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RESEARCH ARTICLE

Comparison of Sports Injury Anxiety in Athletes Doing Sports on Different Surfaces

Hasan GERÇEK[1*], İlayda Dilan IŞIK[2], Melike Naz GÜREL[3], Nihan ÖZÜNLÜ PEKYAVAŞ[4], and Atahan ALTINTAŞ[5]

[1]KTO Karatay University, Vocational School Of Health Services, Department Of Physiotherapy, Konya / Türkiye
[2]University of Health Science, Gülhane Faculty of Physiotherapy and Rehabilitation, Ankara / Türkiye
[3-4]Baskent University, Faculty of Health Sciences, Department Of Physiotherapy and Rehabilitation, Ankara / Türkiye
[5]Baskent University, Faculty of Health Sciences, Department of Sport Sciences, Ankara/ Türkiye
*Corresponding author: hasangercek42@gmail.com

Abstract
The aim of the present study was to compare sports injury anxiety levels of athletes doing sports on different surface regardless from sports type. The study was carried out with 150 male athletes between the ages of 15-35 who had at least one sports injury. The participants were divided into three groups depending on the surface including turf (n=50), artificial turf (n=50), and parquet floor (n=50). The "Sport Injury Anxiety Scale" was used in order to determine the sports injury anxiety levels of the participants. The scale was implemented online through Google Forms. The differences between groups were evaluated with the Kruskal-Wallis test. Also differences between paired groups were evaluated with the Mann Whitney U test. It was observed that athletes doing sports on parquet floor had higher levels of sports injury anxiety compared to those doing sports on turf and artificial turf surface ($p < 0.01$). Considering that athletes who do sports on parquet floor have high levels of sports injury anxiety, we think that these athletes should be supported in terms of coping with anxiety.

Keywords
Athlete injury, anxiety, sports surface

INTRODUCTION

Sports causes specific injuries due to its nature. In the literature, all kinds of damage that occur during sports activities are defined as sports injuries (World Health Organization, 2001). This risk of injury in the sports environment is thought to be related to the interactions between the athlete's personal characteristics and external factors (Bittencourt et al., 2016). Factors that are effective on sports injuries include personal factors such as gender, age, physical structure, psychological factors, insufficient rehabilitation and previous injuries, the insufficiency of sports technique, insufficient warming as well as external factors such as the sports type, sports materials, the ground of the sports activity, climate and environmental conditions, sportive activity period and rules of the game (Özdemir, 2004). Recent studies have shown that one of the factors that trigger or prevent sports injuries is psychological factors (Almeida et al., 2014; Johnson & Ivarsson, 2011).

One of the psychological factors that cause sports injuries is anxiety (Podlog et al., 2011). Anxiety is typically defined as "an unpleasant

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[1]**ORCID:**0000-0001- 7459-4452 , [2] **ORCID:**: 0000-0003-0454-9781, [3]**ORCID:**0000-0001-6296-6730, [4]**ORCID:**0000-0003-0603-5688,
[5]**ORCID:** 0000-0003-1959-9706

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situation as a reaction to the stress perceived in relation to performing a task under the pressure" (Cheng et al., 2009), and it is a common emotional situation experienced by athletes at all performance levels. Acute and persistent emotional changes such as anxiety, fear and depression are observed in athletes with musculoskeletal injuries (Mercan et al., 2005; Roiger et al., 2015). Anxiety situation may cause the athlete to perceive different situations as stress factors, increase physiological activation and decrease environmental attention (Jarvis, 2005). Injury experiences of athletes may cause athletes to worry about different psychosocial parameters. (Podlog et al., 2011; Wrisberg et al., 2006). Increasing the level of anxiety increases the risk of injury for athletes. (Ivarsson et al., 2013; Johnson & Ivarsson, 2011; Li et al., 2017). Parallel to the literature, Ivarsson and Johnson stated in their study that more injuries were observed in athletes with higher anxiety levels (Ivarsson & Johnson, 2010).

Another risk factor related to sports injuries is the surface where the sports is done. Since the beginning of organized sports competitions, grass has been accepted as a field ground. However, standardization is difficult in studies examining injury rates on natural surfaces, due to climatic factors and weathering of natural surfaces over time. For example, most of the data specific to football compares injury rates on third-generation artificial turf and natural turf (Ekstrand et al., 2006; Hershman et al., 2012).

It is thought that the friction coefficients of the parquets used in indoor sports are lower than artificial parquets. It has been reported that there are more anterior cruciate ligament (ACL) injuries in handball and floorball competitions held on artificial ground than in competitions on parquets floors. (Olsen et al., 2003; Pasanen et al., 2008)

During football competitions, 13.2% of injuries that are 26.5% in high school basketball and 15.8% in college basketball are caused by contact with the surface (Clifton et al., 2018; Kerr et al., 2018). Sports ground is one of the biggest factors in anterior cruciate ligament injuries (Agel, Evans, et al., 2007). In female basketball, 19.2% of all sports injuries are caused by contact with sports surface (Agel, Olson, et al., 2007). The playing ground or area may cause anxiety or affect the individual psychologically. The effect of the match or game environment on anxiety and injury can be emphasized. Athletes may have to play on different grass fields or different hardwood fields, this difference affects the athlete psychologically and may increase the level of injury anxiety. The aim of this study was to compare sports injury anxiety levels of athletes doing sports on different surface regardless from sports type. Surface is one of the risk factors in sports injuries. Determining the relationship between the surface and the sports injury anxiety, regardless of the sports, will enable the effect of the surface to be taken into account in the management of the injury anxiety of the athletes.

MATERIALS AND METHODS

Participants

The study approval was obtained from Drug and Non-Medical Device Research Ethics Committee of University Medical Faculty with the decision number 202/035 and was carried out prospectively with the registration to www.clinicaltrials.gov (NCT).

One hundred and fifty male athletes between 15 and 35 years of age who play different sports on different sports surfaces were included in our study. Only male athletes were included in the study, as there was a difference between genders in the sports injuries anxiety levels (Kaplan & Andre, 2021). All stages of the study were carried out in accordance with the Declaration of Helsinki. The participants were divided into three groups depending on the surface including turf (n=50, 50 football), artificial turf (n=50, 50 football), and parquet floor (n=50, 21 handball, 13 basketball, 16 volleyball). One hundred participants play football, 21 participants play handball, 13 participants play basketball, and 16 participants play volleyball professionally.

Inclusion criteria of our study included having history of at least one sports-associated injury and continuing sports actively. The exclusion criteria of our study were determined as having any neurological problem, any current sports injury under treatment.

Data Collection Tools

The demographic information of the athletes, the type of the sports and the sports surface, the region where they commonly suffered from injuries due to the sports, and sports duration were obtained. The "Sport Injury Anxiety Scale" which has been developed by Rex and Metzler (Rex

Metzler, 2016) and adopted to Turkish by Caz, Kayhan and Bardakçı, of which the validity-reliability studies have been conducted was used to determine sports injury anxiety levels of the athletes (Caz et al., 2019). The Sports Injuries Anxiety Scale is a 5-point Likert-type scale consisting of 19 questions. In the scale, "1" is evaluated as "Definitely disagree", and "5" is evaluated as "definitely agree". There is not any item, which is reversely coded in the scale, and higher scores indicate higher anxiety.

Measurement

Since the measurements could not be carried out face-to-face due to the COVID-19 pandemic, it was applied online via Google Forms allowing the subjects to get results in a shorter time and to fill in the data collection tool at the most convenient time for them. Medical teams of sports clubs were reached to reach athletes with a history of injury. The questions we prepared through Google Forms were sent to the athletes with a history of injury via e-mail or smartphone. Participation in the study was done on a voluntary basis, and the informed consent form was presented to the participants before participating into the study.Participants who approved the informed consent form were required to answer all questions.

Statistical Analysis

SPSS 25 IBM Corp. Released 2017 was used for data review. As a result of the power analysis, it was predicted that a total of 150 individuals should be included in order to achieve a study power of 85%. Kolmogorov-Smirnov test, Shapiro-Wilk test and histogram method were used to test the conformity of the data to normal distribution. Due to the data that did not fit normal distribution, the differences between groups were evaluated with the Kruskal-Wallis test. Also differences between paired groups were evaluated with the Mann Whitney U test. The statistically significant level of $p<0.05$ was accepted.

RESULTS

Demographic Information

Demographic information of the individuals included in our study is presented in Table 1.

Table 1. Demographic Information of the participants

	TURF		ARTIFICIAL TURF		PARQUET		p
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	
Age (years)	21.58	3.10	22.64	4.17	23.06	2.85	.087
Height (meter)	1.76	0.05	1.79	0.07	1.75	0.24	.455
Weight (kilogram)	69.80	5.87	75.36	10.17	74.54	15.51	.036
BMI (kg/m^2)	22.34	1.51	23.5	2.6	23.17	3.63	.098
Injury History	2.82	2.43	2.02	1.91	3.10	2.44	.052
Sports Duration (Year)	9.62	2.24	11.12	4.17	10.12	3.64	.090

SD, standard deviation; BMI, Body Mass Index, *p<0.05

Injury Anxiety Levels

When the total injury concerns were examined, the highest injury anxiety was found in the parquet floor athletes (Table 2). When the sub-parameters of the scale were examined in terms of sports surfaces, there was no statistically significant difference in the "Anxiety Regarding Loss of Athletics" subscale between those who did sports on grass and artificial grass; However, those who do sports on hardwood floors have more "Anxiety of Losing Athletics" than those who do sports on grass and artificial turf (Table 2).

A statistically significant difference was found between three groups for " Anxiety related to Experiencing Pain ". The highest " Anxiety related to Experiencing Pain " was found highest on the parquet floor and the lowest on the turf surface (Table 2). There was no statistically significant difference between those doing sports on the turf and artificial turf surface in the

"Anxiety related to Reinjury" subscale; however, those who do sports on parquet floor have more "Anxiety related to Reinjury" when compared to those who do sports on turf and those on artificial turf (Table 2). When the groups were compared in pairs, it was found that the "Anxiety Related to Being Perceived as Weak" was higher on turf surface when compared to artificial turf surface, and "Anxiety related to Loss of Social Support" was higher in those who do sports on parquet floor than those who do sports on artificial turf (Table 2).

Table 2 .Comparison of Injury Anxiety Levels Sub-Parameters According to Sports Surface

	TURF	ARTIFICIAL TURF	PARQUET	KRUSKAL WALLIS		MANN WHITNEY U		
	Mean ± SD	Mean ± SD	Mean ± SD	X^2	p	TURF-ARTIFICIAL TURF	TURF-PARQUET	ARTIFICIAL TURF-PARQUET
ARLA	5.48 ± 1.98	5.86 ± 2.61	6.8 ± 2.03	11.80	**.003***	.719	**.001***	**.016***
ARBPW	5.54 ± 1.8	4.74 ± 1.75	5.14 ± 1.60	5.16	.076	**.030***	.228	.200
AREP	6.68 ± 2.59	8.36 ± 3.93	11.44 ± 2.75	41.34	**.000***	.060	**.000***	**.000***
ARHISI	7.26 ± 3.14	6.82 ± 2.3	7.4 ± 2.7	.74	.688	.710	.815	.324
ARLSS	5.3 ± 2.68	4.74 ± 2.44	5.46 ± 1.98	5.76	.056	.093	.303	**.026***
ARR	9.02 ± 4.48	11.02 ± 4.71	12.00 ± 4.04	11.79	**.003***	.078	**.000***	.286
TOTAL	39.28±11.66	41.54±14.26	48.24 ± 9.49	14.38	**.001***	.318	**.000***	**.023***

*p<0,05**,** Mean; SD; Standard Deviation; ARLA, Anxiety Related to Loss of Athleticism; ARBPW, Anxiety Related to Being Perceived as Weak ; AREP, Anxiety related to Experiencing Pain, ARHISI, Anxiety related to Having an Impaired Self-Image; ARLSS "Anxiety Related to Loss of Social Support"; ARR, Anxiety Related to Reinjury

DISCUSSION

This study was conducted to examine the effect of different surfaces on the injury anxiety of athletes. As a result of this study, we found that the highest total injury anxiety levels belongs to the athletes who do sports on parquet floors. "Anxiety related to Loss of Athleticism", "Anxiety related to Experiencing Pain" and "Anxiety related to Reinjury" sub-parameters of the sports injury anxiety scale were also higher in athletes sporting on parquet floor. Studies conducted with elite football players indicated that more than 90% of athletes think that the surface where sports are done affects the ris of injury (Mears et al., 2018; Poulos et al., 2014).

Although it is believed that artificial turf causes more injuries from the first studies comparing the effect of artificial turf and turf on injuries (Canaway et al., 1990; Schmidt-Olsen et al., 1991), different results have appeared in recent studies (Pasanen et al., 2008; Steffen et al., 2007). Players expressed their negative attitude towards the use of artificial turf for training and matches due to the perceived risk of injury (Burillo et al., 2014). Although the results of our study are similar to some studies in the literature, there are studies indicating different results. We think that these differences originate from the socio-cultural and past injury experiences of the athletes.

The perception of injury risk was found to be higher among basketball players who do sports on parquet floor than those who do sports on synthetic surfaces (Akodu et al., 2017). The study of Ekmekci and Micooğulları (Ekmekçi & Okan Miçooğulları, 2018) who detected higher levels of anxiety in handball players when compared to American football players playing on turf or artificial turf versus handball players on parquet or synthetic ground supports the results of our study; however our resulted are different from Kerketta

on comparison of football and volleyball players (Kerketta, 2015). We believe that the difference between the studies is due to the number of samples included in the study and the examination of the sports rather than the surface in the study conducted by Kerketta. In the literature, we have not encountered a study examining the effect of surface on sports injury anxiety levels, regardless of the sports.

The most significant limitation of our study was the lack of differentiation between synthetic parquet surface and natural parquet surface. Another limitation is performing the study on male athletes only. Consequently, the higher injury anxiety level was observed in athletes who do sports on parquet floor than those who do sports on turf and artificial turf surface. Considering that high sports injury anxiety level increases the risk of injury in athletes, this result suggests that individuals who do sports especially on parquet floor need more support for sports injury anxiety situations.

Conflict of interest

No conflict of interest is declared by the authors. In addition, no financial support was received.

Ethics Committee

The study approval was obtained from Drug and Non-Medical Device Research Ethics Committee of University Medical Faculty with the decision number 202/035 and was carried out prospectively with the registration to www.clinicaltrials.gov (NCT).

Author Contributions

Study Design, OA, GEG; Data Collection, GEG, NE; Statistical Analysis, OA, AYÖ; Data Interpretation, OA; Manuscript Preparation, OA, NE; Literature Search, OA, GEG, NE, AYÖ. All authors have read and agreed to the published version of the manuscript.

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