscle training (PFMT), combined with core stability exercises, can result in improvements in continence and pelvic floor function. Additionally, changes in modifiable risk factors, like the intensity and duration of training, and nutritional status (one that ensures adequate energy availability), are necessary to achieve optimal care (Teixeira et al., 2018; Opara et al., 2022). Some data sources, such as symptoms that are reported by athletes themselves or expert interviews, are moderately-qualitative in nature and could lead to bias and limit external validity (Table 3). Moreover, the lack of diagnostic criteria and objective, standardized assessment tools, as well as the lack of comparative data in literature also complicate cross-study comparisons and establishing treatment protocols (Opara et al., 2022; Rodríguez-López et al., 2021).

Cohort studies that examine the progression and long-term consequences of UI in female athletes, should be carried out. Studies that seek connection between hormones and pelvic floor function, neuromuscular coordination, and the relative effectiveness of physical exercise regimens are required. By developing and validating evidence-based, sport-specific assessment and outcome measures, researchers will be able to diagnose and treat patients more accurately. In addition, an analysis of the use of digital health applications to increase patient adherence and patient involvement in pelvic floor rehabilitation may improve clinical outcomes (Rebullido et al., 2021; Teixeira et al., 2018; Opara et al., 2022).

Table 3. Risk factors

Modifiable risk factors	Unmodifiable risk factors
Intensity of training	Age
Duration of training	Menstrual cycle
Nutritional status	Other hormonal changes
Parity	Anatomical dysfunction
Education	Muscle and connective tissue physiology

4. CONCLUSION

Female athletes have a broad spectrum of UI etiologies. The increase of abdominal pressure is demanding on the pelvic floor musculature and, combined with long training duration and intensity, may lead to muscle fatigue and decreased muscular coordination. Insufficient nutrition can trigger muscle damage and impaired tissue repair. Hormonal fluctuations can modify the pelvic floor muscle tone, and elasticity of the connective tissue. Conservative management strategies have shown significant effectiveness as both prevention and treatment. The stigma around UI should be terminated using open discussion and multidisciplinary teamwork among the healthcare providers, coaching staff, and athletes.

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Conflict of interest

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Data and materials availability

All data associated with this study will be available based on reasonable request to the Corresponding Author.

REFERENCES

1. Călinescu BC, Neacșu A, Martiniuc AE, Dumitrescu D, Stănică CD, Roșu GA, Chivu LI, Ioan RG. Surgical treatments for women with stress urinary incontinence: a systematic review. Life 2023;13(7):1480. doi: 10.3390/life13071480
2. Cardoso AM, Lima CR, Ferreira CW. Prevalence of urinary incontinence in high-impact sports athletes and their association with knowledge, attitude and practice about this dysfunction. Eur J Sci 2018;18(10):1405-12. doi: 10.1080/17461391.2018.1496146
3. Caylet N, Fabbro-Peray P, Marés P, Dauzat M, Prat-Pradal D, Corcos J. Prevalence and occurrence of stress urinary incontinence in elite women athletes. Can J Urol 2006;13(4):3174-9.
4. de Mattos Lourenco TR, Matsuoka PK, Baracat EC, Haddad JM. Urinary incontinence in female athletes: a systematic review. Int Urogynecology J 2018;29(12):1757-63. doi: 10.1007/s00192-018-3629-z
5. Gan ZS, Smith AL. Urinary incontinence in elite female athletes. Curr Urol Rep 2022;24(2):51-58. doi: 10.1007/s11934-022-01133-6
6. Gill N, Lin KY, Whitford E, Jeffrey S, Frawley H. The prevalence of urinary incontinence in nulliparous and parous adult netball players. Continence 2025;13:101753. doi: 10.1016/j.cont.2025.101753
7. Joseph C, Srivastava K, Ochuba O, Ruo SW, Alkayyali T, Sandhu JK, Waqar A, Jain A, Poudel S. Stress urinary incontinence among young nulliparous female athletes. Cureus 2021;13(9):e17986. doi: 10.7759/cureus.17986
8. Kopyra K, Chomiuk T, Kasiak P, Mamcarz A, Śliż D. Evaluation of stress urinary incontinence in physically active and childless Polish females: a cross-sectional study. Physiother Q 2024;32(3):80-85. doi: 10.5114/pq/191514
9. Niederauer S, Hunt G, Foreman KB, Merryweather A, Hitchcock R. Intrinsic factors contributing to elevated intra-abdominal pressure. Comput Methods Biomech Biomed Engin. 2023;26(8):941-951. doi: 10.1080/10255842.2022.2100220
10. Okui N, Ikegami T, Mikic AN, Okui M, Gaspar A. Long-Term improvement in urinary incontinence in an elite female athlete through the laser treatment: a case report. Cureus 2023;15(3):e36730. doi: 10.7759/cureus.36730
11. Okui N. Laser treatment for urinary incontinence in elite female athletes analyzed using a discrete mathematics approach. Sci Rep 2025;15(1). doi: 10.1038/s41598-025-00363-1
12. Opara J, Socha T, Poświata A. Factors influencing stress urinary incontinence in elite female athletes. Physiother Q 2022;30(2):85-9. doi: 10.5114/pq.2021.108678
13. 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(1):279-88. doi: 10.2478/hukin-2020-0008
14. Pisani GK, Sato TD, de Carvalho DH, Carvalho C. Impact of urinary incontinence on quality of life in female CrossFit practitioners: a cross-sectional study. Eur J Obstet Amp Gynecol Reprod Biol 2022;268:56-61. doi: 10.1016/j.ejogrb.2021.11.424
15. Ptak A, Szyc M. Impact of sport and physical activity on urinary incontinence: does exercise act as a protective factor or increase risk? Qual Sport 2024;34:56194. doi: 10.12775/qs.2024.34.56194
16. Rebullido TR, Gómez-Tomás 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. doi: 10.3390/jfmk6010012
17. Rodríguez-López ES, Calvo-Moreno SO, Basas-García Á, Gutierrez-Ortega F, Guodemar-Pérez J, Acevedo-Gómez MB. Prevalence of urinary incontinence among elite athletes of both sexes. J Sci Med Sport 2020; 24(4):338-344. doi: 10.1016/j.jsams.2020.09.017
18. Rzymski P, Burzyński B, Kanpik M, Kociszewski J, Wilczak M. How to balance the treatment of stress urinary incontinence among female athletes? Arch Med Sci 2020;17(2):314-322. doi: 10.5114/aoms.2020.100139

19. Sebastian-Rico JM, Muñoz-Fernández MJ, Martínez-Aranda LM, Calvo-Lluch Á, Ortega-Becerra M. Prevalence of urinary incontinence in female professional soccer players by category and specific position: a comparative study with a control group. Healthcare 2024;12(23):2478. doi: 10.3390/healthcare12232478
20. Syeda F, Pandit U. Urinary incontinence in female athletes: a systematic review on prevalence and physical therapy approaches. Cureus 2024;16(7):e64544. doi: 10.7759/cureus.64544
21. Tarczewska A, Kołodyńska G, Zalewski M, Mucha A, Piątek A, Andrzejewski W. Evaluation of the quality of life and the incidence of stress urinary incontinence in nulliparous women training selected sports: a cross-sectional survey pilot study. Physiother Q 2024;32(3):74-9. doi: 10.5114/pq/183031
22. Teixeira RV, Colla C, Sbruzzi G, Mallmann A, Paiva LL. Prevalence of urinary incontinence in female athletes: a systematic review with meta-analysis. Int Urogynecology J 2018;29(12):1717-25. doi: 10.1007/s00192-018-3651-1
23. Whitney KE, Holtzman B, Cook D, Bauer S, Maffazioli GD, Parziale AL, Ackerman KE. Low energy availability and impact sport participation as risk factors for urinary incontinence in female athletes. J Pediatr Urol 2021;17(3):290.e1-290.e7. doi: 10.1016/j.jpurol.2021.01.041
24. Yang J, Xue D, Huang G. The changing factors affecting local environmental governance in china: evidence from a study of prefecture-level cities in guangdong province. Int J Environ Res Public Health 2020;17(10):3573. doi: 10.3390/ijerph17103573