

Research Article / Araştırma Makalesi

Musculoskeletal system injuries of Turkish table tennis athletes

Türk masa tenisi sporcularının kas iskelet sistemi yaralanmaları

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ABSTRACT

Objective: The aim of the study was to investigate the type of injuries and the distribution of the injury regions of athletes in some Turkish universities' table tennis teams during training and competitions in a year.

Material and Methods: A total of 117 volunteer athletes (51 males and 66 females) participated in the study. A personal information form and the Nordic Musculoskeletal System Questionnaire were used to evaluate the injuries. The questionnaire was created on Google Form and filled in by voluntary participants. SPSS 23.0 statistical package program was used to evaluate the data. Percentage and frequency distributions of the data and chi-square test analysis results are presented in tables. The significance level was considered as $p < 0.05$.

Results: It is seen that table tennis athletes usually experience injuries in the upper extremities during training. It was determined that these injuries did not reveal a difference according to gender, but warm-up exercises performed before training and competitions, and cooling-down exercises performed afterwards had positive effects on injury prevention.

Conclusion: Upper extremity injuries in table tennis athletes can be reduced by correct warm-up and cool-down exercises.

Keywords: Table tennis, sports injuries, athletes

ÖZ

Amaç: Araştırmanın amacı, Türkiye'deki bazı üniversitelerin masa tenisi takımlarındaki sporcuların, son bir yıl içindeki antrenman ve yarışmalarda meydana gelen yaralanma türü ve yaralanma bölgelerinin dağılımını araştırmaktır.

Gereç ve Yöntemler: Çalışmaya 117 gönüllü sporcu (51 erkek ve 66 kadın) katıldı. Sporcuların kişisel bilgi formları ve yaralanmaların değerlendirilmesinde Nordic Kas-İskelet Sistemi Anketi kullanıldı. Anket Google Form üzerinden oluşturuldu ve gönüllülük temelinde dolduruldu. Verilerin değerlendirilmesinde SPSS 23 istatistik paket programı kullanıldı. Verilerin yüzde ve frekans dağılımları ile ki kare testi analiz sonuçları tablolar şeklinde belirtildi. Anlamlılık düzeyi $p < 0.05$ olarak alındı.

Bulgular: Masa tenisi sporcularının genellikle antrenmanlar sırasında üst ekstremité bölgelerinde yaralanma yaşadıkları görülmektedir. Bu yaralanmaların sporcuların cinsiyetine göre bir farklılık göstermediği ancak antrenmanlar ve yarışmalar öncesinde yapılan ısınma ile sonrasında yapılan soğuma egzersizlerinin yaralanmaların önlenmesinde olumlu etkiler sağladığı saptandı.

Sonuç: Masa tenisi sporcularında üst ekstremité yaralanmaları doğru ısınma ve soğuma egzersizleri ile azaltılabilir.

Anahtar Sözcükler: Masa tenisi, spor yaralanmaları, sporcular

INTRODUCTION

Table tennis is a highly popular indoor sport played by men and women of all age groups, both at amateur and professional level, individually or in pairs. Although the exact date of the beginning of this sport, which is played by large masses around the world, is not known, it is estimated that the oldest form of indoor tennis was played by British Army officers in India and South Africa in the 1880s (1). In table tennis, of which the popularity is increasing day by day, as in other sports branches, injuries

are an important factor that negatively affects life for athletes (2).

In general, sports injuries are a general definition given to all damage that occurs as a result of the tissues of the whole or part of the body encountering a resistance that cannot be met during a sports activity. This damage can occur in our daily life as well as during training and competition (3,4). Studies have shown that appropriate warm-up and cool-down exercises play a critical role in reducing the risk of injuries. Warm-up exercises prepare the

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body by increasing muscle temperature, improving flexibility, and enhancing joint mobility, thereby reducing the likelihood of strains and sprains (5). Similarly, cool-down exercises help in gradually lowering the heart rate and preventing stiffness by promoting blood circulation and muscle recovery. The absence of these practices has been linked to an increased risk of muscle tightness and delayed recovery, which can elevate the risk of subsequent injuries (6).

Sports injuries are undesirable situations that negatively affect the performance of athletes. It is important to stay away from injuries. For this, even more important than treating injuries is to prevent this situation before it occurs (7). For this purpose, it becomes important to know the types and regions of injuries that vary according to the age and gender of athletes, to plan training according to physical fitness, to apply sports protection methods, and to raise awareness of family, athletes and coaches (8).

As in all sports branches, prevention of injury risks and appropriate treatment of injuries in table tennis have critical importance for the sustainability of athletes' success. In addition, in a study conducted by Ferrandez et al. (9), it is stated that epidemiological information on table tennis-related injuries is lacking. It can be said that studies on this subject are insufficient in Turkey. In the light of this

information, our study aims to investigate the type and regions of injuries of athletes participating in the Turkish Interuniversity Table Tennis Championships in the previous year.

MATERIAL and METHODS

Research Model

In this research, a descriptive survey model was used to describe and define events that have occurred in the past or are still ongoing (10).

Participants

The participants in the study were determined according to 'easily accessible case sampling', which is one of the purposive sampling methods. In order to determine the sample size in the study, it was planned to reach a minimum total of 80 people by using G*Power 3.1.9.7 power analysis program. Confidence interval was accepted as 95% and the effect size as 0.5 (11). A total of 117 table tennis players from various universities in Turkey were included in the study based on the following criteria: being a licensed table tennis player for at least one year, having a documented diagnosis from a health institution for a table tennis-related injury, not participating in any other sports discipline besides table tennis, being at least 18 years old, and voluntarily agreeing to participate in the study.

Table 1. Frequency and Percentage Distributions of Athletes' Characteristics

Variables	Group	Frequency (f)	Percentage (%)
Age	18-21 yrs	60	51.3
	22-25 yrs	51	43.6
	≥26 yrs	06	05.1
Gender	Male	51	43.6
	Female	66	56.4
Training years	1-5 yrs	34	29.1
	6-9 yrs	23	19.7
	≥10 yrs	60	51.3
Regular warm-up practice	Yes	96	82.1
	No	21	17.9
Regular cool-down practice	Yes	53	45.3
	No	64	54.7
Total		117	100.0

Data Collection Tool

Personal Information Form

The information of the table tennis athletes participating in the study was obtained with a personal information form consisting of four questions about age, gender, and whether they warm up and cool down regularly.

The Nordic Musculoskeletal System Questionnaire

In order to evaluate the injuries of table tennis athletes, 'The Nordic Musculoskeletal System Questionnaire', which was adapted into Turkish by Kahraman, Genç and Göz (12), and whose accuracy and reliability analyses were

performed, was applied. This questionnaire divides the injuries of athletes into nine body parts as neck, shoulder, elbow, wrist, back, waist, hip-thigh, knee, and foot-ankle. The questionnaire consists of 54 questions asking whether there has been an injury in these nine body parts separately in the last 12 months, if there has been an injury, what type of injury it was, where the injury occurred, whether the injury affected daily life, whether the athlete applied to a health institution as a result of this injury and whether it was hospitalized for at least a day.

Data Collection

Before starting the study, the ethics committee approval of the study was obtained from Süleyman Demirel University Health Sciences Ethics Committee with the decision dated 13.09.2024 and numbered 79/59. The data of the study were obtained from table tennis players of some universities in Turkey based on the principle of voluntary participation. In this process, the Declaration of Helsinki was adhered to. The questionnaire was created in Google form and applied to the athletes between 15.09.2024 and 15.10.2024.

Data Analysis

Statistical Package for Social Sciences (SPSS) version 23.0 was used to analyze the data obtained. Before analyzing the data, it was checked whether there were any missing or incorrect answers in the questionnaires. The responses of the athletes such as injury status, the type of injury they experienced, where the injury occurred were analyzed using frequency and percentage distributions. These distributions were expressed with respect to athletes with total injuries. In addition, the chi-square test was used to analyze whether there were differences in the injury status of the athletes according to gender, regular warm-up and cool-down. Significance level was considered as $p < 0.05$.

RESULTS

Table 2. Injury frequencies and rates of injury types according to body regions of athletes

Body region	Dents/ Bruises		Strains		Muscle pains		Muscle cramps		Sprains		Breaks		Other		Total	
	n	%	n	%	n	%	n	%	n	%	n	%	n	%	n	%
Neck	1	0.9	2	1.7	24	20.5	3	2.6	-	-	-	-	-	-	30	25.6
Shoulder	-	-	9	7.7	15	12.8	7	6.0	-	-	-	-	-	-	31	26.5
Elbow	4	3.4	2	1.7	-	-	-	-	-	-	-	-	-	-	06	5.1
Wrist	-	-	1	0.9	5	4.3	-	-	5	4.3	4	3.4	-	-	15	12.8
Back	-	-	9	7.7	16	13.7	4	3.4	-	-	-	-	-	-	29	24.8
Waist	1	0.9	16	13.7	7	6.0	-	-	-	-	-	-	-	-	24	20.5
Hip-thigh	-	-	4	3.4	3	2.6	-	-	-	-	-	-	-	-	7	6.0
Knee	1	0.9	8	6.8	4	3.4	-	-	-	-	-	-	9	7.7	22	18.8
Ankle	-	-	6	5.1	-	-	-	-	6	5.1	-	-	-	-	12	10.3
Total	7	6.1	57	48.7	74	63.3	14	12.0	11	9.4	4	3.4	9	7.7		

Table 3. Frequency and rates of the time of occurrence of injuries in athletes

Body Region	In training		In competition		Total	
	n	%	n	%	n	%
Neck	25	83.3	5	16.7	30	100.0
Shoulder	21	67.7	10	32.3	31	100.0
Elbow	5	83.3	1	16.7	6	100.0
Wrist	14	93.3	1	6.7	15	100.0
Back	29	100.0	0	0.0	29	100.0
Waist	18	75.0	6	25.0	24	100.0
Hip-thigh	7	100.0	0	0.0	7	100.0
Knee	15	68.2	7	31.8	22	100.0
Ankle	8	66.7	4	33.3	12	100.0
Total	142	80.7	34	19.3	176	100.0

Table 4. Evaluation of body parts injury frequencies according to warm-up status

Body Regions	Group	Warming making rates		Total warming making rate		χ^2	df	p
		n	%	n	%			
Neck	No	75	86.2	96	82.1	3.979	1	0.046*
	Yes	21	70.0					
Shoulder	No	71	82.6	96	82.1	0.057	1	0.812
	Yes	25	80.6					
Elbow	No	93	83.8	96	82.1	4.411	1	0.036*
	Yes	3	50.0					
Wrist	No	84	82.4	96	82.1	0.049	1	0.825
	Yes	12	80.0					
Back	No	76	86.4	96	82.1	4.483	1	0.304
	Yes	20	69.0					
Waist	No	78	83.9	96	82.1	1.019	1	0.313
	Yes	18	75.0					
Hip-thigh	No	89	80.9	96	82.1	1.629	1	0.202
	Yes	7	100.0					
Knee	No	80	84.2	96	82.1	1.599	1	0.206
	Yes	16	72.7					
Ankle	No	85	81.0	96	82.1	0.839	1	0.360
	Yes	11	91.7					

*: $p < 0.05$, **: $p < 0.01$

Table 5. Evaluation of body parts injury frequencies according to cooling status

Body regions	Group	Cooling rates		n	Total cooling rate		x ²	df	p
		n	%		n	%			
Neck	No	41	46.6	53	45.3	0.457	1	0.499	
	Yes	12	41.4						
Shoulder	No	38	44.2	53	45.3	0.162	1	0.687	
	Yes	15	48.4						
Elbow	No	53	47.7	53	45.3	5.237	1	0.022*	
	Yes	0	00.0						
Wrist	No	46	45.1	53	45.3	0.013	1	0.909	
	Yes	7	53.3						
Back	No	44	50.0	53	45.3	3.166	1	0.075	
	Yes	9	31.0						
Waist	No	39	41.9	53	45.3	2.070	1	0.150	
	Yes	14	58.3						
Hip-thigh	No	49	44.5	53	45.3	0.421	1	0.516	
	Yes	4	57.1						
Knee	No	42	44.2	53	45.3	0.242	1	0.623	
	Yes	11	50.0						
Ankle	No	50	47.6	53	45.3	2.224	1	0.136	
	Yes	3	25.0						

*: p<0.05, **: p<0.01

Table 6. Evaluation of body parts injury frequencies according to gender

Body Regions	Group	Injury rates		n	Total injury rates		x ²	df	p
		n	%		n	%			
Neck	Male	15	31.4	29	25.6	1.558	1	0.212	
	Female	14	21.2						
Shoulder	Male	13	25.5	31	26.5	0.047	1	0.828	
	Female	18	27.3						
Elbow	Male	3	5.9	06	05.1	0.106	1	0.745	
	Female	3	4.5						
Wrist	Male	6	11.8	15	12.8	0.090	1	0.764	
	Female	9	13.6						
Back	Male	11	21.6	29	24.8	0.502	1	0.479	
	Female	18	27.3						
Waist	Male	10	19.6	24	20.5	0.045	1	0.831	
	Female	14	21.2						
Hip-thigh	Male	3	5.9	07	06.0	0.002	1	0.968	
	Female	4	6.1						
Knee	Male	9	17.6	22	18.8	0.079	1	0.778	
	Female	13	19.7						
Ankle	Male	5	9.8	12	10.3	0.020	1	0.887	
	Female	7	10.6						

*: p<0.05, **: p<0.01

DISCUSSION

Table tennis athletes are often observed to sustain upper extremity injuries during training. It is known that these injuries do not differ based on the athletes' gender. However, warm-up exercises performed before training and competitions, as well as cooling exercises afterward, may have positive impact on injury prevention.

In the present study, it was observed that athletes generally experienced injuries in the neck, shoulder and back regions, and mostly were injured in the form of muscle pain in these three regions. Hayder (13) reported that table tennis players usually experienced injuries in the wrist region (2). Similar to the findings of our study, it was reported that injuries in the wrist, shoulder and elbow-arm regions of table tennis athletes were more common than other body regions. In the study of Alizadeh Ebadi (13), table tennis

athletes were examined as in our study group, and it was observed that only upper extremity injuries and disabilities were experienced as in our findings. In a review, where many studies on injuries related to table tennis were examined, it was documented that the most common types of injuries in table tennis were benign muscle injuries, strains and sprains. In the same study, the risk of injury is given to be lower in table tennis comparing to other sports (14). In another study, it was reported that shoulder injuries were commonly seen in table tennis athletes. However, when the causes of these injuries were examined, it was reported that no definite results could be determined, and more extensive and comprehensive studies were needed (15). Injuries in racket sports are usually reported to involve the shoulder, waist and ankle (16).

In our study, when the injuries that occurred were analyzed in terms of all body parts, it was seen that they occurred mostly during training. When the literature was examined, it was found that the injuries encountered by table tennis athletes during the 2008 Summer Olympic Games occurred mostly during training, in line with our study (17). However, in another study (18), it was found that table tennis athletes encountered more injuries during competitions in the 2012 London Summer Olympic Games. These findings indicate that the context in which injuries occur can vary across different studies and events. Our study aligns with the 2008 Summer Olympic Games data, where injuries predominantly occurred during training, highlighting the potential risks associated with repetitive movements in preparation activities. Whereas the findings of the 2012 London Summer Olympic Games, where injuries were more frequent during competitions, suggest that competitive environments might present unique injury risks, such as high intensity play and psychological pressure (19,20). The disparity may arise from several factors, including variations in training and competition intensity, the level of athletic preparation, different racket strokes and serves, or even the playing surfaces and equipment used in various events (21-24). Additionally, these differences highlight the importance of context-specific preventive strategies to address the unique demands of both training and competition. Future research could further explore the underlying causes of these differences, helping to develop more effective injury prevention programs tailored to table tennis athletes.

In the present study, it was observed that athletes not warming up before training or competition had increased injuries in the neck and elbow regions. In addition to these findings, it was determined that athletes not performing cooling exercises may also suffer of elbow injuries. In Ünal's study (25) on sports injuries due to overuse, many different types of injuries and the factors causing them were analyzed and it was stated that in addition to many internal factors, external factors such as inadequate warm-up and inadequate stretching movements also play a major role in injuries. In Hayder's (2) study where table tennis athletes' injuries were investigated, it was emphasized that injuries were generally caused by insufficient warm-up. Yu et al. (26) reported that the tibialis anterior, vastus medialis and gastrocnemius muscles of table tennis athletes should be stretched and warmed up sufficiently before training and competition. According to the findings in the literature and in our study, while preparing training programs in table tennis, it is thought that exercises that provide good warm-up of the neck and elbow joint muscles should be added to the training program in addition to all joint and

muscle warm-up movements in the initial stages of the training. The findings of our study indicate that in addition to warm-up exercises in these training programs, cooling exercises performed at the end of the training are of great importance in terms of muscle and joint injuries.

When injuries in various body parts were analyzed in terms of gender in the present study, no statistically significant differences were found in terms of injury types, regions and frequency. When the literature is examined in terms of injuries encountered by table tennis athletes according to gender, it was found that Yang et al. (27), aimed to analyze elite table tennis athletes in Chasse-step with a special focus on gender-based biomechanical differences. Accordingly, they emphasized that male table tennis athletes should strengthen lower extremity muscle groups to improve performance, while female table tennis athletes should focus on hip joint groups to prevent injuries. In another study, as the severity of injury among non-professional university table tennis athletes in Taiwan were examined in terms of gender, no statistically significant differences were found for mild and moderate to severe injuries (28).

This research has some limitations. The first limitation is that the research was designed in a cross-sectional research model, and the data was collected over a certain period of time, so it did not examine causal relationships. The second limitation is that the participants in the study were determined by an easily accessible case sampling method. This method limits the generalization of research results.

To conclude, it is observed that table tennis athletes usually experience injuries in the upper extremities, and during training. It was found that these injuries did not differ according to gender, but warm-up exercises performed before training and competitions, and cooling exercises performed afterwards had positive effects on injury prevention.

Ethics Committee Approval / Etik Komite Onayı

The approval for this study was obtained from Clinical Research Ethics Board of Suleyman Demirel University (Approval number: 59, Date: 13.09.2024).

Conflict of Interest / Çıkar Çatışması

The authors declared no conflicts of interest with respect to authorship and/or publication of the article.

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Author Contributions / Yazar Katkıları

Concept – EY; Design – EY, MC; Supervision – EY, MO; Materials – EY, MC, MO; Data Collection and/or Processing – MC Analysis and Interpretation – MC; Literature Review – EY, MO; Writing manuscript – EY, MC, MO; Critical Reviews – EY, MC, MO. All authors contributed to the final version

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