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Forensic Traumatology

EPIDEMIOLOGICAL PROFILE OF ORAL AND MAXILLOFACIAL TRAUMA VICTIMS EXAMINED IN LEGAL MEDICINE AND CRIMINALISTICS SERVICES IN BRAZIL - AN INTEGRATIVE REVIEW.

Perfil epidemiológico de vítimas de trauma bucomaxilofacial periciadas em serviços de Medicina Legal e Criminalística no Brasil – uma revisão integrativa.

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ABSTRACT

Strong and rapid urbanization, without investment in infrastructure and industrialization, generated social problems expressed in violence and traffic accidents, with a consequent increase in the appearance of oral and maxillofacial injuries. In the presence of these injuries, the dentist is the qualified professional to carry out the examination and avoid underreporting of these injuries. The present study aimed to establish the profile of oral and maxillofacial trauma victims examined in Legal Medicine and Criminalistics Services in Brazil and to relate the main epidemiological data found in the national literature such as sex, age group, type of oral and maxillofacial injury, and anatomical region affected. An integrative review was carried out, and the following Portuguese keywords were used: "Odontologia Legal", "Serviço Médico Legal", "Trauma Maxillofacial," and the following English keywords: "Forensic Odontology" and "Forensic Dentistry," "Forensic Services," and "Maxillofacial Injuries". The main results of the 16 selected articles were presented in a summary. It was observed that the epidemiological profile of oral and maxillofacial trauma victims examined in Legal Medicine and Criminalistics Services in Brazil was mostly made-up male adults, aged 20 to 29 years. The most frequently cited injuries were bruises, abrasions and dental fractures. The most cited anatomical region was that involving the soft tissues of the face.

KEYWORDS

Forensic dentistry; Forensic medicine; Wounds and injuries.

INTRODUCTION

Strong and rapid urbanization, without investments in infrastructure and industrialization, generated social problems expressed in violence and traffic accidents, with collective and generational consequences[1]. In Brazil, the growth of urban and traffic violence was reflected in the increase in the number of traumas[2]. In 2017, the Notifiable Diseases Information System (SINAN) of the Health Surveillance Secretariat of the Ministry of Health (SVS/MS) registered 339,096 notifications of interpersonal and self-inflicted violence[3]. In 2002, maxillofacial traumas, according to data from the World Health Organization (WHO), were already among the main causes of death and disability in the world[4]. Thus, trauma is considered a global public health problem[5].

Due to the growing domestic violence, the large number of victims of traffic accidents, traumas resulting from sports accidents, and work accidents, there has been an increase in the appearance of oral and maxillofacial (OMF) lesions, which require a careful evaluation of the facial region[6]. In this context, it is estimated that up to 40% of bodily injuries occur more frequently in the head[7].

By definition, bodily injury is "any and all offenses caused to the functional normality of the human body or organism, whether from an anatomical, physiological or psychic point of view"[7]. Victims of bodily injuries are identified by the police authority and referred to the Criminalistic and Legal Medicine (CLM) services. After carrying out the forensic examinations and other forensic examinations, the official expert issues a document called a report, a legal instrument in which the expert records everything that has been examined[8].

In Brazil, forensic examination can be performed by professionals with higher education in various areas of knowledge, distributed in official services[9]. In modern society, Forensic Odontology has followed the technical-scientific evolutions and the increasing needs of the Forensic Odontologist, being an effective tool in assisting and verifying the veracity of information, elucidating and providing certainty in legal decisions[10].

When the victims present OMF lesions, the dental surgeon is the most qualified professional to examine since it is his area of expertise and intellectual domain[10]. Thus, the presence of this professional is essential to avoid underreporting of these lesions[11]. The dental surgeon has his performance in the Official Criminal Expert guaranteed by Law No. 12,030/2009[12].

Due to the current scenario of violence, in which accidents and aggressions are injuries of great epidemiological relevance, the characterization of the sex and age of the victims of these injuries, who seek care in the CLM services in Brazil, as well as the knowledge of the pattern of OMF lesions produced, deserve to be the object of studies in a population. And thus, subsidize health actions and public policies against violence. The damages, lesions, traumas, and deaths caused by accidents and violence correspond to high emotional and social costs and public security apparatuses[13].

Therefore, the objective of this study was to establish the profile of OMF trauma victims examined in CLM services present in the country and to relate the epidemiological data found in the national literature, such as sex, age group, type of OMF lesion and anatomical region affected.

MATERIAL AND METHODS

The present study had the approach of an integrative review and a bibliographic survey was carried out in the following databases: Virtual Health Library – Odontology (BVS), *Scientific Electronic Library Online* (Scielo), *Medical Publisher* (PubMed), Google Scholar, Latin American and Caribbean Literature (LILACS), Brazilian Bibliography of Odontololy (BBO).

To search for scientific articles, descriptors in Portuguese and English were used, namely: "Odontologia Legal", "Serviço Médico Legal", "Trauma Maxilofacial", "Forensic Odontology", "Forensic Dentistry", "Forensic Services" and "Maxillofacial Injuries". In the search, in addition to the descriptors, the following filters were included: last ten years; free-article; full-text; Brazil; text in Portuguese and English.

Next, the selection of articles found was carried out. To avoid the appearance of bias in the results of present study, articles that already had sex, age group, type of lesion, and anatomical region in the title were excluded; as well as papers presented at events, undergraduate and graduate course completion papers, and duplicate articles. Based on these, each article found was read, with analysis of the methodology and results, to verify the relevance to the theme, and to include only articles from epidemiological studies carried out with reports of living victims, in CLM and thus, select those who were included in the construction of this study.

RESULTS

With the use of descriptors and filters, 242 articles were found, which, after applying the exclusion criteria, were reduced to 46 articles, of which after reading and individual analysis and application of the inclusion criteria, 16 articles were selected (Figure 1).

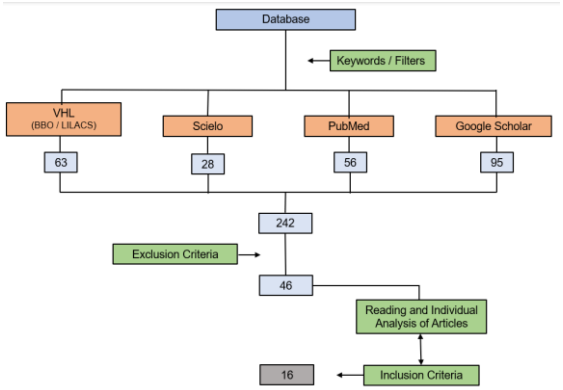

Figure 1 – Flowchart of selection of scientific articles.

The following information was extracted from each included article: authors, title, year of publication, the service where the study was developed - including the municipality and the Federation Units (FU), the period of information collection and the number of reports analyzed (Table 1).

Table 1 - Description of the bibliographic and epidemiological characteristics of each selected scientific article.

No.	Authors	Title	Year of Publication	Institution - Municipality/FU	Collection Period	Number of Reports
1	Saliba TA, *et al*.[14]	Epidemiology of oral and maxillofacial trauma: analysis of expert reports from the IML of Salvador	2021	IML Salvador/BA	2007 - 2013	3,455
2	Costa GC et al.[15]	Analysis of the reports on orofacial lesions registered at the IML of Cascavel-PR	2020	IML Cascavel/PR	2008 - 2017	3,687
3	Sá CDL, et al.[16]	Maxillofacial and dental-related injuries from a Brazilian Forensic Science Institute - Victims and perpetrators characteristics and associated risk factors	2020	PEFOCE Fortaleza/CE	2006 - 2017	1,031
4	Cavalcante GMS, et al.[17]	Facial Injuries and the Gender Issue: Expressions of Violence in a Metropolitan Region of Northeastern Brazil	2020	NUMOL Campina Grande/PB	2010	762
5	Garcez RHM, et al.[18]	Characterization of oral and maxillofacial injuries resulting from physical aggression: gender differences	2019	IML São Luís/MA	2012	1,977
6	Conceição LD, et al.[11]	Epidemiology and Risk Factors of Maxillofacial Injuries in Brazil, a 5-year Retrospective Study	2018	IML Pelotas/RS	2007 - 2011	3,262
7	Hage CA, et al.[19]	Facial trauma and oral morbidity caused by violence in Belém, Pará State, Brazil	2018	IML Belém/PA	2006 - 2010	1,123
8	Miguel LCM, et al.[20]	Dental surgeon's performance at the General Institute of Forensics of Joinville, SC	2017	PGI Joinville/SC	2012 - 2014	1,210
9	Bernardino IM, et al.[21]	Interpersonal violence, circumstances of aggression and trauma patterns BMF 2008-2011	2017	CMOF Campina Grande/PB	2008 - 2011	7,132
10	Vincenzi B, et al.[6]	Retrospective study of maxillomandibular complex lesions in the reports of the Medico-Legal Institute of Cascavel (PR)	2017	IML Cascavel/PR	2002 - 2012	6,443

No.	Authors	Title	Year of Publication	Institution - Municipality/FU	Collection Period	Number of Reports
11	D`Avila S, et al.[22]	Facial trauma among victims of terrestrial transport accidents	2016	NUMOL Campina Grande/PB	2012	2,379
12	Campos MLR, et al.[2]	Analysis of orofacial lesions recorded at the Medical-Legal Institute of São Luís (MA), in the period 2011-2013	2016	IML São Luís/MA	2011 - 2013	2,891
13	D`Avila S, et al.[23]	Characterization of victims of aggression and traffic accidents treated at the Institute of Forensic Medicine and Dentistry – Campina Grande, Paraíba State, Brazil	2015	NUMOL Campina Grande/PB	2010	2,379
14	Conceição LD, et al.[24]	Non-white people have a greater risk for maxillofacial trauma: findings from a 24-month retrospective study in Brazil	2013	IML Pelotas/RS	2009 - 2010	892
15	Santos MS, et al.[25]	Facial trauma: epidemiological profile with emphasis on social and demographic characteristics and characteristics of the injury, Salvador, BA, 2008	2013	DPT Salvador/BA	2008	218
16	Pimenta RMC, et al.[26]	Survey of injuries in the BMF region in victims of violence examined at the Forensic Medical Institute (IML) of Feira de Santana-BA, between 2007 and 2009	2013	IML Feira de Santana/BA	2007 - 2009	260

IML - Legal Medical Institute; PEFOCE - Forensic Expertise of the State of Ceará; NUMOL - Center for Forensic Medicine and Dentistry; IGP - General Institute of Forensics; CMOF - Center for Forensic Medicine and Dentistry; DPT - Technical Police Department.

Regarding location, data collected in the CLM Services were used, mostly located in the FU of the Northeast region (62.5%)[14,16-18,21,22-26], followed by the FU of the South regions (31.25%)[11,15,20,24] and North (6.25%)[19]. Articles developed during the period of the present study in the Southeast and Midwest regions were not selected. The NUMOL of Campina Grande/PB was the institution that most contributed with publications to this study[17,22,23].

Among the selected articles, it was not possible to obtain a standardization in the information on the age group, the type of OMF lesion and the anatomical region affected, so Table 2 summarized the results most cited in each article, with emphasis on sex, age group, type of OMF lesion and anatomical region affected.

Table 2 – Most cited results on sex, age group, type of OMF lesion and anatomical region affected, found in each selected article.

Authors	Sex (%)	Age group years/(%)	Type OMF lesion (%)	Anatomical Region (%)	Further comments
Saliba TA et al.[14]	M (56.06)	20 - 59 (80.72)	Avulsion & Subluxation (65)	Dentoalveolar (61)	Predominance of blunt agents at the time of aggression
Costa GC et al.[15]	M (51.20)	25 - 35 (28.90) 36 - 59 (26.77)	Excoriation (28.12); Ecchymosis (21.21)	bucomaxillofacial (62.50)	-
Sá CDL et al.[16]	M (58.40)	21 - 30 (33.20) 31 - 40 (24.40)	Bruise (40.70); Crown fracture (33.10); bone fractures: jaw (8.90)	Dentoalveolar; moles parts; Superior lip	Predominance of blunt agents at the time of aggression
Cavalcante GMS et al.[17]	F (53.50)	20 - 29 (38.80) 30 - 39 (20.20)	Not informed	Cool moles (92.90)	-
Garcez RHM et al.[18]	F(56.30)	20 - 59 (85.51)	Excoriation (39.91) Ecchymosis (33.49)	orbital (35.91) frontal (26.15)	Predominance of blunt agents at the time of aggression
Conceição LD et al.[11]	M (55.80)	16 - 30 (48)	injury: F (31.30); M (25.50)	Middle Third (73.30)	-
Hage CA et al.[19]	M (69.58)	14 - 24 25 - 35	Dental fracture erosion and ecchymosis	dents: anterior superior Superior lip	-
Miguel LCM et al.[20]	M (54.20)	Not informed	abrasion (36.6) Ecchymosis (26)	Upper Lip (23) Lower Lip (22)	2.8% of reports were completed by dental surgeons
Bernardino IM et al.[21]	F (52.4)	≥ 30 (41.70) 20 - 29 (36.20)	Facial bones fracture	Soft tissues of the face (40.70)	-
Vincenzi B et al.[6]	F (52)	15 - 29 (48); 30 - 59 (42)	Nasal fracture (2.19); Dental fracture (1.27)	Soft tissues (89.30)	-
D`Avila S et al.[22]	M	20 - 29 (48.3)	Not informed	frontal (21.40)	-
Campos MLR et al.[2]	M (55.40)	20 - 29 (40.30)	excoriation (25.30); Ecchymosis (20.10)	Orbital (26)	The professional who issued the most reports was the coroner (90.8%).
D`Avila S et al.[23]	M (56.60)	30 - 59 (39.90)	Not informed	facial; Soft tissues	-
Conceição LD et al.[24]	M (50.80)	16 - 30 (46.10); 31 - 45 (24)	Not informed	middle third (73.30); lower third (26.20); Oral Region: Soft Tissue (21.60)	-
Santos MS et al.[25]	F (57)	Median: 33 years	Soft Tissue Laceration (29.63)	facial	-
Pimenta RMC et al.[26]	M (54.70)	18 - 35	edema; Dental fracture	Intraoral: dentes (54.60); labial mucosa (30.90); Extraoral: buccal (39); malar (10.30)	Predominance of blunt agents at the time of aggression

When analyzing the articles, it was observed that there was a predominance of males (68.75%) among the victims examined[2,11,14-16,19,20,22-24,26]. Regarding age, the standardization was made based on the IBGE (Brazilian Institute of Geography and Statistics) age groups, namely: young people (up to 19 years old), adults (20 to 59 years old) and elderly (over 60 years old). Thus, 56.25% of the victims examined were adults [2,14-18,21-23] (Table 3).

Table 3 – Number of articles selected by age group.

IBGE Age Group (years)	Selected Articles (n)
20 - 59	2
20 - 29	3
21 - 30	1
25 - 35	1
≥30	1
30 - 59	1
Total	**9**

The age groups that, according to the IBGE classification, included two groups at the same time, 14 to 24 years[19],15 to 29[6], 16 to 30[11,24] and 18 to 35[26], were excluded, as well as an article with a median of 33 years[25] and another without age[20].

Regarding the type of lesion bruise, abrasions and dental fractures were the most mentioned. Bruise was mentioned in 31.25% of articles [2,15,18-20], abrasions (25%)[2,15,18,20] and dental fractures (25%)[6,16,19,26] (Table 4). There was no information on this data in 25% of articles[17, 22-24].

To facilitate the identification of the lesions, the fractures called dental[19,26] and dental crown[16] were grouped as Dental Fractures, as well as the mandible fractures 16 facial[21] and nasal[6] as Facial Bone Fractures.

Regarding the anatomical region affected, the soft tissues of the face (lips, jugal mucosa, tongue and others) were the most mentioned region in 31.25% of the articles[6,17,21-23], followed by the teeth (25%)[14,16,19,26] and the upper lip (18.75%) [16,19,20] (Table 5).

To facilitate the identification of the anatomical regions, the following areas were grouped under the term Teeth: dentoalveolar[14,16], maxillary anterior teeth[19] and teeth[26].

As a complete observation, it should be noted that in 25% of articles[14,16,18,26] the use of blunt agents was observed at the time of the aggression.

Table 4 – Main types of lesions mentioned in the selected articles.

Lesion Type	n	%
Contusion	02	12.50
Bruise	05	31.25
Abrasion	04	25.00
Dental Fracture	04	25.00
Facial Bones Fracture	03	18.75

Selected Articles (n=16).

Table 5 – Main anatomical regions mentioned in the selected articles

Anatomical Region	n	%
Teeth	04	25.00
Upper Lip	03	18.75
Facial Region	02	12.50
Frontal Region	02	12.50
Orbital Region	02	12.50
Soft Tissues	05	31.25
Middle Third	02	12.50

Selected Articles (n=16).

DISCUSSION

Conducting research based on data collected in CLM services is of great importance for future studies, which can benefit society and support the development of public policies to prevent and control diseases, such as cases of violence involving the head and neck, which is the area of expertise of the dental surgeon[14-17,21-26].

Brazilian legislation, through Law 5,081/1966[27], allows the work of dental surgeons in the fields of Forensic Odontology, but even so, in Brazil, many Forensic Medical Institutes do not have collaborators specialized in Forensic Odontology[28]. Among the articles selected for this study, in the research by Campos et al.[2] and Miguel et al.[20] data were collected on the professional responsible for filling out the expert reports. In the first survey, it was observed that 90.8% of the forensic examinations performed at the IML of São Luís/MA, in the period from 2011 to 2013, were performed by forensic doctors, none only by forensic dentists and 9.2% by both professionals. In the second, most of the reports referring to lesions of the maxillomandibular complex performed at the IGP of Joinville/SC from 2012 to 2014 were issued by forensic physicians (97.2%), only 2.6% of the reports were completed by forensic dentists and 0.2% were made by external dentists.

In this study, the data collected were investigated in the CLM services of the FU of most geographic regions of the country. Worldwide, epidemiological studies on maxillofacial injuries are common with data obtained from large trauma centers, but this type of investigation carried out with records from forensic science centers is considered rare[22].

Considering that in this study, there was a predominance of adult male victims aged between 20 and 29 years, according to Souza[29], this can be explained by the process of socialization and construction of male identity, which is permeated by factors such as virility, strength, competition, power and aggressiveness, and thus increase the likelihood of men being involved in violent events. In addition, this difference between the sexes occurs because, in most cases, women do not report acts of aggression[15]. Silva et al.[30], when comparatively evaluating the differences in victimization between the sexes based on maxillofacial trauma as markers of urban violence, found

that the male predominance is because they are more prone to risky activities and violent social interactions, frequenting bars, using drugs more and driving dangerously. This information can be confirmed by the notifications made by the urgent and emergency services of capitals and municipalities to the SVS/MS Violence and Accidents Surveillance System (2017), which demonstrated the impact of violence and accidents on the population's illness profile. In this case, 68.1% of the victims of violence and 60.8% of the victims of accidents were male[3].

The appearance of maxillofacial lesions, such as bruises, abrasions and dental fractures, among the results of this study, are consequences of aggression with blunt instruments. This fact was confirmed by Saliba et al.[14], Sá et al.[16], Garcez et al.[18] and Pimenta et al.[26]. The analysis of physical aggressions carried out in the studies by Garcez et al.[18] revealed the presence of bruise-type lesions in the buccinator and labial regions, resulting from the use of blunt instruments, with consequent permanent functional weakness, especially in women.

For an adequate assessment of the dental bodily damage caused by dental fractures, it is necessary to bear in mind that the teeth perform numerous functions, such as masticating, aesthetic, phonetic, and social, so that they can be correctly qualified[31]. As in this study, the research carried out by Hage et al.[19], had among the most common lesions the dental elements, especially the maxillary anterior ones, teeth that are important in feeding, speech and facial aesthetics. According to Sgarbi et al.[31], the victims of aggression, for the most part, tend not to report the dental damage suffered in the circumstance in which only the doctor is present, only having the real dimension of the aggression generated later.

In the present study, in the case of victims of OMF trauma, soft tissues of the face were the most cited anatomical region. This fact was also verified in the studies by Saliba et al.[14] who conducted a survey at the IML Salvador/BA on the etiology of bodily injuries of the BMF complex and observed that in the case of soft tissue injuries, more than 90% of the cases were due to aggression, while in hard tissue injuries there was a relative increase in cases of traffic accidents.

Similarly, Hage et al.[19] related the identification of lesions in the OMF region to cases of violence in individuals with facial trauma and concluded that soft tissue trauma generates painful, stigmatizing lesions and, in most cases, can cause transient or permanent aesthetic damage to the victims. Damage to the victims' faces can cause greater inconvenience when compared to other regions of the human body, as it is a visible and impossible-to-hide place, which compromises the individual's image[32].

CONCLUSION

The epidemiological profile of victims of oral and maxillofacial trauma examined in Forensic and Criminalistic Medicine Services in Brazil is composed mostly of adult males, aged 20 to 29 years. The most frequently cited oral and maxillofacial lesions were bruises,

abrasions, and dental fractures. The most cited anatomical region was the one involving the soft tissues of the face.

RESUMO
A urbanização forte e rápida, sem investimentos na infraestrutura e industrialização, gerou problemas sociais expressos em violências e acidentes de trânsito, com consequente aumento do aparecimento de lesões bucomaxilofaciais. Na presença dessas lesões, o cirurgião-dentista é o profissional qualificado para realizar a perícia e, assim, evitar a subnotificação destas lesões. O presente estudo teve por objetivo estabelecer o perfil de vítimas de traumas bucomaxilofaciais periciadas em Serviços de Medicina Legal e Criminalística no país e relacionar os principais dados epidemiológicos encontrados na literatura nacional, como sexo, faixa etária, tipo de lesão e região anatômica acometida. Foi realizada uma revisão integrativa por meio dos descritores em português: “Odontologia Legal”, “Serviço Médico Legal” e “Trauma Maxilofacial” e em língua inglesa: “Forensic Odontology”, “Forensic Dentistry”, “Forensic Services” e “Maxillofacial Injuries”. Os principais resultados dos 16 artigos selecionados foram apresentados de forma resumida. Observou-se que o perfil epidemiológico de vítimas de trauma bucomaxilofaciais periciadas, em sua maioria, era composta de adultos do sexo masculino, na faixa etária de 20 a 29 anos. As lesões mais citadas foram equimoses, escoriações e fraturas dentais. A região anatômica mais citada foi a que envolvia os tecidos moles da face.

PALAVRAS-CHAVE
Odontologia legal; Medicina legal; Ferimentos e lesões.

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