



## Epidemiological analysis of facial fractures

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### Abstract

**Purpose:** The aim of this study was to evaluate the epidemiological data, socioeconomic status and prevalence of patients with facial fractures treated at a hospital and an emergency room service from March to August of 2014.

**Materials and Methods:** This cross-sectional study analyzed the epidemiological and demographic data related to these patients. Data were subjected to statistical studies with a significance level of 5%.

**Results:** There were 1348 patients attended to during this period and of these, 144 patients presented facial fractures. Most patients involved were men, the mean age of 32.37 years, social Class C, married, living with more than three persons, and 52.1% from the interior of the state. The most affected bones were the mandible, zygomatic complex, nasal, maxillary, and frontal. Most cases involved automobile accidents (45.8%) of these, motorcyclists (38.9%), automobiles (6.3%), trucks (0.7%).

**Conclusion:** From the casuistry of this study, it was concluded that most patients consist of young adults, male, non-white, married, and with low education. The prevailing socioeconomic class is Class C, and most have their own house and are financially independent. A slight majority of the patients come from the interior of the state. Regarding etiology, most were from car accidents and the use of safety equipment was neglected in most cases. The bones fractured most often are the mandible and the bone of the zygomatic complex.

### Introduction

All around the world, the formation of complex urban centers was accompanied by increased mortality from sources of trauma,<sup>[1]</sup> leading to the need to implement policies and alternatives to reduce this serious public health problem, avoiding its grievance.<sup>[2]</sup> Worldwide it is estimated that a major part of population have suffered injuries caused by traffic accidents.<sup>[3]</sup> Based on the estimate of the World Health Organization in 2010, interpersonal violence is responsible for 73,000 deaths each year in Europe and 20-40% of victims require hospital treatment.<sup>[4]</sup> Many of these traumas are not treated in hospital units, thereby causing physical and psychological consequences according to the same estimate.<sup>[4]</sup> With the growth of violence in traffic, the number of injuries by firearms is increasing every day.<sup>[3,5,6]</sup> The present study was conducted in Cuiabá, Mato Grosso, a violent city in Brazil

that recorded 366 deaths by homicides, with a rate of 43.95 homicides per every 100,000 inhabitants.<sup>[4]</sup>

The treatment of trauma patients is costly, requiring large investments for hospitals that serve them, burdening the state and contributing to a breakdown in the system, creating a pent-up demand in several areas. For individual patients, the consequences are functional problems, psychological discomfort, cosmetic problems, emotional and psychological stress, intensive care in hospitals, frequent returns and loss of revenue by having to stay away from their labor activities.<sup>[4,7-9]</sup>

Epidemiologic studies of facial traumas are important to help develop more effective means of prevention, to improve the quality of patient care, and to promote prevention campaigns in the correct locations. Epidemiological data of facial fractures were collected in the emergency service can help the authorities in prevention campaigns to compare data with others similar centers also show the importance of the

specialty of oral surgery and maxillofacial traumatology inside a trauma service.

Hence, the objective of this study was to evaluate the epidemiological data, socioeconomic status and prevalence of patients with facial fractures at a hospital and an emergency room service.

## Subjects and Methods

The present study was conducted with data from patients treated at the Surgical and Maxillofacial Service of the Hospital and Emergency Room, Municipality of Cuiabá, Mato Grosso, Brazil, from March 2014 to August 2014. The performed study is observational with a cross-sectional model (prevalence). During this period, a total of 1,348 patients with related oral and facial problems were attended to, and from these, 144 patients who were victims of facial fractures were selected. The choice of these patients was for convenience. Patients who did not have facial fractures were not submitted to the questionnaires. The work was submitted to the Research Ethics Committee under protocol number 001/2014.

The data collected included: Name, address, age, gender, telephone, city of residence, education, and marital status, monthly income, religion, site of the fracture, etiology of fractures, use or not of safety equipment and a socioeconomic survey was performed. The questionnaires were answered only after signing the informed consent.

The types of fractures were categorized as mandibular, zygomatic complex, maxillary, nasal and frontal, which were diagnosed by experts and experienced professionals, using complementary diagnostic radiographs and computerized tomography scans.

Patients were identified by a personal file, archived in the study database in alphabetical order. This file contains personal and socioeconomic information and the patient's medical history. The database is designed to contain information relevant to the research, containing the following items: Full patient name, address, telephone number, age, gender, service registration number, type of accident, education, marital status, monthly income, use or not of safety devices and type of facial fracture.

A maxillofacial surgeon systematically did the diagnosis of facial fractures. Patients excluded from the study were those who did not present the physical and emotional health conditions or were unable to answer the questionnaire. Incomplete questionnaires were excluded. When deficiencies and/or inconsistencies were perceived during the application of the questionnaire by the examiners, the questionnaire was immediately excluded. As a result, the examiners were trained before the start of the study (pilot study).

The data were entered into electronic databases (Excel, Microsoft, 2007 IBM SPSS version 20). Stratification and organization of data were performed using a Chi-square statistical test. All tests had a significance level of 5%.

## Results

The study population -  $n = 144$  [Table 1] is predominantly male (81.2% -  $P < 0.05$ ). The age of the patients involved in this study ranged from 3 to 83 years. For the self-reported variables skin color, education, marital status and social class, statistical differences were observed in decreasing order ( $P < 0.05$ ), noting that in the black skin color - 80.9% was more prevalent than the others; regarding education, of the individuals who completed elementary school - 61.2% were the majority, followed by high school - 31.9% and higher education - 6.9%; regarding social class, the most frequent occurring was the Class C - 61.8%, followed by the B - 35.4% and A - 2.8%. Most involved had their own housing (63.9%) and income (68.8%) ( $P < 0.05$ ). When asked about the number of people with whom they lived with, 77.8% said they live with three or more people ( $P < 0.05$ ).

At present, most patients attended to at the service were from the interior of the state (52.1%), however, without statistical differences compared to the local population (47.9% -  $P > 0.05$ ).

Specifically regarding the frequency of trauma events [Table 2], most involved included automobile accidents (45.8% -  $P < 0.05$ ), followed by fractures by physical aggression (23.6%), various events (fall of roof, accident at work, etc. - 22.9%) and of lower incidence were injuries by firearms (7.7% -  $P < 0.05$ ). Most of those involved in accidents with fractures were not using safety equipment such as seatbelts or helmets (69.4% -  $P < 0.05$ ). By splitting the skull in the upper portion (front, nasal, zygomatic complex, and maxilla) and lower (mandible), it is clear that most of the fractures were in the upper bones (56.9%), followed by the lower (36.1%) and both (6.9%), respectively, in descending order ( $P < 0.05$ ).

The fractured bones were mostly the mandible (36.8% -  $P < 0.05$ ), followed by the bones of the zygomatic complex (29.8%), with no statistical differences ( $P > 0.05$ ). This same complex did not differ from the nasal (21.1% -  $P > 0.05$ ). The bones with a lower incidence of fractures were the front and the maxilla together (12.3%), in the minority compared to other regions ( $P < 0.05$ ). Subject to the amounts of bones involved with fractures, the vast majority had involvement of a single bone (86.1% -  $P < 0.05$ ), followed by two bones (9.7% -  $P < 0.05$ ) and patients with more than three fractured bones were in the minority (4.2% -  $P < 0.05$ ).

## Discussion

The result of the epidemiological investigation varies according to the geographic region, the population studied, cultural differences and temporal factors. Understanding the etiology and consequences of trauma are relevant to the development of prevention and verification of correct insertion policies regarding the location of the traumatology teams.<sup>[5,7]</sup> Worldwide, the formation of urban complexes was accompanied by increased mortality from trauma, thus leading to the need for implementation of health policies to reduce this serious public health problem.<sup>[3]</sup>

**Table 1:** Frequency and percentage regarding the general data of patients participating in the study ( $n=144$ )

Items	Frequency	Percentage
Gender		
Male	117 <sup>a</sup>	81.2
Female	27 <sup>b</sup>	18.8
Skin color (self-declared)		
White	23 <sup>a</sup>	16.3
Black	114 <sup>b</sup>	80.9
Yellow or indigenous	4 <sup>c</sup>	2.8
Education		
Elementary school	88 <sup>a</sup>	61.2
High school	46 <sup>b</sup>	31.9
Higher education	10 <sup>c</sup>	6.9
Marital status		
Single	38 <sup>a</sup>	26.4
Married	88 <sup>b</sup>	61.1
Common law	18 <sup>c</sup>	12.5
Social status		
Class A	4 <sup>a</sup>	2.8
Class B	89 <sup>b</sup>	35.4
Class C	51 <sup>c</sup>	61.8
Dwelling		
Own	92 <sup>a</sup>	63.9
Other	52 <sup>b</sup>	36.1
Home region		
Cuiaba	69 <sup>a</sup>	47.9
Inboard	75 <sup>b</sup>	52.1
Reside with		
Alone	17 <sup>a</sup>	11.8
With parents	56 <sup>b</sup>	38.9
With others	71 <sup>b</sup>	49.3
Resides with how many		
Alone	15 <sup>a</sup>	10.4
Two people	17 <sup>a</sup>	11.8
Three or more	112 <sup>b</sup>	77.8
Source of income		
Parents	18 <sup>a</sup>	12.4
Family	27 <sup>a</sup>	18.8
Self-supported	99 <sup>b</sup>	68.8
Age of patients		
Minimum	3 years	
Maximum	83 years	
Average	32.37	
Standard deviation	14.65	

Different letters in line show statistically significant difference compared to the other groups ( $P<0.05$ )

**Table 2:** Frequency of items related to patients with maxillofacial fracture

Items	Frequency	Percentage
Type of accident		
Automobile	66 <sup>a</sup>	45.8
Physical aggression	34 <sup>b</sup>	23.6
Firearms	11 <sup>c</sup>	7.7
Others	33 <sup>b</sup>	22.9
Safety equipment		
Yes	44 <sup>a</sup>	30.6
No	100 <sup>b</sup>	69.4
Fracture region		
Upper	82 <sup>a</sup>	56.9
Lower	52 <sup>b</sup>	36.2
Both regions	10 <sup>c</sup>	6.9
Fractured bones		
Front	6 <sup>a</sup>	3.5
Nasal	36 <sup>b</sup>	21.1
Zygomatic complex	51 <sup>bd</sup>	29.8
Maxillary	15 <sup>c</sup>	8.8
Mandibular	63 <sup>d</sup>	36.8
Quantity of fractured bones		
1 bone	124 <sup>a</sup>	86.1
2 bones	14 <sup>b</sup>	9.7
3 bones	5 <sup>c</sup>	3.5
4 bones	1 <sup>c</sup>	0.7

Different letters in line show statistical difference between groups ( $P<0.05$ ). The percentage of the variable "fractured bones" was calculated for 171 bones and not for 144 patients

The findings presented are in many ways similar to those existing in the literature. During the study period, from March to August 2014 (6 months), the oral and maxillofacial surgery sector attended 1348 patients and of these, 144 patients had facial fractures, a number that in the proportions, match the average of trauma services in other major centers the world.<sup>[8,9]</sup> In Brazil, it appears that statistics is also similar in different regions.<sup>[2,10]</sup>

The results for the types of accidents revealed that the two most common mechanisms of facial fractures were motor vehicle accidents (45.8%) and physical abuse (23.7%); fewer injuries by firearms (7.6%) and interpersonal violence, along with the fall make up the statistics presented as the main factors of facial trauma. Similarly, when comparing the results with other centers, motor vehicle accidents are found in large numbers but with an increase in safety equipment and greater authority inspection, and a gradual reduction to this problem and, unfortunately, an increase in interpersonal violence is noted.<sup>[2,11,12]</sup>

Among the patients included in the study period, mandible fracture was the most common of facial bones (43.8%), followed by the zygomatic complex (35.4%), nasal bone (25%), maxilla

(10.4%), and the frontal bone (4.2%). With the coincidences already described these types of bones follow the same global standard. It is known that the variables studied are more probable for risk for trauma that occur in these facial regions.<sup>[2,11-14]</sup> Despite several similarities, in an American hospital located in the North Eastern United States, they do not coincide with the findings of the study. It is believed that the public profile is different from that described in this study; however, the mandible appears in the background of descriptions<sup>[14]</sup> by type of occurrence, automobile accidents, and the male public generally stand out.<sup>[15]</sup>

These data are consistent with the findings in other large cities, as well as in mid-size cities.<sup>[11,12,15]</sup> Social class is another factor related to the rough profile. This is mostly for the occurrence of fractures in the attendance to people of middle and lower classes.<sup>[16]</sup> The degree of prevalent education of the people involved proves to be below. It is known that these two variables are generally correlated. Another interesting point in the study is that many people attended to are from the interior of the state. Despite that the institution is municipal, there still remains the fact that people from the interior still come for attendance, whose characteristics, however, do not run differ from those already described in the study.

The average age of patients was 32.3 years, during which they are economically active. This point is related to a pattern of behavior, especially in relation to traffic accidents, in which it usually involves performing dangerous activities and driving without due care. This factor turns out to be crucial to facial traumas.<sup>[8-10,17,18]</sup>

The boneless frequently involved in the statistics was the frontal bone. Technically, in cases of fracture due to the complexity of the area, the neurosurgeon immediately is called, depending on him to request the work of the maxillofacial surgeon specialist, as is common.<sup>[19]</sup>

It is expected that the results of this work may contribute to the literature that demonstrates the same profile of patients in different parts of the world. However, with the information processed, the study sought to conduct a data analysis to infer stricter public possibilities. These results indicate that the patient's profile involved with facial fracture seems clear and can help professionals working in the area for the prevention of such occurrences.

## Conclusions

From the casuistry of this study, it was concluded that most patients consist of young adults, male, non-white, married, and with low education. The prevailing socioeconomic class is Class C, and most have their own house and are financially independent. A slight majority of the patients come from the interior of the state. Regarding etiology, most are from car accidents and the use of safety equipment was neglected in most cases. The bones fractured most often are the mandible and the bone of the zygomatic complex.

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