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Research Article

Epidemiological pattern and outcome of head injuries during festive and non-festive periods in a tertiary hospital, Nnewi, Nigeria

Prosper O. U. Adogu[1]*, Nonye B. Egenti[2], Chika F. Ubajaka[1], Jude C. Anakwue[3], Anthony I. Ugezu[4]

[1]Department of Community Medicine, Nnamdi Azikiwe University, Awka, Nnewi Campus, Nigeria
[2]Department of Community Medicine, University of Abuja, Nigeria
[3]Faculty of Medicine, Nnamdi Azikiwe University, Awka, Nigeria
[4]Department of Surgery, Accident and emergency unit, Nnamdi Azikiwe University, Nnewi, Nigeria

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***Correspondence:**
Dr. Prosper O. U. Adogu,
E-mail: prosuperhealth50@gmail.com

ABSTRACT

Background: Head injury is trauma to the brain and/or its coverings as a result of an externally applied mechanical force. Study of epidemiological pattern of head injuries is essential in developing necessary preventive strategies and control. To compare the prevalence and pattern of head injuries during the non-festive (February – September) and the festive (October – January) periods in our environment.
Methods: Patients' case files at the Accidents and Emergency unit of Nnamdi Azikiwe University Teaching Hospital (NAUTH), Nnewi, were reviewed.
Results: Two hundred and sixty-six out of 4,846 met the inclusion criteria for traumatic head injury and were recruited for the study, giving a prevalence of 5.5%. About 77.4% of these presentations were males while 22.6% were females. Both males and females were affected more in the festive period (52.4% and 48.3%) than in the non-festive period (51.7% and 47.6%). The >20 – 30 year group recorded the highest presentation at 30.5%. Traders and Commercial Motorcyclists were the most affected occupations with 25.9% and 24.1% respectively, with the most common causes of head injury during both the festive and non – periods being motorcycle and motor vehicle accidents (68% and 18% respectively). About 63% presented with mild head injury, 14% with moderate and 23% with severe head injuries. About 11.4% were discharged, 83.9% were transferred to the ward for further evaluation and monitoring while 4.7% died at the Accident and Emergency department.
Conclusions: Traumatic head injury is one of the major causes of mortality and morbidity in our environment especially in the festive periods. Aggressive and sustained traffic safety education is recommended for all stakeholders in the broad field of accidentology.

Keywords: Epidemiological pattern, Head injuries, Festive periods, Tertiary hospital

INTRODUCTION

Head injury can be defined as injury or trauma to the brain and/or its coverings as a result of an externally applied mechanical force.[1] Traumatic brain which is a term used interchangeably with head injury has an estimated incidence of 600 per 100,000 per year (0.6% of a population) with a mortality of 19 per 100,000 in North America and 9 per 100,000 in Britain.[2] The brain coverings can be traumatized in head injuries resulting in various neurologic and physical damages.[3] Head injury may be open or closed. In a closed (non-missile) head injury, the skull is not broken. Open head injuries may be perforating (in which only the outer coverings and the skull are affected) or Penetrating (in which the meninges is breached and the grey matter is affected).[3] Brain

injuries may be diffuse, occurring over a wide area or focal, located in a small specific area or Coup (occurring at the same side of impact) or contra-coup (occurring at the opposite side of impact) which is worse if the head is in motion.[3]

Causes of head injury include: road traffic accidents (mobilopathy), home and occupational accidents, falls and assault, etc. Road traffic accidents and motorcycle accidents are a common cause of head injuries in the young and middle aged groups in our environment.[4] Some specific outcomes of head injuries include.[4] Lacerations to the scalp and bleeding from the skin, skull fractures which may be linear or depressed, traumatic extradural or epidural hematoma (Bleeding between the dura and the skull), traumatic subarachnoid haemorrhage, cerebral contusion - a bruise to the cerebral parenchyma, concussion - temporary loss of function due to trauma, punch-drunk syndrome (dementia pugilistica) seen in boxing and other contact sports, shaken baby syndrome may be seen in child abuse, coma and death in severe cases. Presentations vary according to the injury. Some patients with head trauma stabilize while others deteriorate.[4] The Glasgow consciousness scale is a tool used for measuring the degree of consciousness and is thus a useful tool for determining the degree and severity of injury in both adult and paediatric age groups.

Head injury is a major health problem in developed and developing nations.[5] The sheer volume of milder injuries poses a logistic problem for accident and emergency departments and surgical wards. Also alcohol-related head injuries are a very common occurrence due to the level and manner of alcohol consumption especially during festive periods and also due to carelessness of individuals who consume alcohol and operate cars and motorcycles.[5] Gender also plays a critical role in the epidemiology of head injuries. Studies have shown that men are more susceptible to head injuries due to their various occupations, sporting activities and basic consciousness/adherence to traffic regulations which is marginally higher in the female gender.[6]

Studying the patterns of head injuries is essential in developing preventive strategies. The importance of analysing the aetiology of head injuries, the circumstances and settings in which they occur in our environment is to identify risky behaviours and/or unsafe environment which can be circumvented by specific preventive measures. As there is also limited literature on the topic in this part of the world, this study is needed to help proffer solutions to these issues stated above.

The general objective of this study is to compare the epidemiological pattern and outcomes of head injuries between the non-festive (February – October) and the festive (November – January) periods in our environment.

METHODS

Area of study

The study was carried out in Nnamdi Azikiwe University Teaching Hospital Nnewi (NAUTH), Nnewi north local government area of Anambra state. Nnewi is the second largest city in Anambra state and is noted for its high commercial activities. According to the Nigerian census conducted in 2006. Nnewi has an estimated population of 391,227.[7] The teaching hospital caters for the health needs of the people of the area and beyond. The hospital offers a conducive learning environment for medical students and students of other health sciences.

Study population

The study was carried out among patients who presented with different degrees of head injury at the accidents and emergency (A & E) department of NAUTH Nnewi from the 1st of February 2014 to the 31st of January 2015.

Inclusion criteria

The study included only patients who presented with different degrees of head injury at the A & E department of the teaching hospital between the 1st of February 2014 and the 31st of January 2015.

Study design

The study was a patient's case-file-based descriptive cross sectional study of epidemiological patterns and outcomes of head injuries amongst the patients who presented at the accidents and emergency unit of NAUTH Nnewi within the period under review.

Sample size

This was obtained using the formula below $n = z^2pq/d^2$**,**

where n = minimum sample size**,** z = standard normal deviate (1.96)**,** p = prevalence of head injuries within the specified time (0.5 used for the sample size needed), q = (1-p)**,** d = 0.05 constant (degree of accuracy).

$N = (1.96)^2 \times 0.5 \times 0.5 / (0.05)^2$ 0.0025= 0.9604 = 384.16

The sample size was then worked out using the formula: nf =n/(1+n/N)

Where N=the estimate of the population size, nf =the desired sample size when the population is <10,000, n=the desired sample size when the population is >10,000

Thus nf = 385.16 / 1+384.16/250 = 249.45

Allowing for 5% attrition on the sample size, Total sample size = 250 + 12.5 = 262.5.

A total number of 270 patients were recruited for the study.

Study instrument

The folder numbers of patients with head injuries admitted into the A & E department were copied out from the medical records department and the numbers were used to retrieve the folders/case notes of the selected patients. Relevant data on age, sex, occupation, mechanism of head injury, associated loss of consciousness, other co-morbidities, place of initial treatment if any and outcome were collected using the proforma.

Data analysis

A coding guide was developed to facilitate data entry. The data was analysed with the IBM statistical package for social sciences (SPSS) software, version 20.0 using descriptive statistics, and cross-tabulation. The results were presented in tables and bar charts.

Limitation of the study

The study was based solely on hospital records which may sometimes display incomplete data. Luckily, only very few folders had such deficiency and as such did not significantly affect the study outcome.

Table 1: Distribution of head injury according to gender.

	Mobilopathy		Others		
Months	Motor vehicle accident	Motorcycle accident	Assaults	Falls	Total
January	4	26	1	2	33
February	2	25	2	2	31
March	2	8	1	1	12
April	2	9	0	2	13
May	3	8	2	1	14
June	2	6	1	2	11
July	2	8	0	1	11
August	3	11	2	1	17
September	1	16	1	0	18
October	8	20	0	4	32
November	9	28	1	3	41
December	12	16	0	5	33
Total	50	181	11	24	266

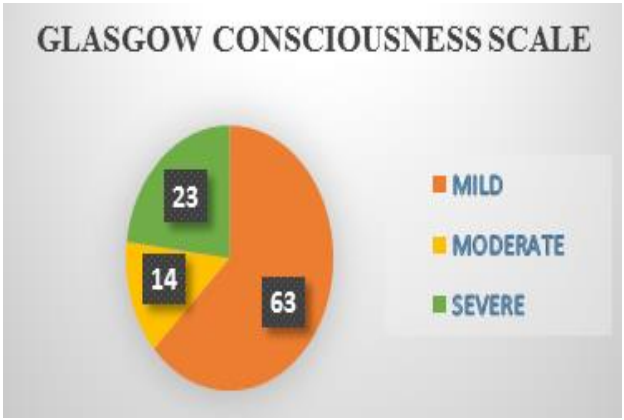

Figure 1: Glasgow consciousness scale distribution at presentation.

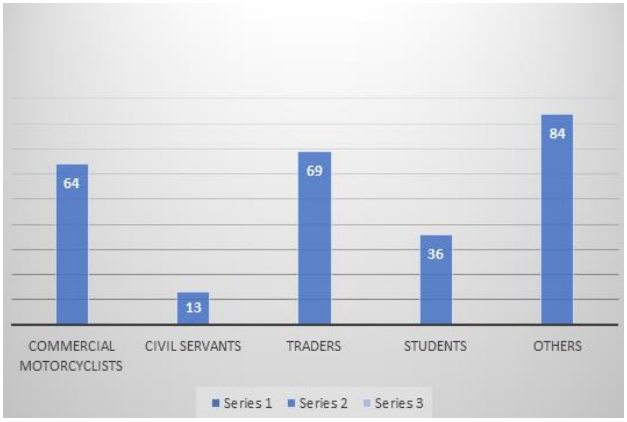

Figure 2: Distribution of head injury according to occupation.

RESULTS

A total of 4,846 patients presented to the Accident and Emergency Department during the study period. Of these, 266 (5.5%) met the inclusion criteria for traumatic head injury and were recruited for the study. This translated into average presentation of about 22 cases per month and 6 cases per week. A little over half of all cases 136 (51.1%) presented to the Accident and Emergency of NAUTH, Nnewi directly from the accident site while the remainder 130 (48.9%) were referrals from other primary, secondary, or tertiary centres or health institutions.

Table 1 showed that in the four (4) months that make up the festive period (October – January), 31 (51.7%) females presented with head injuries as opposed to the remaining 29 (48.3%) that presented within the remaining eight (8) non – festive months. Males constituted a large majority with 206 (77.4%) patients while females were 60 (22.6%) and a Male – Female ratio of 3.4:1.

Males were affected to a greater extent in the festive periods with 108 (52.4%) males presenting in the four (4) festive months and the rest (47.6%) presenting in the eight (8) non – festive months. The festive months showed a Male – Female ratio of 3.5:1 while the non – festive months showed a Male – Female ratio of 3.4:1.

Table 2 showed the highest prevalence of 81 (30.45%) occurred in the >20 – 30 year age group, followed by the >30 – 40 year age group with 50 (18.80%). The >40 year groups constituted a cumulative proportion of 69 (25.94%). The age group most affected during the festive periods are the >20 – 30 year group with 49 cases, followed by the >30 – 40 age group with 22 cases and >10 – 20 with 17 cases.

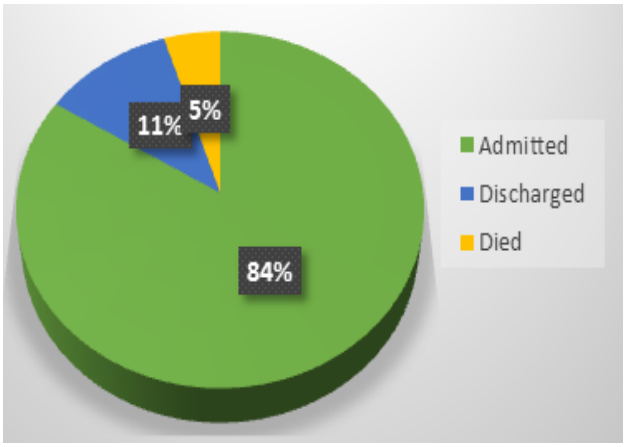

Figure 3: Outcome of head injury.

The scale shows that 63% had mild, 23% severe, while 14% had moderate head injury.

Figure 2 shows that traders had the highest number of head injuries with 69 (25.94%) cases, followed by Commercial motorcyclists 64 (24.05%), and students 36 (13.53%). Civil servants were least affected with 13 (4.99%) cases. All those who could not fit into these occupations including the retired, dependents and children were all classified as 'Others', and were 84 (31.58%).

Table 2: Age distribution of head injuries in the festive and non – festive periods.

Age groups (years)	Frequency	%	Festive period	Non festive period
0 – 10	32	12.03	13	19
>10 – 20	34	12.78	17	17
>20 – 30	81	30.45	49	32
>30 – 40	50	18.80	22	28
>40 – 50	26	9.77	14	12
>50 – 60	18	6.77	9	9
>60 – 70	15	5.64	8	7
>70 – 80	6	2.26	4	2
>80 – 90	4	1.50	1	3
Total	266	100	137	129

Table 3: Cause of head injury according to gender.

Cause of Head injury	Males	%	Females	%
Motor vehicle accidents	41	15.4	9	3.4
Motorcycle accidents	148	55.6	33	12.4
Falls	10	3.8	14	5.3
Assaults	7	2.6	4	1.5
Total	206.	77.4	60.	22.6

Table 3, the most common cause of traumatic head injury was Motorcycle accidents 181 (68%), followed by Motor vehicle accidents 50 (19%), Falls 24 (9%), and Assaults 11 (4%). The leading cause of head injury in males was found to be Motorcycle accidents with 148 (55.64%) males affected as opposed to 33 (12.41%) females. This is followed by Motor vehicle accidents with males 41 (15.41%) more affected than females 9 (3.38%). Females 14 (5.26%) were more affected by falls than males 10 (3.76%).

Table 4 shows the most common cause of head injury during the festive months (October - January) as Motorcycle accidents with 90 presentations, followed by Motor vehicle accidents with 33 presentations, Falls 14 and assaults 2. In the non – festive months, the most common cause of head injury remains Motorcycle accidents with 91 cases, followed by Motor vehicle accidents with 17 cases, Falls 10 and assaults 9. The months of January, February, October, November and December had the highest numbers of case presentations with 33,31,32,41 and 33 cases respectively.

Of the 266 cases that presented during the study period, 30 (11.4%) were discharged, 223 (83.9%) were transferred to the ward for definitive management (4.3 cases per week) while 13 (4.7%) died at the Accident and Emergency department (Figure 3).

Table 4: Monthly distribution of various causes of head injury.

Months	Freq.	%	Males	%	Females	%
January	33	12.4	26	12.6	7	11.7
February	31	11.7	26	12.6	5	8.3
March	12	4.5	9	4.4	3	5.0
April	13	4.9	10	4.9	3	5.0
May	14	5.3	12	5.8	2	3.3
June	11	4.1	7	3.5	4	6.7
July	11	4.1	8	3.9	3	5.0
August	17	6.4	13	6.3	4	6.7
September	18	6.8	13	6.3	5	8.3
October	32	12.0	25	12.1	7	11.7
November	41	15.4	32	15.5	9	15.0
December	33	12.4	25	12.1	8	13.3
Total	266.	100.	206.	100.	60.	100

DISCUSSION

Traumatic brain injury (TBI) remains an important cause of mortality and morbidity in our environment especially during the festive periods. In this study, a prevalence far higher than that seen in Johannesburg (316 per 100,000) and the United States (444 per 100,000) was found.[8,9] This result furthermore stresses the public health significance of TBI in our environment and highlights the need for a better intervention protocol for improved outcome.

The greatest cause of TBI in this study is mobilopathy (road traffic accidents) with the motorcycle being the biggest contributor to this, a finding correlating with most local and regional studies in Nigeria.[10-13] This finding, however, is at a discord with the situation in the US where falls were reported to be the leading etiologic factor.[9] Interpersonal violence accounts for 51% of non-fatal TBI among Africans, as against 10% for whites, while motor vehicle accidents cause 27% of African non-fatal TBI and 63% among whites.[8] Indeed, the dominance of motorcycle accidents in our environment is a serious indictment on the safety of our roads and attitude of the motorcyclists.[14]

This study showed that males are more affected by TBI, more especially in the festive season with a Male-Female ratio of 3.5:1, as opposed to the ratio in non-festive seasons which is 3.4:1. This may be attributed to the busy nature of the roads which are nonetheless bad at these periods, the increased rush of people shopping for the period, the near-complete lack of obedience to the traffic signs and the increase in the consumption of alcohol or other stimulants, mainly by males. Similar Male-Female ratios were obtained in studies involving Africans but showed marked contrasts in the gender preponderance, male to female ratio and overall incidence among whites. Among Africans, the male – female ratio was 4.4:1, but for whites, it is 40.1:1.[8]

As has been previously reported by other local studies in Nigeria, the very active >20 – 30 year group are the most commonly affected, majority being affected by mobilopathy especially motorcycle accidents.[10-13] This is as opposed to the 15 – 19 years old peak incidence age in the US perhaps as a result of the fact that US youths drive cars at an earlier age than Nigerian youths who would usually take up motorcycle driving at this age.[15] Falls are shown to be a greater etiologic factor at the extremes of age and this is in agreement with most other studies.[16-20] The small rise in the incidence of falls during the festive periods may also be attributed to alcohol intoxication, indiscriminate use of illegal drugs, carelessness and child abuse.

Looking at the various occupations of the affected patients, it shows that Traders and Commercial Motorcyclists were those mostly affected, especially during the festive season. This can also be due to the increased rush in our roads, the small sizes of the lanes which are worsened by the presence of hawkers and roadside sales persons, recklessness on the side of the drivers, poor road traffic laws and lack of its enforcement. Students, civil servants, children and dependent people are also affected, although to a lesser extent than other age groups.

The Glasgow consciousness scale (GCS) at presentation showed that a large percentage of patients that presented during the period of this study had mild head injury (63%), others having moderate and severe head injuries

(14% and 23% respectively). This coincides with the study outcome in Eastern China but is not in concordance with the result of Nigerian studies which recorded much fewer mild head injuries than severe ones.[3,5,8]

The outcome of the cases that presented during the study period was such that 95.3% survived the head injury and were either discharged or further managed, while 4.7% died at the Accident and Emergency department. This is partly attributable to the high level of efficacy and expertise of the Emergency team and Neurosurgery department who work tirelessly, even in a state of limited resources to promote the outcome of TBI in the centre. Similar results were recorded in a Glasgow-Outcome-Scale-based assessment in Eastern China; 10.8% of the patients died, 2.6% were in vegetative state, 2.2% had severe disability, 7.2% had moderate disability and 77.3% had good recovery (The outcome depending on age, injury mechanism and initial Glasgow Consciousness Scale score).[21]

In this study, mode of presentation was almost equally split, with a little over half of the patients presenting directly to the centre while the remainder are referrals from other health institutions. However, a different scenario was discovered in a University College Hospital, Nigerian study in which 92.6% of the cases were referred from other medical facilities while 7.4% presented straight from the site of the incident.[11] The situation as found in our study is believed to be due to the fact that Nnamdi Azikiwe University Teaching Hospital, Nnewi is the most equipped tertiary centre in the state with capabilities to optimally manage these patients so as to produce a good outcome and reduce mortality attributable to traumatic brain injuries.

CONCLUSION

This study has shown that traumatic brain injury is one of the major causes of mortality and morbidity in our environment. The result showed that road traffic accidents, mostly those involving motorcyclists are the most common cause of TBI during festive periods in our environment; Traders are more affected than other occupations and the most affected age group is the >20 – 30 group and males have a greater percentage of those affected. This highlights the need for sensitization of our youth on the traffic rules and the need for safety measures, building and maintenance of roads by the government, implementation and enforcement of the road traffic rules by the Federal Road Safety Commission (FRSC) especially during the festive periods when the number of motorists on the roads and a certain level of recklessness are expected to be on the increase.

Recommendations

In view of the findings in this study, the following recommendations are made.

1. More attention should be paid by the government and various research bodies to the prevalence of TBI so as to provide more accurate information to the general populace.
2. Training of health workers and the general populace on the procedure of cardio – pulmonary resuscitation and first aid of patients with TBI so as to help reduce morbidity and mortality.
3. Equipping all government – controlled hospitals with new generation cutting – edge technology for the management and rehabilitation of patients with head injury.
4. Improvement, expansion and maintenance of the state of the roads so as to reduce the incidence of road traffic accidents.
5. Enforcement of the laws against child abuse, assaults, battering and institution of heavy fines or jail sentences to those found guilty of these crimes.
6. Sensitization of the youths especially during festive periods on the need to be safety conscious, drive carefully and to desist from use of stimulants and/or alcohol especially when or before driving.
7. Enforcement of the use of helmets by the FRSC especially during festive seasons to reduce the presentation of head injury.
8. Further studies on the incidence of head injury and its frequency during the festive seasons in other areas and amongst other socio – economic groups should be encouraged.

Limitations

This study was carried out in a single referral center in Nigeria, and therefore has limited generalizability of its findings.

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