A Descriptive Study of Pattern of Injuries in Driver and Pillion Rider Victims of Fatal Two Wheeler Accidents

K. Prasannan, 1 P.A. Sheeju 2

1 Professor, Forensic Medicine & Police Surgeon, Government Medical College, Kozhikode, Kerala.
2 Assistant Professor, Forensic Medicine & Assistant Police Surgeon, Government Medical College, Thrissur, Kerala.

Background:
Motor vehicle crashes are a major cause of fatality all over the world. By 2020 motor vehicle injury is projected to become the third leading contributor to the global burden of disease in the world. Motorcyclists are about 25 times more likely than car occupants to die in Road Traffic Accidents. The present study is aimed to analyse the injury pattern in driver and pillion rider victims of two wheeler accidents.

Method:
In this study 135 (127 males and 8 females) cases of victims of fatal two wheeler accidents in the age group of 11 to 74 years were studied. The details of the accident were collected from police inquest, statements from investigating officers, statements from relative/witnesses. In hospitalised cases details including laboratory investigation reports are collected from case sheet. General examination findings and injuries are documented and also photographed.

Results:
It was observed that majority of the victims were between 20 and 50 years. Skilled labourers constituted 18.5%. Next were students. Only 38.1% were using helmet at the time of accident. In 27.4% of cases definite history regarding helmet use was not available. Probably the relatives may not disclose the non usage of helmet for obvious reasons. It was observed that majority of the vehicle involved was motorcycle. Majority of accidents were front on collisions. Type of other vehicles involved in accidents was heavy vehicles. Among 135 cases alcohol odour was present for stomach contents in 11 victims, 8.3% of drivers and 7.5% of pillion riders. Maxilla was fractured in 11.9% in drivers and 17.64% in pillion riders. Mandible was fractured in 14.28% and 13.72%. Incidence of vertebral fracture was similar in both groups. (14.28% and 14.72%). In drivers and pillion riders head injury was the leading cause of death (70.23% and 66.66%). It includes all cases where head injury was the only cause or occurred in combination with other injuries. Head injury alone was the cause of death in 47% of drivers and 52.9% of pillion riders. Chest injury was the next frequent cause of death. (32.14% and 39.21%). Abdominal injury in 26.19% and 15.68% each. Vertebral column injury in 3.57% of drivers and 7.84% of pillion riders.

Conclusion:
We conclude that in majority of cases the two wheeler involved was motor cycle and the other vehicle involved were heavy vehicles. The commonest modes of accidents were front on collisions, followed by skid and fall. Only 38.1% of drivers were wearing helmet at the time of accident. Incidence of scalp contusion in pillion riders were more, may be due to helmet use in38.1% of the drivers. Scalp lacerations were more in drivers. Pillion riders showed more fissure fractures in skull vault. Base of skull fractures showed similar incidence in both groups. SDH and brain stem injuries were slightly more in pillion riders. Intra cerebral haemorrhage was seen in pillion riders only.

Key words: Head injury, Road traffic accidents, pillion rider, two wheeler accidents

ABSTRACT:
Background: Motor vehicle crashes are a major cause of fatality all over the world. By 2020 motor vehicle injury is projected to become the third leading contributor to the global burden of disease in the world. Motorcyclists are about 25 times more likely than car occupants to die in Road Traffic Accidents. The present study is aimed to analyse the injury pattern in driver and pillion rider victims of two wheeler accidents.

Method: In this study 135 (127 males and 8 females) cases of victims of fatal two wheeler accidents in the age group of 11 to 74 years were studied. The details of the accident were collected from police inquest, statements from investigating officers, statements from relative/witnesses. In hospitalised cases details including laboratory investigation reports are collected from case sheet. General examination findings and injuries are documented and also photographed.

Results: It was observed that majority of the victims were between 20 and 50 years. Skilled labourers constituted 18.5%. Next were students. Only 38.1% were using helmet at the time of accident. In 27.4% of cases definite history regarding helmet use was not available. Probably the relatives may not disclose the non usage of helmet for obvious reasons. It was observed that majority of the vehicle involved was motorcycle. Majority of accidents were front on collisions. Type of other vehicles involved in accidents was heavy vehicles. Among 135 cases alcohol odour was present for stomach contents in 11 victims, 8.3% of drivers and 7.5% of pillion riders. Maxilla was fractured in 11.9% in drivers and 17.64% in pillion riders. Mandible was fractured in 14.28% and 13.72%. Incidence of vertebral fracture was similar in both groups. (14.28% and 14.72%). In drivers and pillion riders head injury was the leading cause of death (70.23% and 66.66%). It includes all cases where head injury was the only cause or occurred in combination with other injuries. Head injury alone was the cause of death in 47% of drivers and 52.9% of pillion riders. Chest injury was the next frequent cause of death. (32.14% and 39.21%). Abdominal injury in 26.19% and 15.68% each. Vertebral column injury in 3.57% of drivers and 7.84% of pillion riders.

Conclusion: We conclude that in majority of cases the two wheeler involved was motor cycle and the other vehicle involved were heavy vehicles. The commonest modes of accidents were front on collisions, followed by skid and fall. Only 38.1% of drivers were wearing helmet at the time of accident. Incidence of scalp contusion in pillion riders were more, may be due to helmet use in38.1% of the drivers. Scalp lacerations were more in drivers. Pillion riders showed more fissure fractures in skull vault. Base of skull fractures showed similar incidence in both groups. SDH and brain stem injuries were slightly more in pillion riders. Intra cerebral haemorrhage was seen in pillion riders only.

Key words: Head injury, Road traffic accidents, pillion rider, two wheeler accidents

INTRODUCTION:
Trauma is a major cause of morbidity and mortality worldwide for death of majority of victims in road traffic accidents (RTA). According to World Health Organization more than 90% of deaths occur in low and middle income countries (1). By 2020 Road Traffic Accident injuries will rise in the 6th place as a major cause of death worldwide (2).

In many countries roads are planned and built to allow motor vehicles to travel faster while insufficient thought is given to the needs of two wheelers and pedestrians. Injury to the head is the commonest cause of mortality and morbidity following two wheeler crashes. Motor cyclists are about 25 times more likely than passenger car occupants to
die in traffic crashes (3). About 20% of deaths in RTA are in motor cycle accidents (4,5). Most of the people were young males who are in the productive period of life. This places heavy burden on the family social and medical resources. Two wheeler riders are more vulnerable to RTA and for sustaining injuries. This group of road users do not have protective shell around them and therefore are more at risk than those inside vehicles. They are at additional risk when their needs have not been taken into consideration during the planning of road construction. The present study was undertaken to compare the injury pattern in drivers and pillion riders in two wheeler accidents.

MATERIALS AND METHODS:

Participants
 In this study 135 (127 males and 8 females) cases of victims of fatal two wheeler accidents in the age group of 11 to 74 years, brought for autopsy in the Department of Forensic Medicine, Medical College Kozhikode were studied. The present study was conducted from Oct 2010 to August 2011.

Inclusion and exclusion criteria
 All persons dying following two wheeler accidents are considered for the study. Two wheels include motor cycles, scooters and mopeds. All the females were pillion riders. Bicycles were excluded from the study. Accidents include all types, against all types of vehicles running on the road, collision with any object, surface or any animal or fall from vehicle.

Methods
 The details of the accident were collected from police inquest, statements from investigating officers, statements from relatives/witnesses. In hospitalised cases details including laboratory investigation reports are collected from case sheet. General examination findings and injuries are documented and also photographed.

Ethical considerations
 The present study was approved by Institutional ethics committee, Government Medical College, Kozhikode.

Data analysis
 Data was analysed by SPSS 20.0

RESULTS
 Results were presented in table no1 to table no13.
 It was observed that majority of the victims were between 20 and 50 years (table-1). Skilled labourers constituted 18.5%. Next were students (table no: 2), only 38.1% were using helmet at the time of accident. In 27.4% of cases definite history regarding helmet use was not available. Probably the relatives may not disclose the non usage of helmet for obvious reasons (table no:3). It was observed that Majority of the vehicle involved was motorcycle (table no:4). Majority of accidents were front on collisions (table-5). Type of other vehicles involved in accidents were heavy vehicles (table no: 6). Among 135 cases alcohol odour was present for stomach contents in 11 victims, 8.3% of drivers and 7.5% of pillion riders (table no:7). Injuries present in victims were presented in table no 8 to table no 13. Maxilla was fractured in 11.9% in drivers and 17.64% in pillion riders. Mandible was fractured in 14.28% and 13.72%. Incidence of vertebral fracture was similar in both groups (14.28% and 14.72%). In drivers and pillion riders head injury was the leading cause of death (32.14% and 39.21%). Abdominal injury in 26.19% and 15.68% each. Vertebral column injury in 3.57% of drivers and 7.84% of pillion riders.

MATERIALS AND METHODS:

Participants
 In this study 135 (127 males and 8 females) cases of victims of fatal two wheeler accidents in the age group of 11 to 74 years, brought for autopsy in the Department of Forensic Medicine, Medical College Kozhikode were studied. The present study was conducted from Oct 2010 to August 2011.

Inclusion and exclusion criteria
 All persons dying following two wheeler accidents are considered for the study. Two wheels include motor cycles, scooters and mopeds. All the females were pillion riders. Bicycles were excluded from the study. Accidents include all types, against all types of vehicles running on the road, collision with any object, surface or any animal or fall from vehicle.

Methods
 The details of the accident were collected from police inquest, statements from investigating officers, statements from relatives/witnesses. In hospitalised cases details including laboratory investigation reports are collected from case sheet. General examination findings and injuries are documented and also photographed.

Ethical considerations
 The present study was approved by Institutional ethics committee, Government Medical College, Kozhikode.

Data analysis
 Data was analysed by SPSS 20.0

RESULTS
 Results were presented in table no1 to table no13.
 It was observed that majority of the victims were between 20 and 50 years (table-1). Skilled labourers constituted 18.5%. Next were students (table no: 2), only 38.1% were using helmet at the time of accident. In 27.4% of cases definite history regarding helmet use was not available. Probably the relatives may not disclose the non usage of helmet for obvious reasons (table no:3). It was observed that Majority of the vehicle involved was motorcycle (table no:4). Majority of accidents were front on collisions (table-5). Type of other vehicles involved in accidents were heavy vehicles (table no: 6). Among 135 cases alcohol odour was present for stomach contents in 11 victims, 8.3% of drivers and 7.5% of pillion riders (table no:7). Injuries present in victims were presented in table no 8 to table no 13. Maxilla was fractured in 11.9% in drivers and 17.64% in pillion riders. Mandible was fractured in 14.28% and 13.72%. Incidence of vertebral fracture was similar in both groups (14.28% and 14.72%). In drivers and pillion riders head injury was the leading cause of death (70.23% and 66.66%). It includes all cases where head injury was the only cause or occurred in combination with other injuries. Head injury alone was the cause of death in 47% of drivers and 52.9% of pillion riders. Chest injury was the next frequent cause of death. (32.14% and 39.21%). Abdominal injury in 26.19% and 15.68% each. Vertebral column injury in 3.57% of drivers and 7.84% of pillion riders.

| Age-years | Frequency | % |
|-----------|-----------|---|
| 10-19     | 20        | 10.3 |
| 20-29     | 55        | 40.2 |
| 30-39     | 36        | 26.7 |
| 40-49     | 21        | 15.5 |
| 50-59     | 8         | 5.95 |
| 60-69     | 10        | 7.40 |
| 70-79     | 0         | 0.00 |

Table 1: Distribution of accidents according to the age of the victim (n=135)

| Occupation     | Frequency | % |
|----------------|-----------|---|
| Student        | 18        | 13.3 |
| Business       | 9         | 6.3 |
| Govt. Service  | 4         | 3.0 |
| Skilled Labourer| 29        | 18.5 |
| Executive      | 4         | 3.0 |
| Salesman       | 9         | 6.7 |
| Manual Labouer | 17        | 12.6 |
| Professional   | 4         | 3.0 |
| Others         | 47        | 34.8 |

Table 2: Occupation of the victims: (n=135)

| Type          | Frequency | % |
|---------------|-----------|---|
| Motor bike    | 129       | 95.6 |
| Scooter       | 6         | 4.4 |
| Total         | 135       | 100 |

Table 3: Helmet use (n=135)

| Accident Type          | Frequency | % |
|------------------------|-----------|---|
| Front on Collision     | 60        | 46.7 |
| Rear end hit           | 11        | 11.0 |
| Skid and fall          | 10        | 10.4 |
| Hit while overtaking    | 5         | 5.90 |
| Other vehicle          | 6         | 4.40 |
| Side on collision      | 5         | 5.90 |
| Two wheeler overtaking | 2         | 2.20 |
| Giddiness and fall     | 3         | 3.00 |
| Trying to open umbrella| 3         | 3.00 |
| Others                 | 3         | 3.00 |

Table 4: Type of Vehicle used by victims involved in the accident

| Type           | Frequency | % |
|----------------|-----------|---|
| Bus            | 29        | 21.5 |
| Lorry          | 7         | 5.2 |
| Utrek          | 15        | 11.1 |
| Car            | 19        | 14.4 |
| Lorry          | 13        | 9.6 |
| Jeep           | 1         | 0.7 |
| Omni van       | 3         | 2.2 |
| Pick up van    | 1         | 0.7 |
| Auto           | 1         | 0.7 |
| Tempo          | 1         | 0.7 |
| Hit a bike & run over | 1 | 0.7 |
| lorry          | 1         | 0.7 |
| Not Known      | 1         | 0.7 |

Table 5: Nature of accidents (n=135)

| Vehicle type          | Frequency | % |
|-----------------------|-----------|---|
| Drivers               | 7         | 8.3 |
| Pillion riders        | 4         | 4.4 |
| Total                 | 11        | 8.1 |

Table 6: Type of other vehicles involved in the accident

| Sign of alcohol intake | Present | % |
|------------------------|---------|---|

Table 7: Sign of alcohol intake
Injury                  Frequency %
Level                  42.8
Laceration             18.5
Contusion + Laceration  9.6
Abraction              9.2
Abraction + Contusion   2.7
Abraction + Contusion + Laceration 1.5
Abraction + Laceration  0.7

Table-8: Injuries to scalp

| Injury              | Driver %   | Pillion rider % |
|---------------------|------------|-----------------|
| N=84                | N=51       |
| Contusion           | 61.9       | 62.75           |
| Laceration          | 29.9       | 24.33           |
| Abraction           | 8.33       | 11.76           |

Table-9: Scalp injuries in drivers and pillion riders

Fracture              Driver %   Pillion rider %
Fissure Fracture Vault 29.76   37.25
Comminuted Fracture vault 21.43 15.69
Depresssed Fracture     7.11     9.8
Diastatic Fracture      6.88     8.88
Fissure Fracture base   35.71   37.25
Comminuted Fracture Base 33.81  39.22

Table-10: Skull fractures in drivers and pillion riders

Injury              Driver %   Pillion rider %
Focal brain injury   83.33     79.29
Diffuse brain injury 46.82     42.56

Table-11: Brain injury in drivers and pillion riders

Injury                  Driver %   Pillion rider %
SAH                    67.86     65
SDH                    35.39     35.40
Brain stem             45.65     45.65
Intra ventricular      32.40     32.40
Intra cerebral         10        0
Cerebellar             8.33      8.33
EDH                    2         2

Table-12: Intra cranial haemorrhages in drivers and pillion riders

Injury                  Driver %   Pillion rider %
Chest                   32.19     44.1
Abdomen                 35.71     33.33
Pelvis                  13.09     11.76
Limbs                   27.38     19.6

Table-13: Other injuries in drivers and pillion riders

DISCUSSION:
Injuries to the victims of two wheeler accidents constitute a significant proportion of severe traffic accident injuries. The present study pattern of injuries especially injuries to head was based on 135 cases of autopsy done in Department of Forensic Medicine, Government Medical college, Kozhikode from October 2010 to August 2011. The objective of the study was to find the pattern of injuries especially head injury in victims of fatal two wheeler accidents in drivers and pillion riders.

The majority of the vehicles driven by the victims were motor cycles (95.6%). Skilled labourers were the most victims (18.5%) followed by students (13.3%). In African and western countries majority of the victims were students (9). The majority of the vehicles involved in collision were heavy vehicles - bus, lorry and tipper, together form about 50%. In a study by Harnam Sigh et al it constituted 36.6% (7). In the study by Martinus Ritcher cars were the major collision opponents (8). The common mode of accident involving riders and pillion riders were front on collision. Drivers 50% and pillion riders 41.2%. Skid and fall was marginally high in pillion riders (11.8%) compared to riders (9.5%). The commonest mode as per study by Nupur pruthi et al was skid and fall, 45.5% (9). Only 38.1% were wearing helmet in spite of helmet wearing being made a statutory requirement. Scalp injuries were present in 81.48% of cases. The victim's sustained contusion more than any other injury (47.4%), followed by laceration (14.8%). Incidence of contusion in pillion riders was more, may be due to the protection by helmet in drivers. Scalp laceration was more in drivers. In facial injuries abrasion was more in drivers (27.4%) than in pillion riders (19.6%).

In skull fractures fissure fracture was present in 32.59% of cases. Pillion riders showed more incidence than drivers, may be due to the protection by helmet. Incidence of skull base fissure fracture was almost same in both groups. Of all victims 78.51% presented with focal brain injury. Sub dural haemorrhage and brain stem haemorrhage were slightly higher in pillion riders. Intra cerebral haemorrhage as seen in drivers only (10%). Incidence of brain contusions were almost same in both groups. Vertebral fracture was seen in 14.07% of cases. Horacic vertebral fracture was more in pillion riders. In the present study in 135 victims other than head injury, chest injury was the common injury. It was present in 48.14%, followed by abdomen (36%) limbs (24%) and pelvis (13%). Out of 135 cases head injury was the cause of death in 49.6%. Incidence of head injury was slightly more in pillion riders, may be due to helmet use by drivers.

Conclusion
We conclude that in majority of cases the two wheeler involved was motor cycle and the other vehicle involved were heavy vehicles. The commonest modes of accidents were front on collisions, followed by skid and fall. Only 38.1% of drivers were wearing helmet at the time of accident. Incidence of scalp contusion in pillion riders were more, may be due to helmet use in 38.1% of the drivers. Scalp lacerrations were more in drivers. Pillion riders showed more fissure fractures in skull vault. Base of skull fractures showed similar incidence in both groups. SDH and brain stem injuries were slightly more in pillion riders. Intra cerebral haemorrhage was seen in pillion riders only.

REFERENCES:
1. Global status report on road safety. Time for action.2009.WHO. (www.who.int/violence-injury-prevention/road_safety_status/2009 accessed 31 December 2010.
2. Global burden of disease: 2004 update. Geneva, World Health Organization,2008(http://www.who.int/healthinfo/global_burden_disease/GBD_report_2004 update_AnnexeA.pdf,accessed 22 November 2010.
3. Traffic safety facts.2009 Data. National Highway Traffic Safety. U.S Department of transportation. October 2011, accessed 20 December 2011.
4. National Crime records bureau. Death and suicides in India.2008
5.Gupta S, Roy Choudhury U,B Deb PK et al. Demographic study of fatal craniocebral Road Traffic injuries in North Bengal region. Medicine Science and Law 1979;19(3):186-194
6. B.A Solagberu, C K P Ofoegbu,A A Nasir et al. Motor cycle injuries in a developing country and vulnerability of riders, passengers and pedestrians. Injury prevention 2006;12:266-8
7. Harnam Singh, A.D Aggarwal. Fatal road traffic accident in motor cyclists not wearing helmets. J Punjab Academy of Forensic Medicine Toxicology 2011;11(1): 9-11
8. Martius Ritcher, Dietmar Otte, UUwe Lehmann et al. Head injury mechanisms in helmet protected motor cyclists: Prospective multicentric
study. Journal of Trauma, Injury, infection, and Critical care 2001;51:949-958

9. Nupur Pruthi, BA Chandramouli, Sampath S, B I Devi. Patterns of head injury among drivers and pillion riders of motorised two wheeler vehicles in Indian Journal of Neurotrauma 2010;7(2):123-128

Cite this article as:
K.Prasanan, P.A. Sheeju. A Descriptive Study of Pattern of Injuries in Driver and Pillion Rider Victims of Fatal Two Wheeler Accidents. Asian Journal of Biomedical and Pharmaceutical Sciences, 5(45), 2015, 29-32.