

## Prevalence, causes and comparison of lower extremities injuries with an emphasis on knee and ankle injury in some football and basketball elite male athletes in Khuzestan province

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**Abstract:** Epidemiology research, particularly in sport is one of the essential tools to identify injuries and strategies for the prevention of sports injuries can be designed and formulated by specifying them. The present study is practical in terms of objective and it is descriptive-field and retrospective in terms of data collection. The statistical population of this research consists of all male athletes in handball, basketball and football in Khuzestan province. The statistical sample consists of 40 football players and 32 basketball players. Data analysis was done using one-way analysis of variance and multiple regression using SPSS version 18. The result of one-way analysis of variance showed that a significant difference exists among the total injuries to lower extremities ( $F = 172.2$ ;  $p = 0.00$ ), knee ( $F = 10.6$ ;  $P = 0.00$ ), ankle ( $F = 9.4$ ;  $P = 0.00$ ) in the three groups. Tukey post hoc test results revealed that in all two cases, followed by basketball, and football.

**Key words:** Prevalence; Lower extremities injuries; Knee; Ankle; Football; Basketball

### 1. Introduction

It is believed that the injuries are an integral part of the sport, especially athletic and professional sport and can affect people's lives. On the one hand athletes also by the damages incurred, may remain away from the sport for days and even months.

Epidemiology has roots in a Greek word that is made of three parts as follows; Epi means upon, Demos means people and Ology means study.

Epidemiology is literally defined as the study of distribution and determination of prevalence of diseases, illnesses, injuries, disabilities and mortality in communities. In fact, epidemiological studies is applicable in controlling health-related issues and problems in communities (Rothman, 2012; Ferris, 2010)

Epidemiological studies are important tools that can be effective in reducing the injury rate. Today, worldwide researches like sports injury epidemiology researches are done to identify the damages, through which one can take steps to prevent injury. As Walter et al. (1985) stated factors of reducing the number and severity of injuries that befell the organization and the sports complex is not specified and featured but by planning to conduct epidemiology studies. Thus, the importance of a detailed report on the damages around the world is becoming more prominent. In this regard Belechri et al. (2002) has examined all injuries in children in six European countries and at the end estimated the

annual injuries in Netherlands 40,000 and 200,000 injuries in the United Kingdom. They also found that with increasing age, the prevalence of injury increases. (Belechri et al., 2011)

Also Carrie Darrow (2009) has also examined the injuries to high school students in America in 9 sport majors. In this study, American football (Soccer) in boys and basketball in girls has devoted the highest rate of severe injuries to themselves. Damage ratio of boys to girls was 1.74. Knees (29%) had the highest value in injuries. Moreover, Mummery (2002) in a study assessed the injuries in last year in Queensland.

They examined the information of patients referring to the medical department for treatment of injuries resulting from sports and recreational activities, using a phone interview and self-report method by computer in the past 12 months. 191 out of 1337 patients (16.6%) need medical treatment. Strain and muscle tears are most commonly reported injuries and lower extremity (40%) is most vulnerable. In this regard, the knee (12.5%) was reported as most injured positions (Mummery et al. 2002). In researches by Parson et al (2013) performed regarding the prevalence and causes of knee and ankle joint injuries in basketball and handball athletes in the United States of America, it has been shown that overweight and gender are discussed as two important factors in this respect. The study has shown that the most important factor in tearing knee cartilage and joint damage was overweight that increases the risk of knee cartilage tear. Torn meniscus cartilage that with stands the

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most weight on the knee joint in overweight people is 3 times more than normal people. Also the majority of obese men and women 15 and 25 times are more likely to the cartilage tear, respectively. Later the research has shown that women's sport injuries are more in ACL ligament tear. According to statistics published annually more than 450 to 850 thousand Americans undergo this surgery due to overweight and the surgery has enormous cost (Parson et al., 2013). Research by Daneshmandi et al., (2009) has examined the main injuries to ankle and knee in basketball and football players: Because the knee joint bears the body weight is affected more than other joints. The occurrence of these events annually has reached over 16587 injuries in male and female athletes of basketball and football in Iran. Knee and ankle injuries and impairments occur followed by knee twist and high pressure on ankle, but factors like stroke, jump, falling from height, long-distance run and inappropriate warm-up may cause injury to the knee joint. Knee injuries in football players account for 55% of sports injuries.

This is while in Iran, no research in the form of epidemiology of injuries has been done in professional level of Khuzestan so far. However, little research has been done on the pathology of sports injuries in other provinces including the research of Daneshmandi et al., (2008) in the field of disabled, Jahan Bakhsh Khosro Zadeh (2008) on Basketball Premier League, Zarei et al. (2008) in a course of Football Premier League, Bambaichi et al. (2010) on Women's Volleyball Pro League, Barani et al., (2009) on Women's Handball Pro League, Rahnama et al. (2007) on students' football, Ziaee et al. (2010) on Taekwondo and Zandi et al. (2010) on Dragon Boat. Researches done in Iran were mostly individual and no comparison has been done among them particularly in common injuries in ankle and knee. Also the type and method of some researches was so that they can be hardly among the epidemiological studies of sports injuries. Given the need for research in this area, researchers have sought to determine, compare and report the rate and prevalence of lower extremity sport injuries in three sport majors, football and basketball in three professional teams in Khuzestan clubs. Hence, using a retrospective injury questionnaire, the extent of lower extremity injuries, especially in knees and ankles was assessed.

## 2. Research Methodology

The statistical population of this research consisted of all male athletes in handball, basketball and football in Khuzestan province. The method of selecting subjects in the present study is non-randomized method (purposive). So province professional teams were selected in the above fields.

The statistical sample includes 40 football players from Foolad -e- Khuzestan and 32 basketball players of Petrochimi Mahshahr and Bandar -e- Imam Petrochemical industries. Studied age was 18 to 40 years. The researcher has referred to the above

clubs and after coordination with the management of clubs and providing necessary explanations to the athletes has distributed the questionnaire and after completing it by the players, questionnaires were collected.

In this study, the information, after required categorizing in an Excel file was transferred to SPSS software and was analyzed.

## 3. Measurement tools and instruments

### 3.1. Measurement of height

To measure height, subjects stood without shoes and a fully stretched stature back to device and height was recorded in centimeters.

### 3.2. Measurement of weight

To measure weight, subjects stood with the least possible clothing (only in sport shorts) on the scale and the weight was recorded in kilograms.

### 3.3. Injury Report Form

Injury report form contains information on the athletic field, age, height, weight and athletic history. The present study considered only the lower body injuries. Injury position and its reason were available in the questionnaire. Validity and reliability of the present research is reported in Alizadeh et al. study in 2013 (Alizadeh, 2013). Reliability of the questionnaire in the current study sample was 74% using Cronbach's alpha. Options of the questionnaire include pelvis, hip joint, groin, thigh, knee, leg, ankle, foot and toes in 29 questions. It is also noteworthy that in addition to the above categories, sports injuries were also reported on the body region (knee and ankle). A sample of the form is provided in the Appendix.

## 4. Determination of possible causes of injuries

This section of the questionnaire consists of 11 questions that include information about possible causes of sports injuries in view of athletes.

### 4.1. Statistical analysis

To describe research findings such as age, height, weight and sport history, descriptive statistical methods were used to determine the mean and drawing Tables and in second section, to determine the significance of hypotheses, inferential statistical methods were used, so that one way analysis of variance (ANOVA) was used for mean differences and Tukey post hoc test was used to determine the location of differences among groups. The multiple regression analysis was also used to determine the relationship between age, height, weight, body mass index and sports history with prevalence of lower extremities injuries in level of significance ( $P < 0.05$ ).

All statistical calculations are done using computer software SPSS/18. Excel 2013 was used to plot graphs.

### 5. Findings

Table 1 shows the age and sports history characteristics of study groups.

**Table 1:** Statistical indicators relating to age and sport history of study groups

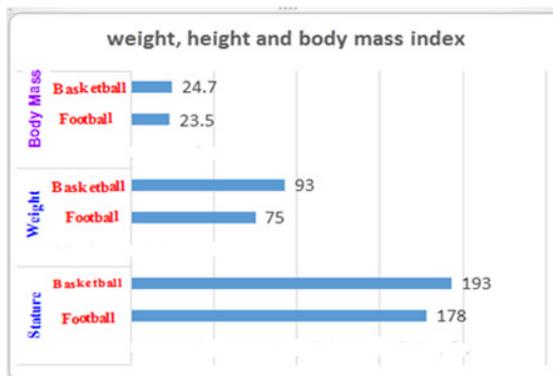
Property	Group	Number	Minimum	Maximum	Mean	Standard deviation
Age (years)	Football	40	19	30	24.6	3.6
	Basketball	32	18	35	26.2	4.1
Sports history (years)			5			
	Football	40	3	10	6.3	2.9
	Basketball	32	4	21	11.8	3.8

As can be seen in Table 1 mean age in football players 24.6 and basketball players 26.2. In terms of sport history, basketball players with the average 11.8 had the most sport history, footballers with 6.2 years.

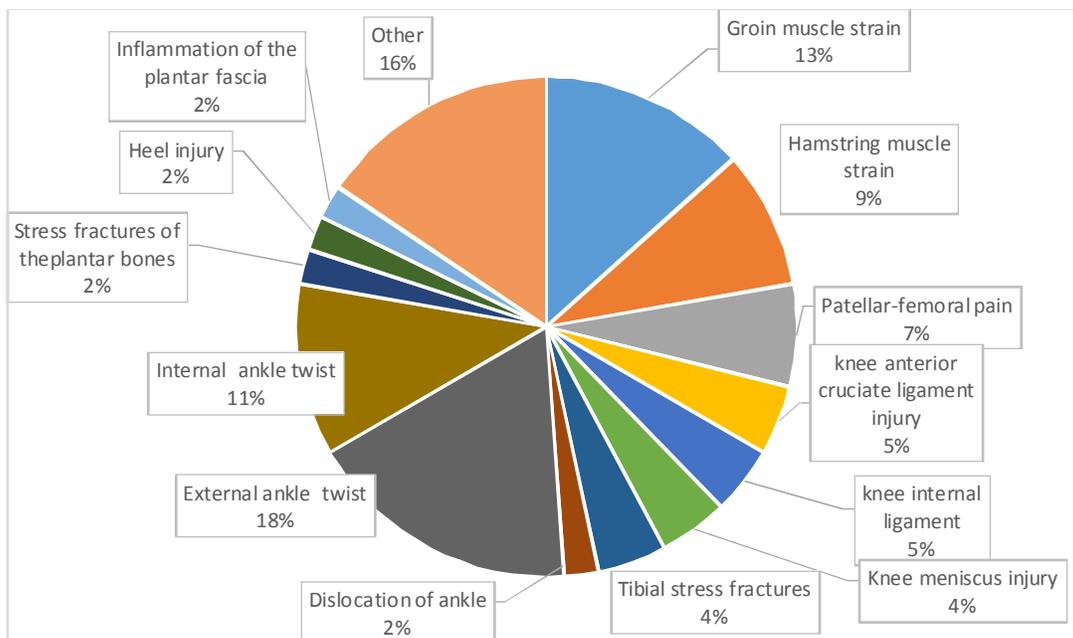
football players average height was 178 cm and basketball players was 193 cm. also in terms of weight, basketball players with an average weight of 93 kg were heaviest and footballers with 75 kg. In the body mass index, athletes had an average footballers 23.5 and basketball players 24.7.

As can be seen in Fig. 2, external ankle sprain is the most common with 17.8% then, groin strain with 13.3% and internal ankle sprain with 11.1% had accounted for most of injuries in football.

Causes of injury in football players are shown in the Fig. 3 below.



**Fig. 1:** The mean related to weight, height and body mass index of studied groups



**Fig. 2:** Percentage of football injuries

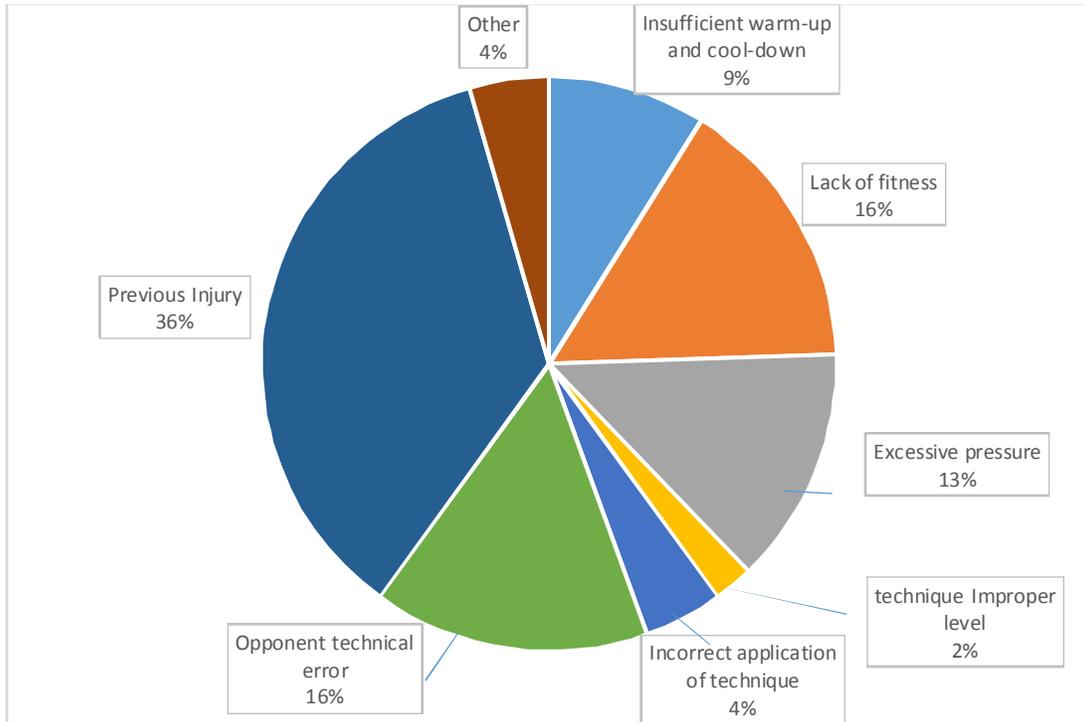


Fig. 3: Causes of injury in the present study footballers

Meanwhile, previous injury with (36%) was most reason and followed by lack of physical fitness and partner technical error with 16% were other main reasons and in Table (4) of the percentage of basketball injuries, it can be seen that groin muscle strain and external ankle sprain with 12% are the

most common injuries, followed by hamstring muscles strain with 10% and quadriceps muscles strain with 8% as well as calf strain with 7.3% were accounted for most of injuries.

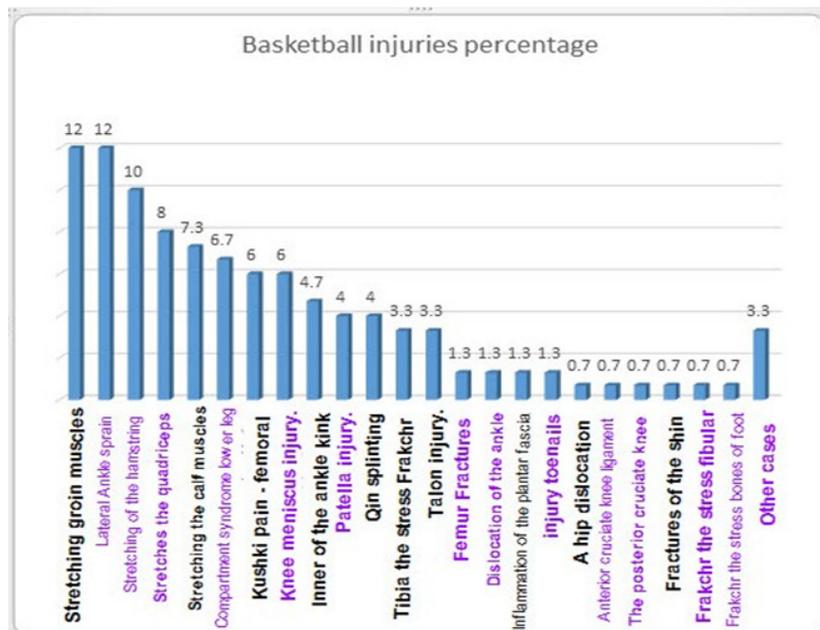


Fig. 4: Percentage of basketball injuries

In Fig. (5) percent due to lower body injuries in basketball players have seen examples of research. As you can see at the excess pressure by 23% and 21% with inadequate heating and cooling of the main reasons for the athletes of this field is injury.

It means that a significant difference exists in the sum of lower extremity injuries in male athlete's football and basketball ( $\alpha < 0.5$ ).

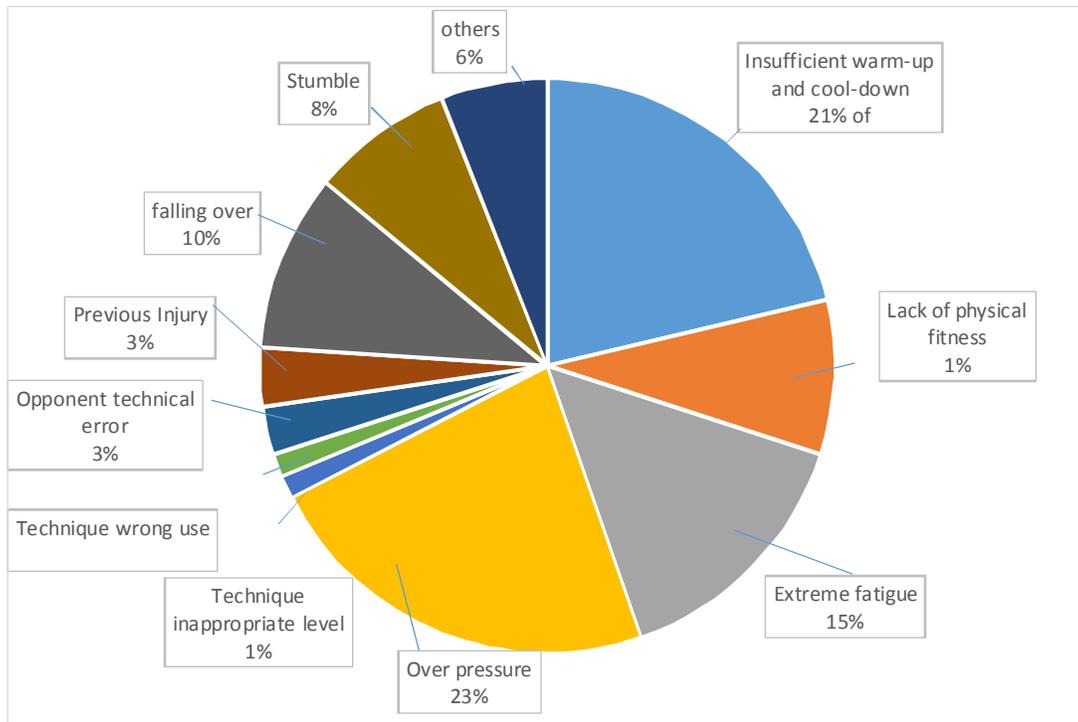


Fig. 5: Reasons for injuries in present study basketball players

Table 2: Result of one way analysis of variance to compare lower body injuries rates in the three groups

	Total Squares	Degree of freedom	Mean square	F	Sig.
Intergroup	1261.407	2	630.704	172.246	.00 *
Intragroup	384.472	105	3.662		
Total	1645.880	107			

\*A significant differences exists ( $\alpha < 0.05$ ).

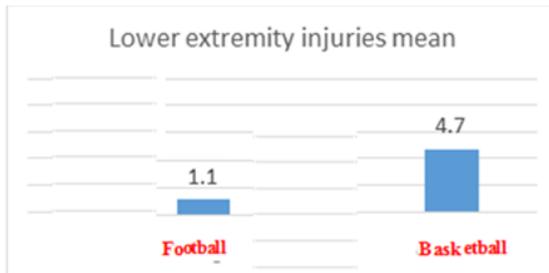


Fig. 6: Average lower bodies injuries in the three groups

Tukey post hoc test indicated more injuries to it was also observed lower body injuries were significantly higher in basketball than football (Table 3).

Results of one way analysis of variance show that a significant difference exists among studied groups in the total knee injuries ( $F = 10.6$ ;  $P = 0.00$ ) (see Table 8-4). So hypothesis H0 is rejected and H1 is confirmed.

Table 3: Tukey test results in determining differences between the three groups lower body injuries

Groups	Mean difference	Standard error	P
Basketball - Football	3.56250	0.45384	0.000 *

Table 4: Result of one way Analysis of variance to compare knee injuries in three groups

	Sum of squares	Degree of freedom	Mean square	F	Sig.
Intergroup	18.178	2	9.089	10.664	.00 *
Intragroup	89.489	105	0.852		
Total	107.667	107			

\* A significant difference exists ( $\alpha < 0.05$ ).

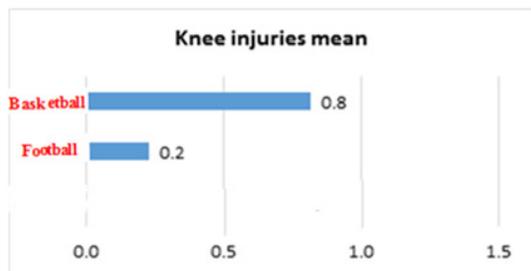


Fig. 7: Average knee injury in three groups

It means that a significant difference exists between total knee injuries in male athlete's football and basketball ( $\alpha < 0.05$ ). The results of one-way analysis of variance showed that in studied groups, significant difference exists in total ankle injuries ( $F = 9.4$ ;  $P = 0.00$ ) see Table (6). So  $H_0$  hypothesis is rejected and  $H_1$  hypothesis is confirmed. This means that significant difference exists between the sum of ankle injuries in male athletes of football and basketball ( $\alpha < 0.05$ ).

Table 5: Result of one-way analysis of variance to compare ankle injuries rate in two groups

	Total Squares	Degree of freedom	Mean square	F	Sig.
Intergroup	11.969	2	5.985	9.481	0.00 *
Intragroup	66.281	105	0.631		
Total	78.250	107			

\* A significant difference exists ( $\alpha < 0.05$ ).

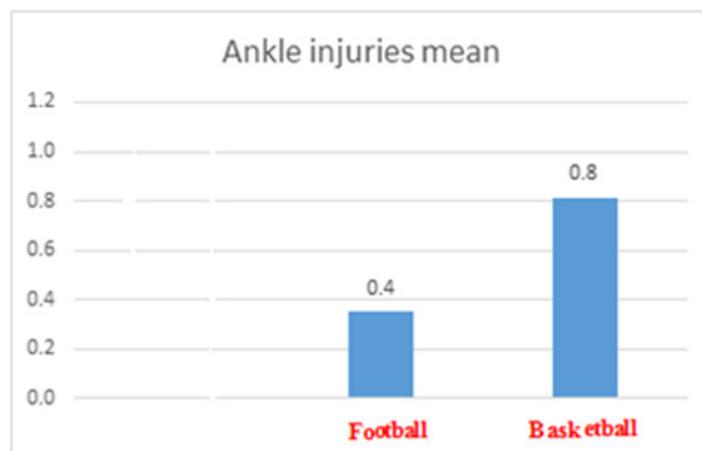


Fig. 8: Average ankle injuries in the three groups

Tukeypost hoc test indicated more ankle injuries in it was also observed that ankle injuries in

basketball were significantly more than football (Table 7).

Table 7: Tukeypost hoc test results to determine differences among three groups' ankle injuries

Groups		Mean	Standard error	P
Basketball	Football	0.46250	0.18843	.041*

### 6. Discussion and conclusions

The present study was practical in terms of objective and descriptive-field and retrospective in terms of data collection. The statistical population of this research consisted of all male athletes in basketball and football in Khuzestan province. The method of selecting subjects in the present study is non-randomized method (purposive). So province professional teams were selected in the above fields. 40 football players with a mean age and standard deviation  $24.6 \pm 3.6$  and 32 basketball players with a mean age and standard deviation of  $26.2 \pm 4.1$ .

1. The results of the analysis of variance showed that a significant difference exists among the groups studied in total lower body injuries ( $F = 172.2$ ;  $P = 0.00$ ) and Tukey posthoc test indicated

more injuries in basketball were significantly more than football.

2. Results of one-way analysis of variance showed that a significant difference exists among studied groups in the total knee injuries ( $F = 10.6$ ;  $P = 0.00$ ). Tukeypost hoc test indicated more knee injuries in Also, no significant difference exists between knee injuries in basketball and football.

3. Results of one-way analysis of variance showed that as significant difference exists among studied groups in the total ankle injuries ( $F = 9.4$ ;  $P = 0.00$ ). It was also observed ankle injuries in basketball were significantly higher than football.

Thus, we can conclude that in the case of the study samples, a significant difference exists in lower body injuries among the two fields and in general injuries then basketball and at the end football had the lowest prevalence. But generally, the number of

injury in all three fields, especially in the ankle was very high which requires providing preventive strategies in these cases.

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## 7. Practical recommendations (arising from research)

1. In most injuries, the main causes were excessive pressure and fatigue, so it can be said in conclusion that if possible, give required resting to the athletes of the two fields and also work on increasing the strength of these athletes.

In all two fields, ankle injuries occurs as a result of low balance (low balance landing in basketball, tackle and fall in football) that it is recommended to seriously take into consideration the balance exercises and proprioception in these fields.

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