

Epidemiological study of bucomaxilofacial trauma in a Paraíba reference hospital.

Estudo epidemiológico do trauma bucomaxilofacial em um hospital de referência da Paraíba.

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A B S T R A C T

Objective: to study the epidemiological data of patients suffering from buccomaxillofacial trauma treated at a referral hospital in the State of Paraíba. **Methods:** we conducted a cross-sectional study of inductive approach, with a comparative statistical procedure and research technique by field direct documentation. The sample comprised hospital records obtained from January 2016 to December 2017 of patients attended by the Service of Buccomaxillofacial Surgery and Traumatology of this hospital, and consisted of 332 patients according to the study's eligibility criteria. Two previously calibrated examiners collected and analyzed the data, both descriptively and inferentially. **Results:** males sustained the majority of facial trauma (83.1%), mainly in the third decade of life (32.2%). Motorcycle accidents were the most common etiology of trauma for both genders. In relation to inferential statistics with a margin of error of 5%, there was no significant association ($p>0.05$) between the genders and the trauma etiological factors. The bones of the nose (38.2%) were the most affected bones and the most frequent soft tissue injury was edema, in 50.9% of cases. Only 20.8% of the patients with bone fractures were polytraumatized. **Conclusion:** the victims of oral and maxillofacial trauma attended at our hospital are predominantly men in the third decade of life, involved in motorcycle accidents and sustaining lesions in the nose bones nose.

Keywords: Facial Injuries/etiology. Dentistry. Accidents.

INTRODUCTION

Maxillofacial trauma from external causes represents one of the greatest problems for public health services in different regions of the world¹. Its causes are violent means, either assaults or accidents, such as falls and burns. These events can be present in the life of any individual, regardless of age, social or cultural condition, and are among the most common public health problems².

According to the World Health Organization, trauma is among the leading causes of death and disability in the world, and an estimated 1.24 million people die each year from it. Head and face injuries account for half of the traumatic deaths, and hundreds or thousands survive these injuries, often with permanent limiting sequelae^{3,4}.

There are social determinants linked to the epidemiology of some trauma types. The etiology of facial trauma, however, is heterogeneous and the predominance of a greater or lesser etiological factor is related to some of the characteristics of the studied population⁵⁻⁷. The trauma of the facial region often results in injury to soft tissue, to the teeth and to the main components of the face skeleton, including mandible, maxilla, zygomatic, nasal bones (NB), nasal-orbital-ethmoid (NOE) complex and supraorbital structures. Such lesions, if not repaired in the most appropriate way, can evolve into important aesthetic, emotional, and functional sequelae. Many of these become permanent deformities, making such injuries one of the most significant world health problems⁸⁻¹⁰.

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The Deputado Janduhy Carneiro Regional Hospital is a hospital unit in the Brazilian northeast, being a reference in medium and high complexity care in the Paraíba State backwoods. Its area encompasses more than 90 municipalities, with a high demand for trauma care (about 65,888 patients per year). The epidemiology of facial trauma may provide support for the development of preventive measures, which will help to reduce these lesions. The objective of this study was to carry out an epidemiological survey of the cases of maxillofacial fractures seen in this hospital.

METHODS

This cross-sectional study had an inductive approach, with comparative statistical procedure and research technique for direct documentation in the field. The research project was approved by the Research Ethics Committee, via Plataforma Brasil (CAAE 69315317.5.0000.5181).

We evaluated 402 hospital records of patients attended by the Department of Oral and Maxillofacial Surgery and Traumatology of the Deputado Janduhy Carneiro Regional Hospital, in the city of Patos, state of Paraíba, from January 2016 to December 2017. Of those, 332 individuals met the eligibility criteria for the research. The study included fully completed and readable medical records of patients of any gender, ethnicity and age group. We excluded the incomplete or hardly readable medical records from the sample.

Two previously calibrated examiners (Kappa=0.89) collected the data, by selecting the charts and tabulating the information together. They obtained the data by direct analysis of the notes recorded in the medical records by the hospital's Buccomaxillofacial Surgery and Traumatology team. From each medical record, we collected information on age, gender, city of origin, occupation, trauma

region, bone affected by fracture, comorbidities, presence of soft tissue lesions and type of lesion. We recorded this information in specific sheets, one for each medical record.

We analyzed data both descriptively and inferentially. We performed descriptive analysis using absolute frequencies and percentages for categorical variables, and mean, standard deviation (mean \pm SD), median and percentiles for numerical variables. For the inferential analysis, we used the Fisher's exact test. The margin of error used in the statistical test decision was 5%. We entered the data in an Excel spreadsheet and the software used to obtain the statistical calculations was the IBM SPSS, version 23.

RESULTS

Of the 332 patients with maxillofacial trauma, 179 (53.9%) were registered in 2016, and the remaining 153 (46.1%), in 2017. Regarding the gender distribution, 276 (83.1%) were males and only 56 (16.8%), females. The age ranged from one to 90 years, with mean \pm SD 32.90 \pm 15.11. The majority of cases occurred in the age group of 20 to 29 years (107/32.2%), followed by 30 to 39 years (79/23.8%) and 40 to 59 years (66/19.9%) (Table 1).

Table 1. Sample characteristics in absolute numbers and percentages.

Victims	n (%)
2016	179 (53.9)
2017	153 (46.1)
Gender: n (%)	
Male	276 (83.1)
Female	56 (16.9)
Age group: n (%)	
1-19	57 (17.2)
20-29	107 (32.2)
30-39	79 (23.8)
40-59	66 (19.9)
60-90	23 (6.9)

As for occupation, the one that registered the highest number of individuals affected by facial trauma was farmer, with 133 (40.1%) cases. We divided the etiological agents according to gender, in twelve groups: motorcycle accidents, assault, sports accident, fall from standing height, car accidents, motorcycle accidents resulted alcohol abuse, accident with animal, work accident, gunshot wound (GSW), trampling, cycling accidents, domestic accidents and uninformed. Upon inferential statistics and fixed margin of error (5%), there was no significant association ($p > 0.05$) between gender and the studied variables. The main etiological factor of the facial traumas was motorcycle accident in males, in 164 (50.8%) cases, and in females, with 28 (8.7%) cases, nine (2.8 %) of which were related alcohol abuse. Assaults occupies the second position as etiological factors for both genders, with 38 cases (11.8%) (Table 2).

Craniofacial fractures were present in 96.1% (319) of the cases and classified in: nasal bones (NB), zygomatic bone body not involving formation of the orbit, the orbital face of the zygomatic bone, which comprises the lateral wall and orbital floor, mandible body, mandible condyle, mandible branch, maxilla, anterior wall of the frontal sinus, orbital face of the frontal bone, including part of the orbit ceiling, upper and lower alveolar processes, as well as the naso-orbito-ethmoidal (NOE) complex. We excluded from the study records that did not report the facial thirds or the affected bones, as well as those with exclusively dental fractures. The distribution of fractures can be seen in table 3.

We observed that some victims presented polytrauma (more than one bone affected by trauma), an aggravating condition of the patient's general health. Table 4 shows the distribution of craniofacial fractures for the occurrence of multiple trauma and the number of simultaneously affected bones.

Table 2. Trauma etiology according to gender, in absolute numbers and percentages.

Gender Etiology of trauma	Male		Female		Total		p value 0.381*
	n	%	n	%	n	%	
Motorcycle accident	164	50.8	28	8.7	192	59.4	
Assault	29	9.0	9	2.8	38	11.8	
Sports accident	20	6.2	1	0.3	21	6.5	
Fall from standing height	12	3.7	6	1.9	18	5.6	
Automobile accident	9	2.8	3	0.9	12	3.7	
Motorcycle accident with alcohol abuse	8	2.5	1	0.3	9	2.8	
Accident with animal	6	1.9	1	0.3	7	2.2	
Work accident	6	1.9	1	0.3	7	2.2	
Gunshot wound	6	1.9	-	-	6	1.9	
Trampling	4	1.2	1	0.3	5	1.5	
Bike accident	4	1.2	-	-	4	1.2	
Domestic accident	3	0.9	1	0.3	4	1.2	
Uninformed	-	-	-	-	9	2.7	
Total	271	83.9	52	16.1	332	100.0	

* Fisher's exact test.

We also assessed patients for the presence of soft tissue injuries (Table 5). We observed that the majority of patients had extra- osseous involvement and, among the lesions, the most recorded was edema, in 115 (50.9%) cases.

Table 3. Affected bones, in absolute numbers and percentages.

Affected bone	n (%)*
NB	122 (38.2)
Zygomatic/Body	116 (36.4)
Mandible/Body	69 (21.6)
Maxilla	40 (12.5)
Mandible/Condyle	17 (5.3)
Mandible/Branch	10 (3.1)
Frontal sinus/Anterior wall	9 (2.8)
Frontal/Orbital face	6 (1.9)
Zygomatic/Orbital face	6 (1.9)
Upper alveoli	4 (1.3)
Lower alveoli	3 (0.9)
NOE	3 (0.9)

* Percentage values relative to the number of 319 patients who had affected bones.

Table 4. Polytrauma, in absolute and percentage numbers.

Polytrauma	n (%)
Absent	250 (75.3)
Two bones	46 (13.9)
Three or more bones	23 (6.9)
Uninformed	13 (3.9)

DISCUSSION

According to the Pan American Health Organization, Brazil spends 4% to 7% of its health budget in the area of mortality and treatment of diseases due to external causes². The importance given to facial injuries resides on the high incidence of morbidity, aesthetic disfiguration, loss of function and relevant financial cost, besides causing emotional repercussions and the possibility of irreversible

Table 5. Frequency of soft tissue injury, absolute numbers and percentages.

Soft tissue injury	n (%)
Yes	226 (68.1)
No	71 (21.4)
Uninformed	35 (10.5)
Type of injury	n (%) *
Edema	115 (50.9)
Laceration	68 (30.1)
Scoring	55 (24.3)
Bruise	42 (18.6)
Hematoma	10 (4.4)
Blepharohematoma	7 (3.1)
Perforation	2 (0.9)
Uninformed	19 (8.4)

* Percentage values relative to the number of 226 patients who had soft tissue injury.

deformities¹¹. Bezerra *et al.*¹², in a review of the literature with 17 articles on the subject, found that the incidence of facial trauma has increased significantly in recent years, which could not be observed in the present study.

As for gender, we verified the prevalence of these lesions in males. Several studies have also shown a higher incidence of male trauma¹³⁻¹⁵. On the other hand Moura *et al.*¹⁶ found only one study with a positive association of female gender and facial trauma, relating this fact to a trend towards an increase in the incidence of trauma in women. The authors emphasized that women are getting increasingly exposed to the risk factors of maxillofacial trauma, such as a greater number of women drivers, alcohol and driving association, their insertion in extra-domestic work and the practice of sports as a leisure and health, including sports involving physical contact, factors traditionally associated with male activity^{17,18}.

The occurrence of facial trauma was more common in patients in the third (32.2%) and fourth decades (23.8%) of life. These data corroborate the findings of Cavalcanti *et al.*¹⁹ and Leite *et al.*²⁰,

held respectively in Campina Grande and João Pessoa, both cities of Paraíba.

There is a shortage of studies in the literature that highlight the occupation of victims of facial trauma, an important data to be observed, since the occupation is linked directly to greater trauma risk. The largest occupational share among trauma victims in this study was farming (40.1%). This fact may be due to Paraíba's economy being almost exclusively based on agriculture. When reviewing the literature, we observed a single study that also evaluated the profession of facial trauma victims, who pointed out that the self-employed were the most affected by this type of trauma, followed by students, with 9%²¹.

Regarding trauma etiology, motorcycle accidents were the most prevalent, though without significant relevance between gender through inferential statistics, error margin set at 5% ($p=0.381$), despite the highest incidence of trauma in man, which is in agreement with the literature^{14,15,22-24}. The incidence of such traumas was higher in patients who abused alcohol. Martins *et al.*²⁵ identified a more significant association of alcohol and motorcycle accidents, reported in 15.4% of trauma victims in their study. Already Carvalho *et al.*²⁴ observed the presence of alcohol in 41.1% of the victims, a much more expressive percentage than the one seen in the previous work and in this study. Alcohol consumption may be much more common than those reported, since a survey conducted by the Brazilian Center for Information on Psychotropic Drugs (CEBRID)²⁶ showed that 74.6% of the Brazilian population consume alcohol during their lifetime. Martins *et al.*²⁵ drew attention to the difficulty of obtaining such information, because the victim assistance team often neglects them, the data becoming subjective.

The second most common etiological factor for maxillofacial trauma was assault for both genders, 9% of cases in males and 2.8% of cases occurring in females. Bezerra *et al.*¹² evaluated studies on facial trauma in a literature review and found that assaults were the most prevalent etiological factor, in 53% of the cases studied. Zamboni *et al.*¹³ evaluated 134 patients in a Buccomaxillofacial Traumatology service of Porto Alegre, finding assaults in 38.8% of cases, their main facial trauma etiology. Our study corroborates researches carried out by Brazilian authors, which revealed assault as the second most common etiological factor of facial trauma^{22,25,27}.

Costa *et al.*²⁸ have pointed out that many health professionals find it difficult to investigate and record the etiology of these traumas, since the victims are usually in a very emotional state, leading to omission because of shame. In some cases, the explanation for the assault may be related to illicit drugs or alcohol abuse. Dahlberg and Krug²⁹ supplemented that while some risk factors are specific to certain types of violence, the vast majority of trauma events share risk factors. Predominant sociocultural conditions such as poverty, isolation, alcohol or drug abuse and access to firearms are risk factors for more than one type of violence. GSW appears in seventh place as a cause of facial trauma in males, together with animal accidents and work accidents, and are reported in 1.9% cases for each etiology in this study. Accidents involving animals, non-existent in other studies, might be related to the fact that most individuals traumatized in this study consist of farmers.

The etiologies of facial trauma vary widely according to the region studied and the demographic and socioeconomic factors of the evaluated population. Moura *et al.*¹⁶, in a systematic review of the literature, observed that researches carried out in countryside municipalities displayed motorcycle accidents as the main cause of facial trauma. In those performed in capitals of the federative units, on their turn, the main cause of facial trauma was interpersonal violence followed by automobile accidents, demonstrating a limit in studies regarding local, environmental and social characteristics.

As for bones affected by fractures in facial traumas, NB were the most prevalent in this study, corresponding to 38.2% of cases, in agreement with data found in the literature^{20,30,31}. The reason lies in the fact that the nose occupies a central and prominent position on the face and is an easily fracturable structure due to the small thickness of the nasal bones. In addition, the main cause of nasal fracture is assault^{32,33}, the second largest cause of facial trauma in our series. Other authors found the mandible as the main bone affected by fractures^{25,34}. In our study, when we evaluated the mandibular portions separately, each area presented a distinct prevalence, but when we consider all the parts of the mandibular bone, it becomes the third bone most affected by fractures, with a total of 30%, below only the zygomatic bone, with 36.4% cases and the NB. Studies confirm this prevalence, associating it with the fact that the mandible is the only mobile bone of the face, being quite vulnerable to receive impacts and fracturing³⁵. On the other hand, Zamboni *et al.*¹³ reported a higher incidence of fractures in the zygomatic bone, which represented 44.5% of the total findings, followed by the mandible (42.5%). Farias *et al.*²⁷ also found zygomatic bone as the most affected by trauma in their research (29.1%), followed by nasal bones (18%).

Regarding polytraumatism, 13.9% of facial trauma victims had at least two bones affected by fractures, and 6.9% had fractures in three or more face bones. When reviewing the literature, we observed that most of the studies did not evaluate this data, analyzing the fractures in isolation. Other authors found that 11.7% of patients had two fractures, 0.9% had four fractures, and 0.7%, five fractures, totaling 13.3% polytrauma patients, almost half of the total percentage found in our study (20.8%)²⁰. This data becomes significant for the evaluation of the complexity of the victim's care and its management to resolve the fractures.

Soft tissue injuries to the face have a prominent role in the care of polytrauma patients in general emergencies, since these injuries can definitely compromise the life of the human being. This is because, when poorly addressed, they leave sequelae, isolating the individual from social life and often resulting in inability to work, which causes economic segregation³⁶. Few studies in the literature review soft tissue traumas. A great part of them evaluated trauma to the facial bones, forgetting that the soft tissue to be compressed between the bones and the external forces can generate numerous injuries like cuts, lacerations, bleeding, bruises, etc¹⁸. We recorded soft tissue traumas in 75.3% of the cases. Silva *et al.*²² observed that these lesions occurred in 28.8% of the cases, a very significant number, however, equivalent to only 1/3 of that found in our sample. The authors reported a certain difficulty in collecting data due to the poor records completion. The study by Marzola *et al.*³⁷, who evaluated victims of facial trauma, showed data concordant with ours, presenting edema as the most frequent lesion in soft tissue. Laski *et al.*³⁸ investigated facial trauma at a university hospital of New Jersey, in the United States, and found that the most common soft tissue trauma was laceration, with 42.4% of the findings.

Santos *et al.*³⁹ also reported that laceration was the main injury to soft tissues, affecting 28% of the patients. In the present study, laceration was as the second most common trauma to these tissues.

Our findings can serve to improve trauma patient care, as well as improve or create new policies to prevent traffic accidents, which were the most important etiological factors found.

R E S U M O

Objetivo: estudar os dados epidemiológicos de pacientes vítimas de traumas bucomaxilofaciais atendidos em um hospital de referência da Paraíba. **Métodos:** estudo transversal de abordagem indutiva com procedimento estatístico comparativo e técnica de pesquisa por documentação direta em campo. O universo foi constituído dos prontuários hospitalares obtidos de janeiro de 2016 a dezembro de 2017 de pacientes atendidos pelo Serviço de Cirurgia e Traumatologia Bucomaxilofacial desse hospital. A amostra foi composta por 332 pacientes de acordo com os critérios de elegibilidade do estudo. A coleta de dados foi realizada por dois examinadores previamente calibrados e os dados foram analisados descritiva e inferencialmente. **Resultados:** os pacientes do sexo masculino foram mais acometidos por trauma facial (83,1%), principalmente na terceira década de vida (32,2%). Acidentes motociclisticos foram a etiologia mais comum de trauma para ambos os sexos. Em relação à estatística inferencial com margem de erro fixada em 5%, não foi observada associação significativa ($p>0,05$) entre os sexos e os fatores etiológicos do trauma. Os ossos do nariz (38,2%) foram os ossos mais afetados e a lesão mais frequente de partes moles foi o edema, em 50,9% dos casos. Apenas 20,8% dos pacientes com fraturas ósseas foram politraumatizados. **Conclusão:** as vítimas de traumatismo bucomaxilofacial atendidas em nosso hospital são predominantemente homens na terceira década de vida, envolvidos em acidentes motociclisticos e com lesões em ossos do nariz.

Descritores: Traumatismos Faciais/etiologia. Odontologia. Acidentes.

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