Journal of Health, Medicine and Nursing
ISSN 2422-8419 An International Peer-reviewed Journal
Vol.42, 2017

Injury Characteristics among Traumatic Brain Injury Patients on Admission at a National Teaching and Referral Hospital in Kenya

Joan Matendechere Shisoka (Corresponding author)
School of Nursing, The University of Nairobi
P.O BOX 00100-30197, Nairobi, Kenya
Mobile Number: +2540722310257 E-mail: joanshisoka@gmail.com

Lillian Adhiambo Omondi
School of Nursing, The University of Nairobi
P.O BOX 00100-30197, Nairobi, Kenya
Mobile Number: +2540720861317 E-mail: laomondi@uonbi.ac.ke

Samuel T. Kimani
School of Nursing, The University of Nairobi
P.O BOX 00100- 30197 , Nairobi, Kenya
Mobile Number: +2540722384917 E-mail: tkimani@uonbi.ac.ke

Abstract

Introduction: Traumatic brain injury (TBI) is one of the leading causes of admissions in hospitals globally. It is associated with significant morbidity and mortality.TBI is a neurosurgical emergency and timely intervention is critical to favorable outcome. **Study objective**: To determine the injury characteristics among traumatic brain injury patients on admission at a national teaching and referral hospital in Kenya **Methodology**: A descriptive cross-sectional design was used for this study, with purposive sampling method being adopted. Data was collected from 91 patients with traumatic brain injuries by use of a check list. **Results:** The results showed that majority of the patients had severe head injury (n=79). There was a significant relationship between age above 40 years, low GCS and severity of brain injury (P= 0.042). There was no significant relationship between severity of brain injury and patients' gender, marital status and level of education. However occupation yielded a significant association with severe brain injury with casual laborers having the lowest GCS (P=0.042). **Conclusion:** Majority of patients who had polytrauma had severe TBI at admission.
Key words: Brain Injury, Injury characteristics, Traumatic Injury, Brain injury on admission**.**

Introduction

Traumatic Brain Injury (TBI) remains the leading cause of death and disability in young adults. The Brain Trauma Foundation estimates that 1.6 million head injuries occur annually in the United States. Out of these, approximately 50,000 die while 70,000 to 90,000 are left with permanent neurological disabilities[1]. Head injuries cause a huge financial burden, which is estimated to be about $75 billion each year in the United States. Similarly, in Canada, the costs of head injuries remain high, with about 18,000 Canadians being admitted to hospital with traumatic brain injury, hence an extrapolated societal cost which exceeds $1 billion[2]. Traumatic brain injury (TBI) results from an external mechanical force applied to the cranium and the intracranial contents, leading to temporary or permanent impairments, functional disability, or psychosocial maladjustment. TBI can manifest clinically from concussion to coma and death. Injuries may be primary injury, which occurs at the moment of trauma, and or secondary injury, which occurs immediately after trauma and produces effects that may continue for a long time[3]. Many TBI patients have polytrauma, injuries to other parts of the body in addition to the head and brain. Trauma victims often develop hyper metabolism or an increased metabolic rate, causing muscle wasting and the starvation of other tissues. Complications related to pulmonary dysfunction can include neurogenic pulmonary edema (excess fluid in lung tissue), aspiration pneumonia (pneumonia caused by foreign matter in the lungs), and fat and blood clots in the blood vessels of the lungs[4]. A serious and common complication of TBI is erosive gastritis, or inflammation and degeneration of stomach tissue. This syndrome can cause bacterial growth in the stomach, increasing the risk of aspiration pneumonia [5].

1.1 Study objective

To establish the injury characteristics among traumatic brain injury patients on admission at a National Teaching and Referral Hospital in Kenya

2. Literature review

Several studies have been performed in relation to TBI injury characteristics. In relation to age, children are known to have a lower mortality and better quality of recovery than adults after brain injury [6]. A study done on severe brain injury patients showed that the outcome of patients below the age of 13 years had better outcome[7]. In another study on pattern and early outcome of pediatric cranioinjury, initial GCS at 24 hours strongly correlated to outcome, with RTA victims and surgery having a significant relationship to poor outcome[8]. Increasing age was associated with worse outcomes but this association was apparent only after age 40. Plausible explanations for this include extra cranial comorbidities, changes in brain plasticity, or differences in clinical management associated with increasing age [9]. A retrospective population-based survey to describe the epidemiology of 204 hospital-referred head injury patients in Ardabil City showed that majority of the respondents (71.6%) were males. About 56.4% of them were single and the mean age was 22.6 ± 25.9 (range: 1–89). Most of the TBI victims (60.8%) were young, with 19.1% of them being self-employed. In terms of injury severeity, 24.5% of them had severe head injuries with road traffic accidents contributing to 41.7% of the accidents[10]. Another study was carried out in relation to the characteristics of moderate and severe traumatic brain injury of motorcycle crashes in Bandung (Indonesia) from January 1, 2013 to June 30, 2014, with a total of 2108 head injury patients being received at the emergency department. The study established that most of the injury victims were males (80.8%) and majority (96.1%) of them were aged below 60 years. About 62.8% of them had sustained head injuries as result of motorcycle related accidents, with 30.7% of them having moderate or severe TBI. During the study period, the mortality rate was 29.2%. Among the causes of the accidents, 14.0% were attributed to alcohol intoxication[11]. Results of a study on the correlation between Glasgow Coma Scale (GCS) and brain computed tomography-scan findings in head trauma patients showed that 80.5% of them had a GCS 13–15. Among these, 76 were younger than 12 years, 22 were aged 13–18 years, 39 aged 19–30 years, and 63 aged more than 30 years. Regarding type of trauma, the highest frequency of head trauma occurred in younger than the 12 years group (38.0%), followed by the age groups older than 30 years (31.5%) and 19–30 years (19.5%). The most common causes of head injury was road traffic accidents. About 45% of the victims had a GCS of 15, 10.5% had GCS ranging from 9 to 12 while 9% had GCS of less than 8. On categorizing the injuries, 77.1% had mild head injury, 11.0% had a moderate head injury, while 11.9% presented with severe head injury[12]. To establish the epidemiology, clinical characteristics and outcomes of head injured patients in an Ethiopian emergency centre, a study was carried out among 204 head injury patients. It was established that 41% of the injuries resulted from road traffic accidents. Among the patients, 25% had a GCS of less than 9 while 26.0% had multi-system trauma [13]. A total of 14,948 of patients presenting with traumatic brain injury from 77 hospitals in eastern China were involved in a study to establish the epidemiology of traumatic brain. Most of the respondents were male adolescents and young adults, whose cause of TBI was mainly road traffic accident. Results of the study also revealed that 62% of the patients had mild TBI, 18.1% had moderate TBI with 20% of the patients having severe TBI [14].

3. Methodology of the study

3.1 Study design

Descriptive cross-sectional study design was used to collect data from a total of 91 patients with Traumatic brain Injuries who were received at the KNH accident and emergency department between the month of May and June 2013.

3.2 Validity and reliability of the data collection tools

Pretesting of the data checklist was done at the KNH accident and emergency department using 10 patients, following which the tools were refined and updated accordingly. Double data entry and cross-checking of the data collection tools before and after entry was also carried out.

3.3 Data collection

Data was collected through clinical observation of traumatic brain injury patients and their treatment record files. This was done by the principle investigator and two research assistants. Their roles included purposive sampling of the TBI patients who fall in the inclusion criteria, carrying out clinical observations of the patients and filling up the data collection charts as well as the treatment record files.

3.4 Data analysis

Both qualitative and quantitative data were collated and entered into the SPSS programme for analysis. For quantitative data, Chi square was used to determine the relationship between variables ($P \leq 0.05$), while qualitative data was collated and summarized into themes. Coding was done following which the data was entered into SPSSS programme for analysis. .Logistic regression was used to determine the cause effect relationships between various variables.

3.5 Ethical clearance

The researcher obtained ethical clearance from the University of Nairobi Research Ethics Committee. Permission to carry out the study in KNH was sought from the Kenyatta National Hospital administration and the management of the various data collection points in the hospital. Informed consent was obtained from the study participants or their significant others (for the patients who had suffered from severe head injury). During the study, participants' privacy was upheld, with all information gathered being handled with utmost confidentiality. Raw data was kept in a safe under key and lock and was only accessible to authorized persons only.

4. Study results

4.1 Socio-demographic characteristics of the study participants

Table 1 below shows that the respondents' age ranged between 18 and 65 years. Majority of them were aged between 21-30 years 52.7% (n=48) followed by 31-40 years 17.6% (n=16) and 41-50 years 13.2% (n=12). The age groups of 51-60years and the less than 20 years tied at 6.6% (n=6) respectively. Respondents aged above 60 years comprised 3.3% (n=3) of the total study participants. In terms of gender, majority of the respondents (89%, n=81) were males while females were 10 (11%). The study also established that most of the respondents (51%, n=45) were not married, while 39% (35) were married. Most of the TBI patients interviewed had attained tertiary level of education 74.1% (n=66) with those who attained secondary level of education being 21.3% (n=19), while the respondents who had primary level of education were slightly less than 5%. Occupation of the traumatic brain injury patients was varied, with most of them being unemployed (31.8% , n=28), followed by casual laborers (29.2%, n=26). About 25.8% (n=23) of the respondents were professionals while 13.5% (n=12) were self employed.

Table 1: Respondents' socio-demographic characteristics

Variables	Frequency	Percentage
Age groups (years)		
20 years and below	6	6.6
21-30	48	52.7
31-40	16	17.6
41-50	12	13.2
51-60	6	6.6
Above 60	3	3.3
Marital status		
Married	35	39.3
Divorced	4	4.5
Single	45	50.6
Separated	7	5.6
Gender		
Female	10	11
Male	81	89
Education level		
Primary	4	4.5
Secondary	19	21.3
College/polytechnic	36	40.4
University	32	33.7
Occupation		
Professional	**24**	**25.8**
Casual laborer	**26**	**29.2**
Unemployed	**29**	**31.5**
Self employed	**12**	**13.5**

4.2 Injury characteristics among the study participants on admission

Table 2 below shows the results of association between patient characteristics and injury characteristics. The results demonstrated that majority of the patients had severe head injury (n=79). Based on age, majority of the respondents who were aged between18-30 and above 40 years with 88.9% and 90.5% respectively had severe head injury. The study demonstrated a significant relationship between age above 40 years and severity of brain injury (P= 0.042). There was no significant relationship between severity of brain injury and gender, marital status and the respondents' level of education. However occupation yielded a significant association of severe brain injury with casual laborers being the most affected (P=0.043).

Table 2: Injury characteristics of the study participants on admission

Patient characteristics	**Injury characteristics**		χ^2	**P-value**	**OR**
	Severe head injury n (%)	Moderate head injury n (%)			
Age					
18-30 years	48(88.9)	6(11.1)	2.4	0.324	1
31-40 years	12(75)	4(25)		0.174	0.375
41-70 years	19(90.5)	2(9.5)		**0.042***	1.187
Gender					
Female	9(90)	1(10)	0.1		1
Male	70(86.4)	11(13.6)		0.753	0.707
Marital status					
Married	32(88.6)	4(11..4)	3.38	0.22	1
Single	41(88.9)	5(11.1)		0.103	0.25
Previously married (separated, divorced)	6(66.7)	3(3.33)		0.964	0.969
Educational level					
Secondary or less	22(91.3)	2(8.7)	0.718	0.705	1
College/polytechnic	32(86.1)	5(13.9)		0.551	0.59
University	25(83.3)	5(16.7)		0.403	0.476
Occupation					
Casual laborer	17(70.2)	9(29.8)	5.49	**0.043***	1
Unemployed	26(89.3)	3(10.7)		0.355	3
Professional	17(73.9)	6(26.1)		0.163	0.34
Self employed	11(88.3)	2(16.7)		0.605	0.6

4.3 Causes of injuries among the respondents

Figure 1 below shows the distribution of causes of injury of the respondents. The study results showed that Road Traffic Accident (RTA) was the leading cause (42.9%) of TBIs among the respondents, followed by assault (36.3%) and then falling from height (15.4%). Other causes included injury by falling objects (4.4%).

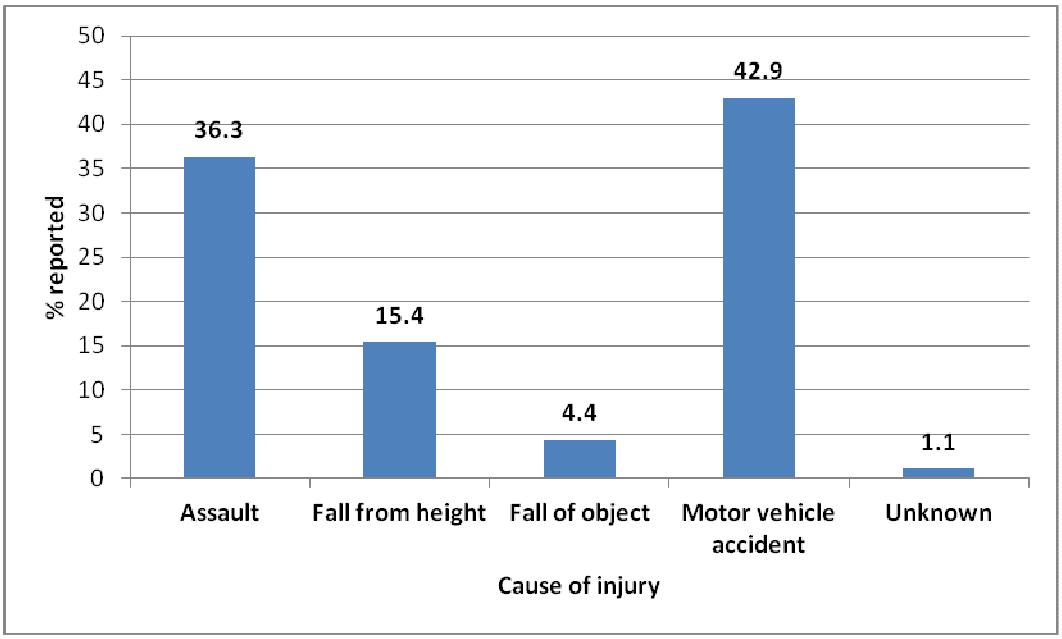

Fig 1**:** Causes of injuries among the respondents

5. Discussion of the study findings

The study established that majority of the respondents (52.7%) belonged to the age group between 21-30 years followed by 31-40 years (17.6%). In terms of gender, majority of the respondents (89%) were males while females were 10 (11%) and most of the respondents (51%) were not married, while (39%) were married. Most of them were unemployed (31.8%), followed by casual laborers (29.2%). Similarly, a retrospective population-based survey to describe the epidemiology of 204 hospital-referred head injury patients in Ardabil City showed that majority of the respondents (71.6%) were males and about 56.4% of them were single. Their mean age was 22.6 ± 25.9 [10.] The current study also established that most of the respondents were unemployed (31.8%), followed by casual laborers (29.2%). The fact that most of the study participants were either unemployed or casual labourers could have been a contributory factor to the injuries, since they might have been involved in risky jobs like working in construction buildings. This is explained by the study findings of this study that about 19.9% of the injuries were either caused by falling from heights or being injured by falling objects. Findings of the current study demonstrated that majority of the patients had severe head injury. The study also showed that occupation yielded a significant association of sustaining severe brain injury with casual laborers being the most affected (P=0.043). This was contrary to the findings of a study on the characteristics of moderate and severe traumatic brain injury of motorcycle crashes in Bandung (Indonesia) from January 1, 2013 to June 30, 2014, involving a total of 2108 head injury patients which established that 77.1% of the TBI victims had mild head injury, 11.0% had a moderate head injury, with only 11.9% of them presenting with severe head injury [11]. Researchers in the current study demonstrated that Road Traffic Accident (RTA) was the leading cause (42.9%) of TBIs among the respondents, followed by assault (36.3%) and then falling from height (15.4%). Similar findings were realized in a study on the epidemiology, clinical characteristics and outcomes among 204 head injury patients in an Ethiopian emergency centre with showed that the leading cause of the injuries was road traffic accidents[13].

6. Conclusion and recommendations

6.1 Conclusion

Majority of the TBI victims presented with severe head injury, with the leading cause of the injuries being road traffic accidents.

6.2 Recommendations

Most of the TBI victims presented with severe head injuries, neuro-intensive care units should be strengthened to manage the injured patients. Reinforcement of the existing road safety measures for motorists and other road users should also be emphasized.

References

1. Cheung S.Y (2007). Outcome of traumatic head injury in Hong Kong. *International journal of care of the injured.38;76-80*

2. Roukoz B. Chamoun, Claudia S. Robertson, and Shankar P. Gopinath. Outcome of traumatic head injury patients. *Journal of Trauma. 2006: 278-281.*

3. Fausi A.S, Longo D.L, Hauser S.L. (2008). Harrisons Principals of Internal Medicine.17th edition. The McGraw-Hill Companies. USA.

4. Bazarian, JJ, Cernak I, Noble-Haeusslein L, Potolicchio S, Temkin N. 2009. Long-term neurologic outcomes after traumatic brain injury. *Journal of Head Trauma,* Rehabilitation 24:439-451.

5. Hukkelhoven CW,Steyerberg EW, Habbema JD. (2005). Predicting outcome after traumatic brain injury: development and validation of a prognostic score based on admission characteristics. *Journal of Neurotrauma 22:1025-39.*

6. Bullock M.R. (2009). Prevention of death in head injury in Natal. *South African Medical Journal. 73:523-527*

7. Mwangombe N.J, Kiboi J. (2001). Factors influencing the outcome of severe head injury patients at Kenyatta National Hospital. *East Africa Medical Journal. 78(5):238-241*

8. Mwangi j. (2005) .The pattern and early outcome of pediatric craniovertebral injuries managed at Kenyatta National hospital. *MMED Thesis, University of Nairobi.*

9. Bruns J and Hauser WA. (2003). The epidemiology of traumatic brain injury: a review. *Journal of Neurosurgery*; 44-10:2-10.

10. Farzahen E, Ardalani GF, Abbasi V, Aghdam FK, Molaei B and Ojaghi H. (2017). The Epidemiology of Hospital-Referred Head Injury in Ardabil City. *Emerg Med Int*; 2017: 1439486

11. Faried A, Bachani AM, Sendjaja AN, Hung YWand ArifinAZ (2017). Characteristics of Moderate and Severe Traumatic Brain Injury of Motorcycle Crashes in Bandung, Indonesia. *World Neorosurgery*; 100: 195-200

12. Afsharian T and Nayebaghayee H. (2016). Correlation between Glasgow Coma Scale and brain computed tomography-scan findings in head trauma patients, *Asian Journal of Neurosurgery*; 11(1): 46-49

13. Landes M, Venugopa R, Berman S, Heffernan S, Maskalyk J, Azazh A. (2017). Epidemiology, clinical characteristics and outcomes of head injured patients in an Ethiopian emergency centre, *African Journal of emergency medicine*

14. Wu X, Hu J, Zhuo L, Fu C, Hui J and Wang Y et al. (2008). Epidemiology of traumatic brain injury in eastern China, 2004: a prospective large case study; *Journal of Trauma*. 64 (5): 1313-9