Original Research Article

An Analysis of Spine Injuries Seen in Fatal Motorized Two-Wheeler Accidents

Mrityunjay Singh Tomar[1], Ashish Jain[2], Anil Mangeshkar[3], Saagar Singh[4]

[1]Senior Resident, Department of Forensic Medicine & Toxicology, Government Medical College, Datia (M.P.), India, [2]Associate Professor, Department of Forensic Medicine & Toxicology, Gandhi Medical College, Bhopal (M.P.), India, [3]Associate Professor, Department of Forensic Medicine & Toxicology, Government Medical College, Datia (M.P.), India, [4]Senior Resident, Department of Forensic Medicine & Toxicology, Government Medical College, Ratlam (M.P.), India.

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Abstract

The global prevalence of two-wheelers is experiencing a notable surge, particularly evident in developing countries, attributed to their economical price points and widespread accessibility. Their compact dimensions, manoeuvrability, and user-friendly nature have solidified their status as among the most prevalent forms of transportation worldwide. In the context of this study, we undertook a comprehensive examination of spinal injuries observed in post-mortem assessments of individuals involved in motorized two-wheeler accidents. Our findings underscore a significant trend: cervical spine injuries emerge as the most prevalent type of injury across both helmeted and non-helmeted riders. This analysis sheds light on the critical importance of understanding the specific injury patterns associated with two-wheeler accidents, serving as a foundational resource for informing public policy initiatives aimed at enhancing safety measures and mitigating the risks associated with this increasingly prevalent mode of transportation. By elucidating the prevalence and characteristics of spinal injuries in such incidents, this research contributes valuable insights towards fostering safer road environments and reducing the toll of two-wheeler accidents on individuals and communities worldwide. It is intended that the data provided by this study would serve to cover the information gap in this area and contribute to known facts, facilitating policy planning and guiding necessary measures.

Key words: Vertebral injuries, spine injuries, road traffic accidents, motorized two-wheelers.

Introduction

As two-wheelers are very inexpensive to acquire and maintain compared to other vehicles, the number of two-wheeled vehicles is rising worldwide, especially in developing nations. The motorbike has become a common mode of transportation due to its mobility, speed, and ease of avoiding traffic jams on the road as well as its ability to maneuver over challenging terrain.[1]

Corresponding Author: Saagar Singh, Senior Resident, Department of Forensic Medicine & Toxicology, Government Medical College, Ratlam (M.P.), India.

E-mail: sukumar.singh4@gmail.com

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The Burden of the Motorized Two-Wheeler Accident Related Injuries:

Faduyile F, Emiogun F, Soyemi S, et al. in their autopsy based study conducted on 5,661 cases (2009-2014) in Lagos, Nigeria found that in a motorcycle accident, males are more commonly injured than females and the peak age group was 31-40 years followed by 21-30 years. The majority of the victims were motorcycle riders, followed by pillion passengers. The craniocerebral injury was the cause of death in majority of the followed by multiple injuries and the most commonly injured organ was head followed by the lower limbs.[1]

Hsieh CH, Hsu SY et al. (2015) in their retrospective analysis of motorcycle-related injuries from the Trauma Registry System in Taiwan identified and compared 4028 male and 2919 female patients who were hospitalized for treatment between January 1, 2009 and December 31, 2013 concluded that women motorcycle riders have unique injury characteristics, including bodily injury pattern, as well as a lower injury severity score and in-hospital mortality when compared to male motorcycle riders.[12]

H S Chhabra and M Arora (2015) in their retrospective study done in Haryana, found that the Road Traffic Accident (45%) is the most common cause of the traumatic spinal cord injury. Out of the cases having traumatic spinal cord injury 66.67% were paralysed, and 71.18% were completely injured. The most compound injury was seen in cervical spine (41%) followed by thoracic spine (30.5%) and the most common time was during daytime (43%). Accidents which had happened on the roads other than the highways have higher incidence of traumatic spinal injuries, which is 39.5% on the highways and 60.5% on the other roads.[10] According to the autopsy based study done by Sharma et al in Chandigarh, India, the incidence of traumatic spine injury is 13.4%.[13]

According to the NCRB, in 2020, two-wheelers were responsible for the greatest number of fatal road accidents (58,129 deaths), accounting for 43.6% of all road accidental deaths, out of which 11,665 (20%) occurred in the state of Madhya Pradesh, India.[2] In spite of recent advancement in the fields of technology and medical sciences, death and deformities following road-traffic accidents are yet to be controlled successfully rather incidences of RTA have been increasing at an alarming rate everywhere.[11] The importance of epidemiological studies in planning prevention strategies as well as clinical and community services for persons with spine injury is well established.[3,4] These studies provide a baseline to monitor the effectiveness of interventions and help in prioritization for resource allocation and thus should be especially helpful for developing nations, who have limited resources.

Material and Methods

The present study was conducted in the department of Forensic Medicine & Toxicology, Gandhi Medical College, Bhopal (M.P.), India from September 2021 to August 2022. All the deaths pertaining to the fatal motorized two-wheeler accidents brought to the Gandhi Medical College Mortuary during this study period have been included. The history regarding the circumstances of the accidents and other relevant data was collected through the autopsy requisition form and through the detailed history taking from the police personnel, friends, relatives etc. Approval to perform this study was obtained from the Scientific and Ethics Committee, Gandhi Medical College, Bhopal (M.P). Material included a pre designed proforma containing relevant information about the cases. Information was derived from autopsy reports, autopsy registers, police reports and hospital (clinical) records, where necessary.

Results

Out of 4590 autopsies performed in the Department of Forensic Medicine & Toxicology, Gandhi Medical College, Bhopal, over the study period, 878 cases of fatal motorized two-wheeler accidents were reported. Therefore, the proportion of deaths due to fatal motorized two-wheeler accidents is 19.13%. Of the 878 two-wheeler accident cases only 57 (6.49%) cases had a history of riding the vehicle with a helmet.

The vertebral injuries constituted 4.6% of the total cases (n=40). Among the helmeted cases (n=57), 10 cases (17.54%) of vertebral injury were seen whereas there were 30 (52.63%) instances of vertebral injuries in the non-helmeted group. The cervical vertebra

fracture is the most common injury seen in both non-helmeted and helmeted cases (n=22 and n=8, respectively), followed by thoracic vertebrae (n=6) combining both helmeted and non-helmeted groups (Table 1).

Table 1: Observation of spine injuries in cases with and without using helmet

Description	Total Cases (n)	Helmeted Cases (n)	Non-Helmeted Cases (n)
Total autopsies performed	4590		
Fatal motorized two-wheeler accidents	878 (19.13%)	57	821
Vertebral injuries	40 (4.6%)	10	30
Most common injury (cervical vertebra fracture) - Helmeted Cases		08	
Most common injury (cervical vertebra fracture) - Non-Helmeted Cases			22
Cases with thoracic vertebrae fracture (both helmeted and non-helmeted)	06		

Discussion

The most common type of spinal injury found in our study is of cervical spine in both helmeted and non-helmeted riders of the motorized two-wheelers. The spinal injury is more common in riders who did not wear a helmet while riding a motorized two-wheeler. Despite its size and population, India has not had any proper study on this matter so far. These findings are in accordance with the study done by Chhabra et al.[10]

Pilot/Demographic studies have been conducted in other nations but the information from these studies does not represent this country. However, according to these studies, there are significant epidemiological differences in India as compared with other developed countries. An insight into the epidemiological/ demographic details is important for developing strategies for prevention programs. RTA is the most common cause of injury in India[5,6] and hence is expected to be the most common cause of spinal injury as well. According to the data released by National Crime Bureau, during 2022, 45.5% victims of road accidents were riders of motorized two-wheelers.[7] Various factors play a role in high incidence of road traffic accidents in India. Different mindsets, and poor and inexperienced driving techniques are important factors.[5,8] Traffic rules are often viewed as imposed and there is a tendency to treat them with disdain. Thus, high speeds and other human errors leading to road traffic accidents is quiet common. Other studies report human error as being the only cause in 57% of all accidents[5] and a contributing factor in over 90% of all accidents. This highlights the critical importance of prevention programs, including public awareness and education. The rate of poor traffic management is a low influencing factor that may reflect people's low awareness. Experts implicate improper segregation of traffic and pedestrians, overloaded vehicles, significant volume of non-motorized traffic not only on the urban as well as rural roads but also on four-lane divided highways and deteriorating traffic law enforcement due to the absence of enforcing teams, skills, facilities and resources as significant predisposing factors.[5] Other implicated factors include limited scientific crash investigation, analysis and dissemination of information.[9]

Conclusion

There is no established pattern when it comes to the daily distribution of injuries. Human error, poor road infrastructure and unfavorable driving

conditions most often predisposed to road traffic accidents. The significantly higher number spine injuries probably reflect the need to establish proper services for pre-hospital and acute care. It is necessary to conduct an appropriate epidemiological study that can confirm the results of the study and help develop appropriate prevention programs.

Although the efficacy of helmets has been proven in reducing the fatalities due to head injuries through various studies, still, in this study, there are cases in which spinal injuries have been observed in helmeted riders. This may be due to sub-standard helmets or poor helmet quality or poor design. The government should ensure that the helmet production standards should be strictly followed. The designs of the helmet should also be improved so as to prevent spine injuries in the persons wearing the helmets.

Conflict of interest: None to declare.

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