Original Article

Blunt trauma head injuries and time to death in the cases autopsied at a tertiary care centre

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Abstract

Background: In developing countries, accident rates in general and traumatic head injuries in particular are increasing as traffic increases besides other factors like industrialization, falls and ballistic trauma. Most injury related deaths and disabilities are preventable.

Objective: To find out the relationship between the extent and severity of fatal blunt trauma injuries in head region with duration of survival (time to death), place of death, hospitalization status and intoxication status.

Methods: This was a hospital based, cross sectional and analytical study done on the cases brought for postmortem examination at a mortuary of B. P. Koirala Institute of Health Sciences, Dharan, Nepal over one year period (13th April 2012 to 13th April 2013). Appropriate statistical test was used to compare the Injury Severity Score (ISS) with duration of survival, place of death, hospitalization status and intoxication status.

Result: Significant difference was present between ISS of hospitalized cases and not hospitalized cases, of cases who died within half an hour (spot death) and between half hour and 6 hour (death at emergency) but there was no significant difference among other different cases who were hospitalized and between intoxicated and not intoxicated at the incident.

Conclusion: This study has shown the time to death in blunt trauma head injury cases with higher ISS is less as compared to those with less ISS. The ISS is also significantly different for hospitalized and not hospitalized cases. This shows us to focus more on preventive strategies of such injuries.

Keywords: Autopsies, Blunt Head injuries, Injury Severity Score

Introduction

Injuries are the third leading cause of death worldwide, causing more than five million deaths annually.[1] Injuries constitute the leading cause of death among children, adolescents and young adults aged 1 to 44 years.[2] Indeed, almost 50 percent of all injury related deaths are among 15-44

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years age group.[3] Each year, injury accounts for more than five million deaths globally. The overall burden of injury in terms of morbidity and mortality is underestimated; while ignoring the number of survivors of injuries, many of whom suffer life-long health consequences. Traffic collisions, falls, drowning, burns and deliberate acts of violence against oneself or others are among the causes of these injuries. In developing countries; accident rates in general and traumatic head injury in particular are increasing as traffic increases besides other factors like: industrialization, falls and ballistic trauma. Most injury related deaths and disabilities are preventable.[4] This study is done with the view to guide policy makers for prioritizing between preventive strategies and therapeutic strategies. For this purpose, this study is done with objective to find out the relationship between the extent and severity of fatal blunt trauma injuries in head region with duration of survival (time to death), place of death, hospitalization status and intoxication status from detail of death scene investigations, history, medical case sheets of hospitalized cases and of the medico-legal autopsy findings. This will also enhance the knowledge of the medical faculty in the field of early diagnosis and management of such injuries.

Materials and Methods

This was a hospital based, cross sectional and analytical study done on the cases brought for postmortem examination at a mortuary of B. P. Koirala Institute of Health Sciences, Dharan, Nepal over one year period (13th April 2012 to 13th April 2013). A routine medico-legal autopsy of these cases was performed and the injuries were noted. The injuries in all the body parts were noted and allotted the Abbreviated Injury Scale (AIS) score as described in the Abbreviated Injury Scale 2005, Update 2008[5] scale book published by the Association for the Advancement of Automotive Medicine. The injuries with their respective scores were entered into a simplified chart; the 3 highest AIS scores in the 3 among the 6 different body regions were squared and were added to obtain the ISS of the case. If the AIS score in any of the 6 body regions was 6, then the ISS was automatically scored 75. Normal distribution of ISS was checked and then appropriate statistical test was used to compare the ISS with duration of survival, place of death, hospitalization status and intoxication status. The probability of significance was set at 5% and 95% confidence limits.

Inclusion and exclusion criteria:

Cases with head injury produced by blunt trauma were included in the study while the cases with unclear cause of trauma and

decomposed body cases were excluded from the study.

Data Collection and Statistical Method: Data were collected systematically in a detailed proforma developed for the postmortem evaluation of blunt trauma injuries. The detailed information's about the cases were collected from different sources including the inquest report and other relevant papers brought by the investigating officer, interviewing the investigating officer, the relatives, neighbors, friends or other persons accompanying the dead body, autopsy examination findings, relevant clinical history and findings found upon admission in hospital and subsequently. All collected data were compiled and entered into the Excel (Microsoft). Statistical Package for Social Sciences (SPSS) version 11.0 was used for analysis. Observations were recorded, analyzed and discussed. Ethical clearance was taken from the Ethical Committee of B. P. Koirala Institute of Health Sciences.

Results

Out of 496 autopsies, 76 cases were of fatal blunt trauma head injury and different causes of these blunt trauma are shown in the table I. The duration of survival for those who died at the spot was less than 30 minutes, who died at emergency was between 30 minutes and 6 hours, who died at ward or Intensive Care Unit (ICU) was between 6 hours to 3 days and who died after discharge was more than 3 days as shown in table III. A Shapiro-Wilk's test ($p<0.05$)[6,7] and a visual inspection of histogram, normal Q-Q plot and box plot showed that Injury Severity Score (ISS) for head injury cases with a skewness of 0.5 (Standard Error: 0.276) and a kurtosis of -1.451 (Standard Error: 0.545)[8,9,10] was not normally distributed. Mann Whitney U test was used to compare the ISS with respect to different factors and it was found that there was significant difference between ISS of those who were hospitalized and those who were not hospitalized as shown in table II. There was no significant difference between ISS of those who were intoxicated to those who were not intoxicated as shown in table II.

Table I: Cause of Trauma

Cause of Trauma	Number (%)
Physical Assault by Blunt Weapon	8 (10.5)
Collapse of Roof	1 (1.3)
Fall from Height	13 (17.1)
Road Traffic Accident	54 (71.1)

Table II: Comparison of ISS with Hospitalization and Intoxication Status

Head Injury Cases	Number (%)	Median ISS (IQR)*	P value**
Hospitalized	36 (47.4)	20 (17-28.25)	0.001
Not-Hospitalized	40 (52.6)	75 (33-75)	
Intoxicated at Incident	26 (34.2)	37 (19.25-75)	0.282
Not-Intoxicated at Incident	49 (64.5)	26 (17.5-62.5)	
Unknown	1 (1.3)	75	

*ISS is Injury Severity Score and IQR is Interquartile range

**Test of significance is 0.05

Hospitalized cases were further subdivided into the cases who died at emergency, at ward or ICU and after discharged. It was found that there was no significant difference between ISS of emergency fatal cases and of ward/ICU fatal cases, between ISS of ward/ICU fatal cases and of discharged fatal cases but there was significant difference between ISS of who died within 30 minutes at the spot and of those who died at emergency as shown in table III. The median ISS with interquartile range (IQR) for all cases was 31.5 (18.5-75) whereas median ISS with IQR for the cases who were hospitalized and who were not hospitalized, who were intoxicated and who were not intoxicated at the time of incident is shown in table II and median ISS with IQR for the cases with different duration of survival and different place of death is shown in table III.

Table III: Comparison of ISS with Duration of Survival and Place of Death

Duration of Survival	Place of Death	Number (%)	Median ISS* (IQR)*	P value**
Less than 1/2 Hour	Spot Death	39 (51.3)	75 (33-75)	0.001
½ Hour - 6 Hours	Emergency	17 (22.4)	20 (17-27.5)	
½ Hour - 6 Hours	Emergency	17 (22.4)	20 (17-27.5)	0.891
6 Hours -72 Hours	Ward/ICU*	9 (11.8)	17 (17-41.5)	
6 Hours -72 Hours	Ward/ICU	9 (11.8)	17 (17-41.5)	0.967
>72 Hours	Discharged	10 (13.2)	20.5 (16.25-30.75)	
Unknown	Spot Death	1 (1.3)	75	

*ISS is Injury Severity Score, IQR is Interquartile range and ICU is Intensive Care Unit

**Test of significance is 0.05

Discussion

This study done with objective to find out the relationship between ISS with other factors especially time to death has shown that the injury severity score for the cases who died prior to hospitalization is significantly different from that of hospitalized cases and this finding is supported by the study done in Singapore[11] where there was a significant difference between the ISS of those who died pre hospital compared to those who died in hospital. In the same study, the mean injury severity score was 38.7, 42% of the victims were pronounced dead at the time of accident, 15% in the emergency, 2% in the operating theater and 41% in ward which is also similar to our findings.[11] Common causes of trauma in our study are road traffic accidents and fall from height which is similar to the study done by Ghimire A et al.[12]

In our study, the portion of death at the spot that is 52.6% and the findings of significant difference between ISS of spot death and that of death at emergency but of no significant difference among ISS of death at emergency, at ward or ICU and after discharge support us to give more priority to the preventive strategies over the therapeutic measures. This view of our study findings is strongly supported by the findings in a study done by Muhammad Tahir Khadim et al[13] where out of 57 head injury cases, 40 (70.2%) injured persons died on spots and 17 (29.8%) were received alive in various nearby hospitals. Seven (12.3%) patients died within 5 hours, 2 (3.5%) between 5-10 hrs, 4 (7%) could stay alive for 21-24 hrs and 1 (1.8%) each for 2 days, 5 days, 10 days and 14 days respectively. Akash Jhanjee[14] found that 19.67% were spot dead and brought dead each whereas 59.02% succumbed to their injuries after some duration of hospital stay which is different from our study finding. In the same study[14], it was found that in victims with low ISS (21-30 and 31-40, ISS score ranges), survival was more as compared to the victims with high ISS (51-60, 61-70 and 71-75, ISS score ranges) which is similar to our study. Majority of the victims with associated body injuries to two or more body regions were spot dead (18 cases) and brought dead (17 cases) while remaining cases had very short survival period.[14] Victims with associated injuries of the chest had long survival period as compared to victims with associated head injuries. Mean ISS[14] was 44 whereas in our study median ISS is 31.5. In a study from Malaysia[15], it was also found that victims with low ISS had a longer survival period as compared to those with high ISS which is similar to our study finding. It was also noted that

victims with two or more region injuries either were spot dead or brought dead.[15] Results of the study emphasize the need to improve the pre-hospital care with provision of trauma services at site and to establish neurosurgical facilities with trauma registry. Limitation of our study is to involve only the cases who are brought to our institute and only of one year.

Conclusion

This study has shown the time to death in blunt trauma head injury cases with higher ISS is less as compared to those with less ISS. The ISS is also significantly different for hospitalized and not hospitalized cases but not significantly different for the cases who were hospitalized depending upon their duration of survival and place of death. This shows that there is a need to give priority to preventive measures for such injuries.

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