

IJBHS 2010096/7201

## Demographic characteristics of orofacial gunshot injury victims

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(Received June 11, 2010; Accepted July 15, 2010)

**ABSTRACT: Objective:** To study the demographic characteristics of orofacial gunshot injury victims in University of Benin Teaching Hospital, Benin City, Nigeria.

**Methodology:** This 5 year retrospective study was carried out at the University of Benin Teaching Hospital between January 2001 and December 2005. All patients with orofacial gunshot injury were identified from the Accident and Emergency Department log book and their case notes subsequently retrieved. . The data collected were: age, gender, occupation, time of injury, location of shooting incident, cause of gunshot and type of firearm implicated.

**Results:** A total of 47 cases were retrieved making it, an average of approximately 9 cases per year. About three quarters (76.6%) of victims were male. The 20-39 year age group consisted about 74.5% of the victims but peak incidence was seen in the 20-29 year age group. Undergraduates constituted 40.4% of the victims. Orofacial gunshot injuries occurred as broad daylight events as almost half (48.9%) occurred between 12.01p.m and 6p.m. Majority of the gunshot attacks occurred indoors (63.8%) and about 25.5% occurred on the highways. In this study, reduction and immobilization was the commonest hard tissue treatment while local flap transfer/flap repair was the commonest soft tissue treatment. The mortality rate recorded was 21.3%.

**Conclusion:** Orofacial gunshot injuries commonly affect young male undergraduates. Most shootings occur indoors and in broad daylight. This information is important in development of educational framework on security and in the training of oral/maxillofacial surgeons and plastic surgeons to meet the demands.

**Keywords:** Demography, orofacial, gunshot injuries, victims

## Introduction

Gunshot injury, a form of ballistic trauma has been defined as any trauma sustained from the discharge of arms or ammunitions during conflict or otherwise<sup>1</sup>. The first recorded use of cannon was by Edward III against the Scots in 1327, and small arms carried by one or two soldier began appearing in the fourteenth century<sup>2</sup>. Today, it constitutes a major problem worldwide and has shown tremendous increase in developing countries especially among civilian populace<sup>3</sup>. The World Health Organization documented gunshot injuries as a significant cause of mortality in the world in year 2001<sup>4</sup>. A mortality rate of 3.9%-11.5% has been recorded from head and chest injuries<sup>5-8</sup> but in 1999, Ugboko et al documented a mortality rate of 22.7%<sup>9</sup>.

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Causes of gunshot injury are accidental discharges from police guns, armed robbery, communal clashes, religious violence, soldiers, hunters, cult-related activities, political violence, accidental shootings, civil unrest, armed conflicts, illegal arm possession, poorly regulated security personnel arm and failed suicide attempt<sup>5,6</sup>. In Nigeria, majority of gunshot injuries are due armed robbery attack while suicidal intent constituted the minority<sup>10</sup>. The identified predisposing factors include inefficient firearm control, high rates of unemployment, poverty and youth restiveness<sup>6</sup>.

Historically gunshot injuries were initially reported in West Africa during the Nigeria civil war era<sup>11</sup>. Gunshot injuries were the second most common cause of trauma related death in Benin City, Nigeria<sup>12</sup>. Firearm injuries contribute to substantial medical, medico-legal, economic as well as social problems<sup>13</sup>. The head and neck region is the third commonest site of gunshot injuries after limbs (upper and lower limb) and chest<sup>14</sup>.

Most civilian orofacial gunshot injuries are caused by low velocity missiles fired from handguns<sup>15</sup>. The locally made dane guns are the most commonly used weapons in the maxillofacial region<sup>9</sup>. Gunshot injuries are commonest among young males and about 80% of gunshot injuries occur in individuals below the age of forty years, with a peak age range of 21-40 years<sup>16</sup>. Although a search of the literature reveal many studies on gunshot injuries in the orofacial region in the Western world, very few report have come out of Nigeria<sup>9,17,18</sup>.

The objective of this study was to examine the demographic characteristics of patients with orofacial gunshot injuries in the University of Benin Teaching Hospital (UBTH), Benin City, Nigeria.

## Patients and Methods

This study was designed as a 5- year retrospective study from January 2001- December 2005. All patients with orofacial gunshot injury were identified from the Accident and Emergency Department log book and their case notes subsequently retrieved. The selection criterion was living victims of orofacial injury at the time of hospital presentation within the stated study period. Exclusion criteria were absence of orofacial injury and being brought in dead. The data of recorded include age, gender, occupation, time of injury, location of shooting incident, cause of gunshot injury, type of firearm implicated, treatment and treatment outcome. The collated data was analyzed using Epi-info statistical software and presented as simple frequency table.

## Results

A total of 47 patients were included in this study. Thirty-six were males and 11 females giving a male to female ratio of 3.3:1 (**Table 1**). The age range patients were 20 to 59 years. The 20 to 29 age group constituted 51.1% with 38.3% as male and 12.8% as female (**Table 1**). The University undergraduates (40.4%) were most often a victim of orofacial gunshot injury (**Table 2**), followed by the political class (12.8%) and business persons (10.6%). Most (54.7%) patients were shot in day light (**Table 3**). Most (38.3%) patients were shot in the privacy of there homes (**Table 4**).

**Table 1: Age and sex distribution of patients**

Age range	Male (%)	Female (%)	Total (%)
20-29	18 (38.3)	6 (12.8)	24 (51.1)
30-39	8 (17.0)	3 (6.4)	11 (23.4)
40-49	9(19.1)	1 (2.1)	10 (21.3)
50-59	1(2.1%)	1 (2.1)	2 (4.3)
<b>Total</b>	<b>36 (76.6)</b>	<b>11 (23.4)</b>	<b>47 (100)</b>

**Table 2: Occupation of patients**

<b>Occupation</b>	<b>Frequency</b>	<b>Percent</b>
Businessman / woman	5	10.6
Civil Servant	5	10.6
Driver	3	6.4
Housewife	4	8.5
Politician	6	12.8
Applicant	5	10.6
Undergraduate	19	40.4
<b>Total</b>	<b>47</b>	<b>100</b>

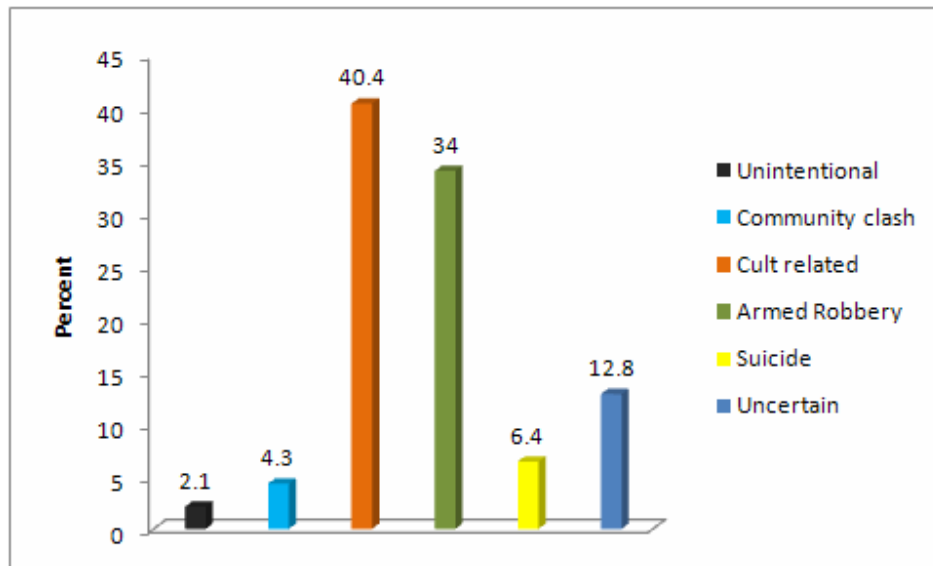
**Table 3: Time distribution of injuries**

<b>Time</b>	<b>Frequency</b>	<b>Percent</b>
12.01a.m- 6a.m	14	29.8
6.01a.m- 12p.m	4	8.5
12.01p.m- 6p.m	23	48.9
6.01p.m-12a.m	6	12.8
<b>Total</b>	<b>47</b>	<b>100</b>

**Table 4: Location of shooting incident**

<b>Location</b>	<b>Frequency</b>	<b>Percent</b>
City road	1	2.1
Highway	12	25.5
Home/hostel	18	38.3
Hotel/restaurant/inn	11	23.4
Festival/party	4	8.5
Office	1	2.1
<b>Total</b>	<b>47</b>	<b>100</b>

Other common locations were inter-state highways (25.5%) and restaurants/ hotels (23.4%). Cult related activities and armed robberies constituted the reasons why most patients were shot (40.4% and 34.0% respectively) (**Figure 1**). In (12.8%) patients, the cause could not be ascertained. Twenty (42.6%) were shot with a pistol and in (21.2%) the type of weapon was unknown (**Figure 2**). Reduction and immobilization was the commonest hard tissue treatment while local flap transfer/flap repair was the commonest soft tissue treatment (**Table 5**). A total of 78.7% survived while 21.3% died. Mortality recorded was higher in males (90.0%) than females (10.0%). Half (50%) of the dead patients died within 24 hour and the remaining 50% died between 24 and 48 hour (**Table 6**).



**Figure 1: Cause of gunshot injury**

**Table 5: Treatment Modalities**

A. Soft tissue treatment	Frequency (%)	B. Hard tissue treatment	Frequency (%)
Debridement	14 (37.8)	Bone grafting	1 (4.5)
Local flap transfer/Flap repair	18 (48.6)	Reduction and immobilization	14 (63.6)
Primary closure	5 (13.5)	Transosseous wiring	7 (31.8)
<b>Total</b>	<b>37 (100. 0)</b>	<b>Total</b>	<b>22 (100. 0)</b>

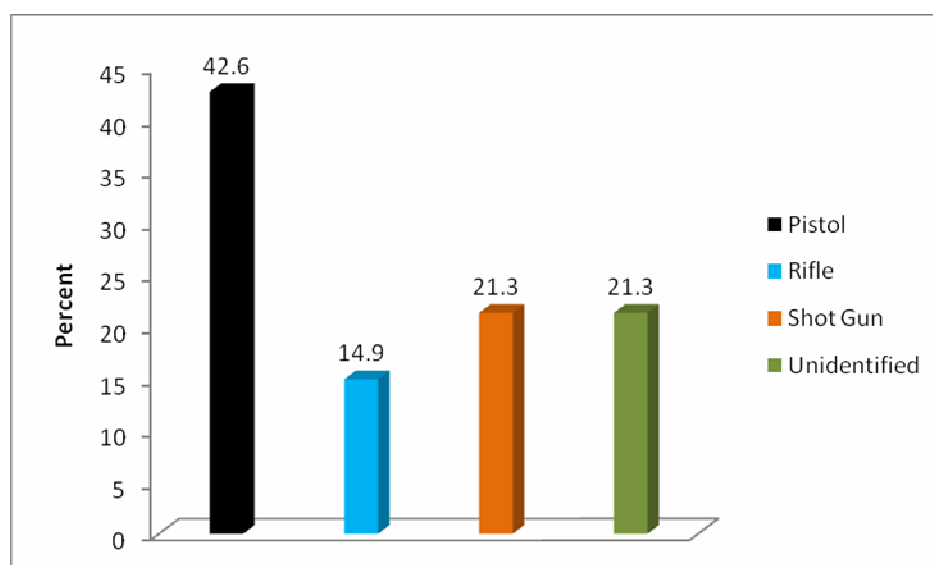


Figure 2: Type of firearm

Table 6: Outcome of treatment

Outcome	Male (%)	Female (%)	Total (%)
Survived	27 (73.0)	10 (27.0)	37 (78.7)
Died	9 (90.0)	1 (10.0)	10 (21.3)
<b>Total</b>	<b>36 (76.6)</b>	<b>11 (23.4)</b>	<b>47 (100.0)</b>

## Discussion

Gunshot injuries continue to fascinate the public, researchers and clinicians apparently due to the emotional and legal issues it elicits as well as the extreme morbidity and mortality associated with it. As with this study, most studies on gunshot injuries adopted retrospective design<sup>19-21</sup>. A total of 47 cases orofacial gunshot wound was retrieved from Accident and Emergency department of the University of Benin Teaching Hospital during the study period. This puts orofacial gunshot injury presentation in our hospital at an average of about 9 cases per year. This number of orofacial gunshot cases was comparable 40 cases of gunshot wounds to the mouth, mandible, and maxilla was treated at Wake Forest University Medical Center over a 7- year period<sup>19</sup>, 44 patients treated for facial gunshot and shrapnel wounds at a medical center in a 10-year retrospective survey<sup>20</sup> and 55 cases reported in 61/2-year period<sup>21</sup>. These low figures point to the rarity of civilian gunshot orofacial injuries.

Gunshot injuries like other trauma affect mainly the male gender<sup>22-24</sup> and the extent of male dominance varies widely in different studies<sup>25-27</sup>. Males were affected more than females in our study at a ratio of approximately 3.3:1. This was similar to figures reported in Iraq among patients with orofacial missile injuries<sup>28</sup>. This presentation differed from earlier reported studies in Nigeria with 95.5% males among patients with orofacial gunshot injuries<sup>9</sup>. This is in conformity with the fact that males dominate most activities and are therefore highly prone to trauma of all sorts in our environment.

Gunshot injuries are most common among young males in the third decade of life<sup>6,15,29</sup>. In our study, the predominant age group affected was 20-29 years representing more than half of the victims (51.1%). A peak incidence in the 40-49 year age group has been reported in Nairobi, Kenya<sup>27</sup>. About three quarters (74.5%) of patients in this present study were 20-39 years which was comparable to 77.6% gunshot incidents reported among the 21-40 years age range in Calabar, Nigeria<sup>3</sup>. In this age group, looks are of paramount importance to the individual and any deviation could easily tilt to depression and withdrawal from society thus typifying orofacial gunshot injury a significant functional, cosmetic and psychological challenge.

Undergraduates consisted 40.4% of the patients in our study and this could be explained by cult activities and the close proximity of our study centre to a university. Violent cult activities among university undergraduates have escalated in the last two decades and reports of gun-related crimes, injuries and death are common place in Nigeria. The second most affected group are politicians who because of their wanton display of ill-gotten affluence and intra-party wrangling make them potential targets for armed robbers and hired assassins respectively.

A previous study on gunshot injuries in Nigeria revealed that a majority (75%) of the attacks occurred at night<sup>29</sup>. This contrasts with our findings in which about half (48.9%) of the patients were attacked in daylight, between 12.01 p.m. and 6.00 p.m. Due to the failure in effective policing by law enforcement agents, criminals have become bolder and most gun-related crimes no longer occur under cover of darkness. Only 29.8% of the orofacial gunshot injuries took place between for 12.01a.m. and 6.00 a.m.

Majority (63.8%) of the gunshot attacks in our study occurred indoors. This illustrates the interpersonal nature of gun-related crimes in Nigeria. The spree-killings reported in the western media is at present uncommon. This is consistent with the report by Adeagbo et al<sup>30</sup> but differed from another study that found that 65% of gunshot injuries occurred outside of the home<sup>31</sup>.

This study illustrates the changing pattern of causation and type of weapons in gunshot injuries in Nigeria. Earlier studies reported that armed robbers were responsible for the majority of attacks<sup>6,10,11,29</sup> and that the shotgun (dane gun) was the preferred weapon<sup>9</sup>. Our findings show that cultists were most often involved in orofacial gunshot injuries and the pistol was most often the weapon of choice. This may again be a reflection of the study environment where the assailants usually from affluent homes can afford the cost of a pistol.

Gunshot to the face causes severe morphological and structural alterations on both soft and bony tissues of the face which results in devastating functional and aesthetic consequences for patients. Anatomic repair of the soft tissue and bony injuries is recommended to obtain an optimal functional and aesthetic outcome<sup>21,32,33</sup>. It is known that facial appearance after reconstruction is positively correlated with social activity level<sup>34</sup>. Soft tissue repair are usually performed by primary closure, local flaps, or skin grafts, and rigid fixation was used for fractures while procedures such as distant flaps or bone grafting were left for delayed reconstruction<sup>35</sup>. In this study, the reduction and immobilization was the commonest hard tissue treatment while local flap transfer/flap repair was the commonest soft tissue treatment. The traditional treatment for war and civilian gunshot injuries to the face are debridement, soft tissue closure and conservative treatment of fractures, with closed reduction and external fixation<sup>36</sup>. The range of treatment rendered in this study fell into the traditional approach except for the bone grafting.

Gunshot injuries cause profound morbidity and significant mortality<sup>27</sup>. In this study, the mortality rate was 21.3%. This is comparable to 22.7% mortality rate documented by Ugboke et al<sup>9</sup> but higher than 11% mortality rate documented by Hollier et al<sup>37</sup>. The legal aspect of gunshot wound management in Nigerian is associated with long protocol which results in delayed emergency treatment and high mortality.

### *Conclusion*

Orofacial gunshot injuries most commonly afflict the young male undergraduates who are typically shot during the day with a pistol. This information is important in development of educational framework on security and in training of oral and maxillofacial surgeons and plastic surgeons to meet the demands.

**ACKNOWLEDGEMENT:** The authors wish to thank Prof. M.A Ojo for his guidance during the preparation of the manuscript.

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