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Investigation of Warm-up Knowledge Levels of Sports Sciences Faculty Students

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Abstract

The aim of this study is was to examine the warm-up knowledge levels of students in the Faculty of Sport Sciences. The population of the study consists of students studying at the Faculty of Sport Sciences at Firat University during the 2024-2025 academic years. The sample of the study includes 260 active athletes among these students. SPSS software was used for data analysis, and descriptive statistics, frequency distributions, t-tests, and ANOVA tests were applied, with a significance level set at $p<0.05$. Findings: The study found that the warm-up knowledge levels of students in the Faculty of Sport Sciences were generally high. It was observed that male students had significantly higher warm-up knowledge levels compared to female students, and athletes with taller stature had higher warm-up knowledge levels as well. There was a statistically significant difference in warm-up knowledge levels based on the sports branch, with students involved in team sports having higher knowledge levels compared to those in individual sports. In conclusion, it was determined that the warm-up knowledge levels of students in the Faculty of Sport Sciences were generally above average, and these knowledge levels varied according to certain demographic characteristics and the type of sport practiced.

Keywords: Sport, Student, Warm-up, Warm-up Knowledge Level

Spor Bilimleri Fakültesi Öğrencilerinin Isınma Bilgi Düzeylerinin İncelenmesi

Öz

Bu çalışmanın amacı, spor bilimleri fakültesi öğrencilerinin ısınma bilgi düzeylerinin incelenmesidir. Araştırmanın evrenini ise Fırat Üniversitesi Spor Bilimleri Fakültesi'nde 2024-2025 yıllarında eğitim gören öğrenciler oluşturmuştur. Araştırmanın örneklemini ise bu öğrenciler içerisinden aktif olarak spor yapan 260 öğrenci oluşturmuştur. Araştırmada SPSS paket programı kullanılmış olup, tanımlayıcı istatistiklerden frekans, T testi, ANOVA testleri uygulanmış anlamlılık düzeyi ($p<0,05$) olarak kabul edilmiştir. Bulgular: Spor bilimleri Fakültesi Öğrencilerinin ısınma bilgi düzeylerinin iyi oranda olduğu erkek öğrencilerin ısınma bilgi düzeylerinin kadınlara göre yüksek olduğu, boyu uzun olan sporcuların ısınma bilgi düzeylerini daha yüksek olduğu görülmüştür. Öğrencilerin ısınma bilgi düzeyleri ile branş değişkeni arasında istatistiksel açıdan anlamlılık olduğu bulunmuş olup takım spor yapanların değerlerinin yüksek olduğu belirlenmiştir. Sonuç olarak, Spor Bilimleri Fakültesi öğrencilerinin ısınma bilgi düzeylerinin genel olarak ortalamanın üzerinde olduğu ve bu bilgi düzeylerinin bazı demografik özellikler ve spor branşına göre değişiklik gösterdiği sonucuna varılmıştır.

Anahtar kelimeler: Spor, Öğrenci, Isınma, Isınma Bilgi Düzeyi

Introduction

Participation in sports, despite being a beneficial habit for health, inherently carries the risk of injuries due to the nature of sports (Lindblom et al., 2018). According to calculations, football injuries account for approximately 50-60% of all sports injuries, which is a significantly high rate (Akkaya et al., 2011). This high percentage is attributed to the large number of individuals playing football worldwide. Although the rate of injuries is considerably high, various approaches to preventing sports injuries, particularly in football, have been developed since the 1980s (Vasileiadis, 2020). While the structure of preventive programs has changed over time, the fundamental and unchanging element has been the presence of a "warm-up program" (Vasileiadis, 2020). In the sports world, warm-up is generally considered a physiological process and is referred to as “warm-up” in English and “sich aufwärmen” in German (Turkish Sports Foundation, 1989). Whether the activity is a performance-based sport, a preparatory exercise for that sport, or simply an exercise for a healthy lifestyle, the first step is always warm-up exercises. Additionally, the initial phase of both competitions and training sessions begins with warm-up (Kuter & Öztürk, 1997).

Warm-up can be defined as a preparatory process consisting of habitual movements before exercise, with two primary objectives (Woods et al., 2007):

- Strengthening muscles to minimize the risk of injury.
- Preparing the athlete both physically and mentally for the upcoming activity.

The primary goal of warm-up is to enhance the athlete’s efficiency and minimize the risk of injuries before, during, and after training or competitions throughout the entire season (Shellock & Prentice, 1985). During warm-up, it is essential for the athlete to sweat slightly but not become fatigued (Woods et al., 2007). This process is defined as both a psychological and physiological preparatory phase. Psychological adaptation, motor balance, and flexibility are among the key objectives of this stage. Warm-up increases body temperature, accelerates blood circulation, improves the efficiency of the heart and other bodily functions for sports, and prepares the body for activity (Sevim, 1995).

Warm-up is recognized as a set of exercises performed to prepare for training or competition in sports. Although there is limited scientific data on the benefits of warm-up for sports or athletes, it is widely adopted by athletes and coaches as a fundamental practice before, during, and after competitions to achieve optimal performance (Bishop, 2003).

Faculty of Sports Sciences students acquire knowledge about athlete health, performance development, and training processes throughout their academic life. In their future careers as sports

managers, coaches, and physical education teachers, they are required to have a high level of knowledge about warm-up and the warm-up process. Having a good level of warm-up knowledge is essential for minimizing the risk of injuries both in their own lives and in the lives of their athletes, making it a necessity for athlete health. This study aims to examine the warm-up knowledge levels of Faculty of Sports Sciences students.

Materials And Methods

Model of the Research

This research is a descriptive study, and the survey model was used in conducting the study (Karasar, 2017).

Population and Sample / Study Group

The population of the study consists of students enrolled at Fırat University Faculty of Sports Sciences during the 2024-2025 academic years. The G*Power software (version 3.1.9.3, Germany) was used to determine the research sample. The theoretical power analysis was conducted using the "ANOVA test" (alpha value = 0.05, test power (1-beta value) = 0.80, partial eta squared (η^2p) = 0.30, and repeated correlation between measurements = 0.70). As a result, it was determined that at least 183 students needed to participate in the study; however, to prevent potential issues, a survey was administered to 275 participants. Fifteen incomplete or incorrectly filled data entries were excluded from the analysis (Aslan et al., 2011). The final sample of the study consisted of 260 students actively engaged in sports. This research aims to examine the warm-up knowledge levels of students studying at Fırat University Faculty of Sports Sciences during the 2024-2025 fall semester.

Data Collection Tools

Information Form

The survey method was used in this research. Participants were informed about the study, and they provided their consent by signing the "Voluntary Participation Form" before being included in the study. The "Demographic Information Form" and the "Athlete Warm-up Habit Information Form," which was used by Arslan et al. (2011) and consists of twenty questions, were utilized to collect data.

Athlete Warm-up Habit Information Form

The questionnaire used in the study is a five-point Likert scale (1=No opinion, 5=Agree). The minimum score from the questionnaire is twenty, while the maximum score is one hundred. The validity and reliability study of the Athlete Warm-up Habit Information Form was conducted by the

researchers, and the results were as follows: KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) value = 0.715, Bartlett's Test = 1968.711, and Cronbach's Alpha (α) = 0.647.

The necessary scales for data collection were applied to students at Fırat University Faculty of Sports Sciences during the 2024-2025 academic year. The required permissions for data collection were obtained. The surveys were administered to students in the faculty environment by the researcher, and the purpose of the study was explained to the participants. The data were collected using the "Demographic Information Form" and the "Athlete Warm-up Habit Information Form."

Data Analysis

The data were analyzed using the SPSS statistical software. The demographic information of the athletes and their warm-up knowledge levels were summarized through descriptive statistics. The validity and reliability study of the Athlete Warm-up Habit Information Form was conducted by the researchers, and the KMO (Kaiser-Meyer-Olkin Measure of Sampling Adequacy) value and Cronbach's Alpha (α) were determined as 0.781.

The normality of the data was assessed by examining skewness and kurtosis statistics. If the skewness and kurtosis values fall within the range of +2 to -2, the data are considered to follow a normal distribution (George & Mallery, 2019). For the data determined to have a normal distribution, Independent Samples t-test and One-Way ANOVA test were applied for within-group comparisons. The significance level was set at $p < 0.05$.

Ethical Statement

Prior to commencing the study, necessary permissions were obtained from the Fırat University Social and Human Sciences Ethics Committee in 7 November 2024.

Findings

Table 1

Demographic Information of Students

Variables		f	%
Gender	Male	132	50,8
	Female	128	49,2
Height	150-160 cm	72	27,7
	161-170 cm	120	46,2
	171-180 cm	38	14,6
	181 cm and over	30	11,5
Weight	50-60 kg	40	15,4
	61-70 kg	132	50,8
	71-80 kg	60	23,1
	81-90 kg	8	3,1
	91 kg and over	20	7,7
Exercise Status	Yes	96	36,9

	No	134	51,5
	Partially	30	11,5
Sports Branch	Team	148	56,9
	Individual	112	43,1
Actively Doing Sports	Yes	196	75,4
	No	64	24,6
Frequency of Exercise per Week	One day	38	14,6
	Two day	76	29,2
	Three day	100	38,5
	Four day and over	46	17,7

50.8% of the participants in the study were male and 49.2% were female. 27.7% were between 150-160 cm tall, 46.2% were between 161-170 cm, 14.6% were between 171-180 cm, and 11.5% were 181 cm and taller. Regarding weight, 15.4% weighed 50-60 kg, 50.8% weighed 61-70 kg, 23.1% weighed 71-80 kg, 3.1% weighed 81-90 kg, and 7.7% weighed 91 kg and above. In terms of exercise habits, 36.9% reported exercising regularly, 51.5% did not, and 11.5% exercised partially. When considering sports type, 56.9% participated in team sports, and 43.1% participated in individual sports. 75.4% reported being actively involved in sports, while 24.6% did not. 38.5% exercised three times a week, and 14.6% exercised once a week (Table 1).

Table 2

Item Averages of the Students' Warm-Up Habits Questionnaire

	$\bar{X}$	SS
Warm-up is only possible through physical activities.	3,78	1,01
Warm-up reduces the risk of injury for athletes.	3,79	0,91
Warm-up has no effect on athletic performance.	3,70	1,06
Warm-up plays an important role in the muscle's ability to contract and relax.	4,05	1,95
Warm-up increases the strength of athletes' muscles.	3,68	1,18
In cold weather, the warm-up duration should be extended.	3,89	1,06
In hot weather, there is no need for warm-up due to the high body temperature.	3,76	1,21
The warm-up duration is fixed and should be the same in every training session.	4,13	0,86
Warm-up should start with general warm-up and continue with specific warm-up.	3,85	1,03
When general and specific warm-up are done together, it tires the athlete, so specific warm-up alone is sufficient.	4,26	0,92
Warm-up positively affects the athlete's neuromuscular system and reduces the athlete's reaction time.	3,59	1,18
Warm-up has positive effects on joint areas, increasing the athlete’s range of motion.	3,83	1,04
Mental activities such as motivation and adaptation are considered part of the warm-up.	4,20	2,77
Warm-up can be performed by applying creams, gels, etc., to the muscles.	4,37	0,78
Exhausting and intense warm-up exercises benefit the athlete during training or competition.	4,06	0,88
Warm-up has no effect on athletes' oxygen intake capacity.	4,16	0,94
Warm-up is the phase that prepares athletes physiologically, psychologically, and mentally for training.	4,16	0,91
Warm-up is purely a psychological phase and has no impact on performance.	3,80	0,98
Warm-up can also be achieved by giving athletes massages.	3,62	1,05
The warm-up duration should be half the length of the training session.	3,63	1,24
Total warming knowledge level	74,13	10,61

The research group reported that the item ‘When general and specific warm-up are done together, it tires the athlete, so specific warm-up alone is sufficient’ had an item average of 4.26±0.92, the item ‘Mental activities such as motivation, adaptation, etc., are considered part of warm-up’ had an item average of 4.20±2.77, the item ‘Warm-up is the phase that prepares athletes physiologically,

psychologically, and mentally for training' had an item average of 4.16±0.91, and the item 'Warm-up can be performed by applying creams, gels, etc., to the muscles' had the highest item average of 4.37±0.78. On the other hand, the research group reported that the item 'Warm-up positively affects the athlete's neuromuscular system and reduces the athlete's reaction time' had an item average of 3.59±1.18, and the item 'The warm-up duration should be half the length of the training session' had an item average of 3.63±1.24, representing the lowest item averages (Table 2).

Table 3

t-Test Analyses of Students' Demographic Information on Athlete Warming Habits Information Form

		$\bar{X}$	ss	t	p
Gender	Male	75,30	9,22	1,281	0,204
	Female	72,92	11,84		
Sports Branch	Team	75,77	10,21	2,048	0,045
	Individual	71,96	10,84		
Actively Doing Sports	Yes	73,95	10,99	0,321	0,731
	No	74,65	9,50		

*p<0.05

Some variables of the participants who answered the Athlete Warm-Up Habits Questionnaire (Gender: female – male, Team – individual sport participants, active sport participants – non-active sport participants) were compared using independent t-tests. When compared based on gender, the warm-up habits of male and female participants showed no statistical difference. The average for males was 75.30±9.22 and for females was 72.92±11.84, with t=1.281, indicating no significant difference (p=0.204). Participants engaged in individual sports (71.96±10.84) and team sports (75.77±10.21) showed a t-value of 2.048, with a significant difference between the groups (p<0.045). For active sport participants (73.95±10.99) and non-active sport participants (74.65±9.50), there was no statistically significant difference in their warm-up knowledge level scores (t=-0.321, p>0.05, p=0.731) (Table 3).

Table 4

t Test Analyses of the Athlete Warming Habits Information Form Regarding the Question of Which Sport the Students Do

	Which sport do you do?	$\bar{X}$	ss	t	p
S1	Team	3,79	1,04	0,162	0,871
	Individual	3,76	0,99		
S2	Team	3,81	0,87	0,265	0,792
	Individual	3,76	0,97		
S3	Team	3,83	1,08	1,608	0,110
	Individual	3,53	1,02		
S4	Team	4,39	2,35	2,300	0,023*
	Individual	3,60	1,12		
S5	Team	3,79	1,19	1,246	0,215
	Individual	3,53	1,17		
S6	Team	3,79	1,08	-1,170	0,244
	Individual	4,01	1,03		
S7	Team	3,68	1,33	-0,777	0,439

	Individual	3,85	1,05		
S8	Team	4,20	0,92	0,978	0,330
	Individual	4,05	0,77		
S9	Team	4,02	0,90	2,226	0,028*
	Individual	3,62	1,15		
S10	Team	4,31	0,90	0,590	0,556
	Individual	4,21	0,94		
S11	Team	3,75	1,04	1,834	0,069
	Individual	3,37	1,32		
S12	Team	4,04	0,97	2,583	0,011*
	Individual	3,57	1,09		
S13	Team	4,52	3,49	1,517	0,132
	Individual	3,78	1,21		
S14	Team	4,44	0,72	1,161	0,248
	Individual	4,28	0,84		
S15	Team	4,02	1,00	-0,508	0,612
	Individual	4,10	0,70		
S16	Team	4,14	0,93	-0,178	0,859
	Individual	4,17	0,97		
S17	Team	4,27	0,91	1,569	0,119
	Individual	4,01	0,90		
S18	Team	3,89	1,02	1,227	0,222
	Individual	3,67	0,91		
S19	Team	3,72	1,01	1,324	0,188
	Individual	3,48	1,11		
S20	Team	3,58	1,31	-0,602	0,548
	Individual	3,71	1,15		

*p<0.05

In the t-test analysis of the question 'Which sport do you practice?' for the students of the Faculty of Sports Sciences, individuals who practice team sports reported that 'Warm-up plays an important role in the muscle's ability to contract and relax' (4.39±2.35). Individuals who practice individual sports reported 'Warm-up plays an important role in the muscle's ability to contract and relax' (3.60±1.12). Team sport participants stated that 'Warm-up should start with general warm-up and continue with specific warm-up' (4.02±0.90), while individual sport participants reported 'Warm-up should start with general warm-up and continue with specific warm-up' (3.62±1.15). Team sport participants also mentioned that 'Warm-up has positive effects on joint areas, increasing the athlete's range of motion' (4.04±0.97), while individual sport participants stated 'Warm-up has positive effects on joint areas, increasing the athlete's range of motion' (3.57±1.09). A statistically significant difference was found in these questions (p<0.05) (Table 4).

Table 5

ANOVA Analyses of Athlete Warm-up Habit Information Form Regarding Demographic Information of Students

		$\bar{X}$	ss	F	p
Height	150-160 cm	74,38	11,46	1,927	0,129
	161-170 cm	74,73	9,46		
	171-180 cm	69,21	11,08		
	181 cm and over	77,33	11,36		
Weight	50-60 kg	74,30	12,68	1,113	0,354

	61-70 kg	73,31	10,46		
	71-80 kg	73,53	8,55		
	81-90 kg	83,50	9,53		
	91 kg and over	77,20	12,81		
Exercise Status	Yes	75,12	11,32	1,271	0,284
	No	72,79	10,42		
	Partially	76,93	7,27		
Frequency of Exercise per Week	One day	71,10	9,80	0,631	0,596
	Two day	75,05	11,95		
	Three day	74,32	9,77		
	Four day and over	74,69	10,93		

*p<0.05

Some variables of the participants who answered the Athlete Warm-Up Habits Questionnaire (height, body weight, exercise participation status, and frequency of exercise per week) were compared using a one-way ANOVA test. It was determined that there were no significant differences in the total scores of warm-up knowledge level between the variables of height, weight, exercise participation status, and weekly exercise frequency (p<0.05) (Table 5).

Discussion

This study was conducted to determine the warm-up knowledge levels of students in the Faculty of Sports Sciences. According to the research findings, the average total score of the students' warm-up knowledge level was 74.13±10.61, which was found to be at a good level. Furthermore, no significant difference was found in the students' warm-up knowledge levels based on gender. The analysis conducted in our study found that male students had higher warm-up knowledge levels compared to female students. It was determined that students who practiced team sports had higher warm-up knowledge levels compared to those engaged in individual sports, and a significant difference was found. Active sport participants had lower scores compared to non-active sport participants, and no statistically significant difference was found between the two groups. It was found that students who were taller had higher warm-up knowledge levels compared to other groups, but no statistically significant difference was found. In terms of body weight, it was determined that as weight increased, warm-up knowledge levels also increased, but again, no statistically significant difference was observed. Regarding the exercise participation status variable, it was found that students who answered "partially" and "yes" had higher warm-up knowledge levels, with no statistically significant difference found. When examining the frequency of weekly exercise, it was found that as the number of exercise days increased, warm-up knowledge levels also increased, but no statistically significant difference was found. It was determined that students who exercised twice a week had higher warm-up knowledge levels compared to other groups. Erdoğan et al. (2022), in their study examining the warm-up habits of tennis athletes, found no significant difference between gender and the total warm-up knowledge score. In a study by Som et al. (2022), it was found that

amateur football players had lower warm-up knowledge levels compared to professional football players, and they had longer injury durations. Koç and Hekim (2014) determined that individuals with knowledge of sports had higher warm-up knowledge levels. In another study conducted by Bentouati et al. (2023), it was reported that the motivational music preferred by athletes during warm-up could prevent the negative effects of exercise-induced fatigue on cognitive and physical performance. Additionally, Hekim (2015) stated in his research that warm-up and cool-down exercises are of great importance for athletes. In the study by Çelik and Hekim (2014), the knowledge and habit levels of sports department students regarding warm-up in sports were examined. 150 university students participated in the study. As a result, it was determined that sports department students had a high level of knowledge about warm-up in sports, and as a result, their habits of performing warm-up exercises before training and competitions were also high. The issues identified in studies conducted in our country regarding the application of warm-up habits were also observed in similar sample groups in international literature. According to Koch et al. (2016), 61.5% of recreational football players and 94.9% of amateur football players stated that they regularly performed warm-up exercises. Moreover, it was determined that amateur football players systematically carried out activities such as preparatory training for football tournaments and pre-match warm-ups, which reduced injury incidence (Koch et al., 2016). In a study conducted by Tokgöz et al. (2015), the frequency of warm-up and cool-down exercises performed by athletes involved in team and individual sports during training and competitions was examined. 150 university students studying in physical education and sports departments and simultaneously engaging in licensed sports participated in the study. At the end of the study, it was determined that athletes attached importance to performing warm-up exercises during training and competitions. The study conducted with athletes involved in team and individual sports at universities revealed that athletes had high warm-up exercise habits before training and competitions, but their cool-down exercise habits after training were low. Therefore, it was emphasized that athletes should also be educated on cool-down exercises in addition to warm-up exercises (Tokgöz et al., 2015). In another study conducted by Hekim et al. (2014) on national, professional, and amateur athletes in different branches, it was found that 90.9% of athletes had a regular warm-up routine before training and that 51.8% of them regularly performed cool-down exercises after each training. In the same study, the majority of athletes agreed with the idea that warm-up is beneficial for better muscle contraction and relaxation, warm-up should start with general warm-up exercises and continue with specific warm-up exercises, and warm-up is a psychological and physiological phase of readiness for training. In Tel's (2011) study, it was stated that the percentage of individuals who did not perform warm-up exercises before football and those who performed insufficient warm-up was quite high. In the research by Munoz-Plaza et al. (2021), it was mentioned that athletes regularly attended warm-up training, but the duration and methods used for

warm-up training differed between teams located in the same region. It was also stated that coaches and players wanted to learn more about warm-up programs that have been proven to reduce lower extremity injuries. In Çobanoğlu's (2021) study, it was found that professional athletes had higher warm-up knowledge levels compared to amateur athletes.

In conclusion, it was determined that the warm-up knowledge levels of students in the Faculty of Sports Sciences were high. It was also determined that students who practiced team sports had higher warm-up knowledge levels compared to those engaged in individual sports, and this difference was significant. Organizing training programs to enhance athletes' knowledge of warm-up, especially for individual athletes, is of great importance in improving athletic performance and reducing the risk of injuries. In this context, educational modules should be developed based on scientific principles, tailored to the needs of athletes, and designed with practical and applicable content. These training programs should be structured by considering the athletes' age, sports discipline, and training level, adopting a comprehensive approach that includes both theoretical and practical education.

Ethics Committee Approval Information

Ethics Committee: The Ethics Committee of Social and Humanities Sciences at Fırat University on November 7, 2024

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Conflict of interest

The authors declare no conflict of interest.

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All authors contributed equally to the writing of this article.

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