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Literature Review Article

Main factors involved in facial trauma sports-related

Thiago Maciel Valente[1]
Thais Maciel Valente[2]
Fernanda Assunção Tiraboschi[1]
Armando Nicodemos Lucena Felinto[1]
Luiz Philipe de Souza Ferreira[3]
Danilo Lopes Ferreira Lima[2]
Paulo Henrique Palácio Duarte Fernandes[3]

Corresponding author:
Luiz Philipe de Souza Ferreira
Universidade de Fortaleza, Department of Physiotherapy
Avenida Washington Soares, 1321, bloco H – Edson Queiroz
CEP 60811-905 – Fortaleza – CE – Brazil
E-mail: philipedesouza@edu.unifor.br

[1] Universidade de Fortaleza, Division of Health Sciences Center, Department of Medicine – Fortaleza – CE – Brazil.
[2] Universidade de Fortaleza, Division of Health Sciences Center, Department of Dentistry – Fortaleza – CE – Brazil.
[3] Universidade de Fortaleza, Division of Health Sciences Center, Department of Physiotherapy – Fortaleza – CE – Brazil.

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Abstract

Introduction and objective: Sports practice has demonstrated several health benefits for the population. Despite the benefits, there may also be an increase in the risk of traumas associated with these activities, the most common types being those involving the face. The study aimed to carry out a review about facial trauma. **Material and methods:** This study is a review performed in April 2020 that used articles available at Latin American and Caribbean Health Sciences Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE) and PubMed database. A total of 1,288 articles were found, after applying filters and analysis: 14 articles were selected to compose this study. **Results:** Although personal protective equipment has great importance, many sports practitioners still neglect its use, due to the cost, inconvenience, and lack of guidance, even with its proven efficiency. This neglect increases the risk of traumas, which are frequent in team and combat sports. Amid traumas, stand out lacerations and dental trauma are the most common injuries, depending on the sport practiced. **Conclusion:** The typical injury mechanisms are collision between players, hitting the ground and contact between players with the equipment worn.

Introduction

Sports practice has demonstrated several health benefits for the population. For this reason, it is being stimulated by governmental and educational systems, inducing its increase in several countries [5]. Despite the benefits, there may also be an increase in the risk of traumas associated with these activities [8].

Among the types of trauma, those involving the face are important in the context of public health, because they are related to the possibility of sequelae, aesthetic problems, functional loss and even psychological problems [30]. Facial traumas are classically more common in males, being approximately four times more frequent in this group [12, 17].

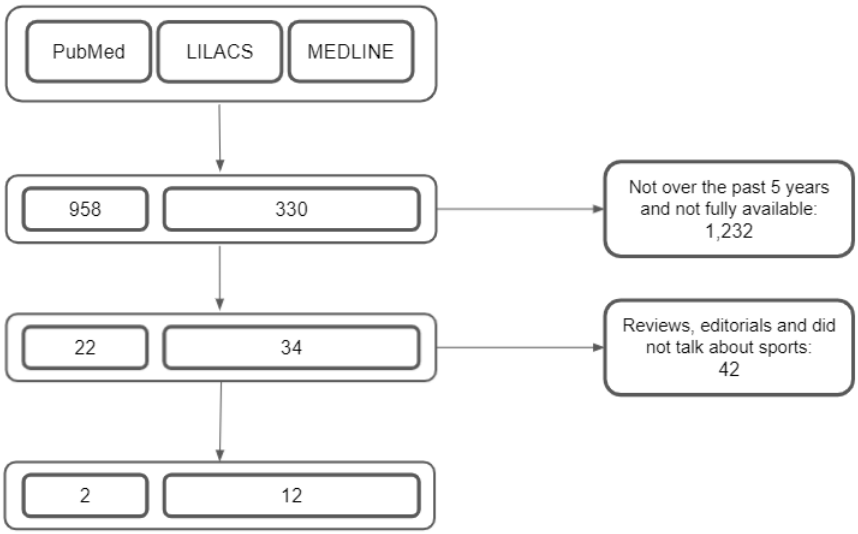
Amidst the most common situations for the occurrence of facial traumas, there are automobile traumas and those related to aggression, work accidents, falls and during sports practice [34, 41]. The sport modality is a factor to be considered, as the type of impact depends most frequently on the sport involved, and the highest prevalence of this type of trauma occurs in contact sports [20]. In addition, degree of contact, position of the player in team sports, fundamentals of the game and nature of that sport are also factors that can influence the incidence of facial trauma [2, 14, 24, 36, 44].

Between the types of facial injuries described in literature, the most common are soft tissue injuries such as abrasion, contusion, and laceration. Fractures and, depending on the type of sport, brain contusions, and cervical spine trauma can also occur [28, 36]. Due to several factors that may be related to facial injuries related to sport, understanding the etiology and severity is necessary to create preventive measures.

Thus, the objective of the present study was to review the current literature regarding facial traumas related to sport, in order to establish the main factors of this type of trauma.

Material and methods

This research is a review that was conducted in April 2020, in the Latin American and Caribbean Health Sciences Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE) and PubMed database. The descriptors were "Athletic Injuries / Traumatismo em Atletas" and "Facial Injuries / Facial trauma", finding 1,288 articles in total. Only studies published in the last five years and that were fully available on the web were included. After using these filters, 56 studies were found. Then, an analytical reading of the title and abstract of the 56 articles available on the platforms was performed, allowing the selection of 14 articles to compose the sample (Figure 1).



LILACS: Latin American and Caribbean Health Sciences Literature; MEDLINE: Medical Literature Analysis and Retrieval System Online

Figure 1 – Flowchart of the literature search

The exclusion of the other articles occurred because they did not deal with any sport or did not address facial trauma. Furthermore, studies dealing with literature or editorial reviews were not considered for the sample of the present study.

Results

The selected articles were organized in a table containing the studies characteristics: reference, type of study, study sample, ages, types of sports, year of publication and where the study was performed (Table I).

Table I – Studies characteristics

Reference	Type of study	Study sample	Ages	Types of sport	Year of publication	Location
Bergman et al. [4]	Prospective study	100	17-36 years old (mean: 24.4 years old)	Handball	2017	Croatia
Hwang and Kim [11]	Prospective study	41	Uninformed	Handball	2019	South Korea
Kerr et al. [13]	Retrospective study	644 (113 were head and facial injuries)	10-14 years old (mean: 12 years old)	American football	2019	United States
Krutsch et al. [16]	Prospective cohort study	132	(Mean age of Semiprofessionals: 22.8 years old); (Mean age of amateurs: 26.1 years old)	American football	2017	Germany
Morvan et al. [19]	Case report	1	34 years old	Kiteboarding	2018	France
Murphy et al. [21]	Retrospective review	162	16-67 years old (mean: 27 years old)	Gaelic football, soccer, rugby, and equestrian sports	2015	Ireland
Petrović et al. [24]	Prospective study	507 players and 35 coaches	Players: 15-42 years old (mean: 22, 7 years old) Coaches: 22-62 years old (mean: 41,17 years old)	Handball	2016	Switzerland
Rattai and Levin [27]	Retrospective study	12.433 (1,977 were head and facial injuries)	Uninformed	Ice hockey	2018	Canada
Ruslin et al. [30]	Retrospective study	108	10-64 years old (mean: 30.6 years old)	Soccer, field hockey, equestrian sports, and rugby	2016	Netherlands
Simmons et al. [33]	Retrospective study	627	Uninformed	Ice hockey	2017	United States

To be continued...

Continuation the table I

Reference	Type of study	Study sample	Ages	Types of sport	Year of publication	Location
Svider et al. [35]	Retrospective study	841	Mean age of 9 years old	Sledding, tubing, skiing, ice skating, snowboard	2016	United States
Tuominen et al. [37]	Prospective study	633 (244 were head and facial injuries)	Uninformed	Ice hockey	2017	World competitions
Vucic et al. [40]	Prospective study	1,299	Mean age of 28.4 years old	Field hockey	2016	Netherlands
Zamora-Olave et al. [42]	Cross-sectional study	347	Mean: 15 years old	Water polo	2018	Spain

Regarding the types of study, the most found were retrospectives, based on information present in a pre-existing database. In addition, prospective studies with the elaboration of a survey to acquire the data were also common.

The sample size of the studies varied between publications, only two studies had less than 100 patients and one of them was a case report. Similarly, ages also varied widely, and only one study had elderly people over 65 years old in its sample.

The mean age most observed in the studies was between 20 and 30 years old. Only three surveys considered underage people, two of which included only minors. Among the modalities, the most observed in the studies was handball and ice hockey, also with variations, influenced by the place where the study was carried out, since sports practice varies according to the local culture, such as Gaelic football, that is uncommon in many countries, except in Ireland. The countries of the European continent were the most present in the articles, although the country most addressed was the United States.

Discussion

The studies were categorized according to the following themes: protective equipment and trauma, sport and trauma, and mechanism of trauma.

Protective equipment and trauma

The increase in the incidence of facial injuries is related to several factors, such as the sudden onset of sports activity, the absence of adequate guidance on the practiced sport, and the lack of protective equipment during training and competitions. Various strategies can be adopted to reduce the risks of trauma during sports practice, such as adaptations to the rules of the sport, changes in the environment and imposition of personal protective equipment [39].

Personal protective equipment such as mouthguards have been worn to prevent facial injuries, such as fractures and bruises, since they allow the redistribution of the force applied during the impact. The separation of direct contact of the teeth with the upper lip [15] helps to prevent tooth avulsion, avoiding tooth loss or ingestion [23].

The athlete and/or sports practitioner is exposed to the occurrence of injuries during the practice. This illustrates the importance of wearing protective equipment during amateur and/or professional sports practice. However, some practitioners still neglect this fact, even in modalities in which protective equipment is mandatory, such as rugby, since the player is obliged to wear protective equipment during competition, but can choose whether to wear it during training, being it the player's responsibility [25]. This situation demonstrates the importance of the athlete and the coach's awareness in the prevention of trauma.

Individual mouth protection devices (mouthguard) during sports practices have been highlighted as the most suitable type of prevention for orofacial trauma, which can halve this type of injury when compared to those people who do not use the protector [15].

The analysis of the articles used in this review can confirm the hypothesis that the proper implementation of protective equipment for the

athlete should be disseminated in all sports. In 2010, it was noticed that athletes practicing Gaelic football who started wearing protective helmets during games reduced the incidence of facial fractures [21], and in American football the players who wear face masks, when suffering an injury, return to their sports activities ten days earlier when compared to those who do not wear it. In addition, when a group of athletes who use mouthguard is correlated with a group that does not have this personal protective equipment, it is observed that the chance of the second group to suffer an orodental damage is three times greater, requiring medical intervention, and twice as likely to develop an injury that would impede them from finishing the game [40].

There are several benefits of using mouthguards during sports practice. Handball athletes who use this equipment have protection against dental avulsion. However, it is reported that many coaches do not incentive the use of this protective equipment during games. This absence of counseling was the main reason reported by the players to not use the protector. Despite that, the team is aware of its benefits and the possible damages that its non-use or incorrect use can bring to those who practice this modality [4, 16].

Nevertheless, many athletes do not use protective equipment during sports, as they report interferences in speech, breathing, swallowing and due to the high cost of some models. This is confirmed by water polo practitioners. Among the athletes interviewed, only 1% have this equipment and use it routinely during matches [42]. Although these complaints are reported, mouthguards have not shown interference in the athlete's performance during the activity, neither decreased functionality nor physiological level. This non-interference must be clarified to the players to increase adherence to the use of the apparatus [9, 32].

Sport and trauma

Among the orofacial injuries, the ones that stand out most in athletes are tissue lacerations and dental trauma [10]. This situation was proposed in one of the reviewed articles, in which the main injury found among physical exercise practitioners was laceration (69.4%), followed by fractures [35]. A study that considers a review of the prevalence of oral injuries in sports would confirm this statement.

Injuries are reported in almost all sports listed in Table I, being more frequent in team and combat sports. Trauma can cause injuries involving bone or dental structures. Injuries have different characteristics and severity, such as damage to tooth support structures, tooth loss, direct tooth fractures, soft tissue lacerations, mandibular dislocation, and bone fractures. The highest prevalence of orofacial injuries is related to team sports, which involve greater physical contact, being the lips and teeth the body parts most involved in this kind of injuries [7].

Concerning lesions on the lips, it is considerably present in the practice of Dutch field hockey, being usually caused by the ball or the hockey stick [4, 40]. Ice hockey is a variant of this sport and, as previously mentioned, colliding with opponents, and being hit by the hockey stick or puck are also the most common trauma mechanisms found in this variant [27].

Soccer is one of the most popular team sports worldwide, with more than 200 million licensed athletes in the world [29]. Facial traumas in soccer and futsal usually result from harsh plays such as elbows, aggressions, kicks and headbutts, the latter being of great concern to players due to the increase in their frequency and their dangerous characteristic for the athletes' physical integrity [26].

In the articles studied, soccer is identified as the main cause of facial trauma, and headbutt is the most frequent injury mechanism [1, 26]. The most common places for sports-related face fractures are the zygomatic, mandible, and nasal bones [38].

Collective and contact sports are the ones that most cause injuries in their practitioners. A sport that represents this statement and was emphatically mentioned during the review of the articles was handball. In this sport, most practitioners claim to have had at least one episode of dental or oral injury [20, 24]. The sites of the main lesions are, respectively, nose, eye, and cheek. The main mechanisms were the hand reaching the area, the elbow, and the ball itself. Regarding the type of injury, fracture and contusion stand out [11].

Mechanism of trauma

The analysis of the mechanisms of facial fracture injuries is complex and has important mechanisms that are necessary to understand the causal factors about the injury, enabling a deeper analysis for the evaluation process and clinical decision making [43].

Retrospective studies conducted by Murphy et al. [21] that aimed to identify the incidence of maxillofacial injuries show that the most common injury mechanisms are collision/impact or contact against the opponent or ground, shock between heads, elbow to face, contact with knees, kicks, punches, and shoulder contact on the opponent,

in which the commonly injured structure is the zygomatic and the mandibular complex. These mechanisms are more prevalent in sports that do not have facial protection, such as soccer, Gaelic football, and rugby. Ruslin et al. [30] investigated the possible relationship between the types and frequency of sports practice, and nature of facial bone fractures and concluded that the most common mechanisms are impacts among other players, damaging the zygomatic complex, being more frequent in sports such as soccer and rugby, confirming the results found in the study by Murphy et al. [21], in which these fractures occur 27% of the time during the runs and the approach or pass [3].

Orofacial mechanisms such as collision/impact or contact against the opponent can be explained by the dissipation of contact forces, in which pressure occurs on the orofacial region [3], caused by kinetic energy transfer after the contact in the region [6], hence the high incidence of orofacial injuries in sports such as soccer, Gaelic football, and rugby, that require rapid transfer of energy between players.

Sports such as field hockey and ice hockey have mechanisms similar to those ones found in soccer, Gaelic football, and rugby, but they have auxiliary equipment such as clubs and discs that increase the chances of high-energy orofacial injuries [40]. During matches, players combine passes and launch the puck towards the goal or to other players [22], which increases the chances of injury. Vucic et al. [40] investigated patterns of orodental injuries and noticed that the most common mechanisms found in hockey players are caused by collision between players and the equipment used, such as clubs and pucks. Rattai and Levin [27] investigated the mechanisms of oral injuries in ice hockey athletes and found that collisions with the opponent and being hit by the puck are common mechanisms that make up almost all the injuries. These findings confirm the results found by Vucic et al. [40].

Mechanisms of orofacial injury in handball are still unclear, but it is known that in this sport there is high incidence of lacerations and injuries, such as to nose, soft tissue, periorbital and dental, which includes alveolus bleeding, luxation, tooth fracture and avulsion. The more likely and accepted mechanisms for orofacial injuries in this sport are ball passes and throws to other players during matches and passes that require pivot movements made during the interruption of defense, being the orofacial region a vulnerable position for injuries, usually caused by collision between players' hands and elbows [11, 22].

Conclusion

The use of personal protective equipment in sports is an important way to prevent facial trauma. The most prevalent injuries were lip lacerations, although fractures are also common, with variations between the type of injury depending on the sport. In addition, it was shown that the trauma mechanisms showed variations between sports, which may occur due to the collision between players or even accidents involving the equipment used in the game, such as hockey sticks.

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