

# Kinesiophobia and fear avoidance behaviors in collegiate female athletes during menstruation

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## Abstract

**Background and Study Aim** The menstrual cycle can be a factor affecting performance in female athletes if accompanied by pain. In this study, authors aimed to examine how menstruation pain affects kinesiophobia and fear avoidance behavior in female athletes.

**Material and Methods** Study included a total of 50 female athletes aged 18-35 years. The athletes were divided into 3 groups as Group 1 (With Pain), Group 2 (No Pain) and Group 3 (Intermittent Pain) according to their pain experience during menstruation. The groups were compared in terms of kinesiophobia and fear avoidance behaviors. Kinesiophobia was evaluated with the Tampa Kinesiophobia Scale (TKS), fear avoidance behaviors were evaluated by using Fear Avoidance Beliefs Questionnaire (FABQ).

**Results** There was a significant difference between the 3 groups in terms of both TKS and FABQ scores ( $p < 0.05$ ). In terms of TKS, there was no significant difference between Group 1 and Group 3 ( $p > 0.05$ ), there was a significant difference between Group 1 and Group 2 and between Group 2 and Group 3 ( $p < 0.05$ ). There was a significant difference in favor of Group 1 in all pairwise comparisons in terms of FABQ scores ( $p < 0.05$ ). Pain intensity was associated with TKS and FABQ.

**Conclusions** A significant majority of female athletes experienced pain during menstruation, exhibited kinesiophobia and fear avoidance behavior due to pain. Since kinesiophobia and fear avoidance behavior can be a limiting factor for the athlete's optimum performance, female athletes should be supported in order for them to develop coping methods.

**Keywords:** athlete, kinesiophobia, pain, menstruation

## Introduction

In order for women to maintain their reproductive functions, changes occur periodically every month, especially in the genital organs, endocrine glands, and the whole organism during the period from menarche to menopause [1]. The period in which these changes occur is called the menstrual cycle. Physiological and periodically normal functioning of the cycle, which manifests itself with a menstrual bleeding in a 21-35-day period, occur with harmonious relations between the endometrium, ovary, anterior pituitary lobe, and midbrain system [2].

Menstruation is not a disease but an event that is the natural course of the organism and this process varies according to factors such as the person, environment, and climate. This period, which usually lasts 3-8 days, is known as the menstrual period. The menstrual cycle consists of four main phases: the menstrual phase, the follicular phase, the ovulation phase, and the luteal phase [3]. Physiological factors unique to women, such as the fluctuation of female sex hormone concentrations during different phases of the menstrual cycle, can be an important consideration for optimizing the performance and maintaining health of female

athletes. It has been hypothesized that physical performance changes throughout a menstrual cycle due to various mechanisms such as variable muscle activation, thermoregulation, metabolism and body composition of the individual. Some uneasiness and physiological and emotional changes felt during this period have the potential to affect the course of sportive activity [4]. Although some female athletes feel a decrease in their physical capacity during the menstrual cycle, some female athletes who are able to cope with pain and similar problems caused by menstruation have performances crowned with Olympic medals during their menstrual periods [5].

While most performance-based research in sport science has focused on male athletes, the results of these studies have been inappropriately applied to female athletes [6, 7]. The impact of the menstrual cycle on physical performance needs to be explored as an important aspect for women's sport and it is a critical area for further research. In addition to the physiological, hormonal, and psychological changes that occur during menstruation, the experience of pain is also common [3]. Pain or related factors may occur during menstruation in the form of fear of movement (kinesiophobia) and fear avoidance behavior, which may affect women's sportive performance and success. As a result of increased

pain perception, the person is afraid to move and shows an avoidance reaction to cope with pain. In case of pain, the person may think that any activity will increase the pain and therefore they should avoid the activity. As the level of fear increases, the level of activity avoidance also increases. Pain-related fear is more inhibitory than pain itself [8]. After traumas and injuries, interventions may be inadequate because the individual avoids moving the traumatic area. Kinesiophobia and fear avoidance behavior are important problems in female athletes and inability to cope with it has the potential to affect functional activity level. Recognizing female athletes who exhibit kinesiophobia and fear avoidance behavior during menstrual periods and supporting them with appropriate strategies may contribute positively to their performance or prevent them from experiencing performance loss.

*Hypothesis and Purpose.* The main question of this study is whether female athletes exhibit kinesiophobia and fear avoidance behavior as a result of menstrual pain and pain intensity. The hypothesis of the study is that kinesiophobia and fear avoidance behavior occur in case of menstrual pain.

## Material Methods

### *Participants*

The study included female students aged 18-35 years performing various sports and attending at Inonu University Faculty of Sports Sciences.

The authors calculated the sample size using the G-Power 3.1.7 package program (Heinrich-Heine-Universität, Dusseldorf, Germany) with a type I error of 0.05 and a type II error of 0.2. The power of the test was set as 0.8. Based on the kinesiophobia value, the minimum number of participants required in the study for a 5-unit difference to be significant was determined as 18. The study included female students who volunteered to participate in the study and who had been regularly performing any sports for at least 3 months. Students with a diagnosis of chronic disease and a history of regular medication use were excluded from the study. Participants who could not complete the study or who wanted to leave the study voluntarily were excluded from the study. Participants were divided into 3 groups as those who experienced pain during menstruation (Group 1), those who did not experience pain (Group 2), and those who sometimes experienced pain (Group 3). The groups were compared in terms of sociodemographic characteristics, kinesiophobia, and fear avoidance behaviors.

### *Ethical Aspect of the Research*

Ethics committee approval was obtained from the Inonu University Health Sciences Non-Interventional Clinical Research Ethics Committee (Decision No: 2022/3822). The study was conducted in accordance with the Principles of the Declaration

of Helsinki. Parents/guardians of the children included in the study were informed in detail about the study and their written consent was obtained.

### *Research Design*

This is a cross-sectional study.

### *Evaluation of Sociodemographic Characteristics*

Participants' age, height, weight, age of starting sports, duration of performing sports (month/day), frequency of performing sports (day/week), sport branch they performed, length of menstrual cycle, length of bleeding period, and whether or not they had pain during menstruation were questioned with a case report. Participants were divided into 3 groups as those who experienced pain during menstruation (Group 1), those who did not experience pain (Group 2), and those who sometimes experienced pain (Group 3).

The questionnaire to be used in the evaluation and the questions asked in the case report were applied online via Google Forms. The fear of movement that may arise due to pain, tenderness, and emotional changes during menstruation was measured with the Tampa Kinesiophobia Scale (TKS) and the fear-avoidance of activity that may arise due to these reasons was measured with the Fear-Avoidance Beliefs Questionnaire (FABQ).

### *Assessment of Kinesiophobia*

Miller et al. developed the TKS used to determine the level of kinesiophobia [9] and Yilmaz et al. established its Turkish validity and reliability.

The TKS is a 17-item questionnaire designed to assess kinesiophobia. Subjects are asked to indicate their level of agreement with each of the 17 statements on a 4-point response scale ranging from "strongly disagree" to "strongly agree". Results range from 17 to 68, with scores greater than 37 indicating a high degree of kinesiophobia. In addition to face and content validity, it has stability and internal consistency over time [11]. The questionnaire consists of 17 items to determine the anxiety of the person about injury as a result of exercise, whether the activity will harm the body in case of pain, and to what extent the pain affects the person.

### *Evaluation of Fear Avoidance Behaviors*

Waddell et al. developed the FABQ in 1993 [12], and Bingül and Aslan established its Turkish validity and reliability [13].

The questionnaire consists of two parts with 16 questions in total. The first part with 5 items measures Physical Activity-related fear beliefs and the second part with 11 items measures Work-related fear beliefs. A 7-point Likert scale is used for scoring. The Physical Activity section has a minimum score of 0 and a maximum score of 24. The Work section has a minimum score of 0 and a maximum score of 42. As the total score increases in each section, fear avoidance beliefs increase. In

our study, the first 5 questions of the fear avoidance questionnaire, which includes beliefs about physical activities, were used. The respondent selects any score from 0 to 6 to indicate how much activities such as bending over, hanging an object, walking, or driving affect back pain. The questionnaire consists of items investigating whether pain is caused by physical activity, whether physical activity increases pain, and whether activities causing/increasing pain are performed.

*Assessment of Pain Intensity*

Pain intensity was questioned using the visual analog scale (VAS). Using a 10 cm line scale for pain severity according to the VAS, “no pain” was rated as 0 points and “worst pain imaginable” was rated 10 points [14].

*Statistical analysis*

Data evaluation was carried out in a computer

environment using SPSS 22.0 package program (IBM, Armonk, NY, USA). The Shapiro-Wilk test was used to test whether the data were normally distributed. Since normality assumptions were not met, Kruskal-Wallis H test was used for numerical data and Chi-square test was used for categorical data. Post hoc analysis (Bonferroni-Dunn’s test) was used for comparisons between groups. Spearman rank correlation coefficient was used in the correlation analysis. Significance level  $p < 0.05$  was taken.

**Results**

There was no statistical difference between the groups in terms of demographic characteristics (age, height, weight, and BMI), menstrual period characteristics (menstrual frequency and menstrual period duration) and sport-specific characteristics (sport branches and duration of performing sports) (Table 1,  $p > 0.05$ ).

**Table 1.** Comparison of the groups in terms of demographic and sport-specific characteristics

Descriptive Features (n=50)	Group 1 (n=20)		Group 2 (n=13)		Group 3 (n=17)		Kruskal-Wallis H Test and p value
	Mean±SD	Median (Min-Max)	Mean±SD	Median (Min- Max)	Mean±SD	Median (Min- Max)	
Age	22.10±3.24		22.69±3.30		22.29±1.89		1.817
	21 (19-31)		22 (20-32)		22 (19-26)		p=0.403
Height	164±0.05		164 ±0.04		161±0.04		4.290
	165 (155-174)		165 (159-172)		162 (154-168)		p=0.117
Weight	61.60±6.23		57.38±5.15		59.88±4.84		4.618
	63 (51-69)		56 (51-66)		60 (52-66)		p=0.099
BMI	22.81±2.26		21.31±1.69		23.01±2.05		6.044
	23.15 (19.20- 26.64)		20.83 (19.10- 25.78)		23.14 (19.10- 26.22)		p=0.050
Variable	n	%	n	%	n	%	Chi-Square test and p value
<b>Frequency</b>							
Less than 21 days	3	37.5	4	50	1	12.5	x <sup>2</sup> =4.945 p=0.293
21-35 days	16	39	9	22	16	39	
More than 35 days	1	100	0	0	0	0	
<b>Duration of Menstrual Period</b>							
1-3 days	4	23.5	4	23.5	9	53	x <sup>2</sup> =5.683 p=0.224
4-7 days	15	46.9	9	28.2	8	25	
8-10 days	1	100	0	0	0	0	
<b>Sport Branches</b>							
Ball sports	11	47.8	7	30.4	5	21.7	x <sup>2</sup> =7.161 p=0.519
Water sports	3	33.3	1	11.1	5	55.6	
Defense sports	2	22.2	3	33.3	4	44.4	
Racket Sports	0	0	0	0	1	100	
Other	4	50	2	25	2	25	
<b>Duration of performing sports</b>							
< 1 year	6	37.5	6	37.5	4	25	x <sup>2</sup> =2.268 p=0.687
1-2 years	1	50	0	0	1	50	
> 2 years	13	40.6	7	21.9	12	37.5	

n: Number of samples, % Percentage, SD: Standard Deviation, x<sup>2</sup>: Chi-Square test BMI: Body Mass Index, p value; statistical significance, \* $p < 0.05$

There was a statistically significant difference between groups in terms of kinesiophobia and FABQ scores (Table 2,  $p < 0.05$ ). In terms of kinesiophobia, the highest score was recorded in Group 1 (pain group), while the lowest score was recorded in Group 2 (no pain group). In terms of fear avoidance beliefs, the highest score was again obtained in Group 1 and the lowest score was obtained in Group 2 (Table 2).

In pairwise comparisons between groups, a significant difference was found between Group 1 and Group 2 in favor of Group 1 and between Group 2 and Group 3 in favor of Group 3 in terms of both TKS and FABQ ( $p < 0.05$ ). There was no significant difference between Group 1 and Group 3 in terms of TKS ( $p > 0.05$ ), whereas a significant difference was found in favor of Group 1 in terms of FABQ (Table 3,  $p < 0.05$ ).

It was found that there was a moderate positive correlation between the duration of menstruation and kinesiophobia, and between the severity of pain, kinesiophobia and fear avoidance in the 1st group, which included the participants who experienced pain during menstruation (Table 4,  $p < 0.05$ ). There was no correlation between FABQ score and duration

of menstrual period and frequency of menstruation (Table 4,  $p > 0.05$ )

## Discussion

In this study, we examined the effects of menstruation pain on kinesiophobia and fear avoidance behavior in female athletes, significant differences emerged between the groups, which supports the research hypothesis ( $p < 0.05$ ). The highest scores were observed in Group 1 in both FABQ and TKS results, while the lowest scores were observed in Group 2. This result supports our hypothesis and shows that the pain experienced during menstruation causes an increase in movement avoidance and fear of movement in female athletes. When the Group 3 values were analyzed, the results were more similar to Group 1, indicating that the frequency of pain experience increased kinesiophobia, although not in every period. Studies on kinesiophobia have mostly investigated problems such as chronic low back pain and knee pain, which makes daily activities of individuals difficult, and immobility may lead to chronic diseases, which may negatively affect the rehabilitation process [15].

**Table 2.** Comparison of the groups in terms of kinesiophobia and fear avoidance beliefs scores

Scales	Group 1 (n=20)	Group 2 (n=13)	Group 3 (n=17)	*Test and p value	Comparison
	Mean±SD Median (Min-Max)	Mean±SD Median (Min-Max)	Mean±SD Median (Min-Max)		
TKS	38.10±8.61	14.53±2.93	35.88±5.93	29.096	Group1>Group3>Group2
	41 (20-50)	14 (11-19)	37 (26-45)	<0.001	
FABQ	19.45±1.76	4.69±1.10	13.00±2.17	41.725	Group1>Group3>Group2
	19 (17-23)	5 (2-6)	13 (9-19)	<0.001	

n: Number of samples, SD: Standard Deviation, TKS: Tampa Kinesiophobia Scale, FABQ: Fear Avoidance Behavior Questionnaire, \*Kruskal-Wallis H test, p value; statistical significance, \* $p < 0.05$

**Table 3.** Pairwise comparisons between groups

Groups	TKS		FABQ	
	Difference of Means	*p value	Difference of Means	*p value
Group 1-Group 2	23.56	<0.001	14.75	<0.001
Group 2-Group 3	-21.34	<0.001	-8.30	<0.001
Group 1-Group 3	2.22	0.742	6.54	<0.001

TKS: Tampa Kinesiophobia Scale, FABQ: Fear Avoidance Behavior Questionnaire, \*Post Hoc Test (Bonferroni-Dunn's test), p value; statistical significance

**Table 4.** The correlation analysis of the parameters in Group 1 experiencing pain during menstruation

Variables	Duration of Menstrual Period		Frequency of Menstruation		Pain Intensity During Menstruation	
	r	*p	r	*p	r	*p
TKS	0.637	0.002*	-0.297	0.204	0.750	<0.001*
	0.166	0.485	0.024	0.919	0.659	0.002*

TKS: Tampa Kinesiophobia Scale, FABQ: Fear Avoidance Behavior Questionnaire, r; Spearman rank correlation coefficient, p value; statistical significance, \* $p < 0.05$

In the study by Doğan et al. examining the coping approaches of Primary Dysmenorrhea (PD) patients with menstrual pain and the relationship between kinesiophobia and pain intensity, traditional methods were preferred more than exercise in PD and individuals with high pain intensity had more fear of movement (kinesiophobia), and relatively low rates of exercise showed that individuals avoided exercise due to pain [16]. In our study, similar to these results, kinesiophobia and fear avoidance behavior were higher in the group experiencing pain. In another study examining the factors affected by kinesiophobia in postmenopausal women with chronic low back pain, pain had an effect on functional disability, and the relationship between kinesiophobia and anxiety and between anxiety and functional disability were significant, and as a result, kinesiophobia affected pain intensity, functional disability, and anxiety [17]. Premenstrual symptoms and physical changes affect women throughout their reproductive lives; premenstrual symptoms and the luteal phase are interrelated, including headaches, cramps, irritability, decreased concentration, depression, and anxiety [18]. It is thought that symptoms such as thigh, abdominal, and low back pain, which frequently occur during menstrual pain, may cause avoidance of movement, and immobility may increase pain. It is stated that kinesiophobia usually occurs between the waist and neck region and as a result individuals avoid movement [10]. Svensson et al. reported that pain increased during menstruation in 51% of women with chronic low back pain [19]. Güçlü et al. evaluated the relationship between the fear avoidance attitudes and disability and quality of life in 105 patients with low back pain, and as a result, they reported that the level of movement phobia increased as the pain intensity increased, and when the pain intensity, anxiety, and depression level increased, physical function decreased [20]. Altuğ et al. examined the relationship between kinesiophobia and quality of life parameters in 112 patients with chronic low back pain, and reported that in the presence of kinesiophobia, quality of life was negatively correlated with general health, physical function, social function, and pain parameters [21]. A study using kinematic analysis showed that a specific lumbar movement was significantly slower in the chronic low back pain group with a high degree of kinesiophobia than in the group with a low degree of kinesiophobia [22]. This suggests that kinesiophobia may affect athletic performance in athletes, especially in sports that require speed.

The kinesiophobia model suggests that patients are afraid to move because of pain to avoid worsening their condition or causing a new problem. This fear leads to two responses: the patient can either confront the activity or avoid it. During confrontation, the individual does not

avoid movement and the fear of this movement gradually decreases. In avoidance, the individual avoids movement and becomes less and less active, resulting in a vicious cycle leading to physical disability [23]. A systematic review by Suarez et al. found a significant association between increased kinesiophobia and high levels of pain intensity and disability, and a moderate association between increased kinesiophobia and high pain intensity and poor quality of life [24]. It is widely accepted that fear avoidance behavior causes the development of disability, and decreasing fear avoidance behavior shortens recovery time in patients with acute low back pain [25, 26]. Another complaint in patients with low back pain is functional disability, which reduces their ability to manage activities of daily living [27]. A study on the Chinese population has shown that menstruation may be accompanied by musculoskeletal disorders and low back pain [28]. Although the exact causes of menstrual low back pain (MLBP) are not yet fully understood, research suggests that MLBP is also influenced by hormonal factors [29].

As the pain increases, kinesiophobia and fear avoidance behavior increase, and as a result, individuals become more inactive, which causes inadequacies even in daily life activities. In case of repeated kinesiophobia, individuals face the risk of injury due to inactivity, and the recovery process is prolonged in cases such as low back pain. Our study examines kinesiophobia and fear avoidance behavior of female athletes and reveals that pain increases both kinesiophobia and fear avoidance behavior in parallel with the results of the studies we examined in the literature.

## Conclusions

Study results have shown that a significant majority of female athletes experience pain during menstruation. Pain intensity during menstruation is associated with kinesiophobia and fear avoidance behavior that can be an obstacle for optimum training and performance. Developing ways of coping in the presence of menstrual pain can provide significant gains in approaching female athletes who exhibit kinesiophobia and fear avoidance behavior and in performing their performance at an optimum level or minimizing the performance losses they may experience. Raising awareness about this problem, which may be ignored by the families, coaches, clubs, and sports and health professionals that female athletes are in contact with, will contribute to the solution of the current problem of the athletes.

## Highlights

A significant majority of female athletes experience pain during menstruation and exhibit kinesiophobia and fear avoidance behavior due to

pain.

Pain intensity is associated with kinesiophobia and fear avoidance behaviour in female athletes during menstruation.

Developing ways of coping in the presence of menstrual pain can provide significant gains in approaching female athletes who exhibit kinesiophobia and fear avoidance behavior and in performing their performance at an optimum level or minimizing the performance losses they may experience.

### Limitations

While the study measured fear avoidance

behavior and kinesiophobia experience of female athletes during menstruation, it did not examine the psychosomatic characteristics of the women. This is the most important limitation of our study. Another limitation of the study is that it was conducted on a relatively small sample. In future studies, studies involving female athletes from different branches in larger groups, examining the psychosomatic characteristics of athletes will contribute to the literature.

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