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Original Article

## Prevalence of Maxillofacial Trauma and use of Mouthguard by Student Athletes in São Luís, Northeastern Brazil

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### Abstract

**Objective:** To estimate the prevalence of maxillofacial trauma (MT) during sporting activities and to compare the level of knowledge and use of mouthguard (MG) by athletes from the public and private school system of São Luís, MA, Brazil. **Material and Methods:** Cross-sectional study in which a target population composed of 416 competition student athletes aged between 10 and 20 years of both genders, basketball (n=100), handball (n=60), soccer (n=96), judo (n=11), karate (n=22) and volleyball (n=127) players were interviewed by a single examiner. A structured questionnaire containing six objective questions about history of MT, knowledge and use of MG was used. Data were statistically analyzed using the  $\chi^2$  test ( $\alpha = 0.05$ ). **Results:** A 26% prevalence of MT was observed in the study population. The knowledge of MG as a method for preventing injuries during sport practice was significant ( $p < 0.05$ ); however, its use by athletes was minimal. A difference in the use of MG by athletes from public and private schools was observed ( $p < 0.05$ ). **Conclusion:** It was concluded that more than one fourth of the study population was affected by some kind of MT, highlighting dichotomy between the knowledge of MG as prevention method and its non-use during sporting practice.

**Keywords:** Maxillofacial trauma; Mouthguard; Sports.

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## Introduction

There is strong evidence of the reduced incidence of dental caries in children and adolescents as a result of the implementation of policies to prevent this disease in developed and developing countries [1]. For this reason, the interest in studies on other oral health conditions has emerged, including maxillofacial trauma (MT) [2].

MTs are prevalent injuries in children and adolescents [3,4]. Currently, MTs have been considered a public health problem due to the psychological impact to affected individuals, sometimes causing irreparable damage to teeth.

Some epidemiological studies have pointed out sport practice as a major cause of MTs, ranging from 14% to 39% [5-9]. The practice of direct contact sports, such as judo, boxing, handball, basketball and soccer stands out as a risk factor for the occurrence of MTs [10]. According to the National Sports Safety Foundation (NYSSF), an American research organization dedicated to the study and prevention of sports injuries, athletes who practice sports involving physical contact have up to 10% probability of suffering some kind of injury during competitions and 33% to 56% chance of occurring during training throughout their professional career [11].

Nevertheless, athletes have as peculiarity the possibility of prevention through the use of mouthguard (MG), which would result in decreased incidence of MT [10]. There are three types of MG: (1) stock mouth protectors, prefabricated in different sizes; (2) boil and bite mouth protectors, in which the material is immersed in heated water for direct impression of the dental arch, and (3) custom-fitted mouth protectors, manufactured by the dentist based on the model of the athlete's mouth [6,10].

According to the American Dental Association (ADA) approximately 200,000 injuries are avoided during sports practice and championships with the use of MG, thus decreasing the incidence of these injuries by 80% [12]. There is no data in literature on the prevalence of MTs in athletes of São Luís. Therefore, the aim of this study was to estimate the prevalence of MT during the practice of competition sports and compare the level of knowledge and use of MG by athletes from public and private schools in São Luís, Maranhão, Northeastern Brazil.

## Material and Methods

This observational cross-sectional study was conducted in 2006. Ten schools registered in the School Games of Maranhão (SGM), annual competition of direct contact sports, were selected: five of which were from public schools, representing all of the state schools enrolled in the SGM and 5 from private schools, randomly selected by simple random draw.

After approval by the local Research Ethics Committee under protocol 33104-1017/2005, a letter was sent to the board of directors of each school and for their physical education teachers in order to clarify about the goals and benefits of the research, as well as to obtain authorization for participation.

The study population consisted of athletes aged 10 to 20 years of both genders practicing competitive sports and regularly enrolled in public ( $n = 164$ ) or private schools ( $n=252$ ), totaling 416 athletes distributed into the following modalities: basketball ( $n=100$ ), handball ( $n=60$ ), soccer ( $n=96$ ), judo ( $n=11$ ), karate ( $n=22$ ) and volleyball ( $n=127$ ).

The subjects were informed about the study aims and signed the Informed Consent Form (ICF). The identity of survey participants was kept anonymous. They were then interviewed by a single investigator using a structured questionnaire containing information on age, gender and six objective questions about history of MT and knowledge and use of MG. An objective clinical examination by visual inspection, using wooden spatula, dental mirror and natural light was performed.

Data were statistically analyzed using Epi Info 3.3 software (Centers for Disease Control and Prevention, Atlanta, GA, USA). Prevalence was expressed in absolute ( $f$ ) and relative (%) frequencies. Associations between the occurrence of MT and gender and level of knowledge and use of MG among athletes from public and private schools were carried out using the  $\chi^2$  test. The significance level was set at 5%.

## Results

Overall, 416 athletes practicing competitive sports selected from public ( $f=164$ ; 39.4%) and private ( $f=252$ , 60.6%) schools were interviewed and examined. The prevalence of MT was 26% ( $n=108$ ). The prevalence of injuries was 23.5% ( $n=62$ ) for males and 30% ( $n=46$ ) for females with no significant difference between genders ( $p>0.05$ ).

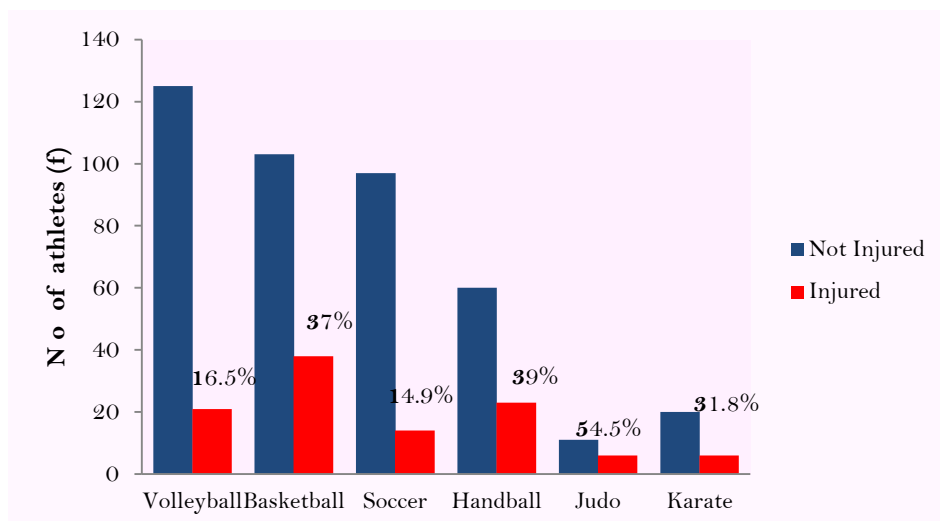
Among injuries presented during participation in sports, 91.7% of respondents ( $n=99$ ) reported the presence of lacerations of lips and gums and 8.3% ( $n=9$ ) reported fractured dental element. The trauma of dental hard tissues was represented in their entirety by fractures in the upper incisors.

Figure 1 summarizes the prevalence of MT by sport modality. Judo showed the highest percentage of athletes with injuries: 54.5% of athletes reported having experienced some type of trauma followed by handball (39%) and basketball players (37%).

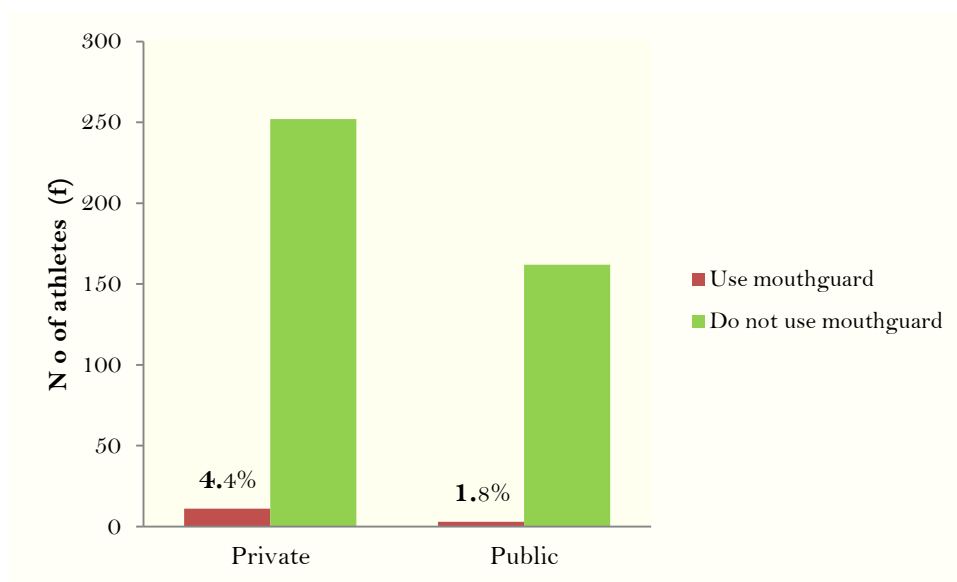
Of the total respondents ( $n = 416$ ), 91.3% reported knowing MG as protection item for the prevention of MT ( $p<0.05$ ). No difference in the knowledge about this protection item among students from public and private education was observed ( $p>0.05$ ).

Regarding the use of MG during sports practice, 96.6% ( $n=402$ ) of athletes did not use it, while only 3.4% ( $n=14$ ) reported using it. The adoption of this prevention method was higher in athletes who reported to have suffered some kind of previous injury (85.7%,  $n=12$ ).

Figure 2 compares the use of MG among athletes from private [ $11/252$  (4.4%)] and public schools [ $3/164$  (1.8%)] ( $p < 0.05$ ).



**Figure 1. Prevalence of maxillofacial trauma in different sports modalities among athletes from public and private schools.**



**Figure 2. Comparison of the percentage of athletes from public and private schools using mouthguard during sports practices.**

## Discussion

A great emphasis to the practice of physical activities has been given, both due to its potential to improve the quality of life and to the possibility of using sport as a tool to educate children and adolescents [13]. However, sports practice has been identified as a risk factor for MT [14].

A 26% percentage of the study population reported some prior experience with MT. These findings are similar to a study that showed a 27% prevalence of injuries in a sample of 943 young people who played sports, 9% being dental injuries [15].

Among trauma of dental hard tissues, the upper incisors are the most affected teeth, with a frequency from 80% to 90.4% [16,17]. These data are similar to those of the present study, where 100% of this type of injury occurred on the upper incisors. This can be explained by the position of these teeth in the dental arch, which makes them weakly protected by the lips [18]. However, there is a consensus in literature that most MTs occur on soft tissues [13,15], which was observed in the population of this study, with 91.7% of lacerations on lips and/or gums.

When the occurrence of injury in different sports was evaluated, a higher prevalence among judo practitioners was found (54.5%; Figure 1). These results do not differ from other studies that used similar methodology to identify the prevalence of injuries in athletes of contact sports; one of them pointed out judo with 69.5% [13], and the other, judo and handball with 52.6% and 57.1%, respectively [7].

Of respondents, 30% females and 23.5% males were affected by some sort of MT during sports practice, with no difference between genders ( $p>0.05$ ). This finding is controversial, because it agrees with some studies [2,18] and diverges from others [17,19]. The difference in the prevalence of MT between genders could be attributed to the difference between methodologies used in these studies, as they aimed to identify the etiology of trauma, pointing fights and violence as most common causes [17] or type of sport practiced (combat sports) [19], explaining the higher prevalence among men, as men present a more violent behavior or for being the most among practitioners of combat sports.

Different studies have shown that the use of MG can reduce or even prevent these injuries, but most athletes do not use it [10,20,21]. Corroborating these findings, a study conducted in Israel showed that 97% of athletes in different types of sport did not use this prevention method [15]. Recently, in a survey with Brazilian basketball players it was also found that 93% did not use MG [11]. These results are in agreement with the present study, in which 96.6% of the athletes, despite knowing MG, did not use it.

On the other hand, a study conducted in France found that 64.3% of respondents used MG during sports practice. Researchers have credited this positive behavior of athletes of protecting themselves from MT to sponsors who provide MG to those athletes [22].

Interestingly, this study showed a higher percentage of use of MG among athletes who had suffered some kind of injury (85.7%), which was already evidenced in literature [21,23]. This finding could be explained by the awareness and care acquired by athletes after suffering some previous trauma experience.

Regarding the level of knowledge on MG, the result of 91.3% in this study was similar to that found by other researchers with rates of 94.9% [21] and 90% [24], with no difference observed when comparing the knowledge on MG for prevention of MT among athletes from public and private schools ( $p>0.05$ ).

Finally, our results showed that although the knowledge on the benefits of MG is significant, the percentage of athletes who use it is minimal; however, the results showed differences between

private (4.4%) and public (1.8%) schools ( $p < 0.05$ , Figure 2). This is alarming, since it is known that the only way to avoid any type of injury of the maxillofacial complex during the practice of contact sports is through the adoption of effective preventive measures.

## Conclusion

Traumatic injuries affected more than a quarter of students practitioners of competitive sports in the city of São Luis, northeastern Brazil, evidencing the dichotomy between knowledge on MG as a prevention method for the occurrence of MT and non-use of this protective item during sports practices. For this reason, we believe that systematic and effective educational campaigns aimed at intensifying the use of MG as a prevention method for the occurrence of MT should be institutionalized in the public and private education network in order to reduce the prevalence and/or severity of these injuries in this population.

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