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Studies on the Pattern of Injuries In Fatal Two-Wheeler Motor Vehicular Accidents With and Without Helmets

KEYWORDS: trauma; accidents; injuries; helmet

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ABSTRACT ***Background***- *Traffic accidents are an endemic disease affecting majorly young people, who are in the prime of their lives. In middle age, the leading causes of death are traffic accidents. Two-wheelers cause maximum fatalities in traffic accidents.*

Aim*: To study the pattern of injuries sustained by riders involved in motorized two-wheeler accidents.*

Objective*: What role does a helmet play in protecting the rider from head injuries in an accident?*

Method and material: In the present study, total 50 cases were studied. Out of which 30% were wearing helmets and 66% were non-helmeted and 4% were wearing turban. ISI marked helmeted persons were 40% and non-ISI marked were 60% of the total helmeted persons. Two groups were made first with and without helmet, second with and with-out ISI marked helmet for study.

Result*: Brain injuries and skull fractures were maximum in non-helmeted group. Most spot death occurred due to head injuries.*

Conclusion*: It was found that head and brain injuries are the commonest cause of death in two- wheeler accidents. In chest injuries, ribs were fractured commonly. In abdominal injuries, liver was the most commonly affected organ. In group not wearing helmets, head injury as cause of death was seen in 88% of cases and group with helmets 26%.*

Introduction:

Accidents in our present times are the single most serious health problem especially in fast moving urban cities. Traffic accidents are an endemic disease affecting majorly young people, who are in the prime of their lives. In middle age, the leading causes of death are traffic accidents. Two-wheelers cause maximum fatalities in traffic accidents. Motorized two-wheelers accidents are increasing every day. Human factor in aetiology of accidents are most difficult to predict and control. The term "accident" itself suggests "inevitability"- an act of providence against which precautions are useless. The number of motor vehicles on road has been continuously growing. The motorized two wheeler population in Delhi has increased very rapidly in the past decade which in itself represents the increase in the production of these vehicles in India. Two wheelers are bought mostly by the middle class families who are not able to afford cars and want to avoid the time wastage in public transportation. Since, two-wheelers are a rapid mode of transport and economical, they are extensively used by the middle class families Inspite of great risks and the fact that they are inconvenient for most of the months in a year. So, although they are cheap for individuals, they are expensive for the society as a whole when the cost of medication, operations, time loss due to injuries and deaths, etc. is taken into consideration.

A study, in Delhi by Chandra et al [1] stated that roadside vehicular accidents death was a penalty paid by us for modern civilization. A study of death due to head injury in Chandigarh by singh et al [2] stated that the vehicular accidents 70% were the major cause of head injury, riders of two-wheeler(31%) were the most common victims. In a study by sood [3] of factors influencing injury among riders involved in motorized two-wheelers accidents in India, it stated that motorcycle riders had a significantly higher injury severity score than did scooter riders. In a study by Wagle et al [4] on helmet use by motorcyclists, a total of 83 cases were studied. Out of these 81patients were male and only 2 female. 58 were without helmet and 22 with helmet. They found that helmet use have significant effects on that person's outcome. Hundley et al [5] did a study on non helmeted motorcyclists. They found that helmet use was associated with lower injury severity, mortality and resource utilization.

Two-wheelers are less safe as they rest on two points thus there is less stability. Therefore, for two-wheeler riders balancing themselves on the vehicle is very important and needs some skill. The two-wheelers have no shields around the riders as the four-wheelers, etc. have. So, the riders are much more exposed to the environmental vagaries like heat, cold, rain, dust, animals that cross their paths and even insects flying around. Two-wheelers can be easily hit by the large vehicles as they are less conspicuous on the roads. A British study shows that persons injured in motorcycle accidents required more hospital care than any

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other major group of injured patients. As head is the most vulnerable part of the motorcycle riders, it is evident that the helmet reduces the fatalities significantly.

Objectives of research:

- To study the incidence of two- wheeler motor vehicular accidents.
- To compare pattern of injuries sustained by two-wheeler riders wearing crash helmets and without it.
- To study the relationship between two-wheeler accidents and various factors, like age, sex, weight and height of victims, type of other vehicles involved and impact site.
- To evaluate the role of helmet in prevention of fatal head injuries among the two- wheeler riders.

Material and methods: This study was done to study the pattern of injuries in fatal two-wheeler motor vehicular accidents with and without helmets. **The** study was divided between two groups. First with and without helmets. Second with and without ISI marked helmets. 50 cases were taken in the study (2005-2007). This study was done on cases received for medico legal autopsy at the mortuary of department of forensic medicine, Maulana azad medical college and associated hospitals during the period 2005-2007. In this present study, the attempts were made to study pattern of injuries in fatal two wheeler accidents in relation to the changing pattern of traffic and to establish the relationship between the extent, nature and site of head injury and other injuries to the fatality, survival time, age, sex, and type of other vehicle involved from the autopsy findings so as to widen the medical horizon in the field of diagnosis, treatment in cases of such injuries and also how much a helmet can help preventing the head injuries in such accidents.

Results

In the present study, total 50 cases were studied, of which 76% were drivers and 34% were pillion riders. Out of which 30% were wearing helmets and 66% were non-helmeted and 4% were wearing turban. Those who were wearing helmets were categorized according to ISI mark. ISI marked helmeted persons were 40% and non-ISI marked were 60% of the total helmeted persons. Two groups were made first with and without helmet, second with and without ISI marked helmet for study. In this study males are predominantly affected.

Majority victims are of young age group of 21-30 yrs and maximum age group 21-50 yrs. Time of accidents took place between 9 pm to 12pm at night. Motorcycles were involved in accidents in 54% cases followed by scooter in 44% cases and scooty in 4% cases. Most of accidents were due to slipping 32% followed by accidents due to heavy vehicles and then to car/jeep. Spot death occurred in 16% of cases. Out of these all except one case were from non-helmeted group. Most spot death occurred in head injuries. Victims with helmets, especially ISI helmets had longer survival period in the hospitals. Brain injuries and skull fractures are maximum in non-helmeted group.

Vehicles involved:

	Type of vehicle	Number of victims	Percentage
1	Scooter	22	44%
2	motorcycle	27	54%
3	Scooty	1	2%

Type of victims:

Type of victims	Number of victims	Percentage
Drivers	38	76%
Pillion Riders	12	34%

Incidence of helmeted and non-helmeted victims

	Type of victims	Number of victims	Percentage
1	Victims with helmets	15	30%
2	Victims without helmets	33	66%
3	Victims with turban	2	4%

Cranial injuries pattern in victims with and without ISI helmets

	Injuries	Victims without ISI helmets	percentage	Victims with ISI helmets	percentage
1	Scalp injuries	7	77%	1	16%
2	Skull fractures	6	66%	0	0%
3	Brain injuries	3	33%	0	0%
4	Intracranial and brain stem hemorrhage	8	88%	0	0%
5	Brain stem hemorrhage	0	0%	0	0%

Causes of death in victim with and without helmet

	Causes of death	Victims without helmets	Percentage	Victims with helmets	Percentage
1	Head injury alone	31	88%	4	26%
2	Head injury and other injuries	3	9%	3	20%
3	Other injuries	1	3%	8	54%

Discussion:

Head and brain injuries are the commonest cause of death in two- wheeler accidents. Most common brain hemorrhage in decreasing order was subdural hematoma, subarachnoid hemorrhage and extradural hemorrhage. In chest injuries, ribs were fractured commonly, followed by clavicle and sternal fractures. Dislocation of shoulder was present in 8% cases. No difference in pattern of chest injuries was seen in victims with and without helmets. In abdominal injuries, liver was the most commonly affected organ, followed by spleen, kidney and urinary bladder.

Fracture of pelvis was present in 10% cases. Lower limbs were frequently involved in injuries than the upper limbs. Femur (22%) was most commonly fractured bone in limbs, followed by tibia and fibula 16%, radius and ulna 10%, humerus 8%, phalanges+ metacarpals 6%, metatarsals+ phalanges 2%. Femur was most commonly fractured in group wearing ISI marked helmets in 83 % of cases. Most common cause of death in this study was head injury 70%, followed by other injuries 18%, head and other injuries 12%. In group not wearing helmets, head injury as cause of death was seen in 88% of cases and group with helmets 26%. In group which was wearing helmets and was divided according to use of ISI and non- ISI helmets, head injury as the cause of death in victims with non-ISI helmets was 44 % and no case with head injury as the cause of death was seen in victims wearing ISI helmets. The first recorded motor-vehicle accident in the United States occurred in New York City in 1899 (Baldwin D.M., 1955). 52 years later, in December 1951, the millionth traffic victim died as a result of vehicular accident. Since then, about 6000 people receive injuries every day (Kuloski J. 1960).

In remote past, head injuries were the result of falls,

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hunting and also military operations. However in the last century, vehicular accidents have surpassed all other causes of head injuries. In 1979, 71.999% of vehicular accidents deaths were due to head injuries J. chandra [1](1979). A study of death due to head injury in Chandigarh by singh et al [2] stated that the vehicular accidents 70% were the major cause of head injury, riders of two-wheeler(31%) were the most common victims. Lin et al [6] did a study on crash severity, injury pattern and helmet use in adolescent motorcycle riders. According to this study more injuries to the external skin, face and head and more severe injuries occurred in unhelmeted than in helmeted riders. Crashes involving unhelmeted riders were not more severe but more frequently involved face and head injuries than crashes involving helmeted riders. Zetas and thanasophon [7] (1979) did a study on injury patterns in motorcycle accidents. The average age of accident was 22.4 years. The average period of hospitalization was 12.5 days. 54% of the sample studied sustained major bone fractures. Sosin, sacks and Holmgren [8] did a study of head injury associated deaths from motorcycle crashes in 1990. Their review of US mortality data from 1979 to 1986 identified 15,194 deaths and nearly 600,000 years of potential life lost before age 65 years that were associated with head injuries from motorcycle crashes. Population based rates adjusted for age, sex, and race in states with partial or no motorcycle helmet use laws were almost twice than those in states with comprehensive helmet use laws. Hitosugi, takatsu and shigeta [9] did a retrospective analysis of injury severity and the relation between head and neck injuries and helmet used. They concluded helmet use significantly decreased the severity of head and neck injuries but had no effect on over all injury severity or the severity of injuries to the other body regions. It stated that head and neck injuries are the most common cause of death in motorcyclists.

The common saying, "no injury of head is too trivial to be ignored or so serious to be despaired of", still holds good to this day. There are simple precautions which can make all the difference between life and death, especially for two-wheeler riders – wearing a well designed helmet and making one conspicuous for example. Yet many motorcyclists brush aside or such suggestions frivolously because either of ignorance of importance of crash helmets, or of the inconvenience they feel the helmet would cause. But, of all motorists, they are the one who most need the protection.

Recommendations:

Strict traffic rules should be followed, as it is already compulsory in Delhi to wear helmets by riders and Pillion riders of two- wheelers.

Helmets and other protective gears like rear view mirror should be sold with two- wheelers itself.

It should be made compulsory to wear only ISI marked helmets.

More awareness of danger of not wearing helmets should be brought to general public. Voluntary wearing of helmets should be encouraged.

Some protective gears for chest and lower limbs should be made.

Design of two-wheelers should be improved, to prevent more of lower limb injuries.

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