





Original Article (short paper)

Prevalence of facial trauma in contact sports practitioners in the Federal District of Brazil

Gabriel Henrique Campos Pinheiro¹ , Larissa Alves de Sousa¹ ,
Eder Alberto Sigua-Rodriguez² , Douglas Rangel Goulart^{1,3} 

¹*Centro Universitário Euro-Americano UNIEURO, Departamento de Odontologia, Brasília, DF, Brasil.*

²*Institución Universitaria Colegios de Colombia, Centro de Investigaciones del Colegio Odontológico, Bogotá, Colômbia.*

³*Universidade Federal de Goiás, Faculdade de Odontologia, Goiânia, GO, Brasil.*

Abstract - Aims: The purpose of this study is to assess the prevalence of oral and dentoalveolar trauma among contact sports practitioners in the Federal District of Brazil. **Methods:** A cross-sectional descriptive study was conducted using a questionnaire developed specifically for this research regarding the occurrence of facial trauma, site of injuries, how they occurred, the approach is taken to solve the problem, and the use of several types of mouthguards. Data were analyzed using the SPSS 20.0 software, and the chi-square test (X^2) was chosen to examine the differences between categorical variables. The results were considered statistically significant for $p < 0.05$. **Results:** A total of 141 athletes were interviewed, with a prevalence of facial trauma of 65.2%, which was higher in professional athletes (71.1%). Lesions ranged from soft tissue lacerations to combined trauma; and the most frequent injuries were soft tissue laceration (53.3%), combined trauma (16.3%), and dental fracture (9.8%). Only 20.6% of the participants required treatment for related injuries. Regarding the use of mouthguards, 34% of the athletes reported regular use of this device, and Type II mouthguard was the most used (39.7%). Dentists participate in the process of production and dissemination of mouthguards in 17.1% and 10.5% of cases, respectively. **Conclusion:** The data showed that most athletes are not aware of the importance of using mouthguards. The dentist must be more present in the area of sports dentistry, both for awareness and production of these devices, which support the safe practice of contact sports.

Keywords: athletic injuries, mouth protectors, preventive dentistry, tooth injuries.

Introduction

It is noteworthy that the population has been looking for a better quality of life through sports, but some sports may present certain risks because they involve physical contact with opponents^{1,2}. The National Youth Sports Foundation (NYSF) suggests that athletes who engage in contact sports are 33–56% more likely to suffer injuries to orofacial structures than athletes in other non-contact sports^{1,3}. Oral cavity injuries account for 18–30% of traumas suffered by athletes⁴. This is an extensive problem since the debilitation of the maxillo-mandibular complex involves physical, aesthetic, psychological, and functional damage^{5,6}.

In 1913, Ted Lewis, an English boxer, reported that the use of “a piece of gutta-percha on the teeth” would significantly lessen the discomfort caused by blows to the mouth region. Thenceforth, the development of mouthguards began⁷. A mouthguard is an intraoral device designed to protect teeth, soft tissues, bones, and temporomandibular joints during sports practice. It distributes the forces caused by a blow along with its extension, reducing injuries to the structures of the stomatognathic system^{3,6-8}.

The use of mouthguards is important to prevent neurological injuries since they absorb the impacts that may project the mandible against the base of the skull³. There are four types of mouthguards: stock mouthguards, which are prefabricated and come in various sizes (Type I); thermoplastic mouthguards, which are heated to form the dental arch (Type II); individualized single-laminated mouthguards, which are obtained through dental arch molding and use ethylene and vinyl acetate copolymer as raw material (Type III); and multi-laminated mouthguards (Type IV), made from the same material as Type III and moldings, but with the possibility of using more than one layer of material depending on the sport's demands^{1,5,7,9,10}.

Despite the advancement of technology in the manufacture of mouthguards, many athletes and coaches do not realize the importance of using them in contact sports. In addition, sports dentistry is poorly developed in Brazil, and the use of these devices is often not supervised by a dentist. Thus, the objective of this study is to identify the prevalence of facial trauma in contact sports practitioners in the Federal District of Brazil, and thus identify the most

frequent types of injuries, the prevalence of wearing protective equipment and whether the athletes know to minimize and prevent such occurrences.

Methods

A cross-sectional descriptive study was conducted with athletes who regularly play contact sports in the Federal District of Brazil. This study included amateur and professional athletes of both genders, over 18 years old, residing in the Federal District of Brazil. The practitioners should play contact sports at least once a week. The sports included were those that involved direct physical contact with the opponent, such as martial arts and team sports (i.e. basketball, handball, football). Recruitment was carried out by invitation during visits to training sites and through the dissemination of research in virtual communities of athletes. Incomplete questionnaires or people who did not meet the inclusion criteria were excluded, such as people under 18 years old, sporadic sports practitioners (not a constant practitioner of contact sports), or practitioners of other sports that did not involve direct contact with the opponent. Questionnaires completed by patients residing outside the Federal District of Brazil were removed.

A questionnaire developed specifically for this research was used. It contains questions about age, gender, sport, practice time, frequency of training, professional or amateur practice, experience with orofacial trauma, need for treatment for injuries, treatment received, use of protective equipment at the time of injury, use of mouthguard during training and competitions, reasons for not using the mouthguard, type of mouthguard used, how the athlete obtained the mouthguard and, finally, whether the athlete receives guidance at the gym/club about the importance of using this equipment. Data from questionnaires were tabulated in Microsoft Excel 2016. For the descriptive analysis of the results, the distribution of absolute (n) and relative (%) frequencies were performed.

This research was approved by the Research Ethics Committee of the University Center of the Federal District (UDF), under number 3.201.795. After agreeing to participate, all-volunteer athletes signed an Informed Consent Form prepared for this research. The results were divided according to sports, age, gender, training frequency, practice time, history of oral and maxillofacial trauma, medical/dental treatment (as required), use of mouthguards, and type of mouthguard used. Subsequently, the data were submitted to a descriptive and comparative analysis using the SPSS 20.0 software for Windows. The chi-square test (X^2) was chosen to examine the differences between categorical variables as professional and amateur athletes. The results were considered statistically significant for $p < 0.05$.

Results

The link to the questionnaire was accessed by 300 athletes, 147 did not respond and 12 returned incomplete,

thus 141 met the inclusion criteria (a response rate of 47%). As for the respondents, 30.5% were female and 69.5% were male, with a mean age of 28.55 years (± 7.88), a minimum age of 18 years, and maximum age of 56 years. Regarding sports, the following were found: Rugby (n=7; 5%); Soccer (n=21; 14.9%); Brazilian Jiu-jitsu (n=41; 29.1%); Karate (n=8; 5.7%); Judo (n=10; 7.1%); Muay Thai (n=21; 14.9%); Mixed martial arts (MMA, n=15; 10.6%); Hapkido (n=1; 0.7%); Basketball (n=4; 2.8); Boxing (n=7; 5%); Handball (n=1; 0.7%); Football (n=3; 2.1%); Volleyball (n=1; 0.7%); and Kickboxing (n=1; 0.7%). About 67.4% of the participants reported being amateur athletes, and 32.6% reported being professional athletes. When asked about the practice time, about 9.2% answered that they had been practicing their sport for less than or equal to 1 year; and 17% had been practicing it for over 20 years. [Table 1](#) presents the sample distribution according to the practice time. Most of the sample (32.6%) reported the frequency they practiced sports was three times a week. [Table 2](#) shows such data. No statistically significant difference was observed for the frequency of orofacial injury between professional and amateur athletes ($X^2=1.26$; $p=0.26$).

Of the 46 professional athletes identified in the survey, 33 (71.7%) answered they had already suffered some kind of injury. Of the amateur athletes, 59 (62.1%) had also suffered trauma during sports practice. Regarding gender, 67 (68.3%) men and 24 (55.8%) women reported having suffered orofacial injuries, with no statistically significant difference regarding the frequency of injuries and gender ($X^2=1.37$; $p=0.24$).

When asked about orofacial trauma, the participants reported (n=92; 65.2%) they had already suffered some type of oral and maxillofacial injury, and 29 (20.6%) required medical and/or dental treatment. There was no statistically significant difference in the frequency of injuries when comparing participants who used the mouthguard always or sometimes with those who never used it ($X^2=4.1$; $p=0.129$). [Tables 3](#) and [4](#) present data on the need for treatment and the most frequent types of trauma. [Table 5](#) presents data on participants requiring treatment.

Table 1 - Practice time in years for the sample of athletes from the Federal District of Brazil.

Practice time	Frequency of responses	Percentage
<= 1 year	13	9.2
1 to 3 years	19	13.5
4 to 6 years	31	22
7 to 9 years	19	13.5
10 to 12 years	11	7.8
13 to 15 years	17	12
16 to 19 years	7	5
> 20 years	24	17
Total	141	100

At the time of the injury, 21 (24.1%) participants reported they were wearing protective equipment and 66 (75.9%) were not. As for the use of mouthguards, 48 (34%) athletes use it regularly and 64 (45.4%) never use it at all; 28 (19.9%) reported using it sporadically or during competitions only, and 1 (0.7%) participant left the response blank. Of the survey participants, 66 (46.8%) described the reason for not using the mouthguard as follows: 14 (21.2%) reported discomfort, 19 (28.8%) considered it unnecessary, 4 (6.1%) reported having difficulty adapting to it, 13 (19.7%) reported not being aware of the need and the benefits of its use, 5 (7.6%) reported diffi-

Table 2 - Distribution of responses per training frequency.

Practice frequency	Frequency of responses	Percentage
Once a week	6	4.3
2 times per week	31	22
3 times per week	46	32.6
4 times per week	14	9.9
5 times per week	14	9.9
6 times per week	14	9.9
7 times per week	16	11.4
Total	141	100

Table 3 - Distribution of responses per medical/dental treatment required for injuries occurring during the practice of contact sports.

Responses	Frequency of responses	Percentage
Yes (required medical/dental treatment)	29	20.6
No (required no medical/dental treatment)	62	44
Subtotal	91	64.6
No response	50	35.5
Total	141	100

Table 4 - Distribution of responses per type of trauma suffered during the practice of contact sports.

Type of trauma	Frequency	Percentage
Fracture of facial bones	3	2.1
Soft tissue laceration	49	34.8
Dental fracture	9	6.4
Avulsion	4	2.8
Brain concussion	3	2.1
Edema	4	2.8
Temporomandibular joint dislocation	1	0.7
Combined trauma	15	10.6
Combined trauma and brain concussion	4	2.8
Subtotal	92	65.1
No response	49	34.8
Total	141	100

Table 5 - Distribution of responses per type of treatment for injuries caused during the practice of contact sports.

Treatment	Frequency	Percentage
Hospital surgery	3	2.1
Suture (outpatient)	3	2.1
Restoration	7	5
Prostheses	5	3.5
Reimplantation and endodontic treatment	1	0.7
Hospital observation	5	3.5
Combination treatment	5	3.5
No response	128	79.4
Total	157	100

culty in breathing, 1 (1.5%) reported difficulty in cleaning, 2 (3%) reported difficulty in communicating, 3 (4.5%) reported lack of habit and 5 (7.6%) reported more than one reason mentioned above. Only 78 (55.3%) athletes described the type of mouthguard used. **Table 6** shows the distribution of mouthguards by type.

Only 76 (53.9%) participants answered how they obtained the mouthguard. For 39 (51.3%) participants, the sporting stores/ shops' were the most prevalent places followed by specialized companies (n=19; 25%), the dental office (n=13; 17.1%), coach/trainer (n=3, 3.9%), virtual stores (n=1; 1.3%) and 1 participant did not know (1.3%). Those who had some type of mouthguard were asked how they got to know about the equipment they used and the following responses were obtained: through the coach/trainer (n=20; 26.3%); dentist (n=8; 10.5%); gym professionals (n=5; 6.6%); colleagues (n=30; 39.5%); search for protection methods (n=8; 10.5%); and marketing from manufacturers of mouthguards (n=5; 6.6%). They were also asked whether there is any guidance on the use of mouthguards in the gym/club where they train; 86 (61%) participants said "yes" and 55 (39%) reported that they do not receive this type of guidance.

The sports with the highest prevalence of trauma among the 92 athletes were: Brazilian Jiu-jitsu (31; 33.7%) and MMA (12; 13%). **Table 7** shows the distribution of trauma by sport.

Table 6 - Distribution of responses per type of mouthguard worn by contact sports athletes in the Federal District of Brazil.

Type of mouthguard	Frequency	Percentage
Type I	9	6.4
Type II	31	22
Type III	22	15.6
Type IV	15	10.6
He/she did not know	1	0.7
Total	78	55.3
No response	63	47.7
Total	141	100

Table 7 - Distribution of athletes who reported orofacial trauma per sport.

Sport	Frequency	Percentage
Rugby	4	4.3
Soccer	10	10.9
Football	2	2.2
Brazilian Jiu-Jitsu	31	33.7
Karate	5	5.4
Judo	9	9.8
Muay Thai	8	8.7
Boxing	6	6.5
Handball	1	1.1
Mixed martial arts	12	13
Hapkido	1	1.1
Volleyball	1	1.1
Basketball	2	2.2
Total	92	100

Discussion

In the present study, facial trauma was prevalent in 62.5% of contact sports athletes, supporting similar results found in other studies (57.9 to 64.9%)^{2,9}. Professional athletes appear to be more likely to suffer injuries than amateur athletes, probably due to higher frequency, intensity, and regularity of the training. In this study, we found that professional athletes reported more involvement in orofacial injuries; however, we did not find any statistically significant difference between an amateur and professional athletes.

The occurrence of trauma is slightly more prevalent in men (68.3%) than women (55.8%). These data support the findings of other authors^{2,11}. Our results have shown that 68.1% of athletes who suffered some type of injury did not require medical and/or dental treatment. This fact may be related to the characteristics of non-combat sports that favor only movements that are aimed at physical exercise, as found in some questionnaire responses.

Among those who responded requiring medical/dental care, the most prevalent treatment was composite resin restoration for those with dental fractures (24.1%). Only 3 athletes required sutures for soft tissue laceration, which was the most prevalent type of injury to the lips, tongue, and cheek (53.3%), followed by combined trauma (soft tissue laceration, fracture of the cheekbones, and dentoalveolar injury (16.3%)) and dental fractures (9.4%). Soft tissue lacerations were the most prevalent injuries (60%) in studies with the same type of sample¹. Dental fractures are also frequent injuries among soccer and handball players (7.7%)¹¹. In this study, a total of 7 athletes (7.6%) mentioned having been affected by brain concussion, and, in other studies with soccer athletes, the prevalence of this

injury was 62.7%¹⁰, emphasizing that the variety of injuries may depend on the sport practiced by the athlete.

In this study, only 24.1% of practitioners wore mouthguards at the time of trauma during training and/or competition, while 75.9% of injured athletes wore no protection for the oral and maxillofacial complex at the time of trauma. The most cited sport, Brazilian Jiu-jitsu, also had the highest number of injured athletes (37.7%); this percentage was similar to that found in the literature².

Regarding the frequency of use, a low prevalence of regular use by respondents was found (only 34.3% of athletes use it regularly). Close findings were observed by Batisda¹² in athletes from Brazilian Jiu-Jitsu, Judo, and Muay Thai, where only 34.6% of the sample used mouthguards¹². The low frequency of use of mouthguards may be related to the higher number of amateur athletes in this research, since the use of mouthguards is mandatory for professional athletes who participate in many competitions, as shown in the literature^{10,13-16}.

About 28.8% of the athletes answered they used no mouthguards because they consider it unnecessary, 21.2% reported discomfort as a major factor for not using the equipment and 19.7% reported not knowing the equipment and its importance; such data show a lack of sample information on protection methods and the variety of equipment that improves defense and comfort during exercise. The Type II mouthguard was the most used by the participants of this research (total of 39.7%). In a descriptive and cross-sectional study with 231 martial arts fighters, Type II mouthguards were also the most widely used (52.5%)⁶.

The participation of the dentist in the process of production and dissemination of the use of mouthguards was low, only 13 athletes acquired the device from these professionals, while 8 were informed by them about the importance of using one. It was noted that there is a large participation of specialized companies, with 25% of the mouthguards were acquired from these. It is not known whether there is any participation of the dentists in the process of production and molding of the dental arch of the athletes. The participants reported that individual molding was made in the gyms/clubs, questioning ethical and legal compliance, as it is not known whether health and safety requirements are followed in these facilities. Most mouthguards, however, are available through sporting goods stores (51.3%), but only Type I and II mouthguards are sold in these stores.

Most of the sample (61%) said they had already received guidance on protection from the professionals responsible for monitoring the training, a low number since the literature has consistent information on the prevalence of trauma and forms of preventing and mitigating damage^{1,11,12,17-19}.

Based on this study, it is possible to establish guidance measures for athletes and information on the types and the advantages of using mouthguards. Results may

vary by location of the assessment, so multicenter studies with larger samples may show this scenario at the national level. The use of mouthguards helps in the safe practice of contact sports. Research papers such as the present paper help in the dissemination of data in order to establish health education policies.

This study has limitations related to the study design, as it is a descriptive cross-sectional study including athletes with different training times. In addition, we acknowledge the restricted sample size compared to the wide variety of sports included, as well as the inclusion of both amateur and professional athletes.

Conclusion

The prevalence of orofacial trauma in contact sports practitioners in the Federal District of Brazil is high. Most athletes do not use a mouthguard regularly, and some do not know about their importance. There is little participation by the dentist in the production of mouthguards and the dissemination of protection methods for contact sports practitioners.

References

1. Barberine AF, Aun CE, Caldeira CL. Incidência de injúrias orofaciais e utilização de protetores bucais em diversos esportes de contato. *Rev Odontol UNICID*. 2002;14(1):7-14.
2. Cavalcanti A, Santos FG, Peixoto LR, Gonzaga A, Dias C, Xavier A. Orofacial injuries in combat sports practitioners. *Pesqui Bras Odontopediatria Clin Integr*. 2012;12:223-8.
3. Barros LJ. Protetores Buciais e sua Prevenção nos Traumatismos Dentais durante a Prática Desportiva [Monografia de Especialização]. Programa de Pós-Graduação, Faculdade de Odontologia, Universidade Federal de Minas Gerais, 2012.
4. Spinass E, Giannetti L, Mameli A, Re D. Dental injuries in young athletes, a five-year follow-up study. *Eur J Paediatr Dent*. 2018;19(3):187-93.
5. Pobleto FAO, Noritomi Py, Coto NP, Almeida AS, Naclério-homem MG. Análise por meio do método dos elementos finitos de um protetor bucal para atividades esportivas. 2012;19(4):159-64.
6. Di Leone CCL, Barros IRCN, Salles AG, Antunes LAA, Antunes LS. O uso do protetor bucal nas artes marciais: consciência e atitude. *Soc Bras Med do Exerc do esporte*. 2014; 20:451-5.
7. Coto NP. Estudo do comportamento mecânico de protetores bucais em copolímero de etileno e acetato de vinila: Modelo experimental de arcos dentais obtidos em epóxi.[Dissertação de Mestrado]. São Paulo: Faculdade de Odontologia da USP, 2006.
8. Gómez-Gimeno À, Zamora-Olave C, Cordobés-Navarro M, Willaert E, Martínez-Gomis J. Satisfaction with shortening the palatal extension of a mouthguard for water polo players: a randomized crossover study. *Dent Traumatol*. 2019;35(2):135-41.
9. Zamora-Olave C, Willaert E, Montero-Blesa A, Riera-Punet N, Martínez-Gomis J. Risk of orofacial injuries and mouth-guard use in water polo players. *Dent Traumatol*. 2018;34(6):406-12.
10. Delaney JS, Lacroix VJ, Leclerc S, Johnston KM, West PA. Concussions among university football and soccer players. *Clin J Sports Med*. 2002;12(6):331-8.
11. Fernandes LM, Neto JCL, Lima TFR, Magno MB, Santiago BM, Cavalcanti YW, de Almeida FFD. The use of mouthguards and prevalence of dentoalveolar trauma among athletes: a systematic review and meta-analysis. *Dent Traumatol*. 2019;35(1):54-72.
12. Bastida EM, Peron RAF, Queiroz AF, Hayacibara MF, Terada RSS. Prevalência do uso de protetores bucais em praticantes de artes marciais de um município do Paraná. *Rev Bras Odontol*. 2010;67(2):194-8.
13. Spinass E, Mameli A, Giannetti L. Traumatic dental injuries resulting from sports activities; immediate treatment and five years follow-up: an observational study. *Open Dent J*. 2018;12(1):1-10.
14. Couto NP, Meira JBC, Dias RB. Fraturas nasais em esportes: sua ocorrência e importância. *Rev Sul-Brasileira Odontol*. 2010;7(3):349-53.
15. Hanson NJ, Lothian DD, Miller CL, Michael TJ, Miller MG. Over-the-counter performance-enhancing mouthguards are unable to decrease blood lactate and improve power output during a Wingate anaerobic test (WANT). *J Exerc Sci Fit*. 2018;16(3):83-6.
16. Assis C. Os rumos da odontologia do esporte no Brasil. *Rev Bras Odontol*. 2013;70(2):160-3.
17. Sizo SR, Silva ES, Rocha MPC, Klautau EB. Avaliação do conhecimento em odontologia e educação física acerca dos protetores bucais. *Rev Bras Med do Esporte*. 2009;15(4):282-6.
18. Costa SS. Odontologia desportiva na luta pelo reconhecimento. *Rev Odontol da Univ Cid São Paulo*. 2009;21(2):162-8.
19. Tribst JPM, de Oliveira Dal Piva AM, Borges ALS, Bottino MA. Influence of custom-made and stock mouthguard thickness on biomechanical response to a simulated impact. *Dent Traumatol*. 2018;34(6):429-37.

Corresponding author

Prof. Dr. Douglas R Goulart, Department of Dentistry - Euro-American University Center – UNIEURO, Av. das Nações, Trecho 0, Brasília, DF, Brasil.
E-mail: douglasrgoulart@gmail.com

Manuscript received on December 31, 2019

Manuscript accepted on April 17, 2020



Motriz. The Journal of Physical Education. UNESP. Rio Claro, SP, Brazil
- eISSN: 1980-6574 – under a license Creative Commons - Version 4.0