

## ORIGINAL ARTICLE

# Analysis of Head Injuries Due to Motorcycle Accidents Attended in Medical Teaching Institute (MTI), DHQ, Gomal Medical College (GMC), Dera Ismail Khan, Pakistan

SARFARAZ KHAN,<sup>1</sup> SHAHID NAWAZ,<sup>2</sup> FAKHAR HAYAT<sup>2</sup>  
SARAH REHMAN,<sup>2</sup> NOOR SARDAR<sup>2</sup>

<sup>1</sup>Department of Neurosurgery, Kohat Institute of Medical Sciences (KIMS) Kohat – Pakistan

<sup>2</sup>Medical Teaching Institution (MTI), District Headquarter (DHQ), Gomal Medical College (GMC), Dera Ismail Khan – Pakistan

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## ABSTRACT

**Objective:** The consumption of motorbike is increasing in Asia. The aim of this study was to analyze the head injuries due to motorcycle accidents attended in the District Headquarter (DHQ), Dera Ismail Khan.

**Material and Methods:** All the age groups from both genders were part of our study. All the patients show reduced GCS with some sign of having abnormalities on Computed tomography (CT) brain were included in our eligibility criteria. Pedestrians, those died before hospital arrival, complain about any other type of injury other than a head injury, and not have proper admission in the hospital was excluded from the study.

**Results:** 478 patients were included in the current study. More than 44.14% of accidents were reported in patients aged 20 – 29 years. 441 (92.25%) were men, and 381 (79.7%) were driving themselves. Among 478 only 71 (14.85%) were wearing a helmet. Almost 47.48% of the accidents occurred on the weekend. 274 (57.32%) patients reached the hospital within 5 hours after the accident. 218 (45.6%) patients had a head injury. Brain edema was the most common CT abnormality 214 (44.8%).

**Conclusion:** Mainly, the males were affected by a motorcycle accident and face head injury in the third decade of their life. The CT scan indicates brain edema as the most common findings. 45.6% of patients have a severe head injury and a mortality rate of 13.4% was reported.

**Keywords:** Road Traffic Injuries (RTIs), Road traffic accidents (RTAs).

## INTRODUCTION

The aim of this study was to analyze the head injuries due to motorcycle accidents reported in the District Headquarter (DHQ) Hospital of D. I. Khan. In 2012, WHO mentioned that the main reason of death in people age ranged from 15 – 29 was the motorcycle head injury.<sup>1</sup> Motor vehicle accidents are a prominent reason for death among teenagers and youth.<sup>2</sup> The road accidents lead to severe injuries.<sup>3</sup> It is estimated that worldwide 8,56,000 road expiries occur annually. Among them, almost 74% occur in developing countries.<sup>4</sup> Road Traffic Injuries (RTIs) are considered as the main reason for injuries and deaths around the

world. According to some predictions, by 2020 it will become the third most common reason of death globally.<sup>5</sup> People prefer to use two-wheeled motorbikes due to its small size and capability to move easily from the massy traffic.<sup>6</sup> Motorbike accidents have become a major safety problem in the world. It may cause serious head injuries that result in casualties.<sup>7-9</sup> Almost 61% of deaths in motorcycle accidents are due to head injuries.<sup>10</sup> Use of helmet reduces the chances of head injuries to a great extent.<sup>11</sup> Many studies proved the positive connection between the use of helmet and the reduction of head injuries and deaths among bike riders. The reported percentage

of injuries varies from 60 – 88%.<sup>12,13</sup>

Studies proved that road traffic accidents (RTA) are responsible for 50% of deaths among motorbike users.<sup>14</sup> The main reasons for these injuries in developing countries are the failure of motorcyclists to use helmets, over speeding, and not observing the traffic laws.<sup>15,16</sup> The researchers have identified another reason for bike accidents in South and East Asian region i.e., the entanglement of loose garments in two or three-wheeler vehicles.<sup>17-20</sup>

In developed countries, the rate of injuries and casualties are comparatively low as compared to the developing countries. But still, the mortality rate due to motorbike accidents is twenty times more than other automobile accidents.<sup>21,22</sup> The consumption of motorbike is increasing in Asia, e.g. only in Pakistan, in 2000, there were 100,000 motorbike users, with two million increase annually.<sup>23</sup> A 16% mortality rate is reported among motorcyclists.<sup>24</sup>

## **MATERIALS AND METHODS**

### **Study Design and Sampling**

This prospective, multi-centric study was conducted from November 2018 – June 2019. This study was initiated after approval from the research ethics committee. The data was collected from the MTI, DHQ, AND GMC hospitals of D.I. Khan of 478 patients was included in the study that complains about any head injury.

### **Inclusion Criteria**

All the age groups from both genders were included in our study.

Patients with altered GCS along with Computed tomography (CT) brain abnormalities were included in our eligibility criteria.

The patients were treated according to the procedure in the hospital. They were evaluated according to the modern trauma life support guideline<sup>25</sup> and stabilized in the trauma room. After recovery, a thorough demographic history was obtained with the help of pre-designed Performa.

After taking their history, patients were referred for other relevant investigations like brain X-rays, CT scan brain, chest CT or chest X-ray, MRI or 3D CT.

In order to analyze the head injury, we categorized them into three groups i.e. severe, moderate, and mild, according to the GCS, GCS 3 – 8, 9 – 12, and 13 – 15 respectively. Other than these, some threatening signs

like loss of consciousness (LOC) > 25 min, amnesia after a head injury, nausea, etc. were also recorded. The patients were discharged from Neurotrauma if their CT was normal, and GCS was unaltered.

### **Exclusion Criteria**

Pedestrians, those who died before hospital arrival, complains other than head injury and those patients who were not admitted in the hospital were excluded from the study.

### **Data Analysis**

The data was entered and analyzed using SPSS version 22. Frequency and percentage of tables were generated. The Chi-square test was applied and P < 0.05 was considered as statistically significant.

## **RESULTS**

The 478 patients were included in the current study. In Table 1, the demographic details of the patients, factors related to injury, wearing a helmet or not, and the patients' status as driver or rider were compiled. The 211 (44.14%) accidents were reported in patients of age 20-29 years. 441 (92.25%) were men, and 381

**Table 1:** Demographic status of patients.

<b>Variables</b>	<b>Frequency (n)</b>	<b>Percentage (%)</b>
<b>Age</b>		
1 – 10	9	1.9
11 – 20	82	17.1
21 – 30	211	44.14
31 – 40	74	15.41
41 – 50	51	10.61
51 – 60	30	6.22
61 – 70	21	4.4
<b>Gender</b>		
Male	441	92.25
Female	37	7.75
<b>Patients' Status</b>		
Driver	381	79.7
Backseater	97	20.3

(79.7%) were operating motorcycle themselves and remaining were the back-seaters.

Among 478, only 71 (14.85%) were wearing a helmet. It was also observed that almost 47.48% of the accidents were happening on Saturdays and Sundays. The 274 (57.32%) patients reached the hospital within 5 hours after the accident. The types of accident and other above-mentioned details are shown in Table 2.

**Table 2:** Important variables required for study.

Helmet	Number	Percentage
Yes	71	14.85
No	407	85.15
Type of Accidents		
Motorcycle to car	149	31.1
Motorcycle to Truck	121	25.3
Motorcycle to motorcycle	54	11.2
Motorcycle to wall	102	21.3
Motorcycle to others	52	10.87
Arrival Time		
1-5 hours	274	57.32
6-10 hours	132	27.65
11-15 hours	54	11.29
16-20 hours	18	3.74
Accident Day		
Working days (Monday-Friday)	251	52.52
Weekend (Saturday-Sunday)	227	47.48

Table 3 mentions the type of head injury on the basis of GCS. The 218 (45.6%) patients lie in thesevere category of head injury. In Table 4, the

**Table 3:** Nature of head injury.

Kind of Head Injury	GCS	Number	Percentage (%)
Severe	3 – 8	218	45.6
Moderate	9 – 12	154	32.2
Mild	13 – 15	106	22.2

condition of patients head injury was compiled after CT scan. Brain edema had the largest share i.e. 214 (44.8%).

**Table 4:** Findings of CT Scan.

Findings of CT Brain	Frequency	Percentage (%)
Subdural hematoma	53	11.1
Contusions	117	24.5
Brain edema	214	44.8
Epidural hematoma	106	22.2
Pneumocephalus	61	12.8
Traumatic Subarachnoid hemorrhage	83	17.4
Depressed skull fractures	32	6.6

Table 5 shows the outcome of Glasgow coma score. In level 5, the percentage of the patients was 209 (43.7%). The use of helmets and GCS were found to be statistically significant ( $p = 0.03$ ) factors in traumatic head injury (TBI) patients. The death was reported in 64 patients with a mortality rate of 13.4%.

**Table 5:** The outcome of Glasgow scale.

Glasgow Outcome Score (GOS)	Frequency	Percentage (%)
5	209	43.7
4	113	23.6
3	88	18.4
2	27	5.6
1	41	8.6

## DISCUSSION

The use of motorcycle has increased globally, especially in developing countries like ours. Among all the injuries, head injury is most common.<sup>26</sup> The current study analyzed that the affected population was of male member 441 (92.25%) and was in the range of age group 21 – 30 years i.e., 211 (44.41%). The study of Monk et al also proved the same.<sup>27</sup> Literature showed the similar findings regarding the age group of

21 – 31 years for the head injury cases.<sup>28,29</sup> Few studies also mentioned that the age groups from 11 – 20 to 31 – 40 were more affected than the other age groups.<sup>30,31</sup>

The two main effects of head injury are loss of memory and consciousness. For the best analysis, we divided it into three main categories of GCS i.e. severe, moderate, and mild. It was observed that if a person has GCS more than 13, he has more chances of abnormal radiological outcomes.<sup>32,33</sup> As the results of our studies are a concern, we also have a significant number of patients in this category i.e. 106 (22.2%) who show abnormal CT scan results.

The estimated time of patients was calculated in our study was 1 – 5 hours. Most of the patients come without any ventilator facility. The reasons for late arrival were heavy traffic, non-availability of the ambulance, and weak traffic rules. These factors resulted in more deaths from traffic accidents.<sup>34</sup> In developing countries, people do not know about the traffic rules and the importance of wearing a helmet in the two-wheeled vehicle. In our study, only 71 (14.85%) patients used to wear helmets, and the remaining were not 407 (85.15%). This observation was also consistent with some previous studies.<sup>35-37</sup>

The CT scan of all patients was done because of its importance as an early imaging technique within 24 hours<sup>38</sup> and it detects pathologies and hematoma more accurately as compared to MRI.<sup>39</sup> According to Papa et al.<sup>40</sup> and Leong et al.,<sup>41</sup> the CT scan is recommended for the patients presenting with a traumatic head injury. It is also suggested that a CT scan should be done if a patient of traumatic head injury shows any signs of nausea, loss of memory, and LOC.<sup>42,43</sup> In our study, the CT scan was done if any above-mentioned factors were reported. We excluded patients with a normal CT scan.

In the current study, 6.6% of cases were having depressed skull fractures, 11.1% subdural hematomas, 22.2% epidural hematomas, 44.8% brain edema, 17.4% traumatic subarachnoid hemorrhages and 12.8% pneumocephalus. The findings of Leong et.al showed a great number of epidural hematoma with a 5% mortality rate.<sup>44</sup> Our study showed a mortality rate of 13.4% quite similar to the study, which showed a 13.2% mortality.<sup>45</sup> Nnadi et al<sup>46</sup> showed that 21.6% of patients have brain edema, whereas, we reported it as 44.8%. Zimmerman et al showed a brain edema as the common result of CT scan.<sup>47</sup>

## **CONCLUSION**

Mainly, males were affected by motorcycle accidents and faced head injury in their third decade of their life. The CT scan indicated the brain edema as the most common findings. 45.6% of patients had a severe head injury with mortality rate of 13.4%.

## **Recommendations**

We suggested that the effective use of quality helmets can reduce the probability of losses of life and severe head injuries in the injured motorcyclists in Pakistan. Refining regulation and implementation might help avoid deaths and serious head injuries in Pakistan and in other countries.<sup>48,49</sup>

## **Limitation of the Study**

This study was included the limited number of patients and a relatively shorter time duration. There is a need for study on a larger number of patients. The data from the trauma centers would present more significant results in detail.

## **Additional Information**

**Disclosures:** Authors report no conflict of interest.

**Human Subjects:** Consent was obtained by all patients/ participants in this study.

**Conflicts of Interest:**

In compliance with the ICMJE uniform disclosure form, all authors declare the following:

**Financial Relationships:** All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

**Other Relationships:** All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

*Address for Correspondence:*

*Dr. Shahid Nawaz*

*Assistant Professor & Head*

*Department of Neurosurgery*

*MTI, DHQ Teaching Hospital*

*GMC, D. I. Khan*

*Email: nsgshahidkhattak2012@gmail.com*

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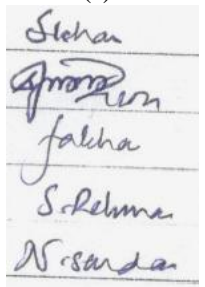
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**AUTHORSHIP AND CONTRIBUTION DECLARATION**

Sr.#	Author’s Full Name	Intellectual/Contribution to Paper in Terms of:	
1.	<b>Sarfaraz Khan</b> (Main/Principal Author).	1. Basic Study Design and wrote introduction.	Signature by the author(s) 
2.	<b>Shahid Nawaz</b> (2nd Author)	2. Wrote Discussion	
3.	<b>Fakhar Hayat</b> (3rd Author)	3. Analysis of data, References and interpretation of results etc.	
4.	<b>Sarah Rehman</b> (4th Author)	4. Literature review and manuscript writing and data Calculations	
5.	<b>Noor Sardar</b> (5th Author)	5. Data analysis and methodology	

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