







Investigation of the relationship between pelvic floor awareness and urinary incontinence in young athletes

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Abstract

Objectives: Knowledge and awareness about the pelvic floor are closely related to knowing the function of the pelvic floor muscles (PFM), identifying the risk factors for the PFM, and providing the diagnosis and treatment of possible problems. The aim of this study is to determine the relationship between pelvic floor muscle awareness and urinary incontinence (UI) in young athletes.

Methods: One hundred eighty athletes between the ages of 18-26 were included in the study, which was designed as a cross sectional. The UI status, pelvic floor health knowledge level, physical activity level and daily life effects related to incontinence of the athletes were evaluated. One way ANOVA test was used to analyze the presence of UI according to physical activity level. The presence of incontinence and pelvic floor awareness by gender were analyzed by T-test in independent groups.

Results: There was no correlation between the pelvic floor awareness of young athletes and the presence of UI ($p > 0.01$). It was determined that the athletes with moderate and vigorous physical activity levels experienced more incontinence than those with low-intensity physical activity ($p < 0.05$). It has been concluded that athletes whose daily life is affected due to UI have more pelvic floor awareness ($p < 0.01$).

Conclusion: Although there is no relationship between the presence of UI and pelvic floor knowledge and awareness in athletes, pelvic floor awareness is higher in athletes whose daily life is affected due to UI.

Keywords: Pelvic Floor, Awareness, Knowledge, Urinary Incontinence, Athletes.

Introduction

The pelvic floor is a structure made up of muscles and fascia that support pelvic organs such as the bladder, bowel, and uterus and contribute to the maintenance of continence.^[1] Although conditions such as urinary incontinence (UI), pelvic pain that occur with pelvic floor dysfunction do not threaten life, they negatively affect the quality of life of individuals.^[2] Strenuous exercise and high-intensity physical activities are possible risk factors for pelvic floor dysfunction in athletes.^[3] It has been reported that athletes do not consult to their trainers or a health professional when they experience any pelvic floor dysfunction, and the main reason for this is their lack of knowledge about the pelvic floor.^[3] In studies involving women, it was concluded that low level of knowledge about the pelvic floor was highly associated with pelvic

floor dysfunctions.^[4] Insufficient pelvic floor knowledge in healthy men is generally associated with sexual dysfunctions, while men with benign prostatic hyperplasia are explained by increased urinary symptoms.^[5,6]

Professional athletes encounter various pathologies related to their sport.^[7] Although these pathologies are mostly considered as musculoskeletal injuries, urinary incontinence occurring during vigorous physical activity is one of the pathologies associated with sports.^[8] Urinary incontinence is defined as involuntary urinary incontinence, and the main forms of UI seen in athletes are stress urinary incontinence (SUI), urgency urinary incontinence (UUI), and mixed urinary incontinence (MUI).^[9] SUI is a condition that can occur even when the urethra is intact due to excessive exertion, vigorous physical activity, and coughing. UUI is urinary

incontinence that occurs immediately after the urge to void. MUI is a combination of both urge and stress urinary incontinence.^[3] It is known that the incidence of SUI increases with age, but the presence of SUI in athletes in their 20s has been shown in studies.^[10] While 20% of nulliparous young women in the general population experience SUI, it has been reported that this rate is 80% in those who do high-intensity activities such as trampoline exercise.^[11] This rate was found to be 0.7% in young men between the ages of 19-44, but the prevalence of SUI increases with age, reaching 2.7%.^[12]

The prevalence of UI in athletes varies depending on the intensity of the exercise, the floor and the movements.^[13] Moderate-intensity physical activity reduces the risk of urinary incontinence by contributing to pelvic floor muscle (PFM) strength, while heavy exercises are a risk factor for SUI.^[14] Urine leakage occurs as a result of the sudden increase in abdominal pressure during exercise and inadequate contraction of the PFM simultaneously.^[13] The physical effort required for high-intensity exercise in different branches of sport and the chronicity of intra-abdominal pressure increase are strong factors that directly affect pelvic floor functions.^[10] Urinary incontinence that occurs during training and competitions is often seen in branches of sports such as ball games and gymnastics.^[14] Jumping, landing and running activities increase the incidence of SUI.^[11]

Knowledge and awareness of the pelvic floor are closely related with knowing the function of PFM, identifying risk factors for PFM and providing diagnosis and treatment of potential problems. It is common for people who are actively involved in sports to suffer from SUI. However, there is no study in the literature examining the level of knowledge and urinary symptoms of athletes about the pelvic floor. It is very important to determine the level of pelvic floor awareness, especially in young athletes, to prevent them from SUI related to physical activity they may be exposed to in the future, and to have information about pelvic floor health.

Objectives

The aim of this study is to determine the relationship between PFM awareness and incontinence in young athletes who do long-term and high-intensity sports that increase the risk of SUI.

Methods

This study was registered on ClinicalTrials.gov with number NCT05356832.

The study was designed as a cross sectional and was carried out with young athletes, between the ages 18-26, from the Faculty of Sports Sciences of Suleyman Demirel University in the 2021-2022 academic year. Ethics committee approval of the study was obtained from the Ethics Committee of Suleyman Demirel University (number: 54/5, date: 21.12.2021) and the study was conducted in accordance with the Declaration of Helsinki.

The power analysis of the study was performed by G.Power 3.1.9.2. (University of Kiel, Germany). The method was simple random sampling and estimating a proportion from a finite population. It is known that the population is 200 young athletes. Considering the rate $p=0.5$, the effect size was calculated as $d=0.042$. according to this effect size and considering the type-I error as 5% and the power as 0.95, the sample size was calculated as $n=164$. However, in the study period, the sample size reached to $n=180$ young athletes [Figure 1].

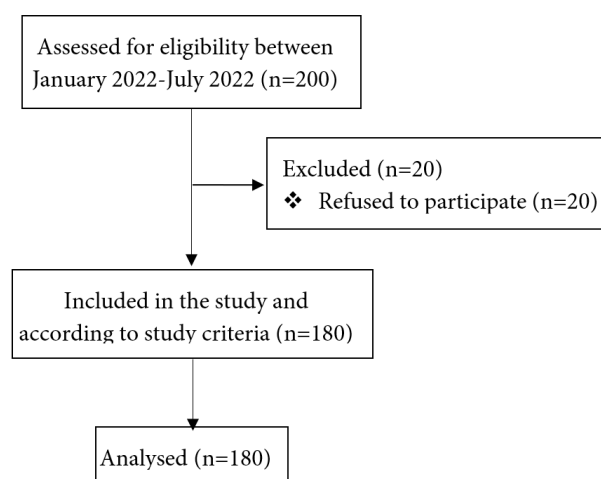


Figure 1. The study flow chart in line with the STROBE

Face-to-face interview method was used to collect data. After the participants' age, gender, type of sport and duration of participation in sport in years were recorded in the demographic form, the International Physical Activity Questionnaire-Short Form (IPAQ-SF) was applied to determine the physical activity levels. Pelvic Floor Health Knowledge Quiz (PFHKQ) was used to examine pelvic floor awareness. The frequency and severity of the participants' urinary symptoms were determined by the International Urinary Incontinence Consultation Questionnaire-Short Form (ICIQ-SF). The effect of urinary incontinence on their daily lives was examined with the Incontinence Impact Questionnaire-7 (IIQ-7).

International Physical Activity Questionnaire- Short Form (IPAQ-SF): IPAQ-SF, which is used to determine

physical activity levels, was translated into Turkish Sağlam et.al. in 2010.^[15] Light, moderate and vigorous activities and sitting time of the participants in the last seven days were recorded. For physical activities performed for at least 10 minutes, the MET value (metabolic equivalent) was multiplied by the number of days and minutes, and the total score was calculated in terms of MET/week. According to the results, the classification was made as low physical activity (MET=<600), moderate physical activity (MET=600-3000) and vigorous activity level (MET=>3000).^[16]

Pevic Floor Health Knowledge Quiz (PFHKQ): It was used to determine the knowledge level of pelvic floor health. The questionnaire was developed in Turkish by Al-Degees et al in 2021. The questionnaire has sub-categories of function/dysfunction (8 items), risk/etiology (13 items), diagnosis and treatment (8 items), and pelvic floor awareness is evaluated with a total of 29 items. The scoring system was as follows: "1" point for items answered correctly and "0" point for items answered incorrectly or unknown. High score indicates a high level of pelvic floor knowledge.^[2]

International Consultation of Incontinence Questionnaire-Short Form (ICIQ-SF): It was used in the evaluation of urinary symptoms of athletes. The Turkish validity study of the questionnaire was performed in 2004 by Çetinel et al.^[17] The questionnaire includes six questions to determine the frequency of urinary incontinence, during which activities it occurs and how much it affects daily life.^[17,18] A total score between 0-21 is obtained in the questionnaire. A low score indicates that the quality of life due to incontinence is less affected, while a high score indicates that it is affected more. The most appropriate cut-off point for this questionnaire was determined as 8. A score of 8 and above indicates uncomfortable urine leakage.^[18]

Incontinence Impact Questionnaire-7 (IIQ-7): The questionnaire consists of seven questions and a total score of 0-21 points is obtained. High scores indicate low quality of life. The Turkish validity study of the questionnaire was conducted by Çam et al. in 2007.^[19]

Statistical analysis

The statistical analyses were performed by SPSS 21.0 (IBM Inc, Chicago, IL, USA). The descriptive statistics were presented as mean±SD for numerical variables and frequency (percentage) for categorical variables. The normality of continuous variables was checked by the Kolmogorov-Smirnov test. One-way ANOVA test was used to analyze the presence of urinary incontinence

according to physical activity levels. The presence of incontinence and pelvic floor awareness by gender were analyzed by Student t-test for two independent groups. A "P-value" less than 0.05 was considered significant.

Ethical considerations

The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval (code: 54/5, date: 21.12.2021) was obtained.

Results

The demographic characteristics of the athletes are given in Table 1. The mean age and BMI of the participants were found to be 20.88±1.93 years and 22.30±2.80 kg/m², respectively. It was determined that the mean duration of participation in sports was 8.60±3.88 years.

Table 1. Sociodemographic characteristics of athletes

Sociodemographic characteristics	Number (%)	
Gender	Female	48 (26.7)
	Male	132 (73.3)
Marriage status	Single	179 (99.4)
	Married	1 (0.6)
Branch of sports	Basketball	19 (10.6)
	Volleyball	42 (23.2)
	Football	100 (55.6)
	Handball	19 (10.6)

The comparison of UI status according to the physical activity levels of the groups is presented in Table 2. It was found that athletes with moderate and vigorous physical activity experienced significantly more UI than those with low level of activity (p<0.05). However, there was no significant difference between the groups with moderate and vigorous physical activity levels in terms of UI status (p>0.05).

When pelvic floor awareness and presence of urinary incontinence were examined by gender, it was seen that female athletes had significantly more incontinence (p<0.05). It was concluded that pelvic floor awareness and knowledge level were similar in female and male young athletes (p>0.05), [Table 3].

It was found that there was no significant relationship between the presence of incontinence and pelvic floor awareness of the participants (p>0.01). However, it was concluded that daily life is more affected in athletes with incontinence (p<0.01). It was determined that incontinence-related quality of life was positively moderately correlated with pelvic floor awareness. (p<0.01), [Table 4].

Table 2. ICIQ-SF scores of athletes by physical activity levels

	Low Physical Activity (Mean±SD)	Moderate Physical Activity (Mean±SD)	Vigorous Physical Activity (Mean±SD)	P value
ICIQ-SF	0.00±0.00 ^a	0.35±1.04 ^{ab}	0.49±1.32 ^{ac}	< 0.05

ICIQ-SF: International Consultation of Incontinence Questionnaire-Short Form, SD: Standart deviation, p: one way anova test, a,b,c: Groups with the same letter in each feature are statistically different from each other.

Table 3. Comparison of presence of UI and pelvic floor awareness by gender

	Gender	n	Mean±SD	P value
ICIQ-SF	Female	48	0.70 ±1.57	0.002
	Male	132	0.34 ±1.06	
PFHKQ	Female	48	7.93 ±6.04	0.39
	Male	132	6.94 ±6.38	

ICIQ-SF: International Consultation of Incontinence Questionnaire-Short Form, PFKHQ: Pelvic Floor Health Knowledge Quiz, n: number, SD: Standart deviation, p: t test.

Table 4. Comparison of urinary incontinence, incontinence-related quality of life and pelvic floor awareness

		ICIQ-SF	IIQ-7	PFHKQ
ICIQ-SF	r	1	0.456**	0.139
	p		0.000	0.063
IIQ-7	r	0.456**	1	0.036
	p	0.000		0.629
PFHKQ	r	0.139	0.036	1
	p	0.063	0.629	

ICIQ-SF: International Consultation of Incontinence Questionnaire-Short Form, IIQ-7: Incontinence Impact Questionnaire-7, PFKHQ: Pelvic Floor Health Knowledge Quiz, **: Spearman correlation analysis, p<0.01.

Discussion

In our study, in which we examined the relationship between the presence of UI in athletes and pelvic floor awareness, it was observed that female athletes experienced more UI than male athletes, and the pelvic floor awareness and knowledge levels of female and male athletes were similar. It was concluded that the pelvic floor awareness and knowledge levels of the athletes whose daily life was affected due to incontinence were higher.

UI can be seen in both male and female populations. However, studies have shown that the prevalence of UI is higher in women.^[13] The majority of our sample consisted of men, and in accordance with the literature, it was observed that female athletes experienced urinary incontinence more than male athletes. Previous studies

have shown that pelvic floor dysfunctions experienced by female athletes are associated with anatomical predisposition and high-impact sports.^[20-23] Giagio et al., in their review of the relationship between sport and pelvic floor dysfunction, reported that the majority of the studies were conducted with female population and that the number of studies evaluating male athletes was insufficient.^[22] Studies evaluating only male athletes for urinary symptoms or incorporating equal numbers of both genders will help to further clarify the prevalence of sports-related SUI.

In the literature, it has been reported that SUI is associated with the intensity of physical activity, not with the types, in summary, high-impact sports seem to be associated with SUI more than low-impact sports.^[23] Hagovska et al. demonstrated that SUI was positively associated with physical activity intensity in women who were grouped as active and inactive according to MET levels.^[21] In our study, it was determined that more than half of the athletes grouped according to their physical activity levels had intense physical activity levels. When the relationship between physical activity level and urinary incontinence was examined, it was concluded that those with moderate and vigorous physical activity levels experienced more incontinence than athletes with low activity levels. Similar to our study, Borin et al. compared volleyball and handball players with women who do not play sports and found a strong correlation between physical activity level and SUI.^[24] It has been shown that the prevalence of SUI is high in those who do high-impact sports, and it has been revealed that the main cause of SUI in athletes is the level of physical activity.^[20]

Inadequate PFM contraction during sudden increase in intra-abdominal pressure is shown as the cause of SUI in athletes. Despite this pressure increase caused by vigorous physical activities, it is possible to prevent incontinence by providing adequate PFM awareness and teaching contraction at the right time.^[25,26] According to the results of our study, it was found that the pelvic floor awareness of young athletes was not associated with the presence of urinary incontinence. It has been determined that those whose daily life is affected due to urinary incontinence have higher pelvic floor awareness. Berzuk et al., in their study examining the relationship between pelvic floor dysfunction and pelvic floor knowledge in women, concluded that, contrary to our results, low knowledge level is consistent with high prevalence of dysfunction.^[4] The importance of PFM awareness in the management of pelvic floor dysfunctions other than incontinence has been demonstrated in previous studies.^[27,28] Raising awareness

and increasing the level of knowledge is essential for pelvic floor rehabilitation and maintaining adequate muscle contraction.

This study has some limitations. The main limitation of our study is the unequal number of male and female athletes. Including equal participants from both genders in future studies will provide clearer results in terms of determining the level of knowledge between genders. Another is that the number of births of female athletes included in the evaluation was not examined and the condition that factors such as BMI that could contribute to UI were similar in female and male athletes was not observed. Whether the participants had sufficient and real knowledge about the pelvic floor was evaluated according to their self-reports. This situation may not be an adequate assessment to reveal their awareness. For example, they should also be questioned whether they have made any urology visits for SUI.

Conclusions

SUI, which occurs due to physical activity in athletes, negatively affects the daily life of individuals and even prevents them from participating in sports. Pelvic floor awareness has an important place in the management of urinary symptoms. With pelvic floor awareness trainings, pelvic floor muscle functions should be taught to athletes in the early stages of sports life and how to contract correctly should be explained. It is thought that increasing the awareness of the pelvic floor in athletes will guide the prevention of serious urinary problems that may occur in the future and the planning of appropriate treatments for the athlete.

Acknowledgment

None.

Competing interests

The authors declare that they have no competing interests.

Abbreviations

Pelvic Floor Muscles: PFM;
 Urinary Incontinence: UI;
 Stress Urinary Incontinence: SUI;
 Urgency Urinary Incontinence: UUI;
 Mixed Urinary Incontinence: MUI;
 International Physical Activity Questionnaire- Short Form: IPAQ-SF;
 Metabolic Equivalent: MET;
 Pelvic Floor Health Knowledge Quiz: PFHKQ;
 International Consultation of Incontinence Questionnaire- Short Form: ICIQ-SF;

Incontinence Impact Questionnaire-7: IIQ-7;
 Body Mass Index: BMI.

Authors' contributions

All authors read and approved the final manuscript. All authors take responsibility for the integrity of the data and the accuracy of the data analysis.

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Availability of data and materials

The data used in this study are available from the corresponding author on request.

Ethics approval and consent to participate

The study was conducted in accordance with the Declaration of Helsinki. Institutional Review Board approval (code: 54/5, date: 21.12.2021) was obtained.

Consent for publication

By submitting this document, the authors declare their consent for the final accepted version of the manuscript to be considered for publication.

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