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## ORIGINAL ARTICLE

# The knowledge, attitude and practices of male sports participants to sports-related dental trauma in Khobar and Dammam, Saudi Arabia – A pilot survey



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## KEYWORDS

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**Abstract** The risk of dental trauma may increase during sports participation. The purpose of this study was to evaluate the knowledge, attitude, and practices of sports participants concerning sports-related dental trauma and associated emergency/preventive practices. The study included 124 male subjects over 18 years of age participating in contact and non-contact sports in three clubs in the Eastern Province, Saudi Arabia. A questionnaire was used to assess past experience of dental trauma related to sports in addition to the use of a mouth guard and knowledge of related emergency procedures. Outcomes were compared between individuals practicing direct and non-direct contact sports. One third of the participants had experienced dental trauma while playing sports, mostly crown fracture, mobility, and avulsion. Their knowledge of first aid and emergency procedures was inadequate. A significantly higher proportion of non-direct contact sport participants sought the help of a dentist for themselves or others ( $P = 0.04$  and  $0.003$ , respectively). Only 33.9% used mouth guards, with higher odds of mouth guard use associated with participating in direct contact sports and believing a tooth can be lost during sports practice (odds ratio = 5.59 and 5.37, respectively). Educational programs are needed to increase the awareness in sports participants of the risk of dental trauma during sports participation, to improve their knowledge of first aid procedures, and to increase the use of mouth guards.

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## 1. Introduction

Sports and exercise are associated with improved health, although some practices can increase the risk of traumatic injuries to dental and oral tissues (Kumamoto and Maeda, 2004; Levin et al., 2003). Some US studies have shown that 60%

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of individuals experienced dental trauma during sports activities (Kaste et al., 1996). Sports involving direct contact (boxing, wrestling, martial arts, etc.) were reported to increase the risk for dental trauma compared with other sports (Ferrari and Ferreira de Medeiros, 2002; Holmes, 2000).

The consequences of dental trauma can range from simple tooth fracture to tooth avulsion (Levin et al., 2003). Avulsion is one of the situations that calls for the subject or those around him/her to be knowledgeable of the appropriate responses, since what is done directly after avulsion affects the outcome and the chances of tooth survival. Immediate reimplantation of the avulsed tooth (Andreasen and Andreasen, 2007; Andersson and Bodin, 1990) or its maintenance in a storage medium that facilitates the survival of periodontal ligament cells (Levin et al., 2003) is fundamental for successful reimplantation. When the tooth is maintained in a wet storage medium (e.g. milk), it can be reimplanted later, and the chance of success increases (Blomlo et al., 1981; Lindskog and Blomlo, 1982). However, often people allow the tooth to dry, keeping it wrapped in plastic or sometimes immersed in solutions that do not permit cell survival (Holmes, 2000; Kivttem et al., 1998). This may lead to undesirable consequences (Andreasen and Andreasen, 2007). It is important that sports participants be aware of how to respond to dental trauma so that a positive outcome is assured (Kaste et al., 1996; Petti and Tarsitani, 1996). In addition, sports-related dental trauma can be prevented using mouth guards. A systematic review reported that non-users of mouth guards had significantly more oro-facial injuries than those who used them (relative risk = 1.86, 95% confidence interval: 1.76–1.96) (Knapik et al., 2007).

Dental trauma associated with sports is a problem that is not well studied in Saudi Arabia. The purpose of this study was to evaluate the knowledge, attitudes, and practices concerning sports-related dental trauma among direct and non-direct contact sports participants in the cities of Dammam and Khobar, Eastern Province of Saudi Arabia. Another aim was to assess the prevalence of mouth guard use and associated factors among the study participants.

## 2. Material and methods

A cross-sectional study was designed to address the objectives. Approval of the study was obtained from the Research Unit, College of Dentistry, University of Dammam (#EA201418). The study was conducted in three sports clubs in the Eastern Province of Saudi Arabia in the period from March to April 2013. Sports participants were selected based on their involvement in direct contact sports (boxing, Kung Fu, Karate, Taekwondo, Roman wrestling, and mixed martial arts) or non-direct contact sports (football, volleyball, and swimming). Only individuals 18 years of age and older were included so they would have been exposed to sports for a sufficient duration for the outcome (trauma) to have occurred. A convenience sample, rather than a random sample, was selected, since only three clubs in Dammam and Khobar agreed to join the study. There were two other sports clubs that did not respond to our invitation to participate. Dammam and Khobar were selected for logistical considerations because of their proximity to the University of Dammam, where the study team was based. The potential number of subjects fitting the

inclusion criteria was too small to allow for random sampling. Therefore, participants in the clubs who consented to join the study during the data collection period were included. Only male subjects were invited to participate.

Data were collected using a self-administered questionnaire that was developed based on previous studies (Lang et al., 2002; Levin et al., 2003; Panzarini et al., 2005). The questions were collected, edited, and modified, then translated into Arabic and pilot-tested on five male subjects familiar with the subject of sports-related dental trauma. They ensured that the questions were clear and could be easily understood. Their responses were not included in the data analysis. The questionnaire was divided into three parts. Part I contained questions about personal background (age, education, type of sport, and duration of involvement). Part II collected information about history of sports-related dental trauma. Part III included questions about the participant's attitude toward sports-related trauma and the actual use of a mouth guard.

The study team members discussed the questionnaire and the interpretation of the questions/items to ensure standardized data collection. Investigators approached sports participants in the clubs during their break or after they finished their training, explained the study purpose and invited them to respond to the questionnaire. If participants had difficulty understanding a question/item, an explanation was given to them by one of the team members. The questionnaire took 5–10 min to complete, and it was collected in the same visit.

Data were entered into a Microsoft Excel file and imported into SPSS version 17.0 for analysis. Direct and non-direct contact sports participants were compared using the chi square test, Fisher's exact test, or a *t* test to evaluate background variables, types of trauma, practices, knowledge, attitude, and use of mouth guards. Univariate logistic regression models were developed for independent variables and potential confounders associated with the use of a mouth guard (dependent variable), and only variables showing a significant association were entered into the multivariate logistic regression model. The independent variables included in the regression analysis were age (in years), time since starting sports' practice (in years), education (illiterate, less than university, and university and beyond), sport types (direct and non-direct contact), previous dental trauma because of sports (yes/no), how to clean an avulsed tooth before reimplantation (using a brush, using water, or do not know) and believing a tooth can be lost during sports playing (yes/no). Odds ratios and confidence limits were calculated. Significance was set at the 5% level.

## 3. Results

A total of 124 sports participants returned the questionnaire (response rate =  $124/144 = 86.1\%$ ). Table 1 shows the sample description. Most participants practiced direct contact sport (57.3%), including boxing, Kung Fu, Karate, Taekwondo, Roman wrestling, and mixed martial arts (2.8%, 4.2%, 7%, 1.4%, 47.9%, and 36.6%, respectively). Out of all subjects, 42.7% reported practicing non-direct contact sports: football, swimming, and volleyball (94.3%, 3.8%, and 1.9%). The mean (SD) ages for direct and non-direct contact sports participants were 22.1 (5.3) and 25.7 (4.9) years, respectively ( $P < 0.0001$ ). The participants were involved in their respective sports for a mean (SD) of 4.2 (3.3) years and 11.8 (5.5) years, respectively. Participants in direct contact sports had a significantly higher education level ( $P < 0.0001$ ).

**Table 1** Sample description.

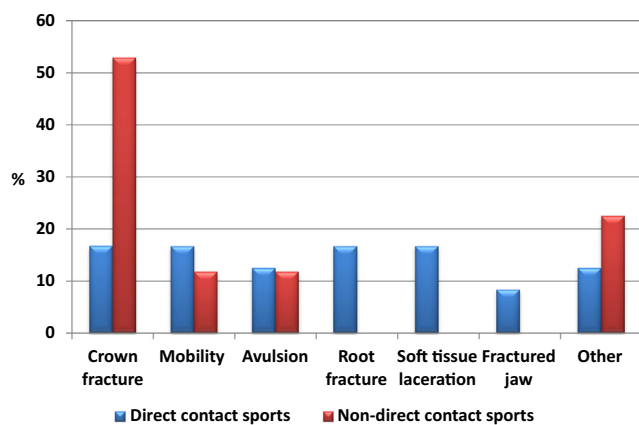
Variables		Direct-contact sports	Non-direct contact sports	<i>P</i> value	All participants
N (%)		71 (57.3)	53 (42.7)	–	124 (100)
Age	Mean (SD)	22.1 (5.3)	25.7 (4.9)	< 0.0001*	23.7 (5.4)
Time in sports	Mean (SD)	4.2 (3.3)	11.8 (5.5)	< 0.0001*	7.5 (5.8)
Education	Illiterate: n (%)	2 (2.8)	16 (30.2)	< 0.0001*	18 (14.5)
	Less than university: n (%)	55 (77.5)	27 (50.9)		82 (66.1)
	University and beyond: n (%)	14 (19.7)	10 (18.9)		24 (19.4)

\* Statistically significant at  $P \leq 0.05$ .

About one third (33.1%) of the participants had experienced dental trauma related to sports. Of these, 58.5% participated in direct contact sports and 41.5% in non-direct contact sports. Fig. 1 shows the specific types of dental trauma in the two groups ( $P = 0.10$ ). No root fracture, fractured jaw, or soft tissue lacerations were reported by the non-direct contact sports group. The most common type of traumatic injuries in the two groups combined was crown fracture, followed by mobility and avulsion.

Table 2 shows the practices reported by the respondents when sports-related dental trauma occurred to them or to someone else while they were present. Half of the respondents did nothing when they were injured (56.1%), with a significantly greater proportion of non-direct contact sports participants seeking the help a dentist than participants in direct contact sports (41.2% and 8.3%,  $P = 0.04$ ). A significantly greater percentage of non-direct sports participants reported that after trauma, a dentist treated their teeth and the problem was resolved (47.1% compared with none in the direct contact group) whereas a greater percentage of direct contact sports participants reported change in color and extraction ( $P = 0.005$ ). A significant difference existed between the groups in how they helped others with dental trauma because of sports, where 47.2% of non-direct contact sports participants transported the person to the nearest dentist, whereas 64.3% of direct contact sports participants tried to find the nearest hospital/emergency clinic/physician ( $P = 0.003$ ). A significantly higher proportion of non-direct contact sports participants compared with direct contact sports participants reported managing someone's avulsed tooth (62.3% and 43.7%,  $P = 0.04$ ) although there was no difference between the two groups in reporting re-implanting an avulsed tooth ( $P = 0.82$ ).

Table 3 shows the knowledge of the respondents of how to manage an avulsed tooth. There was no difference between the groups in knowing whether an avulsed tooth needed cleaning before re-implantation,



**Figure 1** Types of sports-related dental trauma among the study participants.

how to do that cleaning, or how to transport it to the dentist if it is not re-implanted (correctly answering = 61.3%, 21%, and 9.8%,  $P = 0.19, 0.08, \text{ and } 0.31$ ).

A significantly higher proportion of direct contact sports participants reported using mouth guards compared with the non-direct contact sports participants (47.9% and 15.1%,  $P < 0.0001$ ), with 33.9% of all respondents reporting doing so. There was no significant difference between the groups in the proportion of participants who believed they could lose a tooth during playing sports (64.8% and 66%,  $P = 0.89$ , total = 65.3%, Fig. 2).

Table 4 shows the association between using mouth guards and various factors. In univariate regression, as respondents spent one additional year in sports, the odds that they used mouth guards decreased by about 10% (OR = 0.91). Respondents who were involved in direct contact sports had 5 times the odds of using mouth guards as those who were not (OR = 5.17). Respondents who knew that avulsed teeth should be cleaned with water before being re-implanted had about four times the odds of using mouth guards as those who did not know what to do (OR = 3.73). Respondents who believed a tooth can be lost during sports had 4.93 times the odds of using mouth guards as those who did not believe so. In multivariate regression, higher odds of using mouth guards were associated with being involved in direct contact sports and believing teeth can be lost during sports (OR = 5.59 and 5.37).

#### 4. Discussion

The study aimed at assessing the practices, attitude, and knowledge of direct and non-direct contact sports participants concerning sports-related dental trauma. In general, participants reported adopting appropriate practices when they had trauma themselves or if they were in the company of someone who had trauma. Their knowledge was inadequate, jeopardizing their ability to act correctly when the need arises. The study sheds light on the situation of sports-related dental trauma in Saudi Arabia, which is essential to better understand the problem and plan for its prevention. One of the study limitations, however, is the convenience sampling strategy used, which makes generalization difficult. This sampling strategy had to be used because of the small number of available participants consenting to participation. Another limitation is the cross-sectional design, which cannot prove causality, although it indicates an association between beliefs and type of sports on one hand and the use of mouth guards on the other hand. Recall bias is also an issue that may have affected the reporting of the types of trauma. However, the categories the respondents were asked to select from were chosen so that they can be objectively reported, omitting other conditions that may be perceived subjectively, such as bleeding, pain, and swelling.

The prevalence of sports-related dental trauma reported by the participants in our study (33.1%) was similar to that

**Table 2** Practices reported by participants concerning self and others' sports related orofacial trauma.

Variables		Direct-contact sports: <i>N</i> (%)	Non-direct contact sports: <i>N</i> (%)	<i>P</i> value	Total: <i>N</i> (%)
Dealing with trauma to oneself	Did nothing	15 (62.5)	8 (47.1)	0.04*	23 (56.1)
	Immediately sought the help of a dentist	2 (8.3)	7 (41.2)		9 (22)
	Sought the help of a dentist the following day	3 (12.5)	2 (11.8)		5 (12.2)
	Went to the emergency clinic in the club	4 (16.7)	0		4 (9.8)
Consequences of sports-related dental trauma	None	11 (45.8)	6 (35.3)	0.005*	17 (41.5)
	Problems but tooth treated and problems were resolved	0	8 (47.1)		8 (19.5)
	Change in tooth color	5 (20.8)	1 (5.9)		6 (14.6)
	Had to extract tooth	3 (12.5)	1 (5.9)		4 (9.8)
Provided help to a person with sport related orofacial trauma	Transported him to nearest dentist	20 (28.6)	25 (47.2)	0.003*	45 (36.6)
	Tried to find nearest dentist	27 (38.6)	8 (15.1)		35 (28.5)
	Tried to find nearest hospital/emergency clinic/physician	45 (64.3)	20 (37.8)		65 (39.9)
	Nothing/could not deal with this	5 (7.2)	8 (15.1)		13 (10.6)
Previously managed someone's avulsed tooth		31 (43.7)	33 (62.3)	0.04*	64 (51.6)
Re-implanted previously someone's avulsed tooth		28 (39.4)	22 (41.5)	0.82	50 (40.3)

\* Statistically significant at  $P \leq 0.05$ .

reported by Ferrari and Ferreira de Medeiros (2002) among Brazilian athletes participating in official competitions in the period 1998–1999 (28.8%). Crown fractures were the most frequently reported type of trauma in our study (34.8%), higher than the prevalence reported by Sepet et al. among a group of Turkish athletes > 18 years old (Sepet et al., 2014) (14.3%), possibly because their study included a majority of non-direct contact sports participants. This higher prevalence of crown fracture may be explained by the velocity of impacting forces that exists in these types of sports (Lang et al., 2002). The prevalence of avulsion reported in our study (12%) was higher than that reported by Schildknecht et al. (2012) among a group of Swiss rugby players (8.6%) and was similar to that reported by Frontera et al. among male Brazilian basketball players (13.7%) (Frontera et al., 2011).

Although both groups reported a similar prevalence of sports-related dental trauma, non-direct sports participants reported seeking the help of a dentist immediately in case of trauma to themselves or when transporting other injured persons to dentists. This may in part explain why this group reported favorable outcomes following trauma compared with none at all from the direct contact sports participants. Early contact with dentist to manage trauma is important to positive post-trauma outcomes (Knapik et al., 2007).

Most participants did not know the correct method of cleaning a tooth before re-implantation or the medium in which to store the tooth until it is transported to a dentist. Improving the knowledge of sports participants of this type

of first aid procedures is important to avoid jeopardizing the chances of success when re-implantation is performed. Sepet et al. (2014) also reported inadequate knowledge of correct emergency procedures among Turkish sports participants, where 58.3% indicated they would transport an avulsed tooth in a handkerchief, a napkin or saline.

Studies confirm that using mouth guards while playing sport reduces the incidence and severity of orofacial trauma (Knapik et al., 2007; Levin et al., 2003; Tiwari et al., 2014). In the present study, only 33.9% reported using mouth guards. Levin et al. (2003) reported that 27% of study participants were knowledgeable of the need for mouth guards, but only 3% actually used them. Our results, similar to others, emphasize the need for educational campaigns about the role of a mouth guard in preventing orofacial trauma among sports participants (Kumamoto and Maeda, 2004). The majority of participants, regardless of the type of sports in which they participated, believed they were at risk of losing a tooth while playing sports. This belief was significantly associated with using a mouth guard, echoing the concept behind the health belief model for explaining health behaviors (Cummings et al., 1978).

Participation in direct contact sports was associated with 5 times the odds as non-direct contact for the use of mouth guards. Interestingly, there was no significance difference between the groups in having experienced at least one type of dental trauma because of sports. The decision to use a mouth guard is thus not because of actual increased risk but

**Table 3** Knowledge of how to manage an avulsed tooth among sports participants.

Variables	Direct-contact sports: <i>N</i> (%)	Non-direct contact sports: <i>N</i> (%)	<i>P</i> value	Total: <i>N</i> (%)
Avulsed tooth needs cleaning before being re-implanted	40 (56.3)	36 (67.9)	0.19	76 (61.3)
How to clean an avulsed tooth	Brush (36.6)	30 (56.6)	0.08	56 (45.2)
	Water <sup>‡</sup> (25.4)	8 (15.1)		26 (21)
	Do not know (38)	15 (28.3)		42 (33.9)
How to transfer an avulsed tooth to dentist	In saline (38.6)	30 (56.6)	0.31	57 (46.3)
	In water (12.9)	6 (11.3)		15 (12.2)
	In milk <sup>‡</sup> (12.9)	3 (5.7)		12 (9.8)
	In a piece of paper/cloth (17.1)	10 (18.9)		22 (17.9)
	In person's mouth (10)	2 (3.8)		9 (7.3)
	Carry in hand (5.7)	2 (3.8)		6 (4.9)
Other (2.9)	0	2 (1.6)		

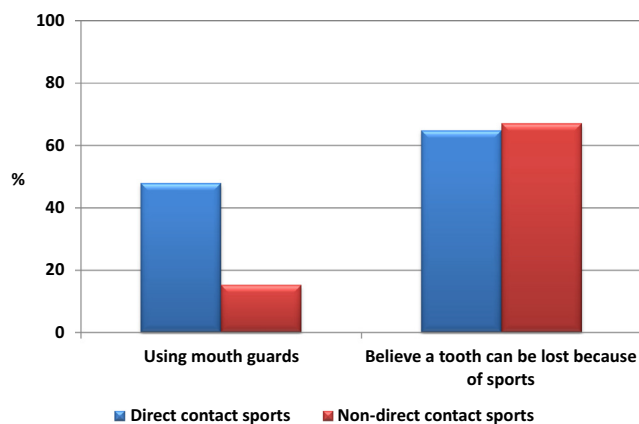
<sup>‡</sup> Correct answers.

**Table 4** Factors associated with using mouth guards in the study sample.

Variables	Univariate regression		Multivariate regression		
	OR	95% CI	OR	95% CI	
Age	1.01	0.94, 1.08			
Time in sports	0.91*	0.84, 0.98	0.98	0.87, 1.09	
Education	Illiterate vs university and beyond	0.83	0.23, 3.00		
		Less than university vs university and beyond	0.82	0.32, 2.11	
Sport type	Direct contact vs non-direct contact	5.17*	2.13, 12.52	5.59*	1.57, 19.86
		Yes vs no	1.40	0.64, 3.06	
Previous trauma because of sports	With a brush vs do not know	1.52	0.61, 3.75	1.55	0.54, 4.44
		With water vs do not know	3.73*	1.31, 10.65	3.10
Believes a tooth can be lost during sports practicing	Yes vs no	4.93*	1.88, 12.98	5.37*	1.83, 15.71

OR: odds ratio, CI: confidence interval.

\* Statistically significant since CI does not contain the null value (= 1).

**Figure 2** Using mouth guards and belief that tooth can be lost during sports practice.

of perceived risk, which is shared among people practicing the same type of sport. This is confirmed by the fact that using mouth guards was not associated with previous experiences with dental trauma.

The findings of our study have to be interpreted cautiously, due to the small sample size, and need confirmation based on a larger sample that can represent sports participants in Saudi Arabia. Within these limitations, the finding shows inadequate

knowledge among sports participants regarding emergency procedures in case of dental trauma while playing sports. An educational program to increase awareness, improve knowledge, and promote the use of mouth guards is needed. Since belief in being at risk for trauma while playing sports was associated with higher odds of using mouth guards, educational programs must also address the risk of trauma in direct and non-direct contact sports.

#### Conflict of interest

The authors had no conflict of interest to declare.

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