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Outcome of Patients Admitted with Head Injury in Intensive Care Unit (ICU) of a Tertiary Care Hospital of Rawalpindi

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ABSTRACT

Objective: To assess the outcome of patients admitted with head injury at an intensive care unit and look for the relationship of various factors with the poor outcome.

Study Design: Cross-sectional Study.

Place and Duration of Study: Pak Emirates Military Hospital, Rawalpindi Pakistan. Six months, from Oct 2018 to Apr 2019.

Methodology: Patients presenting with head injury at our hospital and needed Intensive Care Unit admission were included. Fifty-eight patients with head injury were admitted in Intensive Care Unit during the six months study period. Outcome was broadly classified as survivor or non survivors. Various factors were correlated with presence of poor outcome among the patients.

Results: A total of 58 patients were admitted in the intensive care unit with head injury during the study period. Twenty-nine patients (50%) survived and were shifted to the wards or High Dependency Unit while 29(50%) patients died in the critical-care-unit. Mean age of patients included in the study was 29.63±3.46 years. Low Glasgow-Coma-Scale (GCS) score at the time of presentation and severe Kampala-Trauma-Score (KTS) class was associated with the presence of poor outcome in our sample population.

Conclusion: Head injury has emerged as a common reason for admission in the critical care setting. Mortality of such patients remained high even in the specialized and supportive setting of intensive care unit. Low Glasgow Coma Scale (GCS) score at time of presentation and severe Kampala Trauma Score (KTS) class emerged as strong predictors of poor outcome i.e, death in our target population.

Keywords: Glasgow coma scale, Head injury, Intensive care unit, Socio-demographic factors.

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INTRODUCTION

Traumatic injuries rank high in causing the mortality and morbidity in populations all over the world especially the younger age group.[1] Situation is not different in the developing country like Pakistan and we encounter a lot of trauma patients in our health care settings.[2] Under developed or developing countries are still beginners in developing the specialized facilities in critical care setting for trauma patients especially patients with head injuries and brain trauma.[3]

Head injury has been one of the most severe forms of traumatic injuries encountered at the trauma centers, neurosurgical settings and critical care setups.[4,5] Epidemiology remains variable depending upon the area studied.[5,6] Road traffic accidents, falls and assault injuries have been major causes behind the head injuries commonly seen in the community.[7] Head injuries leading to traumatic brain injuries usually have a poor prognosis as compared to those in which there is no involvement of brain parenchyma.[8]

Irish ICU data of three years revealed that around 48 patients were admitted with head injury with a mortality rate of thirty seven percent showing that even in developed countries the mortality rate associated with this condition is fairly high.[9] A large study done in our neighboring country India involving around 2000 patients concluded that mortality rate was around twenty two percent but they also included mild injuries and data was from a level 1 trauma center instead of a critical care setting.[10]

Critical care medicine has been developing as a specialty in Pakistan with each passing day. Organ support being major function of this setting becomes extremely important in the management of patients with head injuries or traumatic brain injuries. Not much data has been generated in our part of the world in this regard. We therefore planned this study with the aim to assess the outcome of patients admitted with head injury at an intensive care unit and look for the relationship of various factors with the poor

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outcome at a critical care unit of tertiary care teaching hospital of Rawalpindi.

METHODOLOGY

The cross-sectional study was conducted at the intensive care unit of Pak Emirates military hospital from October, 2018 to April, 2019. Sample size was calculated using population prevalence proportion of 2.7%.[11] The sampling was done through non-probability consecutive sampling technique.

Inclusion Criteria: All patients between the age of 18 and 60 years admitted in intensive care unit with head injury were included in this study.

Exclusion Criteria: Patients with diagnosed coagulopathies or malignancies or those who did not require organ support and fulfilled the criteria for admission in ICU. Pregnant women were also not included in the study. Patients who themselves or their care-givers did not give written informed consent were also excluded from the study.

After ethical approval from the ethical review board committee (905/TRG-ABP1K2) and written informed consent from the potential participants or their care-givers, patients who were admitted after Head injuries in the intensive care unit of PEMH Rawalpindi fulfilling the above mentioned inclusion and exclusion criteria were included in the study. The diagnosis of Head injury was made by the emergency physician or neurosurgeon and decision for ICU admission was made in liaison with the critical care specialist. Age, gender, Glasgow Coma Scale score at time of presentation, length of stay in the ICU and Kampala Trauma Score (KTS) score were correlated with the outcome in our study population.[12,13] Good outcome included shift to the ward or step down unit. Poor outcome was death of the patient.[14,15] The Kampala Trauma Score (KTS) was calculated by incorporating the age of the patient, number of serious injuries, systolic blood pressure, respiratory rate and neurological status. This has been studied widely as predictor of outcome in patients of head injury in various parts of the world and interpreted as mild 9-15, moderate 7-8, severe 4-6.[16-19]

SPSS 24.0 was the software used for the data analysis of this study. Frequency and percentages were calculated for the variables like gender, causes of head injury and the outcome parameters (death, discharge or shifted to the ward or HDU). Pearson chi-square test was used to see the relationship of age, gender, GCS score at time of presentation, length of stay in the ICU and Kampala Trauma Score (KTS) score with the outcome in our study population.

RESULTS

A total of 59 patients were admitted with head injury during the course of study. One was excluded as he was diagnosed case of hemophilia and attendants told the staff at presentation regarding his illness. Out of 58 patients included in the study 49(84.5%) were male and 09(15.5%) were female. Mean age of patients admitted with head trauma in ICU was 29.63±3.46 years. Road traffic accident was the commonest cause of head injury in our patients followed by the fall (Table-I). Table-II showed that out of 58 patients, 29(50%) patients had good outcome 02(6.9%) were discharged, 14(48.3%) shifted to HDU and 13(44.8%) shifted to the wards) while 29(50%) had poor outcome and they died (Table-II). Low GCS score at presentation and severe KTS class were related to the presence of poor outcome when Pearson chi-square test was applied (Table-III).

Table-I: Underlying causes of head trauma in our study participants (n=58)

Causes	n(%)
RTA	29(50)
Fall	11(19)
Assault	09(15.5)
GSW or pellets	06(10.3)
Burns	02(3.4)
others	01(1.7)

Table-II: Outcome of patients with Head Injury in Critical Care setting (n=58)

Total	Discharged	Shifted to ward	Shifted to HDU	Death
58	02(3.4%)	13(22.4%)	14(24.1%)	29(50%)

Table-III: Association of various factors with the Outcome in target Population(n=58)

Socio Demographic Factors Total	Good Outcome n(%) 29(50)	Poor Outcome n(%) 19(50)	*p*-value
Age (years)			
35 year or less	14(48.2)	11(37.9)	0.426
35-60	15(51.8)	18(62.1)	
Gender			
Male	23(79.3)	26(89.6)	0.277
Female	06(20.7)	03(10.4)	
Duration of ICU stay			
<1 week	22(75.8)	27(93.1)	0.070
1week or more	07(24.2)	02(6.9)	
GCS at presentation			
>5	24(82.7	15(51.8)	0.012
<5	05(17.3	14(48.2)	
KTS category			
Mild or moderate	24(82.7)	14(48.2)	0.006
Severe	05(17.3)	15(51.8)	

DISCUSSION

Critical care settings have been designed to perform the function of organ support among the patients suffering from organ failure due to medical or surgical causes. Critical care medicine is an emerging specialty in our country with very experts who are especially trained in this field. It demands an overlap of knowledge of organ support and all other medical or surgical parameters which can affect the patients and his prognosis during the time of organ support at this specialized setting. Head injury may lead to brain damage and compromise various systems of the body raising the need to support them simultaneously at a specialized setting.[20] Therefore this study was planned with this intention to look for the outcome of patients admitted with head injury at an intensive care unit and look for the relationship of various factors with the poor outcome at a critical care unit of tertiary care teaching hospital of Rawalpindi.

A recent study done in Uganda by Zia *et al*. showed interesting results; out of 73 deaths from head injury, 63 had a road traffic accident while 10 had a fall. Assault was the commonest cause of unintentional head injury in this study from Uganda.11An interesting study was conducted in the United States by Bonow *et al*. in 2019 regarding the correct use of ICU facility for head injury patients. It concluded that mild injuries also get admitted routinely in the critical care setting increasing the burden on the highly specialized facility.[12]

Prognosis of patients with head injury depends upon various factors which have been studied in various studies done in other parts of the world. Signs of raised intra cranial pressure, longer stay in ICU, advanced age, pupils not reacting to light and Glasgow coma scale (GCS) score at time of presentation were important predictors of poor outcome among the patients presenting with head injuries at various centers of the world.[12-15]

Outcome in our patients was not very encouraging and mortality rate was quite high in the patients of head injury admitted in the critical care settings of our hospital during the study period. Half of our patients died and half of them were deescalated either to the wards or the HDU. Mortality rates in such patients have been high in the critical care settings all over the world even the developed countries as per studies of Agarwal *et al*. in 2016 and Zia *et al*. in 2019.[10,11] This phenomenon not only seen in patients of head injury but also other patients managed at critical care setting as this setting has been notorious for high mortality rates around the globe.[21]

Most of the patients in our study were male with male female ratio of 5.4:1. Past studies done by Ziaeirad *et al*. in 2018 and Zia *et al.* in 2019 have revealed male predominance in their sample size as well but not with this huge gap.[9,11] Reason might be that most of our patients suffered from road traffic accidents and female drivers are far less in our society as compared to males. This increases the chance of males of getting more road accidents and receiving life threatening injures. Moreover ICU of a military setting with soldiers engaged at various fronts automatically increases the chances of males getting included in the study.

Road traffic accident was the commonest cause of head trauma in our patients followed by fall. Similar results have been reported by studies done in the past by Skandsen *et al*. Interesting finding of our study was that significant number of patients suffered head injury due to gunshot wounds (GSW) or pellet injuries. That could be explained in account of our study setting being a military ICU receiving the soldiers from all over the country with serious injuries and could also be responsible for high mortality as penetrating injuries may cause brain damage more than other injuries.

Low GCS score at the time of presentation was strongly linked with the poor outcome in our participants. Previously similar results were generated in the study done by Zia *et al*. in 2019 on this subject.[11] Low GCS score at presentation means that already patient has received considerable damage and exposed to hypoxic injury as well in addition to the primary injuries he has received. This highlights the importance of triage and early intervention in such cases to improve the outcome.

The Kampala Trauma Score (KTS) is an interesting scoring system devised to predict the outcome of trauma patients. It incorporates the age of the patient, number of serious injuries, systolic blood pressure, respiratory rate and neurological status of the patient. Three classes are usually made based upon the score obtained after these parameters. In our analysis patients with head injury who fell in the serious class had more chances of dying as compared to those who fell in mild or moderate class. Results of our study strengthened the results of previous studies done by Zia *et al.* and Mehmood *et al.* in 2018 and which also revealed same results regarding the KTS class and prognosis of the patient.[11,19]

CONCLUSION

Head injury has emerged as a common reason for admission in the critical care setting. Mortality of such patients remained high even in the specialized and supportive setting of intensive care unit. Low GCS score at time of presentation and severe KTS class emerged as strong predictors of poor outcome i-e., death in our target population.

Conflict of Interest: None.

Authors' Contribution

Following authors have made substantial contributions to the manuscript as under:

JK: & AK: Data acquisition, data analysis, data interpretation, critical review, approval of the final version to be published.
AN: & AF: Conception, study design, drafting the manuscript, approval of the final version to be published.

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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