

**MAXILLOFACIAL INJURIES AND MOUTHGUARD USE DURING  
SPORT ACTIVITIES IN CHILDREN AND ADOLESCENTS :  
A survey investigation in East Anatolia, Turkey**

**ÇOCUKLAR VE ADOLESANLARDA SPOR AKTİVİTELERİNDE  
MEYDANA GELEN MAKSİLLOFASİYAL YARALANMALAR VE  
MOUTHGUARD KULLANIMI:**

**Doğu Anadolu'da Bir Anket Araştırması**

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**ABSTRACT**

**Purpose:** The purpose of this study was to evaluate the occurrence of maxillofacial injuries and awareness and use of mouthguards in children and adolescents during sport activities.

**Methods:** A total of 745 students who are attending preschool, primary school, secondary school and high school were included in the study. A questionnaire was administered regarding the type of sport activity practiced and history of sport related maxillofacial injuries, and the use and awareness of the mouthguards.

**Results:** The total number of oral and maxillofacial injuries experienced during all sport activities was 223, affecting 29.9% of the participants. The majority of the participants who had history of at least one maxillofacial injury suffered from soft tissue laceration (44.4%), followed by dental fractures (13.9%), multiple injuries (12.1%), nasal injuries (10.8%), alveolar fractures (7.2%), TMJ injuries (5.8%), avulsion (3.6%) and mandibular fractures (2.2%). The injuries mostly resulted from soccer, followed by basketball, and skiing. The highest incidence was in the 16-18 year age group with male propensity. Only 20.27% of the participants were aware of the mouthguard.

**Conclusions:** These results show that there is a high risk of maxillofacial injury during sport activities in children and adolescents. The knowledge of the reasons and awareness for protective devices use such as mouthguard were not high. It must be intensified.

**Key words:** Athletic Injuries ; Facial Injuries ; Mandibular Injuries ; Maxillofacial Injuries; Soft Tissue Injuries I

**ÖZET**

**Amaç:** Bu çalışma spor aktivitelerinde çocuk ve adolesentlerde maksillofasiyal yaralanmaları ve mouthguard kullanımını araştırmak amacıyla yapıldı.

**Metot:** Anaokulu, ilkokul, ortaokul ve lise öğrencilerinden oluşan toplam 745 öğrenci çalışmaya dahil edildi. Hangi tür spor aktivitesi yaptığı, sporla ilişkili geçirilmiş olan maksillofasiyal yaralanmalar ve mouthguard kullanımını içeren anket formları katılımcılara uygulandı.

**Bulgular:** Tüm spor aktivitelerine katılanların %29.9 unu etkileyen toplam 223 maksillofasiyal yaralanma tespit edildi. Maksillofasiyal yaralanmaya maruz kalanların çoğu sırasıyla yumuşak doku laserasyonu (%44.4), dental fraktürler (%13.9), multiple yaralanmalar (%12.1), burun yaralanmaları (%10.8), alveoler fraktürler (%7.2), temporomandibular eklem yaralanmalarına (%5.8), diş avulsiyonu (%3.6) ve mandibular yaralanmalara (%2.2) maruz kalmıştı. Yaralanmalar sıklıkla futbol, basketbol ve kayak esnasında oluşmuştu. 16-18 yaş grubunda ve erkeklerde yaralanma insidansı daha fazla idi. Katılımcıların sadece %20.27 si koruyucu mouthguard kullanımından haberdardı.

**Sonuç:** Bu bulgular çocuk ve adolesanların maksillofasiyal yaralanmaya maruz kalmalarında yüksek bir risk bulunduğunu göstermektedir. Öğrencilerin mouthguard gibi koruyucu ekipman bilgisine sahip olma ve kullanım oranı oldukça düşüktür. Bu durum iyileştirilmelidir.

**Anahtar kelimeler:** atletik yaralanmalar ; fasiyal yaralanmalar; mandibular yaralanmalar; maksillo- fasiyal yaralanmalar; yumuşak doku yaralanmaları

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## INTRODUCTION

Regular physical activity plays a significant role in the well-being of a child. A well-designed exercise programme enhances the immediate physical, psychomotoric and intellectual attainments of a child.<sup>1,2</sup> Recently, as more and more children participate in sports and recreational activities, sporting injuries are becoming increasingly common.<sup>1-3</sup> The potential competitive inequality and increased risk of injury associated with sports are especially evident in contact and collision sports. Although minor soft tissue injuries and cuts and abrasions make up the majority of injuries, more serious injuries including acute fractures and stress fractures do occur. During the growth spurt, adolescents are particularly vulnerable to injuries. Elite athletes, however, have lower injury rates than the general sporting populations because of the the ability and skill of the individual.<sup>2-4</sup>

The mouth is the most frequently injured area of the body among children, young and adults who participate not only in contact sports, such as rugby and hockey, but also in obviously less dangerous sports such as basketball.<sup>5</sup> Recently, mouthguards and faceguards were shown to be effective for the prevention of injuries.<sup>6</sup> The mouthguard, which is a resilient device or appliance, protects against injuries of the teeth, lacerations of the mouth and fractures and dislocations of the jaw.<sup>7,8</sup>

The epidemiological approach in sports traumatology aims to quantify the occurrence of sports injuries in relation to who is affected by injuries, where and when these injuries have occurred, and what is their outcome. Efforts are also made to explain why and how such injuries occur, to develop strategies to limit their occurrence, and to prevent them. Preventing sports injuries in young individuals is important to reduce the short- and long-term social and economic consequences. The epidemiological approach implies that injuries do not happen purely by chance.<sup>2</sup>

Sports-related injuries have increased and seen even in children.<sup>9-10</sup> Although there are some research on this topic in the literature,<sup>11-13</sup> there is a lack of research in Turkey. Cetinbas and Sonmez<sup>14</sup> investigated orofacial trauma in 11-18 years old children and adolescents in football, ice hockey and

martial arts in Ankara. However we did not find any research including all sports in east Anatolia region in Turkey.

The purpose of this study was to evaluate the occurrence of maxillofacial trauma and awareness and use of mouthguards in children and adolescents during sport activities in east Anatolia, Turkey.

## MATERIAL AND METHODS

A convenience sample of students was surveyed in preschool, primary school, secondary school and high schools (academic school year 2005/2006) in Erzurum which is located in east Anatolia region in Turkey. The study population consisted of 745 (572 males, 173 females) child (age 4 through 12) and adolescent (age 13 through 19) students who participated voluntarily in this study. A written questionnaire, described by Onyeaso and Adegbesan,<sup>7</sup> was administered regarding the type of sport activity practiced and history of sport related to oral and maxillofacial injuries, what age the injury occurred, and the use and awareness of the mouthguards. Brief information was given to athletes and their coaches and parents about questionnaire. Students could ask any question about questionnaire to their coaches and to researchers when they needed help. Researchers used the face to face interview to complete the other questionnaires. Thus, researchers could explain the questions and could help the athletes when they fulfilled the questionnaires. When the very young students could not remember the history of injury, they or/and researchers asked their families or coaches about the injury. Thus, 745 questionnaires were completed without any lack of information.

### **Questionnaire form:**

- Age:
- Sex:
- Sports modality:
- How long have you been practicing this sport activity?
- Have you ever experienced any maxillofacial injury during sport activity?
- What kind of injury have you experienced?

- a)** soft tissue laceration      **b)** dental fractures
- c)** nasal fractures              **d)** alveolar fractures



- e) mandibular fractures f) TMJ injuries  
g) others.....  
at what age: a) 4-6 b) 7-9 c) 10-12  
d) 13-15 e) 16-18  
- Are you aware of mouthguards?  
- Do you use mouthguard during sport activity?  
- Which type of mouthguard do you use?

## RESULTS

745 students (572 males, 173 females) completed the questionnaires exactly. Distribution of the sports in the study sample is shown in Table 1. Most of participants practiced soccer (39.87%), followed by basketball (20.67%), and skiing (10.47%). The other sports were much lower, ranging from 5.91 to 1.61%. The total number of oral and maxillofacial injuries experienced during all sport activities was 223 (males: 192, females:31), affecting 29.9% of the participants. The injuries mostly resulted from soccer (n=112), followed by basketball (n=46), skiing (n=21), taekwondo (n=16), and less in other sports (Table 1). The majority of the participants who had history of at least one oro-facial injury suffered from soft tissue laceration (n=99, 44.4%), followed by dental fractures (n=31, 13.9%), multiple injuries (n=27, 12.1%), and alveolar fractures (n=16, 7.2%) (Fig.1).

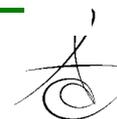
**Table 1.** Distribution of sports activities, distribution of injuries according to the type of the sport, and awareness and use of mouthguards

Sports	Total N (%)	Males N	Females N	Injury N-% (N, male-female)	Awareness of mouthguards N	Use of mouthguards N
Soccer	297 (39.87)	281	16	112-37.7 % (107-5)	24	-
Basketball	154 (20.67)	116	38	46-29.9 % (36-10)	22	9
Taekwondo	44 (5.91)	26	18	16-36.3 % (13-3)	44	35
Skiing	78 (10.47)	44	34	21-26.9 % (17-4)	4	-
Volleyball	23 (3.09)	9	14	5-21.7% (3-2)	5	2
Gym	12 (1.61)	2	10	2-16.6% (0-2)	6	-
Handball	14(1.88)	10	4	2-14.3% (2-0)	6	-
Wrestling	35(4.68)	35	-	7-20.0% (7-0)	8	2
Karate	32 (4.30)	21	11	11-34.3% (7-4)	32	28
Swimming	26(3.49)	14	12	0- 0.0 % (0-0)	-	-
Table tennis	12(1.61)	6	6	1-8.33% (0-1)	-	-
Long tennis	18(2.42)	8	10	0-0.0% (0-0)	-	-
<b>Total</b>	<b>745 (100%)</b>	<b>572 (76.78%)</b>	<b>173 (23.22%)</b>	<b>223 (192-31) (29.9%)</b>	<b>151 (20.27%)</b>	<b>76 (10.20%)</b>

**Table 2.** The distribution of injuries in age groups

Age group	Number of injuries (Male-Female)	Total Number
4-6	9-2	11 (4.9 %)
7-9	20-6	26 (11.7%)
10-12	29-6	35 (15.7%)
13-15	55-8	63 (28.2%)
16-18	79-9	88 (39.5%)
<b>Total</b>	<b>192-31</b>	<b>223 (100%)</b>

Distribution of maxillofacial injuries during each specific type of sport activity in relation to the total number of participants in the same type of sport is shown in Table 1. Soccer players had the highest percentage of injured participants (37.7%), followed by taekwondo (36.3%), karate (34.3%), basketball (29.9%), skiing (26.9%), and all other sports (21.7% or less). Age distribution at the time of injury is shown in Table 2. The highest incidence was in the 16-18 year age group with male propensity. Only 20.27 % (n=151) of the participants were aware of the mouthguards. Only 76 of 745 students were using mouthguards during sport activities(10.20 %) (Table 1).



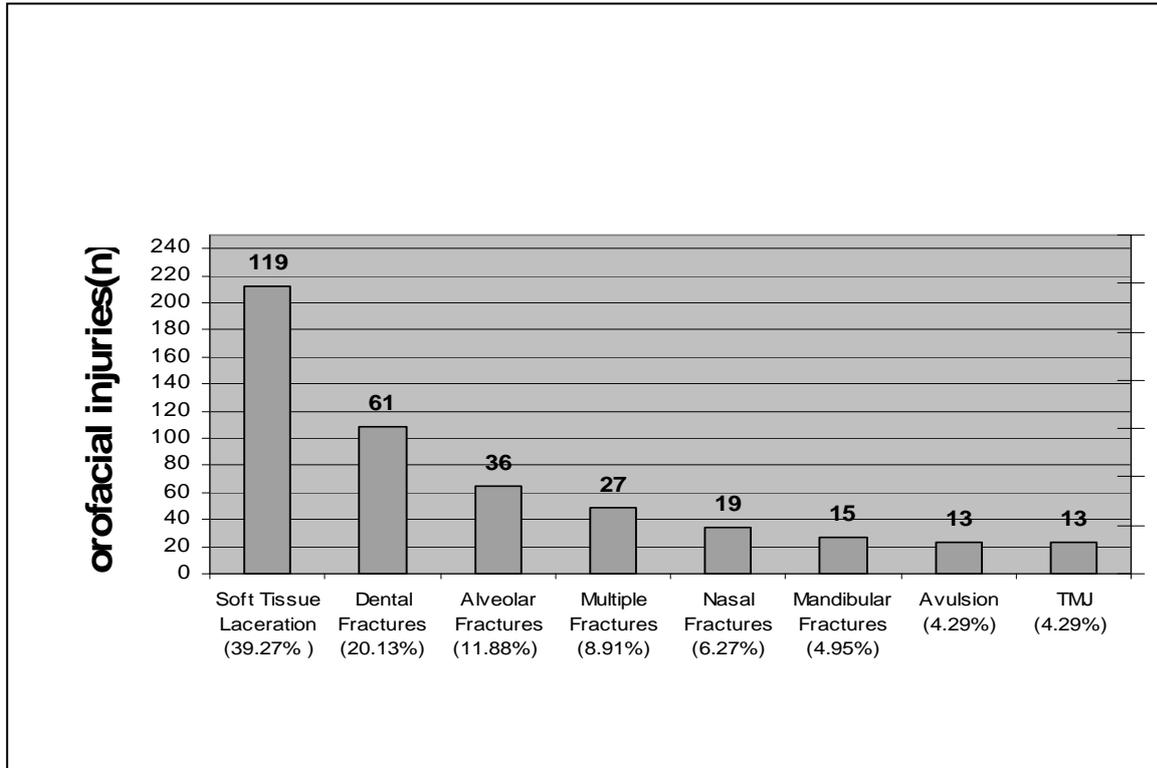


Fig.1. Distribution of types of the maxillofacial injuries

## DISCUSSION

Participation in children's and youth sports is widespread in Western culture. Many of these youngsters initiate year round training and specialisation in their sports at a very early age.<sup>9</sup> As an undesired but inevitable consequence, sports-related injuries have increased significantly.<sup>2,6-8,10,11</sup>

While numerous studies exist on sports-related dental trauma for several countries throughout the World, there is a lack of research on this topic in Turkey. For this reason, we aimed to evaluate the occurrence of maxillofacial trauma associated with athletic activities and awareness and use of mouthguards in young athletes from East Anatolia region in Turkey.

In this study, we used face to face interview to fulfill the other questionnaires exactly. Thus, all of the students could complete the questionnaires. We think that face to face questionnaire is very effective method for such study, because participants, particularly very young students, can ask some

questions to understand very well the questionnaires, and researchers can check the athletes to fulfill the questionnaire without lack of information.

In the present study, the general rate of occurrence of maxillofacial trauma in children and adolescents was 29.9%, experienced by 223 of the participants. Cetinbas and Sonmez<sup>14</sup> reported that although 77.2% of the coaches had seen orofacial trauma in 11-18 years old children and adolescents during sport activities, none of the this age group used mouthguards while participating in football, ice hockey and martial arts in Ankara. In a study from Israel reported by Levin et al<sup>11</sup>, it was shown that the maxillofacial injury rate was 27%.<sup>11</sup> Ferrari and Ferreira de Medeiros found that 28.8% of the oral injuries were as a result of participation in contact sports.<sup>12</sup> Rodd and Chesham showed that oral injuries incurred during sports activities account for 26% of all oral injuries in school children.<sup>13</sup> Our rate (29.9%) was relatively found to be high when compared to the previous studies (rate: 26-29%).<sup>11-13</sup> This may be attributed not only to sporting injuries which are becoming increasingly common but also to lower use

of protective devices such as mouthguard in children and adolescents.

Frenguelli et al<sup>15</sup> reported in 208 trauma cases that soccer is responsible for 64.8 % of maxillofacial traumas in Italy. Delilbasi et al.<sup>16</sup> reported in 100 trauma cases that soccer is responsible for 18 % of maxillofacial fractures. In our study, the injuries mostly resulted from soccer (n=112). Tozoglu S&U<sup>17</sup> showed that soccer related injury is very high in Turkey. They found that soccer plays an important role for craniofacial injury according to a one year retrospective research.<sup>17</sup> Our research also confirms these results. It may be related to the fact that soccer is the number one sport in Turkey like in Italy and mostly protective devices are not used by athletes.

In this study, we have observed that the number of injuries sustained increased with age. This is in accordance with the study by Levin et al.<sup>11</sup> It was attributed to increased frequency of sports participation at increased ages.<sup>11</sup> It was emphasized in the literature that boys seem to be more prone to orofacial injury than do girls in the literature.<sup>2,18</sup> Our study also confirms this finding. Higher body weight, intense force applied, and a more aggressive attitude could be reasons for high incidence of injuries reported among men.<sup>16</sup>

When a person chooses to become involved in athletic competition, he or she does not do so in anticipation of injury. However, one can not ignore the possibility of injury. Recently, mouthguards and faceguards were shown to be effective for the prevention of injuries<sup>6,19</sup> and these devices are now worn with greater frequency by athletes. After mouthguards and facemasks became mandatory for amateur football in USA, the incidence of facial and dental injuries fell from 2.26 per 100 players to 0.30.<sup>20,21</sup> In spite of the fact that our results point to the high risk of potential dental injuries during sport activities, unfortunately, the majority of the athletes were not aware of the mouthguards; the use rate was only 10.20 % in this study. Levin et al<sup>11</sup> reported that the level of usage, knowledge and awareness regarding the benefits of using a mouthguard was very low in Israel, too. Mouthguards and faceguards provide protection against direct injuries to the teeth, oral structures, edentulous areas, jaws, nose, nasal pyramid, and zygomatic arches.<sup>22,23</sup> Finch et al.<sup>24</sup>

showed that awareness of the safety benefits of wearing protection devices and a previous injury are strong motivators for people to wear protective equipment. Diab et al.<sup>25</sup> showed that parents were more likely to require them for their children who participated in a mandatory mouthguard sport, a contact sport, or who had been previously injured.<sup>25</sup> Our findings confirm this study that percents of use of mouthguards are very high in karate and taekwondo than the other sports. Educational strategies focusing on the potential injury risk during sports and the benefits of wearing protective devices should be developed for both players and their parents for all sports.<sup>24</sup>

In conclusion, this study reveals that there is a high risk of injury associated with sports not only in contact sports but also in noncontact sports. Awareness and use of mouthguards are very low in children and adolescents. Benefits of wearing protective devices should be introduced to both players and their parents for all sports. Athletes, coaches, dentists and other professionals should promote the use of mouth protection devices in children and adolescents to minimize the risk of sports related injuries.

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