

Comparison of Dental Injuries and Mouthguard uses in three Styles of Martial Arts: Karate, Taekwondo and Jiu-jitsu

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ABSTRACT

Objectives: Dental injuries associated with martial art are a problem that is not well studied in Jordan. The purpose of this study is to study the risk of dental injury in three commonly practiced martial art styles (Karate, Taekwondo and Jiu-jitsu), as well as to evaluate the knowledge, attitude, and practices of participants to dental trauma and associated emergency, also to study the prevalence of mouth guard uses by participants.

Method: A total of 250 children and youngsters, 167 boys and 83 girls aged 5-20 years, from three different sports (karate (n = 100), taekwondo (n = 90), and Jiu-jitsu (n = 60) participated in this study, conducted in three sports clubs in Amman Jordan in the march 2018. A standardized questionnaire about history of sports-related dental trauma was used. Questions were also asked about participant's attitude toward sports related trauma and the actual use of a mouth guard.

Results: Dental injury had been experienced by 18% of participant. The most common style of martial arts with dental injuries was taekwondo, with rates of 30 % (27/90), Karate 12 % (12/100), and jiu-jitsu 10 % (6/60). The main type of dental injuries was crown fractures 46.7 %; teeth displaced 37.8 % and tooth avulsions 15.6% (7/45). About first aid, participants are preferred Public Dental Service for management of dental injury 46.67%. Only 57 participants 26.8% were aware of the possibility of returning an avulsed tooth to its socket. And 72.8% of participants had inadequate knowledge about the appropriate storage media for the avulsed tooth. Majority of the participants 69.2 % knew about the mouth guard, mainly through the club 75.7% while only 34.8 % of participant reported that they use it during sports. The greatest numbers of participant use mouth guard during sports seen in taekwondo, with rates of 39.1%, Karate 37.9% and jiu-jitsu 23 %.

Conclusion: The present study revealed inadequate knowledge of sport participants regarding emergency procedures in case of dental injuries and the importance of mouthguards to prevent sports related dental injuries.

Keywords: Dental injuries, Jiu-jitsu, Karate, Martial arts, Mouthguards, Taekwondo

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Introduction

Martial arts are a popular form of exercise and sport worldwide. It is one of the methods of fighting, often without weapons that come from the Far East. There are hundreds of different styles of martial arts, for example Taekwondo, kung Fu, karate, Jiu-jitsu, judo, etc. each being mechanically, philosophically, culturally, and geographically diverse.

Community sports whether for exercise, competition or the simple enjoyment of recreational activity has grown rapidly, it provides lifelong benefits for athletes, offering them the opportunity to achieve physical fitness and improve their overall health. martial arts is one of these community sports, which is derived from the "arts of Mars" (Roman god of war),⁽¹⁾ and presently encompasses formal combat traditions that can be practiced for self-defence. Martial arts can be effective tools for building muscle strength and balance and enhancing flexibility in children and adolescents.^(2, 3) However, many of Martial arts, such as karate, taekwondo, jiu-jitsu, and mixed martial arts pose serious health risks as well.

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Nowadays the interest and participation in martial arts is increasing by young athletes, the members during that they faced injuries. Therefore prevention of facial injuries which can harm lips, cheeks, tongue and teeth is more important.⁽⁴⁾ The risk of dental trauma in sports involving direct contact (boxing, wrestling, martial arts, etc.) was more than other sports.⁽⁵⁾

Taekwondo is an international martial arts sport with a heavy emphasis on head-height, fast, jumping, and spinning kicks. Taekwondo athletes are three times more at risk of orofacial injuries than non-contact sports practitioners,⁽⁶⁾ with an incidence of orofacial injuries ranging between 20-34%.^(7,8)

Karate is now predominantly a striking art using punching, kicking, knee strikes, elbow strikes and open-hand techniques.⁽⁹⁾ Zetaruk et al.⁽¹⁰⁾ in their study, conducted on the five martial arts reported the least damage in karate and the probability of several injuries in taekwondo was three times as much as in karate. They also, introduced head and face, upper limb and soft tissues as the points most likely of being injured Karate. But in another study by the Galic *et al.*⁽¹¹⁾ higher rate of dental injuries was observed in karate (17.2%) than in taekwondo (3.5%).

Jiu-jitsu is a martial art that focuses on groundwork, joint locks, and chokeholds instead of kicks and punches. The sport has Japanese roots, and is specifically influenced by the technical aspects of Kodokan judo.⁽¹²⁾ There was a 77% incidence of injuries among the participants. Those injured had an average (15%) wounds and cuts in the head/face region, were on the lips and mouth area wounds/cuts (31%).⁽¹³⁾

Dental hard tissue injuries due to sports include luxation, tooth intrusions, crown and/or root fractures, avulsions and maxillofacial fractures.^(14,15,16,17) The soft tissue injuries can occur as lip cuts, cut gums, cuts to the face or cuts to the tongue.⁽¹⁸⁾ The most common orofacial injuries which were 40% sports related dental injuries as oral structure and teeth in front region of face,⁽¹⁹⁾ and the most common dental injury associated with sports is a crown fracture.⁽²⁰⁾

In Germany, sports-related dental injuries account for 13% to 39% of all trauma cases.⁽²¹⁾ While the prevalence of dental trauma among Pan American games athletes was 49.6%, where 63.6% of them were related to activities during training or competition.⁽²²⁾ In the Czech Republic, the most frequent causes of injured permanent teeth in patients older than 11 years were sport activities.⁽²³⁾

The US Surgeon General's report on oral health found that sporting activities are linked to nearly one-third of all dental injuries.⁽²⁴⁾ Castaldi has shown that dental and facial injuries contribute up to 39% of total injuries experienced in youth sport.⁽²⁵⁾ In Ireland, Stewart et al.⁽²⁶⁾ found that sports injuries accounted for 23% of children attending Cork emergency services for dental trauma treatment.

The risk of oral injuries during performing sports and exercise activities can be reduced substantially by using mouthguards.⁽²⁷⁾ Mouthguards offer protection by separating the cheeks and lips from the teeth, making users less susceptible to soft-tissue laceration and preventing opposing arches from traumatic contact and these protective devices provide a resilient, protective surface to distribute and dissipate transmitted forces on impact.⁽²⁸⁾

Three types of mouthguards are generally available: stock mouthguards, mouth-formed mouthguards (most commonly "boil-and bite" type) and custom made mouthguards.^(29, 30, 31)

Studies have been done on wearing mouthguards and occurrence of dental injuries. Basketball players who use mouthguards had significantly lower rates of dental injuries and dentist referrals.⁽³²⁾ A Nigerian study also showed that prevalence of orofacial injuries was significantly lower while wearing a mouth guard.⁽³³⁾ A survey in Switzerland, Germany and France found only one individual among all of squash players who experienced dental traumas wore a mouth guards.⁽³⁴⁾ The importance of utilizing mouthguard was found in one Turkish study where 13.2% of university athletes had suffered from one or more form of oral injury while not wearing mouthguards.⁽³⁵⁾

Dental trauma associated with martial art is a problem that is not well studied in Jordan. The purpose of this study was to determine the risk of injury in three commonly practiced martial art styles (Karate, Taekwondo and Jiu-jitsu), to evaluate the knowledge, attitude, and practices of participants to dental trauma and associated emergency, and to assess the prevalence of mouth guard uses.

Method

A cross-sectional study was conducted in three sports clubs in Amman Jordan in the march 2018. Approval of the study was obtained from the Directorate of Technical Rehabilitation and Development of Human Resources Royal Medical Services. Sports participants were selected based on their involvement in martial arts (Karate, Taekwondo and Jiu-jitsu). The questionnaire was distributed to 250 Male and female aged 5-20 years. Data were collected using a self-administered questionnaire; the questions were collected, edited, and modified, then translated into Arabic.

The questionnaire contained 16 items and was divided into three parts. Part I contained questions about personal background (age, sex, 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 questionnaire was collected in the same visit. Data were entered into a Microsoft Excel file and imported into SPSS version 17.0 for analysis. Significance was set at the 5%.

Results

A total of 250 children and youngsters (167 boys and 83 girls) were included in this study. The most common age range was 5-10 (33.2%) and most of the athletes had been professionally exercising for <5 years (37.2%) .the sports involved were Karate 40% (100/250), Taekwondo 36% (90/250), and Jiu-jitsu 24% (60/250) (Fig.1).

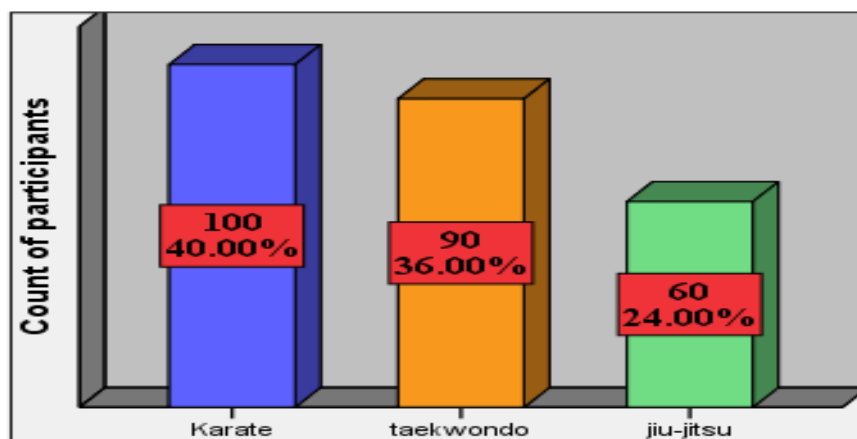


Fig 1: Distribution of participants in various types of sport

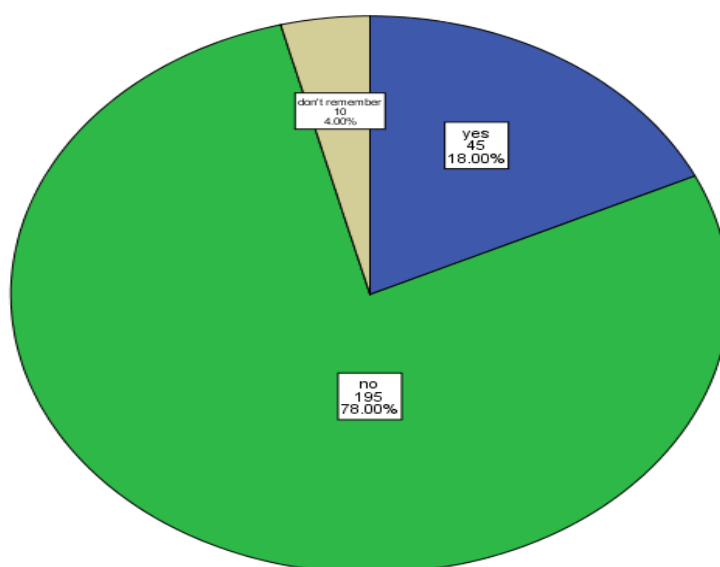


Fig 2 Question 6 "Have you reported previous dental injury yourself?"

Most of the participants believed that they are vulnerable to dental injuries during practice 82.4%.When asked"Have you ever reported previous dental injury yourself? 45of the 250 respondents answersyes (18%), and 205 answered no, (Fig.2), the highest percentage of participant with dental injuries were seen in taekwondo, with rate of 30 % (27\90), Karate 12 % (12\100), and jiu-jitsu 10 % (6\60), with statistically significant differences (p = 0.007) (Table. I).

Table I: Sport type vs. dental injury Cross tabulation

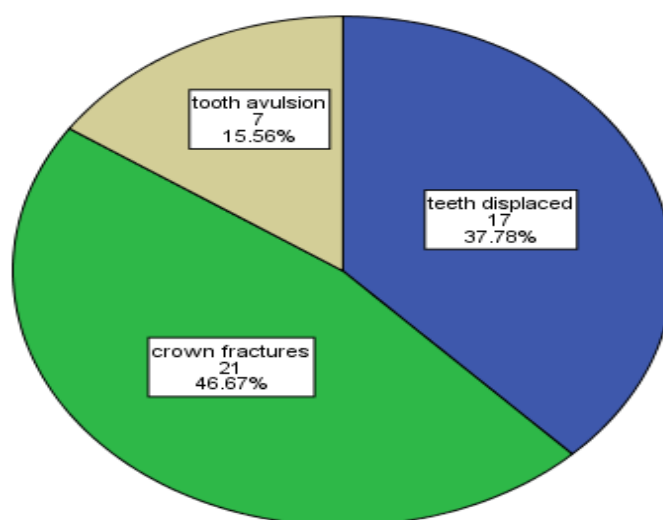
			Sport type			Total
Dental injury	yes	Count	Karate	taekwondo	jiu-jitsu	
		% within sport type	12	27	6	45
	no	Count	12.0%	30.0%	10.0%	18.0%
		% within sport type	83	60	52	195
	Don't remember	Count	83.0%	66.7%	86.7%	78.0%
		% within sport type	5	3	2	10
			5.0%	3.3%	3.3%	4.0%

The main type of dental injuries was crown fractures 46.7 % (21\45), teeth displaced 37.8 % (17\45) and tooth avulsions 15.6% (7\45) (Figure.3), and the relation between type of sport and type of dental injury that most common type of dental injury was crown fracture in taekwondo, karate and jiu-jitsu 48.1%; 50%; 33% respectively (Table.II), with no statistically significant differences ($p = 0.739$).

Table II: Sport type vs. type of dental injury Cross tabulation

			Sport type			Total
Dental injury type	teeth displaced	Count	Karate	taekwondo	jiu-jitsu	
		% within sport type	5	10	2	17
	crown fractures	Count	41.7%	37.0%	33.3%	37.8%
		% within sport type	6	13	2	21
	tooth avulsion	Count	50.0%	48.1%	33.3%	46.7%
		% within sport type	1	4	2	7
Total		Count	8.3%	14.8%	33.3%	15.6%
			12	27	6	45

About first aid, participants are preferred Public Dental Service for management of dental injury (46.67%), and 83.6% of the participants sought dental care immediately, because they believe in the importance of a professional management of dental injury in order to increase the rate of success.

**Fig 3 Question: 7** “What kind of dental trauma did you experience?”.

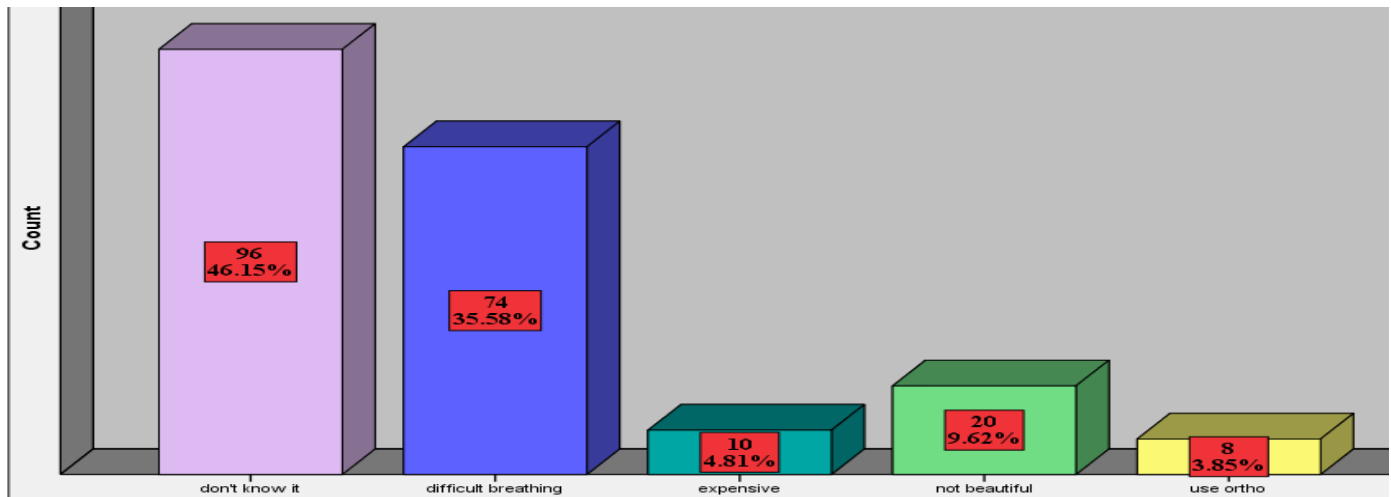


Fig 4: Question 16 “Why don’t you wear a mouthguard during sports practice?”

The majority of the participants 69.2 % (173\250) knew about the mouth guard, mainly through the club (75.7% - 131\173) while only 34.8 % (87\250) of participant reported that they use it during fights.

The most frequently worn mouthguards were stock mouthguards (79.3%) and the most common causes for not using mouthguard were don't know it 46.83% (96\205) and difficult breathing (34.63% - 71\205). (Figure.4)

The greatest numbers of participant use mouth guard during sports seen in taekwondo, with rates of 39.1 % (34\87), Karate 37.9 % (33\87), and jiu-jitsu 23 % (20\87) with no statistically significant differences. (Table.III)

Table III: sport type vs. Use of mouthguard Cross tabulation

		Sport type				Total
			taekwond			
Use mouthguad	yes	Count	Karate	o	jiu-jitsu	87
		% within sport type	33.0%	37.8%	33.3%	34.8%
	no	Count	67	56	40	163
		% within sport type	67.0%	62.2%	66.7%	65.2%
Total		Count	100	90	60	250

Discussion

Injuries are very common in sports, especially in that close contact between athletes, which are more susceptible to facial and dental trauma. A sample of 250 Jordanian participants to martial sport clubs asked about dental injuries and their attitude to use mouthguards during activity. The favorite sports are karate and taekwondo. More of the participants (82.4%) are aware of risk of dental injuries during sports practice.

The present study reveals 18% (45\250) of participants had experienced one form of dental injury during sport activities. This result is corroborating other studies Zetaruk et al (2005) (17%),⁽⁴⁰⁾ and McLatchie (1977) (20%).⁽³⁶⁾

The greatest numbers of participant with dental injuries were seen in taekwondo, with rates of 30 % (27\90), which is similar to previous studies, ^(5,37,38,39) while dental injury in Karate 12 % which corroborating with Vesna et al., 2015 (10.5%), ⁽⁴⁰⁾ and the percent of dental injury in jiu-jitsu was 10 % (6\60).

These result corroborating with Zetaruk et al.⁽⁴⁰⁾ in their study, conducted on the five martial arts reported the least damage in karate and the probability of several injuries in taekwondo was three times as much as in karate.

Crown fractures were the most frequently reported type of trauma in our study (46.7%), and teeth displaced 37.8 %. However, Biagi et al.⁽³⁹⁾ Mori et al. ⁽⁴¹⁾ and Keçeci et al.⁽⁴²⁾ reported that crown fractures were the most common type of dental injury. The prevalence of avulsion reported in our study (15.6%) was similar to that reported by Frontera et al.⁽⁴³⁾ among male Brazilian basketball players.

With regard to the basic knowledge the possibility of returning an avulsed tooth to its socket and how to store an avulsed tooth. Many previous studies ^(25, 37, 44, 45) reported low knowledge in regards to the possibility of returning an avulsed tooth to its socket.

In a study by Panzarine et al.⁽⁴⁶⁾ reported a high rate (95%) of misinformation about tooth avulsion, in our study only 26.8% were aware of the possibility of returning an avulsed tooth to its socket and 72.8% of participants had inadequate knowledge about the medium in which to store the tooth until it is transported to a dentist and it was similar to that reported by Castilho et al. 2009.⁽⁴⁷⁾

The majority of the studies confirm that using mouth guards while playing sport reduces the incidence and severity of orofacial trauma.^(48, 49, 50) In our study, the majority of the participants knew about mouthguards 69.2%; however, only 34.8% reported using mouth guards which is comparable to the findings of Al-Arfaj et al, 2016.⁽⁵¹⁾ The lower incidence of using mouthguards can be explained by the lack of indication on the part of the teachers and/or trainers who are not fully prepared. One of the most frequently reported barriers to not using mouthguard were (don't know it 46.83%) and difficult breathing (34.63%); this was also reported in other studies.^(5,6,37,41,44,52,53)

In the presented study The main type of mouthguard used for those wearing mouthguards was stock mouthguards (100%), and a custom-made mouthguards from a dentist (0%). in a study by Margaret et.al,⁽⁵⁴⁾ stock mouthguards are the most commonly used mouthguards, stock mouthguards are good for growing children as they can be remolded over time.⁽⁵⁵⁾ However, this type of mouthguard can be loose fitting, which can limit their effectiveness.⁽⁵⁵⁾ They are significantly less effective than individualized custom-made mouthguards.^(56, 57)

The rate of using mouthguards by taekwondo participants in our study was low 37.8% in comparable to the findings of Lee et al,⁽⁶⁾ and Aljohani et al,⁽⁵⁸⁾ . This low rate could be attributed to the lack of information regarding to this protective device.

The rate of using mouthguards by Karate participants in our study was 33 %, McLatchie et al,⁽⁵⁹⁾ have conducted the only study to date investigating the effect of preventive measures on competition injuries in karate. In adult karate athletes, the total injury rate decreased from 25% to 5% injuries per bout after implementation of preventive measures involving coaches, athletes, referees and protective equipment.

The American Dental Association,⁽⁶⁰⁾ recommends the use of mouthguards in 29 sports/exercise activities. Also, meta-analyses have demonstrated that the risk of an orofacial sports injury was 1.6-1.9 times higher when a mouthguards was not worn.⁽⁴⁸⁾

In our study the relation between dental trauma and participant age is statistically significant, there is a higher proportion of trauma in children 11-15 years old of compared to those below (p = 0.012). The occurrence of dental traumas tends to increase with age, probably due to the more frequent participation in sport, as well as training and competitions becoming more intense in older ages.^(5,35,61,62,63,64)

In this investigation most of the athletes were male (66.8%). Furthermore, a relationship between the male gender and the occurrence of dental trauma was found, although similarly to other studies it was statistically significant (p = 0.002).⁽⁶⁵⁾ This may be related to a higher participation of boys in contact sports and more physically aggressive activities.⁽⁶⁶⁾

Conclusion

The present study revealed inadequate knowledge of sport participants regarding emergency procedures in case of dental injuries and the importance of mouthguards to prevent sports related dental injuries.

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