

## Road Traffic Accident – A Preventable Cause of Head Injury: Experience in Lady Reading Hospital, Peshawar

MUHAMMAD USMAN, MUMTAZ ALI, KHALID MAHMOOD KHAN

*Hayat Mohammad Khan, Muhammad Siddique, Zahid Khan*

*Department of Neurosurgery, Postgraduate Medical Institute*

*Lady Reading Hospital Peshawar – Pakistan*

### ABSTRACT

**Objective:** To study the different causes and aspects of head injury in patients of road traffic accidents.

**Material and Methods:** This observational study was conducted in Neurosurgery Department of PGMI, Lady Reading Hospital Peshawar from January 2010 to June 2010. Patients of all ages with either sex were included in this study, while those patients of head injury having associated thoracic, abdominal or pelvic injuries were excluded. All the data was collected by using a Performa. Data was analyzed by descriptive statistics using SPSS software version 17.

**Results:** Out of total 1344 trauma patients, 638 sustained head injury due to Road traffic accident (RTA). Male were 67.24% (429 patients) and female were 32.75% (209 patients). Most of the patients (66.45%) were up to 30 years of age, i.e., less than 10 years were 23.98% and 42.47% were of the age range of 11-30 years. Majority of the patients (87.93%) were treated conservatively, while 77 patients (12.06%) required surgical intervention and were treated accordingly. Major radiological findings were extradural hematoma and brain edema, 15.98% each, brain contusions 12.69%, skull bone linear fracture, linear fracture with pneumocephalus and subgaleal hematoma 9.56% each. Out of total 137 patients of severe head injury (GCS = 3 – 8) only 28 expired. Most of the patients (67.86%) had satisfactory condition at discharge.

**Conclusion:** Although majority of the patients of road traffic accident did not require any neurosurgical intervention, most of them remained admitted for quite a long period of time, due only to a cause which could have easily be avoided.

**Key Words:** Head Injury, Road traffic accident, Extradural Hematoma, Subarachnoid Hemorrhage.

### INTRODUCTION

Head injury is considered as a major health problem and is a more frequent cause of death and disability that makes considerable demands on health services. In developing countries, including Pakistan, RTAs rates in general and head injury in particular are increasing as the traffic increases. Other factors like Industrialization, falls and ballistic trauma, which are more common in our part of the world for the last one decade, also play a major role.<sup>1</sup>

Head injury is the leading cause of mortality in patients who are younger than 45 years of age and

accounting for more than a third of all injury related deaths in United States.<sup>2</sup> Traumatic brain injury leads to 1,000,000 hospital admissions per annum throughout the European Union and it causes the majority of the (50,000) deaths from road traffic accidents and leaves 10,000 patients severely handicapped. Of those victims three quarters are young people.<sup>3</sup>

Alone road traffic injuries considered as the number one cause of disease burden among children between 5 and 14 years, and also the number three cause among those in the age group 15 to 29 years with a male to female ratio of 3:1.<sup>4,5</sup> Worldwide, RTAs related losses cost round about \$518 billion in 2004.<sup>6</sup>

Another statistic in the literature showed that road traffic injuries are a huge public health and development problem that kills between 800,000 and 1.18 million people, and injures or disables another 20 to 50 million more every year.<sup>7</sup> And the data from the WHO and World Bank show that without appropriate intervention, these injuries will rise dramatically by the year 2020, particularly in rapidly developing countries. In addition, apart from the enormous impact on families and communities, moreover, health facilities are over – burdened with victims of road traffic crashes, over – stretching their health budgets.<sup>8</sup>

Road traffic injury is an increasing health problem globally and especially in South – East Asia.<sup>9</sup> Head injury is considered the most common cause of death in trauma accounting for about 50% of deaths at the accident site. Of particular significance are motorbike accidents involving passengers without helmet, which produce severe injuries. As many as two thirds of all RTA victims sustain some form of head injury.<sup>10</sup> In spite of best management of head injury victims, 15–20% of head injuries prove fatal. The majority of patients require conservative management and only 10–20% of patients need surgical intervention<sup>11</sup>, also evident in our study.

The importance of protecting the head injury is gaining wider acception globally. Firm and objective preventive efforts will clearly be effective in reducing the incidence of head injuries and their complications. Wearing of protective devices e.g. helmets and shoulder belts, in cars have reduced the incidence and degree of severe head injuries. Research and epidemiological data are required, which is somewhat deficient in this part of the world, therefore the present study was conducted to ascertain and initiate appropriate preventive measures and to plan necessary actions in the form of services.

**MATERIAL AND METHODS**

This observational study was carried out on 638 patients of RTA, conducted in Neurosurgery Department of PGMI, Lady Reading Hospital Peshawar from January 2010 to June 2010. All the patients of trauma due to RTA, of all ages and with either sex were included in this study, while patients of head injury were having associated thoracic, abdominal or pelvic injuries at the time of presentation were excluded. All the data was collected and analyzed by descriptive statistics using software SPSS version 17.

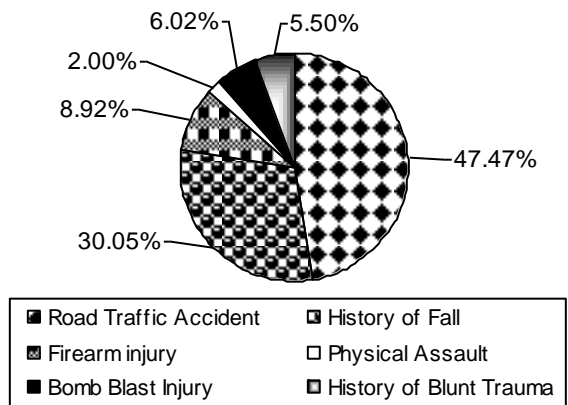
All the patients were undergone through thorough

history, detailed clinical examination and relevant investigations including computerized tomographic (CT) scan of brain with bone window. All patients were managed as per standard protocol of ATLS, like any other patient of trauma, by taking care of the airway and breathing, restoration and maintenance of hemodynamics was taken and optimal environment for the brain (by taking care of intracranial pressure) was provided.

Those patients who need surgical intervention were subjected to pre-operative preparation, like complete blood count (CBC) and viral serology (HbsAg and Anti-HCV Ab) was done. Blood and surgical disposables were arranged accordingly. An informed consent was taken, explaining the prognosis. The ethical approval was taken from the hospital ethical committee, “Postgraduate Medical Institute, Institutional Research and Ethics board”. The management and outcome of the patients were reviewed.

**RESULTS**

Out of total 1344 head injury patients (Figure 1), 638 patients (47.47%) sustained head injury due to RTA, of those 429 (67.24%) were males and 209 (32.75%) were females. Most of the patients (66.45%) were up to 30 years of age, i.e., less than 10 years were 23.98% and 42.47% were of the age range of 11 – 30 years (Figure 2).



**Figure 1:** Mechanism of Injury (n = 1344).

Most of our patients belong to Peshawar i.e. 24.29%, while 12.06% from Chamkani and Nowshera, 2.97% from Kohat, Karak and Hangu, 6.11% from Bannu and D.I. Khan, 33.22% from Charsadda, Mardan and Swabi, 12.06% from Boner and Dir, 2.97%

from Agencies and 6.26% were from across the border, Afghanistan.

At the time of initial presentation the Glasgow Coma Scale (GCS) of majority of the patients (78.52%) were between 9 – 15, i.e. they presented with mild to moderate head injury (Figure 3), while 21.47% of the patients presented with severe head injury.

Majority of the patients (87.93%) were treated conservatively, while 77 patients (12.06%) required surgical intervention and were treated accordingly. Major radiological findings were extradural hematoma (EDH) and brain edema, 15.98% each, brain contusions 12.69%, followed by skull bone linear fracture, linear fracture with pneumocephalus and subgaleal hematoma 9.56% each (Table 1). Out of total 137 patients of severe head injury (GCS = 3 – 8) only 28 expired, i.e. the mortality rate is 4.38%. Most of the patients (67.86%) had satisfactory condition at discharge, while 27.74% of the patients were referred to local hospitals.

## DISCUSSION

In the period of six months the total number of patients of head injury registered at neurosurgery ward, neurotrauma ward and neurosurgery ICU were 1344. The mechanism of injury in most of the patients was RTA (47.47%), followed by history of fall (30.05%). These findings are comparable with an international study<sup>12</sup>, in which the mode of injury showed RTAs responsible for 44.4% followed by history of falls 32.2%.

Not surprisingly our study shows the majority of the deceased (67.24%) were males. And the reason behind that is the greater male exposure on urban and mostly rural streets and similar higher incidence of traffic accidents among males has been found by many other researchers.<sup>13-18</sup> The most common age group affected in our study was the first 3 decades of life (66.45%) and is consistent with the Frank Kennedy et al<sup>19</sup> and studies available from other countries.<sup>13-15,17,18,20,21</sup> This age group is the most active phase of life, physically and socially, and therefore outnumbers the other road user, that's why they account for the maximum number of accidental deaths. As there is maximum involvement of individuals in the economically

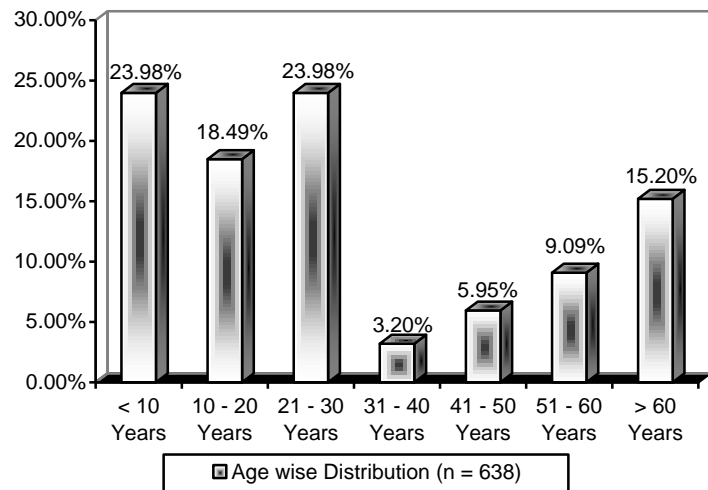


Figure 2: Age – wise Distribution.

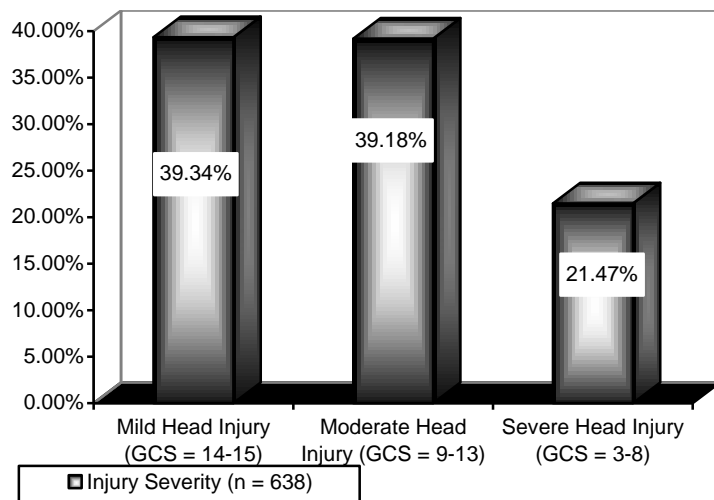


Figure 3: Injury Severity (n = 638).

productive years, RTA mortalities have an important economic impact. Therefore, preventive measures focusing at these high – risk groups are important to reduce the incidence of head injury.

We received most of the patients (75.71%) outside the Peshawar, from other districts of the province and only 24.29% from Peshawar. This figure emphasizes the need of appropriate medical care facilities (including trauma centers) to be established at district level and sub-divisional / tehsil levels to provide prompt and quality care to head injury patients.

At the time of presentation the GCS of majority of the patients (78.52%) were between 9 – 15, i.e. they presented with mild to moderate head injury, while

data presented by two studies<sup>12, 22</sup> showed that most of the patients (more than 70%) presented with mild head injury. The reason behind this presentation may be due to the lack of proper obeying of traffic laws, like wearing of helmets, seat belts and unavailability of speed detectors, all of which are associated with high rate of RTA related morbidity and mortality.

**Table 1:** Radiological Findings.

Findings	No. of Patients	% age
EDH	102	15.98
Brain edema	102	15.98
Brain contusions	81	12.69
Skull bone linear #	61	9.56
Linear # and Pneumocephalus	61	9.56
Subgaleal Hematoma	61	9.56
Acute SDH	42	6.58
DSF	40	6.26
SAH	40	6.26
ICH	20	3.13
Post-traumatic Hydrocephalus	8	1.25
Unremarkable	20	3.13

Major radiological findings were extradural hematoma (EDH) and brain edema, 15.98% each, brain contusions 12.69%, followed by skull bone linear fracture, linear fracture with pneumocephalus and subgaleal hematoma 9.56% each and these findings are somewhat consistent with other few researchers.<sup>12,23</sup>

In the present study the main bulk of the patients (87.93%) received conservative treatment, while only 12.06% required surgical intervention and was treated accordingly. This data is comparable with other researcher,<sup>12</sup> in which conservative treatment was given in 90.5% of patients followed by surgical treatment (9.5%).

The mortality rate was 4.38%, which is somewhat comparable with an international study,<sup>12</sup> in which it was 6.4%. While, the mortality rate increases if the RTAs are purely due to motorcyclists, i.e. the mortality rate approaches to 11% in a study<sup>22</sup> on motorcyclists, a figure comparable with that reported elsewhere for motorcyclists.<sup>24</sup>

Regarding outcome of our patients, 95.62% improved, which is comparable with an international study<sup>12</sup>, which showed that 93.6% of the patients improved. Of those 95.62% of patients, 67.86% were discharged satisfactorily and 27.74% of the patients were referred to local hospitals, because these patients of head injury need prolonged rehabilitation including physiotherapy, therefore, these were referred to appropriate local hospitals for neuro-rehabilitation.

Pakistan is identified as one of the high risk countries of injury related mortality for children and adolescents, with an estimated mortality rate of 30+ per 100,000 people.<sup>25</sup> Preventing injuries caused by road traffic accidents has always been a major task of the public authorities for several years. Now there is need of the time that to minimize the morbidity and mortality resulting from head injury multifaceted approach should be adopted. These measures should include better maintenance of roads, improvement of road visibility and lighting, proper mechanical maintenance of automobile and other vehicles, enforcement of traffic rules, compulsory wearing of helmets by motor bike users and use of seat belts, furthermore implementing compulsory road safety education to school children from primary education level.

Facts and figures proved that there is a strong association between helmet use and intracranial injuries, the increased risk of serious head injury in the non-helmet users has been documented previously<sup>26-30</sup> and this emphasizes an urgent need for increasing helmet use. Earlier studies have reported reductions in head injury associated mortality through the use of helmets.<sup>31-38</sup> Another study showed that helmets reduce the incidence of fatal head injuries by 20 – 45%, also reducing the occurrence and severity of other injuries as well and this strategy so far is the most successful intervention to preventing injury amongst motorcyclists.<sup>39</sup> In a study done by a researcher in Rome showed that severe head injury reduced dramatically after a law requiring helmets of scooter drivers was passed.<sup>36</sup>

Other most important factor in reducing or preventing head injury due to RTA is the reduction and control of speed on the roads. Studies proved that there is reduction in road deaths, some as high as 24%, after lower speeds were enforced.<sup>40</sup> Another example from Ghana<sup>41</sup> showed that speed control measures on a major highway reduced RTAs by 35% and fatalities round about by 55%.<sup>42</sup> Another important measure is the consistent use of seat belts, evidence has been around for a long time, that properly used seatbelts reduce

the risk of serious and fatal injury by 40 – 65%.<sup>43</sup> Now the time demands that appropriate road maintenance, proper road infra-structure and engineering with sufficient traffic signs which can go a long way in improving the safety of the roads.

There is a limitation of our study that we did not collect information from the first hospital or primary health care center the patient attended, and it is possible that this would bias the results, like injuries sustained by the patients, GCS of the patients and particularly the objective assessment of head injury severity. Despite this, the data presented in this article will provide important sum of information on the nature and severity of injuries due to RTAs in Pakistan and it will assist with planning to deal with these head injuries as well as prevention of road traffic accidents in this region.

## CONCLUSION

Although majority of the patients of road traffic accident did not require any neurosurgical intervention, they required only conservative treatment, most of them remained admitted for quite a long period of time, due only to a cause which could have easily be avoided.

*Address for Correspondence:*

*Dr. Muhammad Usman*

*Post-graduate Resident, Neurosurgery Department,  
PGMI Lady Reading Hospital, Peshawar – Pakistan*

*E-mail: drusman387@yahoo.com*

## REFERENCES

1. Janett B: Epidemiology of Head Injury. Arch Dis Child 1998; 78: 403-6.
2. Ake Grenvik, Stephen MA, Ayres SM, Holbrook PR, Shaemaker WC: Management of Traumatic Brain Injury in the Intensive Care Unit. Critical Care 4th Edition. 2000: 322-6.
3. European Brain Injury Society homepage [http://www.ebissociety.org/head-injury.html].
4. Jha N. Epidemiological study of road traffic accident cases: A study from Eastern Nepal: Regional Health Forum WHO South – East Asia Region. 2004; 8.
5. Nantulya MV, Reich MR. The neglected epidemic: Road traffic injuries in developing countries. BMJ. 2002; 324: 1139–41. [PMCID: PMC1123095] [PubMed: 12003888]
6. Peden M: Global collaboration on road traffic injury prevention. Int J Inj Contr Saf Promot 2005; 12 (2): 85-91.
7. Murray CJL, Lopez A, eds. The global burden of disease: a comprehensive assessment of mortality and disability from diseases, injuries and risk factors in 1990 and projected to 2020. Cambridge, MA, Harvard School of Public Health on behalf of the World Health Organization and the World Bank, 1999 (Global Burden of Disease and Injury Series, Vol. I).
8. Jacobs G, Aaron-Thomas A., Astrop A. Estimating global road fatalities. London, Transport Research laboratory, 2000: TRL report No. 445.
9. Charles M, Manjul J: The essential trauma care project—Relevance in South East Asia. Regional Health Forum WHO South East Asia Region 2004; 8 (1): 29-38.
10. Greenfield LJ, Mulholland MW, Oldham KT, Zelenock GB: Head Injuries. Surgery Scientific Principles and Practice I edition. 1993: 267-72.
11. Kirmani MA, Sexena RK, Wani MA: The spectrum of Head Injury in the Valley of Kashmir as seen at Sher-i-Kashmir Institute of Medical Sciences, Srinagar, Kashmir. Thesis submitted for M.S (General Surgery) 1986.
12. Yattoo G, Tabish A: The profile of head injuries and traumatic brain injury deaths in Kashmir. J Trauma Manag Outcomes 2008; 2: 5. doi:10.1186/1752-2897-2-5.
13. Salgado MSL, Colombage SM. Analysis of fatalities in road accidents. Forensic Sci Int 1998; 36: 91-6.
14. Sahdev P, Lacqua MJ, Singh B, Dogra TD. Road Traffic fatalities in Delhi: causes, injury patterns and incidence of preventable deaths. Accid Ann Prev 1994; 26: 377-84.
15. Friedman Z, Kungel C, Hiss J, Margovit K, Stein M, Shapira S. The Abbreviated injury scale – a valuable tool for forensic documentation of trauma. Am J Forensic Med Pathol 1996; 17: 233-8.
16. Henriksson EM, Ostrom M, Eriksson A. Preventability of vehicle – related fatalities. Accid Ann Prev 2001; 33: 467-75.
17. Sharma BR, Harish D, Sharma V, Vij K. Road Traffic accidents – a demographic and topographic analysis. Med Sci Law 2001; 41: 266-74.
18. Jha N, Agrawal CS, Epidemiological Study of Road Traffic Accident Cases: A Study from Eastern Nepal. Regional Health Forum WHO South – East Asia Region, 2004; 8 (1): 15-22.
19. Kennedy F, Gonzalez P, Ong C, Fleming A, Scott RS: The Glassgow coma scale. Journal of Trauma 1993; 35 (1): 75-7.
20. Chandra J, Dogra TD and Dikshit PC. Pattern of cranio-intracranial injuries in fatal vehicular accidents in Delhi, 1966-76. Med Sci Law 1979; 19: 188-94.
21. BL Meel. Trends in fatal motor vehicle accidents in Transkei region of South Africa. Med Sci Law 2007; 47: 64-8.
22. Fitzharris M, Dandona R, Kumar GA, Dandona L. Crash characteristics and patterns of injury among hos-

- pitalized motorized two – wheeled vehicle users in urban India. *BMC Public Health* 2009; 9: 11.
23. Kumar A, Lalwani S, Agrawal D, Rautji R, Dogra TD. Fatal road traffic accidents and their relationship with head injuries: An epidemiological survey of five years. *IJNT*; 2008; 5 (2): 63-7.
  24. ACEM: MAIDS: In-depth investigation of accidents involving powered two – wheelers, Final Report 1.1. Brussels: Association of European Motorcycle Manufacturers (ACEM); 2004.
  25. World Health Organization. Child and adolescent injury prevention: a global call to action. Geneva: World Health Organization, 2005: 16 p.
  26. Peek – Asa C, McArthur DL, Kraus JF: The prevalence of nonstandard helmet use and head injuries among motorcycle riders. *Accid Anal Prev* 1999; 31 (3): 229-33.
  27. Rutledge R, Stutts J: The association of helmet use with the outcome of motorcycle crash injury when controlling for crash/injury severity. *Accid Anal Prev* 1993; 25 (3): 347-53.
  28. Shankar BS, Ramzy AI, Soderstrom CA, Dischinger PC, Clark CC: Helmet use, patterns of injury, medical outcome, and costs among motorcycle drivers in Maryland. *Accid Anal Prev* 1992; 24 (4): 385-96.
  29. Viano D, von Holst H, Gordon E: Serious brain injury from traffic – related causes: Priorities for primary prevention. *Accid Anal Prev* 1997; 29 (6): 811-6.
  30. Liu B, Ivers R, Norton R, Boufous S, Blows S, Lo S: Helmets for preventing injury in motorcycle riders. *Cochrane Database Syst Rev* 2008: CD004333.
  31. Peden M, Scurfield R, Sleet D, Mohan D, Hyder AA, Jarawan E, Mathers C: World report on road traffic injury prevention. Geneva: World Health Organisation; 2004.
  32. Dandona R, Kumar GA, Raj TS, Dandona L: Patterns of road traffic injuries in a vulnerable population in Hyderabad, India. *Inj Prev* 2006; 12 (3): 183-8.
  33. Agnihorti A, Joshi H: Pattern of road traffic injuries: one year hospital – based study in Western Nepal. *Int J Injury Control Safety Promotion* 2006; 13: 128-30.
  34. Heng KWJ, Lee AHP, Zhu S, Tham KY, Seow E: Helmet use and bicycle-related trauma in patients presenting to an acute hospital in Singapore. *Singapore Med J* 2006; 47 (5): 367-72.
  35. Coben JH, Steiner CA, Miller TR: Characteristics of motorcyclerelated hospitalizations: Comparing states with different helmet laws. *Accid Anal Prev* 2007; 39 (1): 190-96.
  36. La Torre G, Van Beeck E, Bertazzoni G, Ricciardi W: Head injury resulting from scooter accidents in Rome: differences before and after implementing a universal helmet law. *Eur J Public Health* 2007; 17 (6): 607-11.
  37. Phuenpathom N, Tiensuwan M, Ratanalert S, Saeheng S, Sripairojkul B: The changing pattern of head injury in Thailand. *J Clin Neurosci* 2000; 7 (3): 223-5.
  38. Branans CC, Knudson MM: Helmet laws and motorcycle rider death rates. *Accid Anal Prev* 2001; 33 (5): 641-8.
  39. Servadei F, Begliomini C, Gardini E, Giustini M, Toggi F and J Kraus. Effect of Italy’s motorcycle helmet law on traumatic brain injuries. *Injury Prevention* 2003; 9: 257-60.
  40. Finch DJ, Kompfner P, Lockwood CR, Maycock G. Speed, speed limits and accidents Project Report 58. Crowthorne: Transport Research Laboratory, 1994.
  41. Afukaar F.K., Antwi P., and Ofosu-Amaah S. Pattern of road traffic injuries in Ghana: implications for control. *Injury Control and Safety Promotion* 2003; 10 (1-2): 69-76.
  42. Reducing traffic injuries from inappropriate speed, Editor RE Allsop, European Transport Safety Council, 1995, Brussels.
  43. European Transport Safety Council: Road Infrastructure Working Party, Ed September 1996.