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Epidemiology of Sport and Active Recreation Injuries Presenting to a Tertiary Emergency Department in the Sultanate of Oman

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Abstract

Background: Sport and recreational activities are becoming popular worldwide. This is attributed to the increase in public awareness about the benefits of physical activity. Furthermore, the availability of fitness facilities has increased in recent years. With such change in daily activities comes an increase in sport-related injuries presenting to emergency departments. There is a lack of data regarding the epidemiology of sport related injuries and their burden on emergency departments in the sultanate of Oman.

Aims: This study aims to provide a scientific perspective on the epidemiology and burden of sports and recreation related injuries in the Sultanate of Oman.

Methods: A retrospective cross-sectional study of all sports and recreation related injuries presented to the emergency department of the national trauma Center in the Sultanate of Oman between Jan 1st, 2016 and December 31st, 2016. Data was extracted from the electronic medical system used at the national trauma center. Demographics, clinical and management details were extracted. Data was recorded in EXCEL Software and analyzed using SPSS software.

Results: A total of 1015 patients were identified to have presented to the national trauma Center during the study period with sport and recreation related injuries. Young men in the second and third decade of life were the most prevalent population affected by sport injuries (mean age 24 SD+- 8). The rate of emergency department visits due to sport-related injuries was higher in November 14.9% (n=151) and June 10.5% (n=107). Football related injuries are the most common among different sports 59% (n=594), followed by weight lifting related injuries 2% (n=22). Knee, ankle and foot are the most commonly injured which constitute 18.8%, 17.6%, 17.3% respectively. 95.5% of cases were treated non-operatively. A significant number of patients who were discharged from the ED were treated conservatively 76.9% (n747) p-value <0.001, whereas 58.5% (n=24) p-value <0.001of those who got admitted underwent emergent surgeries.

Conclusion: Sports and recreation related injuries are common in our community. Although most of these injuries are not of a serious nature, most of the injured individuals seek medical care at the emergency department leading to unnecessary crowding and inappropriate utilization of the health system. Increasing public awareness about sport related injuries and the preventive methods when practicing sports and recreational activities is necessary.

Keywords: Sport injury; Active recreation injury; Emergency department presentation

Abbreviations:

SR Injuries: Sport-Related Injuries; ED: Emergency Department; USA: United States of America; UK: United Kingdom; ORIF: Open Reduction and Internal Fixation; SOB: Shortness of Breath

Introduction

Sports and recreational activities are becoming popular worldwide including the Sultanate of Oman. According to national statistics, there were more than 193 registered sport facilities in 2015 compared to 186 in 2014. Furthermore, the number of registered players at the ministry of sports affairs increased by more than 18% in 2015 compared to 2014 [1]. Among those 50% were Football players, 12% hockey players, 10% basketball players, and 6% volleyball players [1]. Despite the lack of available data, it is noticeable that the number of people participating in recreational activities is significantly more than those in organized sports. Football is considered one of the most popular recreation activities in the Sultanate of Oman. This rise in sport spread can be attributed to the public awareness about the benefits of physical activity and the spread of fitness facilities.

The increase in the incidence of sport and recreation related injury is expected with the increase in the number of people participating in

different sports. Injuries related to sport and recreation commonly present to emergency departments. In the UK and the USA there is 1.5 and 3.7 million emergency department visits per year, respectively, due to sport and exercise related injuries [2,3]. Sport-related injuries were found to be the third most common cause of admission in an Australian hospital [4]. Furthermore, different studies have shown that sport related injuries cause a significant burden to the emergency department and to the hospital economic status [3-7]. A study from Australia reported that $ 265 million were spent on all sports injuries in people aged 15 years and older, and more than $ 110 million on hospital treatment of acute lower limb injuries over a period of 7 years [5].

SR-injuries affect the quality of patients' life in the short term and long term. Athletes who sustain serious injuries like fractures, ligamentous injuries, etc. need admission, follow up, and rest for periods of time. For those who are employed, this leads to increased time lost from work with a subsequent decrease in the individual productiveness. In addition, sport puts athletes at risk for joint injuries, commonly knee and ankle, which can be associated with the development of osteoarthritis in future [8].

Aims and Objectives

Despite of these indicators of high rate of sport related injuries; there is no epidemiological study that represents the prevalence and characteristics of these injuries in the Sultanate of Oman. Epidemiological studies help the community and decision makers to identify how and why sport injuries happened. Therefore, strategies to prevent and control these injuries can be made. Our study aims to provide a scientific perspective on the epidemiology and burden of sport related injuries presenting to a single major hospital in the Sultanate of Oman, which can aid future researches in addressing strategies to prevent and control SR-injuries in Oman, and raise awareness among public and health workers.

Materials and Methods

A retrospective cross-sectional study of all sports and recreation related injuries presenting to the emergency department of the national trauma center in the Sultanate of Oman between January 1st, 2016 and December 31st 2016. Patients of all age groups were included in the study. We excluded all non-sport related injuries cases and cases where the documentation of most study variables was missed. Data was extracted from the electronic medical system used at the national trauma center. An ethical approval was sought from the Khoula Hospital ethics committee.

Most patients who presented to the ED with a history of sport trauma were labeled by the triaging staff as a case of "sport trauma". Since there is no agreed term to represent the sport-related injuries in the electronic medical system and to minimize the chance of missing any case, we conducted an online survey asking all medical staff at the emergency department to report the terms that they used when they encounter a case of sports injury. All terms were used to extract the data from the electronic medical system. The search terms that were used: Football, basketball, volleyball, handball, tennis, horsemanship, cycling, running, horse riding, horse, athletics, swimming, exercise, sport injury, sport trauma, lifting, gym, player, training, sliding, and fall while playing. The cases were individually reviewed and the following variables were recorded: Demographics, triage category, time of injury, type of sport, injuries sustained, anatomical location, management and disposition.

An electronic data collection sheet was made using "EXCEL" software. The data collection sheet contains all the variables mentioned below. The data was analyzed using "SPSS" software version 22. For descriptive purposes, categorized variables described as percentages. Continuous variables presented as mean with standard deviation. Chi-square test was used to compare categorical variables, $p<0.05$ was considered as statistical significance.

Results

Prevalence, age, gender

Over the year of 2016, 1036 patients presented to the emergency department with a history of a sport related injury. 21 cases were excluded from the study either because of incomplete data on their electronic record system or left without being seen. 99% (n=1015) of patients who attended the ED were males. 27 patients had more than one injury in two anatomical locations. More than 97% (n=994) of patients were triaged as category 4 using the ESI triage system, while 1.5% (n=15) of cases triaged as category 3. Among patients with SR injuries the mean age was 24 years (SD 8) (range: 5-59 years). Young men in the second and third decade of life were the most prevalent population affected by sport injuries. The rate of injuries keeps fluctuating over the period of the study. The rate of ED presentation due to sports was high in November 14.9% (n=151) followed by June 10.5% (n=107). There was a significant drop in the rate of ED presentation in May1.6% (n=17). Figure 1 shows the prevalence of sports-related injuries that attended the emergency department through the year of 2016.

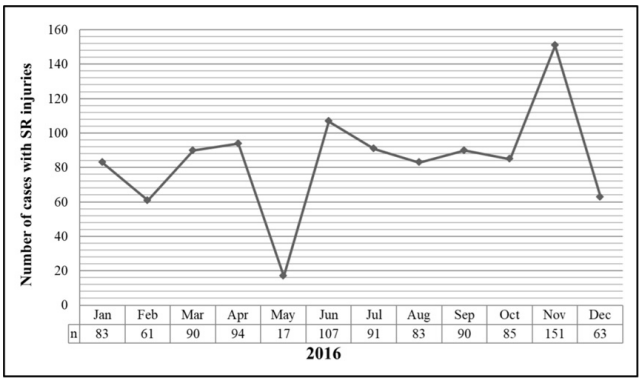

Figure 1: The prevalence of sports-related injuries that attended the emergency department through the year of 2016.

Sport subtypes

17 types of sports were identified to cause patients presentations to the ED. Of these, football 58.5% (n=594) was found to be the common cause of sport injuries followed by weight lifting activities (Gym) 2.2% (n=22). The rate of ED presentation due to injuries in volleyball, hockey, running, cycling, basketball, taekwondo, swimming, walking, tennis, cricket, inline skates, diving, Jet Ski, handball, and bowling was low. Unfortunately, the type of sport was not identified in 34.2% (n=347) of cases due to missing records.

Mechanism (% of total frequency)		Twisting (24%)	Contact with another player (37.3%)	Fall while playing (19.5%)	Lifting heavy weight (2.9%)	Contact with stationary object (3.8%)	Over use (4.1)	Unidentified (8.6%)	Total numbers
Types of sport (% with in type of sport)	Foot ball	26.7% (158)	40.8% (241)	20% (118)	0.2% (1)	3.9% (23)	3.9% (23)	4.6% (27)	591
	Gym	-	-	-	90.9% (20)	9.1% (2)	-	-	22
	Volleyball	10% (1)	50% (5)	10% (1)	-	20% (2)	10% (1)	-	10
	Running	-	-	39.8% (4)	-	7.7% (1)	53.8% (7)	7.7% (1)	13
	Basket ball	30% (3)	30% (3)	10% (1)	-	20% (2)	10% (1)	-	10
	Hockey	-	100% (1)	-	-	-	-	-	1
	Cycling	-	-	100% (3)	-	-	-	-	3
	Tennis	-	33.3% (1)	33.3% (1)	-	-	33.3% (1)	-	3
	Cricket	100% (1)	-	-	-	-	-	-	1
	Inline skates	-	100% (2)	-	-	-	-	-	2
	Jet ski	-	100% (1)	-	-	-	-	-	1
	Hand ball	-	-	-	-	100% (1)	-	-	1

Table 1: The prevalence of different mechanisms of injuries in different types of sports.

		Anatomical location (n)	Injuries sustained % (n)					
			Fracture	Contusion	Sprain/strain	Muscle spasm	Dislocation	Other
The frequency of injuries (%) within anatomical location	Lower extremities 63.5% (645)	Hip (3)	33.3% (1)	33.3% (1)	33.3% (1)	-	-	-
		Thigh (39)	-	17.9% (7)	17.9% (7)	38.6% (22)		3
		Knee (191)	-	21.5% (41)	75.9% (145)	-	0.5% (1)	4
		Leg (57)	26.3% (15)	50.9% (29)	1.8% (1)	10.5% (6)	-	6
		Ankle (179)	3.4 (6%)	14.5% (26)	81% (145)	-	-	2
		Foot (176)	27.8% (49)	58.5% (103)	7.4% (13)	-	1.1% (2)	9
	Upper extremities 25.3% (257)	Shoulder (36)	2.8% (1)	11.1% (4)	58.3% (21)	8.3% (3)	16.7% (6)	1
		Arm (6)	33.3% (2)	50% (3)	-	-	-	1
		Elbow (22)	9.1% (2)	59.1% (13)	9.1% (2)	-	13.6% (3)	2
		Fore arm (32)	87.5% (28)	12.5% (4)	-	-	-	-
		Wrist (51)	9.8% (5)	37.3% (19)	52.9% (27)	-	-	-
		Hand (110)	56.4% (62)	16.4% (18)	19.1% (21)	-	2.7% (3)	6

Table 2: Distribution of type injuries sustained according to the anatomical locations (*Others: Nail, Hematoma, Ligamentous injury, SOB, tendon injury, and Abrasions/lacerations).

Mechanism of injury

Usually the type of injuries can be anticipated by the type of sport practiced. Table 1 reflects the prevalence of different mechanisms of injuries in different types of sports. The most common mechanism of injury turned to be direct contact with another player 37.2% (n=384) followed by twisting 24% (n=248). Among football players, contact with another player 40.7% (161) is the most common mechanism of injury while in Gym attenders lifting heavy weight is the commonest. Overuse was noted more in runners 53.8 % (7) and football players 3.8% (23).

Anatomical location of injuries

The most sustained injuries in sports are sprain/strain 36.9% (n=375), contusion 30.7% (n=312), and fractures 18.6% (n=189) (Figure 2). The prevalence of injuries is more in the lower extremities 63.5% (n=645) compared to the upper extremities 25.3% (n=257) (Figure 3). Within the lower extremities, knee and ankle injuries are more prevalent. Wrist joint injury 5.2% (n=54) and the hand are the most injured part in the upper extremities. Table 2 shows the prevalence of injuries within the anatomical location. In football players, the most frequently injured part (in descending order): Knee, ankle and foot.

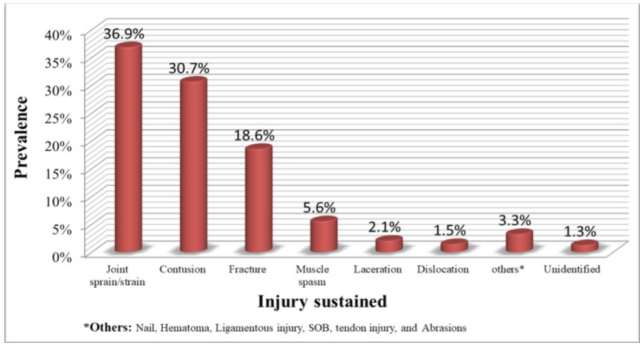

Figure 2: Prevalence of different types of injuries that are related to sport.

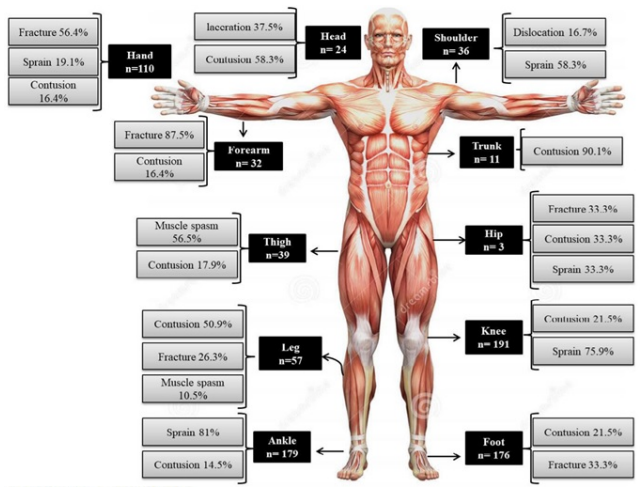

Figure 3: Rate of injuries in different body parts and describing the type of injury within the anatomical location.

Management and disposition

Table 3 demonstrates the management and disposition of patients with sport-related injuries. Most of sport-related injuries are not of a serious nature. More than 97% of cases were triaged in category 4. Patients with SR injuries were treated operatively and/or conservatively. The conservative therapies includes close reduction of a displaced joint or fracture, suturing a superficial cut wound, analgesia, applying slab, applying ice to the injured part, and applying tube grip bandages. A significant number of patients, who were discharged from the ED, were treated conservatively 76.9% (n=747) with a p-value of <0.001. In contrast to those who were discharged, a significant number of admitted patients underwent emergent surgeries 58.5% (n=24) p-value <0.001. 39% (n=16) of cases, who had a follow-up appointment, underwent elective surgeries.

Disposition / Management	Operated N (%)	Not Operated N (%)	Total N (%)	P-Value
Admission	24 (58.5%)	11 (1.1%)	35 (3.5%)	<0.001
Discharged	1 (2.4%)	747 (76.9%)	748 (73.8%)	<0.002
Referred	16 (39.0%)	214 (22.0%)	230 (22.7%)	<0.003
Total	41 (100.0%)	972 (100.0%)	1013 (100.0%)	-

Table 3: Management and disposition of patients with sport-related injuries.

Discussion

This study is the first study that reports the prevalence of sport-related injuries from the sultanate of Oman. It provides information about the demographic, nature, pattern, and types of injuries associated with practicing sport and recreational activities. This study is conducted in Muscat (>2 000 000 inhabitants) in the national trauma center of Oman [9]. The catchment area, which is covered by this trauma center, is a typical Omani area with urban and rural municipalities.

Studies have shown that sport related injuries cause a significant burden to the emergency department and to the hospital economic status [3-7]. A study from Australia reported that $ 265 million were spent on all sports injuries in people aged 15 years and older, and more than $ 110 million on hospital treatment of acute lower limb injuries over a period of 7 years [5]. This study highlighted the volume of sport related injuries on the national trauma emergency department in Oman. Future research into the economic coast of such injuries will be essential.

According to the national registry, the number of sports practitioners and recreational activities is increasing. In 2015, there was more than 18% increase in the number of registered players at the ministry of sports affairs compared to 2014. The most popular type of sport was football [1]. Our study showed 59% of sport injuries were related to football. Different international studies also reported that football (soccer) is associated with high incidence/prevalence of injury [10-12].

This study looked at the prevalence of SR injuries in all age groups. We found that most injured people were young men in the second and third decade of life. This finding is in agreement with the data from Finland [13], Sweden [14], Australia [15], Canada [16], and Germany [17]. The fact that the majority of affected patients are in these young age groups, who are productive members of society, likely, has a direct negative impact on the country's economy from the associated loss of productivity.

The rate of presentation of SR injuries to the ED is affected by multiple factors. One of these factors is seasonal variation. Our study

found that there is significant drop in ED presentation of SR injuries on January and May 2016, which are considered to be an exam period for most of college and school students in the country. We assume that this drop of SR injuries is related to this exams period as there is a significant rise in the number of cases during the summer break.

Similarly to previous studies [3,6,11,13,16-18], the most frequently occurring injuries were sprain/strain 36.9% (n=375), contusion 30% (n=312), and fractures 18.6% (n=189). These injuries were reported more in the lower extremities. Football-related injuries are the most frequent and these injuries have a direct impact on the health system and patients quality of life [10,19]. Among football players, knee and ankle injuries were the highest comparing to other body parts. Sprain/strain is the most frequently reported injuries among football players. A meta-analysis has shown that history of knee injury is a major risk factor for the development of early osteoarthritis [20]. Therefore, training, protective equipment, and other safety measures should be considered when practicing football.

Limitations

There are limitations in our study. Unfortunately, there was no uniform terminology used for SR injuries presenting to the national trauma center making the retrieval of the data a bit challenging. The absence of a collective term for all sport and recreational related injuries in the national trauma center creates a possibility that we did not include all cases. We tried to minimize this by doing online survey for all ED staffs to give us the terminologies that were possibly used when they encounter cases with SR-injuries. In addition to that, there are cases which do not present to ED and therefore our study does not cover all the patients with SR-related injuries in the region.

The nature of our study is retrospective study. Our data are based on the electronic medical records, therefore there was missing data. Other studies in sport related injuries had the same limitations [11,13,15,21]. This should be kept in mind when interpreting the results.

Conclusion

This study provides a descriptive data of SR injuries presenting to the ED. The study has shown that young men in the second and third decade of life were the most prevalent population affected by sport injuries. Football related injuries are the most common among different sports. Knee, ankle and foot are the most commonly injured which constitute 18.8%, 17.6%, 17.3% respectively. 95.5% of cases were treated non-operatively. Although most of these injuries are not of a serious nature, most of the injured individuals seek medical care at the emergency department leading to unnecessary crowding and inappropriate utilization of the health system. Increasing public awareness about sport related injuries and the preventive methods when practicing sports and recreational activities is necessary.

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Conflict of Interest

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