

# Maxillofacial Trauma: Prevalence in the San Vicente de Paúl Regional University Hospital, San Francisco de Macorís, Dominican Republic.

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## Abstract

Worldwide maxillofacial injuries have become a social problem, since there has been an alarming increase of this type of injury. In the Northeast region of the Dominican Republic the facial trauma constitutes a significant proportion of all trauma, although epidemiological studies in the country are few. A retrospective study was undertaken to assess causes of maxillofacial trauma in the San Vicente de Paúl Regional University Hospital in the town of San Francisco de Macorís, Duarte State, Dominican Republic. Between July 2002 and July 2011, 786 cases of maxillofacial fractures were seen at the Oral and Maxillofacial Surgery Unit of this Hospital. Most fractures occurred in adults with ages ranging from 21 to 30 years (30.2%). Men (58.5%) were more affected than women (41.5%) and most patients treated were from the locality of San Francisco de Macorís (34.2%). Traffic accidents/motorcycles (39.7%) were the major cause of trauma, followed by automobile accidents (18.7%) and physical violence (16.4%). Hard tissue injuries (63.5%) were more common. The mandible (22.1%) was found to be the most commonly fractured bone in the facial skeleton, followed by the zygomatic complex (12.7%). Wounds or lacerations (24.0%), edema (4.6%) and hematoma (4.6%) were the most common types of soft injuries.

## INTRODUCTION

A trauma is defined as tissue damage caused by mechanical agents that produce sequels such as wounds or lacerations, edema, ecchymosis and fractures<sup>1</sup>. This has become a huge health problem, being regarded as the third leading cause of death worldwide, surpassed only by cardiovascular disease and cancer<sup>2</sup>. Being the most exposed part of the body, the face is particularly vulnerable to such injuries, 20–60% of all those involved in automobile accidents having some level of facial fractures<sup>3,4</sup>.

Maxillofacial traumas are injuries that affect facial structure and have vital consequences, functional or aesthetic, producing emotional distress, disability or long-term deformity. The severity of this trauma lies in the commitment of anatomical structures such as nasal cavity, paranasal sinuses, orbits and other adjacent as brain and cervical spine<sup>5</sup>.

The number of patients with maxillofacial injuries that are received in the various emergency services from different health facilities includes a significant percentage, and growing, of all treated patients<sup>1</sup>. Surveys of facial injuries

have shown that the etiology varies from one country to another and even within the same country depending on the prevailing socioeconomic, cultural and environmental factors<sup>6,7</sup>. Earlier studies from Europe and America showed that road traffic crashes were the most frequent cause of facial injuries<sup>8,9</sup>. However, more recent studies have shown that physical violence is now the most common cause of maxillofacial injuries in developed countries<sup>10-11</sup>, whereas traffic accidents remain the most frequent cause in several developing countries<sup>12-13</sup>.

Considering that there were no official statistics on maxillofacial trauma in the Northeast Cibao region of the Dominican Republic, was decided to make this investigation in order to determine the prevalence of maxillofacial trauma that arise. Hopefully, the information obtained will help to improve knowledge and prevention of maxillofacial injuries, in this community in particularly. The Northeast Region includes the provinces of: 1- Duarte with the municipalities of San Francisco de Macorís, Villa Rivas, Castillo, Pimentel, Arenoso, Las Guáranas and Hostos. 2- María Trinidad Sánchez with the municipalities: Nagua, Cabrera, El Factor

and Río San Juan. 3- Sámana: Santa Bárbara de Samaná, Sánchez and Las Terrenas. 3- Hermanas Mirabal: Salcedo, Tenares and Villa Tapia.

This research was conducted at the San Vicente de Paúl Regional University Hospital, in the municipality of San Francisco de Macorís, Duarte Province, Dominican Republic. This hospital also receives patients from other nearby locations and municipalities outside the region such as La Vega and Cotuí.

## MATERIALS AND METHODS

All patients presenting facial trauma were seen in the maxillofacial unit of San Vicente de Paúl Hospital from November 2002 to November 2011, with a cross-sectional retrospective study conducted in December 2011. The information was obtained through the departments of archives and statistics of this hospital. A protocol was prepared to identify the following features: gender predilection, peak age of incidence, municipality with the highest frequency of patients, etiology of injury, as well as type and site of the trauma.

The etiology was classified as: traffic accidents (cars, motorcycles and pedestrian), physical violence, accidental falls, sports accidents, weapon injuries (knife and fire gun) and other causes.

The investigation was conducted using data contained in medical records according to the International Classification of Diseases and Health Related Problems (ICD-10), codes which referred to maxillofacial trauma associated with terminations to the location of the trauma and causes were handled. Only medical records with complete information were included. Seven hundred and eighty six (786) maxillofacial trauma patients participated in the research.

Data was analyzed and tables were made using Microsoft Office Excel 2007.

## RESULTS

Seven hundred and eighty-six patients were seen and treated in the maxillofacial unit at the Hospital of San Vicente de Paúl from November 2002 to November 2011. The majority of facial trauma patients were male with a total of 58.5% (female: 41.5%; Table 1). The peak age of incidence in men and women involved with maxillofacial trauma was 21–30 years (30.2%; table 2) followed by 31–40 years (21.9%).

**Figure 1**

Table 1.- Distribution of patients by gender.

Gender	n	%
Male	460	58.5
Female	326	41.5
<b>TOTAL</b>	<b>786</b>	<b>100</b>

**Figure 2**

Table 2.- Distribution of patients by age and gender.

Age (in years)	n male	%	n female	%	n TOTAL	%
1-10	21	4.6	11	3.4	32	4.1
11-20	77	16.7	51	15.6	128	16.3
21-30	134	29.1	103	31.6	237	30.2
31-40	95	20.7	77	23.6	172	21.9
41-50	66	14.3	43	13.1	109	13.9
51-60	42	9.1	34	10.4	76	9.7
> 61	25	5.4	7	2.1	32	4.1
<b>TOTAL</b>	<b>460</b>	<b>99.9</b>	<b>326</b>	<b>99.8</b>	<b>786</b>	<b>100.2</b>

The great majority of trauma cases in the population under study were from San Francisco de Macorís with 34.2% (table 4), followed by Nagua (11.6%) and Castillo (7%). La Vega provided the least amount of cases with only 0.4%.

**Figure 3**

Table 3. - Distribution of patients by municipalities of origin.

Province	Municipality	n	%
	San Francisco de Macorís	269	34.2
	Villa Rivas	45	5.7
<b>Duarte</b>	Castillo	55	7.0
	Pimentel	26	3.3
	Arenoso	12	1.5
	Las Guáranas	50	6.4
	Hostos	11	1.4
	Nagua	91	11.6
<b>Maria Trinidad</b>	Cabrera	18	2.3
<b>Sánchez</b>	El Factor	9	1.1
	Río San Juan	15	1.9
	Santa Bárbara de Samaná	43	5.5
<b>Samaná</b>	Sánchez	31	3.9
	Las Terrenas	19	2.4
	Salcedo	28	3.6
<b>Hermanas Mirabal</b>	Tenares	27	3.4
	Villa Tapia	9	1.1
<b>Concepción de La Vega</b>	La Vega	3	0.4
<b>Sánchez Ramírez</b>	Cotuí	21	2.7
	Otros	4	0.5
	<b>TOTAL</b>	<b>786</b>	<b>99.9</b>

Road traffic accidents (table 3) were the most frequent aetiological factor, mainly motorcycle accidents (40.7% of all males; 38% of all females) with 39.7% of all etiologies followed by car accidents (18.6% males; 18.8% females) with a total of 18.7%. The least common were falls (1.2%

male, 1.7% female; total 1.4%).

**Figure 4**

Table 4. - Distribution of patients by aetiology and gender.

Aetiology	n male	%	n female	%	n TOTAL	%
Falls	6	1.2	5	1.7	11	1.4
Physical violence	78	15.6	51	17.8	129	16.4
Traffic accidents/ cars	93	18.6	54	18.8	147	18.7
Traffic accidents/ motorcycle	203	40.7	109	38.0	312	39.7
Traffic accidents/ Pedestrian	21	4.2	16	5.6	37	4.7
Fire gun	26	5.2	14	4.9	40	5.1
Knife	33	6.6	18	6.3	51	6.5
Sports accidents	16	3.2	9	3.1	25	3.2
Animal attacks	11	2.2	5	1.7	16	2.0
Other	12	2.4	6	2.1	18	2.3
<b>TOTAL</b>	<b>499</b>	<b>99.9</b>	<b>287</b>	<b>100</b>	<b>786</b>	<b>100</b>

Regarding the type of injury (table 5), it was found that the great majority of cases were hard tissue injuries (63.5%). Mandibular fractures were the most common (22.1%), followed by zygomatic-orbital complex (12.7%), combined fractures (11.7%), dentoalveolar (5.1%), nasal and middle third fractures (4.3% each), panfacial (1.8%), and naso-orbital-ethmoid (1.5%). Soft tissue injuries (36.4%) in the form of a wound or laceration (24.0%), followed by edema and hematoma (4.6% each), and ecchymosis (1.8%) were the most common types of these kind of injury.

**Figure 5**

Table 5. - Distributions of maxillofacial injuries.

Injury	n	%
<b>SOFT TISSUE INJURY</b>	<b>286</b>	<b>36.4</b>
Wound	189	24
Edema	36	4.6
Ecchymosis	14	1.8
Hematoma	36	4.6
Other	11	1.4
<b>HARD TISSUE INJURY</b>	<b>500</b>	<b>63.5</b>
Mandible fractures	174	22.1
Nasal fractures	34	4.3
Middle third fractures	34	4.3
Malar Zygomatic Complex fractures	92	11.7
Dentoalveolar fractures	40	5.1
Panfacial fractures	14	1.8
Naso-orbital-ethmoid fractures	12	1.5
Combined Fractures	100	12.7
<b>TOTAL</b>	<b>786</b>	<b>100</b>

## DISCUSSION

The human face constitutes the first contact point in several human interactions, thus injuries and/or mutilation of the facial structures may have a disastrous influence on the affected person<sup>14</sup>.

Injuries to the craniomaxillofacial area affect a significant number of trauma patients, and consequences of trauma to this region can include any combination of dental, bone, or soft tissue injury<sup>15</sup>. The knowledge and the accuracy of the information on maxillofacial trauma have a significant involvement in treatment planning of future services, and design of preventive measures.

The sex distribution in this investigation is consistent with others studies<sup>16,17,18,19, 20, 21</sup>, with a higher frequency of Maxillofacial trauma in males than females. But unlike these studies, the range of difference found between these two genders (58.5% male, 41.5% female) is not large, which is

explained by the rising tide of violence in the female community in the country.

Facial trauma is most common in the third decade, consistent with much of the international and worldwide literature. The age distribution in this study showed that the most common age group involved was 21 to 30 years of age, in agreement with previous studies<sup>21, 22, 23, 15</sup>. This can be explained by the increased physical activity, number of fights and self mobility of young adults (20s)<sup>19</sup>. This finding differs slightly in the age range with the investigation of Lin et al (2007), which positioned the group of 19 to 28 years as the most frequently affected. While Klenk et al (2003) in their study indicated that the most frequently injured patients belonged to the 16 to 20 years of age, in contrast with the results of this research.

San Francisco de Macorís had the highest number of patients treated for facial trauma within the population studied, followed by Nagua. La Vega, meanwhile, had the lowest number of patients, which may be because this town has its own trauma hospital, Juan Bosch, and only a few patients for personal reasons, choose the hospital of San Vicente de Paul.

The present study supports the findings of early studies in developing countries<sup>3, 8, 9, 12, 13, 14, 17, 21, 22</sup> of traffic accidents been the most common cause of maxillofacial injuries worldwide, with an impressive and disturbing 63.1 percent of all etiological factors. But is in disagreement with other reports<sup>7, 10, 11, 25</sup> from developed countries where physical violence has replaced traffic accidents as the major cause of maxillofacial injuries.

The reductions in traffic accidents in developed countries are largely attributed to a wide range of road safety measures such as seat belt use, traffic calming measures and traffic law enforcement. Therefore, there is an urgent need to get down to what the developed nations have done to reduce/prevent road traffic crashes<sup>13</sup>.

Physical violence was the second most common cause of maxillofacial injuries in the population studied in the Northeast Region. Perhaps, the poor socioeconomic conditions of the country and area have led to stress and propensity to different ways of crime like robbery; and an excessive drinking can explain the increasing aggression-related maxillofacial injuries.

Hard tissue injuries were more common than the soft ones, agreeing with the investigation of Laski et al (2004). This

finding disagrees with similar studies in which soft tissue injuries were more common<sup>27</sup>. Of soft tissue injuries, lacerations or wounds were the most frequent consistent with the study of Gassner et al (2003), followed by edema and hematoma with the same amount of cases and ultimately, ecchymosis.

The mandible was the most frequent fractured bone in this study, agreeing with most of the similar studies<sup>3, 4, 5, 11, 16, 17, 19, 20, 21, 23</sup>. Malar zygomatic complex fractures followed mandible fractures. Maxilla fractures<sup>28</sup> and malar zygomatic complex/arch were reported by other studies as the most frequently involved area<sup>13</sup>.

## CONCLUSIONS

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