

# Characteristics and Outcomes of Traumatic Head Injuries in Hail Region, Saudi Arabia – Hospital Based Study.

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## ABSTRACT

**Background:** Head injury is one of the most common causes of death following trauma worldwide. Epidemiological data of traumatic head injuries (THI) is important for establishing prevention program. Such data are few in our region. For that reason our primary goal was to study the descriptive features and outcomes of THI among adult patients presented at King Khalid General Hospital in Hail, Saudi Arabia. **Methods:** A hospital-based, retrospective, cross-sectional study was conducted at King Khalid General Hospital in Hail, Saudi Arabia. All patients who were admitted with THI, from April 2016 to April 2017 were identified through a trauma database, which includes cases that required hospital admission or died in the emergency department. The records of 89 patients were reviewed. Characteristics of patients and injury-related data were obtained. The data were entered into Excel sheet and exported to SPSS version 20 statistical package for further analysis. Descriptive statistics were used to explore the data in relation to relevant variables. Binary logistic regression analysis was employed. Odds ratio with 95% confidence intervals (CI) was computed to identify relations between the variables. **Results:** We reviewed the records of 89 adult patients met the inclusion criteria with a mean age of 29.6 years and a male predominance of 93.1%. Most injuries were secondary to motor vehicle collisions (MVC; 71.2%). Only 10.7% of patients had a severe THI (Glasgow coma score, GCS < 8). The overall mortality rate was 21%. Mortality was significantly associated with older age (P=0.0001) and lower GCS (P=0.0001). Outcome was good in majority of patients (88.5%). **Conclusion:** This study indicated that outcome of THI is affected by age and GCS of patients.

**Keywords:** Head Injury, Emergency, Outcome, Trauma, Saudi Arabia.

## INTRODUCTION

It is well established that road traffic accidents (RTA) is a leading cause of morbidity and mortality between teenagers and young adults.<sup>[1]</sup> More than 50% of the cases of head trauma are caused by RTA. Traumatic head injury (THI) was found to cause immediate death in more than 20% of acute trauma patients. Amongst the severely injured patients, majority survives with severe disability including physical and cognitive difficulties, personality changes, epilepsy, and speech impairment, and few continue to be in a vegetative state.<sup>[1-3]</sup> Rehabilitation of THI patients is a burden on the family, society, and health services.<sup>[4-6]</sup> Outcome of THI varies from hospital to another depending on the availability of modern neurosurgical and neuroradiological facilities and qualified expertise. It can be measured by mortality, morbidity, or survival rates.<sup>[1]</sup> Fortunately, a large proportion of head injuries have good outcomes with a Glasgow coma score (GCS) between 13 and 15 at

admission.<sup>[7]</sup> With recent advancements in modern neurosurgical practice, the mortality rate resulting from head injury is a good reflection of the severity of morphologic brain damage as well as the standard of post-trauma care. A center in Ibadan, Nigeria, reported an overall mortality rate of 12.5% and researchers in India reported a rate of 7.7% following childhood head trauma,<sup>[8,9]</sup> while others in Hong Kong and Sydney reported lower rates of 0.6% and 1.4%,<sup>[10,11]</sup> respectively. However, Glasgow outcome scoring (GOS) is a more comprehensive measure of outcome and was employed for this study. It assesses good recovery, disability, and mortality rates simultaneously. The purpose of this study was to determine outcomes of non-operatively managed adult head injury patients and the clinical predictors of such outcomes.

## MATERIALS AND METHODS

A hospital-based, retrospective, cross-sectional study was conducted at King Khalid General Hospital in Hail, Saudi Arabia. All patients who were admitted with THI, from April 2016 to April 2017 were identified through a trauma database, which includes cases that required hospital admission or died in the emergency department. The cases that were discharged from the ED without admission were not

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included. The missing data was collected and verified from the hospital medical records. Ethical approval for the present study was obtained from the ethical committee of the hospital.

The records of 89 patients were reviewed. Characteristics of patients and injury-related data were obtained. It included patient's age, gender, use of protective devices, date, time, and injury mechanism and place. The severity of THI was assessed at presentation to the ED using Glasgow Coma Scale (GCS), which is a valid method to predict disability and mortality in patients with head injury. Also we obtained data outcome of injury including the need for surgical intervention, length of hospital stay, and patient's final disposition following discharge. The data were entered into Excel sheet and exported to SPSS version 20 statistical package for further analysis. Descriptive statistics were used to explore the data in relation to relevant variables. Binary logistic regression analysis was employed. Odds ratio with 95% confidence intervals (CI) was computed to identify relations between the variables. The level of significance was set at P value <0.05.

## RESULTS

### Patient and injury characteristics

The records of 89 patients satisfied the inclusion criteria were reviewed. The mean age was 29.6 years. Males (93.1%) were more affected than females (6.9%). Motor vehicle collision (MVC) was the most common mechanism of injury (71.2%).

### Injury severity

The mean GCS was 8. Only 10.7% of patients had a severe THI (GCS <8). While majority of patients (80.2%) had mild THI (GCS13-14) and 10% had moderate THI (GCS 9-12). Patients admitted with severe THI constituted 97 % of the total mortality rate.

### Injury outcome

The overall mortality rate was 21% of the total study sample. MVC was responsible for 59.9% of deaths. Mortality was significantly associated with older age (P=.0001), longer hospital stay (P=.0001), and lower GCS (mean of 4, P=.0001). Gender was not a significant factor in association with mortality (P=0.288). Transfer out of the ED was mostly to the medical ward (62%). A total of 70% were discharged home.

## DISCUSSION

To the best of our knowledge this study is the first to address the demographics of THI in adults in Hail region in Saudi Arabia. MVC was the main mechanism of THI, which was similar to other studies in neighboring countries such as United Arab

Emirates and Qatar.<sup>[12,19]</sup> However, reports from the developed world, like the US, identified fall and assaults as the main causes of THI.<sup>[7]</sup> nevertheless, MVC injuries in the US remained the leading cause of THI-related deaths.<sup>[7]</sup> The increased THI rate young adults compared to older adults (8.4 to 2, respectively) is higher than other studies in the developed world and neighboring countries. It could be a reflection that young adults compose the majority of the population in Saudi Arabia.<sup>[12,19]</sup> The median age in Saudi Arabia is 21 years and people under the age of 24 comprise 48.6% of the population.<sup>[17]</sup>

Pedestrian injuries were the second common cause of THI. The alarming figure of mortality within this group (46%) is different from those reported in the developed world. For instance, in Europe and the US pedestrian mortality among THI patients reached 20% and 14% respectively.<sup>[20]</sup> Although developed countries reported less pedestrian injuries, 5000 people die and 60 000 are injured as pedestrians in the US annually. Comparative results from the European Union indicate that out of 50 000 annual road traffic deaths, 8500 were pedestrians.<sup>[21]</sup>

The severity of THI is one of the most important predictors for mortality in hospitalized trauma patients.<sup>[25,26]</sup> Internationally, the reported mortality rate among THI patients was 15 per 100 000 individuals in Europe and 17.8 per 100 000 individuals in the US.<sup>[9]</sup>

The mortality rate of 21% in this study was higher than the overall mortality in the United Arab Emirates (6%) and Qatar (8%).<sup>[12,19]</sup> Among different mechanisms of injuries included in our study, most deaths occurred among MVC group (59.9%) followed by pedestrian group (27.3%). This raises a serious public health concerns and calls for an action to prevent such fatal injuries.

Our study has some limitations. It is a hospital-based study where all included patients required hospital admission. There were few details available on the location of the injury, restraining devices such as seatbelt and helmets, and detailed neurological status at discharge. Nonetheless, it illustrates an alarming percentage of deaths secondary to admitted patients with THI. It also identified MVC injuries as the main cause that require appropriate public health measures and preventive programs. Various injury prevention programs were effective in reducing morbidity and mortality worldwide. Preventive programs in Sweden resulted in a significant reduction of road traffic injuries.<sup>[20]</sup> The use of protective equipment like seatbelts and helmets for motorcyclists and bicyclists can reduce the incidence of head injuries. There is also a need for collecting trauma data on a population scale to identify the major causes of injury and design-targeted prevention programs.

## CONCLUSION

MVC was the main mechanism responsible for THI admission and mortality. The current study calls for the need of a countrywide data collection program and the development of organized injury prevention strategy.

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