DOI Number: 10.5958/0974-1283.2019.00170.1

A Retrospective Study of Motorised Two Wheeled Vehicular Accident Cases Attending the Emergency Department of a Tertiary Care Hospital

Slong D[1], Marak AR[2], Ropmay AD[3], Patowary AJ[4]

[1]Assistant Professor, [2]Senior Resident Doctor, [3]Associate Professor, [4]Professor, Department of Forensic Medicine and Toxicology, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong

Abstract

Introduction: Road traffic accidents are responsible for a number of deaths and injuries every year in India of which a significant portion is contributed by motorised two wheeled vehicle accidents. In recent years, Meghalaya has witnessed an increased in the ownership of two wheeled vehicles among the population. Therefore, this study was undertaken to determine the pattern of motorised two wheeled vehicular accidents attending a Tertiary care hospital.

Methodology: This observational study conducted from January 2012 to December 2014, includes consecutive cases of motorised two wheeled vehicular accidents attending the Emergency Department of a Tertiary care hospital in Meghalaya. The data were extracted from the medicolegal register maintained in the Medical Record Department of the Institute.

Results: A total of 368 cases were studied. Most of the victims were males and in the age group of 20 – 30 years. The majority of accidents occurred between 12 pm and 5:59 pm. The injuries sustained were mostly to the head and neck (39.70%) and no difference was seen in the localisation of the injuries among the different groups of victims; χ^2 (8) = 6.92, p = 0.5458.

Conclusion: The victims of motorised two wheeled vehicular accidents were predominantly the young male riders. Most of these injuries occurred in the head and neck region. Since there is no difference in the localisation of injuries among the riders and pillion riders, usage of helmets should not be mandated to the riders alone.

Keywords: *Two wheeled vehicular accidents, Emergency department.*

Introduction

Road traffic accident (RTA) is defined as a collision involving at least one vehicle in motion on a public/ private road that results in at least one person being killed or injured.[1] Globally, RTA is responsible for over 1.2 million deaths each year and is the main cause of death in those aged between 15 and 29 years. These deaths occur mostly in the low and middle income countries (90%), although they accounted for only 54% of the world's registered vehicles. Among the road users, motorcyclists attributed to nearly a quarter of all road traffic deaths out of which the South East Asian and Western Pacific regions each accounting for 34% of the motorcyclist deaths.[2]

In India, motorised two wheeled vehicle (MTV) involvement in 33.8% of the 480652 RTA that occurred in

Corresponding author:
Dr D. Slong
Assistant Professor, Department of Forensic Medicine and Toxicology, North Eastern Indira Gandhi Regional Institute of Health and Medical Sciences (NEIGRIHMS), Shillong, Meghalaya - 793018
E - mail: dauni.slong@yahoo.co.in

2016 is the highest among the vehicle categories leading to 52,500 deaths and 1, 53, 060 injured.[3] In recent years, Meghalaya has witnessed an increase in ownership of MTV from 27237 in 2005 to 94843 in 2016.[4]

The first step in developing any prevention strategy requires an understanding of the magnitude of the problem. Although data were available from various government agencies eg police department, etc, these lack certain information like injury pattern sustained by the victims. Moreover, study on the pattern of motorised two wheeled vehicular accidents (MTVA) from this region of the country, especially Meghalaya, is found to be deficient.

Therefore, this study is undertaken to find out the pattern of MTVA attending the emergency department of a Tertiary care hospital in Meghalaya.

Materials and Method

This retrospective observational study was conducted in a tertiary care hospital in Meghalaya from January 2012 to December 2014. The study includes consecutive cases of MTVA attending the Emergency Department during the study period. The cases include the rider, pillion rider and pedestrian hit by MTV. The motorised two wheeled vehicles include all types of motorcycles and scooters. Cases which were brought dead were excluded from the study. The data were extracted from the medicolegal register maintained in the Medical Record Department following the approval of the concerned authority of the hospital. The parameters studied were the age and sex of the victim, date and time of accident, the types of victims involved in two wheeler accidents, mode of accident, sites of injury sustained by the victims and the manner of disposal of the cases (discharged/ admitted/death).

The data were analysed using Excel 2007 and Medcalc version 18. Student's t test and Chi square test were used to compare means and proportions. The results were considered significant for a p-value of less than 0.05.

Results

Out of a total of 1162 victims of RTA attending the Emergency department during the study period, 368 (31.67%) were due to MTVA. Table 1 shows the demographic characteristics of the victims of MTVA. Males constituted the majority of the cases with 85.60% in comparison to females (14.40%).The mean age of the males (M = 26.47 years, SD = 11.08) was slightly lesser than that of the females (M = 28.92 years, SD = 17.85), although statistically there was no significant difference between the two (t (266) = 1.26, p = 0.21). However, a significant difference in the age group of those affected by MTVA was seen with nearly half (48.10%) of the victims belonged to the age group 20 – 30 years, χ^2 (6) = 20.85, p = 0.0020. In relation to the time of day (Fig 1), most of these accidents happened between 12 pm and 5:59 pm (39.95%) followed by 6 pm to 11.59 pm (35.05%).

As shown in Table 2, the most vulnerable group was the riders (238) followed by the pillion riders (72) and pedestrians (58). Out of the 238 riders, males constituted 228 (95.80%) of the cases and females 10 (4.2%). In contrast to the male victims where 72.38% of them were riders, the females were mostly pedestrians (45.28%) and pillion riders (35.85%). This relationship between gender and the types of victims involved was found to be statistically significant, χ^2 (2) = 62.72, $p < 0.0001$.

When comparing the mode of accidents, more self accidents were responsible for the MTVA than collisions (Table 3). Of the 310 riders and pillion riders, self accident was responsible for injuring 68.71% of the cases and collision 31.29% of the cases. Also, a difference was seen in the two modes of accidents between the rider and pillion riders (χ^2 (1) = 4.75, p = 0.029).

The total number of injuries (859) exceeded the cases as several victims suffered multiple injuries to the body (Table 4). The injuries sustained by the victims were mostly localised on the head and neck region (39.70%), lower limb (28.17%) and the upper limb (21.77%). However, there was no difference in the localisation of the injuries among the different groups of victims; χ^2 (8) = 6.92, p = 0.5458.

Overall, nearly 70% of the cases were discharged after initial treatment and 27.45% were admitted into the various wards. In addition, there was a difference in the proportion of cases admitted among the various group of victims (χ^2 (4) = 10.81, p = 0.0288) with 32.77% of the riders, 15.28% of the pillion riders and 20.69% of the pedestrians were admitted (Table 5).

Table 1: Demographic Characteristics of Victims

Characteristics	Male N (%)	Female N (%)	Total N (%)
Gender	315 (85.60)	53 (14.4)	368
Mean age	26.47±11.08	28.92±17.85	26.83±12.29
Age group (years)			
0 - 10	17 (5.40)	7 (13.21)	24 (6.52)
10 - 20	63 (20.00)	11 (20.75)	74 (20.11)
20 - 30	160 (50.79)	17 (32.08)	177 (48.10)
30 - 40	46 (14.60)	6 (11.32)	52 (14.13)
40 - 50	14 (4.44)	5 (9.43)	19 (5.16)
50 - 60	12 (3.81)	3 (5.66)	15 (4.08)
Above 60	3 (0.95)	4 (7.55)	7 (1.90)

Table 2: Type of Victims

Characteristics	Rider N (%)	Pillion Rider N (%)	Pedestrian N (%)	Total N
Male	228 (72.38)	53 (16.83)	34 (10.79)	315
Female	10 (18.87)	19 (35.85)	24 (45.28)	53

Table 3: Type of Accidents

	Rider N (%)	Pillion Rider N (%)	Total N (%)
Self accidents	156 (65.55)	57 (79.17)	213 (68.71)
Skid and fall	144	54	198
Hit stationary object	12	3	15
Collision	82 (34.45)	15 (20.83)	97 (31.29)
Light motor vehicle*	49	14	63
Motorised two wheeler	15	0	15
Heavy motor vehicle**	14	1	15
Autorickshaw	2	0	2
Hit pedestrian	2	0	2

*cars, jeep, gypsy **bus, truck

Table 4: Site of Injury

	Rider N (%)	Pillion Rider N (%)	Pedestrian N (%)	Total N (%)
Head and neck	223 (38.58)	63 (38.18)	55 (47.41)	341(39.70)
Thorax	30 (5.19)	5 (3.03)	5 (4.31)	40 (4.66)
Abdomen	35 (6.06)	9 (5.45)	5 (4.31)	49 (5.70)
Upper limb	125 (21.63)	43 (26.06)	19 (16.38)	187 (21.77)
Lower limb	165 (28.55)	45 (27.27)	32 (27.59)	242 (28.17)

Table 5: Treatment Outcome

	Rider N (%)	Pillion Rider N (%)	Pedestrian N (%)	Total N (%)
Discharge	153 (64.29)	59 (81.94)	43 (74.14)	255 (69.29)
Admission	78 (32.77)	11 (15.28)	12 (20.69)	101 (27.45)
Others (under observation and LAMA)	7 (2.94)	2 (2.78)	3 (5.17)	12 (3.26)

Discussion

In the three year study period, MTVA victims constituted 31.67% of the overall victims of RTA attending the emergency department. This rise coincided with the growth in the registration of MTV in Meghalaya, from 65712 (as on 31st March 2012) to 85,996 (as on 31st March 2015)[4]. Although a similar observation was made by Nwadiaro HC et al [5] (30.3%) and Solagberu BA et al [6] (27.2%), other studies [7-10] have reported higher figures as MTV were increasingly being used as a commercial means of transport in some of those countries [9,10].

The victims involved in MTVA were young, a fact which was endorsed by several authors, [5,6,11,12] has raised concern as they form the most productive age group of the population. Similarly, victims between 20years and 50 years constituted almost 68% of all cases which concurred with the study by Vijayakumari N et al [13] (72.5%). As far as gender distribution was concerned, male were the frequent victims which was in compliance with Cavalcanti AL et al[11] (85.8%) and Niraj R et al[14] (86.4%). In the past, several studies [15-17] have shown that young male individuals were more often overconfident in their ability, have poor attitude towards safe driving, higher tendency towards risky riding behaviour eg over speeding, violation of traffic rules etc and hence more likely to encounter an accident. These same reasons could be the contributing factor for the maximum involvement of the young and male victims in our study. These MTVA happened mostly at the time of day when the traffic density was at its maximum i.e. between 12 pm and 5:59 pm. According to Chalya PL et al,[9] 73.9% of the accidents took place during the day and 23.9% at night.

Self accidents due to skidding was the frequent mode of accident observed, as similarly reported by Vijayakumari N et al.[13] The state of Meghalaya being mountainous with winding roads coupled with being one of the wettest place in the country, with an annual average rainfall of 4000 mm to about 11436 mm, [18] may have contributed to the majority of accidents due to skidding. Corresponding to the finding of our study, a number of authors [6,9,12,19] have reported riders to constitute a majority of the victims followed by the pillion riders and pedestrians. In our study of the relation between gender and the type of victims, most of the male victims were riders; female victims were either pedestrians or pillion riders. Oluwadiya KS et al [20] in their study observed that 60.3% of the males were riders and 70.9% of the females

were pillion riders.

The head and neck region was the site in which the surface injuries were commonly found followed by the lower and upper limbs, a finding also supported by others. [5,10,] This again emphasises the importance of wearing a helmet as this will greatly reduce morbidity and mortality among the victims. According to WHO, helmet use diminishes the risk of fatal injury by up to 39% and severity of injury by about 72%.[21] However, the severity of injury is not only affected by mere usage of helmet but by the type of helmet used [22] and the correct way of wearing it.[23] Moreover, the usage of helmet should not be mandated to riders alone but also to the pillion riders as it has been suggested that the injury pattern of both riders and pillion riders were similar.[24] However, this was a drawback of this study as the helmet wearing status of both the riders and pillion riders at the time of accident could not be ascertained from the data available. Another limitation of this study was that the prevalence of alcohol consumption among the victims could not be determined; evidence has shown that alcohol plays a role in these accidents [25] as it affects the riding skill and performance of riders.[26] While most of the victims were discharged following treatment, 27.45% of them were admitted in different wards; a finding similarly observed by Nwadiaro HC et al.[5] This could be because of low velocity impact as many of these accidents happened in the town itself.

Conclusion

The number of motorised two wheeled vehicle accidents has shown an increasing trend. The victims were mostly males and belonged to the younger age group. Injuries sustained were mostly to the head and neck and this pattern was seen in the different group of victims. Therefore, it may be suggested that helmet wearing should not be mandated to the riders alone but also to the pillion riders.

Conflict of Interest: None.

Source of Funding: None.

Ethical Clearance: Approved by Institutional Ethics Committee (IEC).

References

1. WHO. World report on road traffic injury prevention, 2004 [internet]. [cited 2018 April 18]; Available from:http://www.who.int/violence_injury_prevention/publications/road_traffic/world_report/en/
2. WHO. Global status report on road safety, 2015 [internet]. [cited 2018 April 18]; Available from: http://www.who.int/violence_injury_prevention/road_safety_status/2015/en/.
3. Ministry of Road Transport and Highways. Road Traffic Accidents in India. [internet].[cited2018 April 18]; Available from: http://morth.nic.in/showfile.asp?lid=2904
4. Ministry of Road Transport and Highways. Road Transport Year Book (2015-16). [internet]. [cited 2018 April 18]; Available from: http://morth.nic.in/showfile.asp?lid=3141
5. Nwadiaro HC, Ekwe KK, Akpayak IC, Shitta H. Motorcycle injuries in north-central Nigeria. 2011 Apr-June;14 (2): 186-9.
6. Solagberu BA, Ofoegbu CK, Nasir AA, Ogundipe OK, Adekanye AO, Abdur-Rahman LO. Motorcycle injuries in a developing country and the vulnerability of riders, passengers, and pedestrians. Injury Prevention. 2006 Aug 1;12(4):266-8.
7. Fitzharris M, Dandona R, Kumar GA, Dandona L. Crash characteristics and patterns of injury among hospitalized motorised two-wheeled vehicle users in urban India. BMC Public Health. 2009;9(1):11.
8. Tham KY, Seow E, Lau G. Pattern of injuries in helmeted motorcyclists in Singapore. Emergency Medicine Journal. 2004 Jul 1;21(4):478-82.
9. Chalya PL, Mabula JB, Ngayomela IH, Kanumba ES, Chandika AB, Giiti G, Mawala B, Balamuka D. Motorcycle injuries as an emerging public health problem in Mwanza City, Tanzania: A call for urgent intervention. Tanzania Journal of Health Research. 2010;12(4):214-21.
10. Allen Ingabire JC, Petroze RT, Calland F, Okiria JC, Byiringiro JC. Profie and Economic Impact of Motorcycle Injuries Treated at a University Referral Hospital in Kigali, Rwanda. Rwanda Medical Journal;72(4):5-11.
11. Cavalcanti AL, Lucena B, Rodrigues IS, Silva AL, Lima TT, Xavier AF. Motorcycle accidents: morbidity and associated factors in a city of northeast of Brazil. Tanzania Journal of Health Research. 2013 Oct;15(4):1-5.

12. Umebese PF, Okukpo SU. Motorcycle accidents in a Nigerian University campus. A one year study of the pattern of Trauma sustained in the University of Benin campus. Nigerian Journal of Clinical Practice. 2001;4(1):33-6.
13. Vijayakumari N, Meiyazhagan K, Manjunath KH. Pattern of Injuries in Non-Fatal Victims of Two Wheeler Accidents at Salem, Tamilnadu-a Cross-Sectional Study. Indian Journal of Forensic Medicine & Toxicology. 2015 Jan 1;9(1):131-134.
14. Niraj R, Sapkota K, Onta PR, Thapa P, Thapa UJ, Dware P, Sharma S. Motorcycle Accident Profile in Manipal Teaching Hospital. American Journal of Public Health Research. 2015 Oct 28;3(5A):190-3.
15. Wong JT, Chung YS, Huang SH. Determinants behind young motorcyclists' risky riding behavior. Accident Analysis & Prevention. 2010 Jan 31;42(1):275-81.
16. Clarke DD, Ward P, Truman W. Voluntary risk taking and skill deficits in young driver accidents in the UK. Accident Analysis & Prevention. 2005 May 31;37(3):523-9.
17. Chang HL, Yeh TH. Motorcyclist accident involvement by age, gender, and risky behaviors in Taipei, Taiwan. Transportation Research Part F: Traffic Psychology and Behaviour. 2007 Mar 31;10(2):109-22.
18. Forest survey of India. State of forest report 2017 [internet]. [cited 2018 May]; Available from: http://fsi.nic.in/isfr2017/meghalaya-isfr-2017.pdf
19. Ogunlusi JD, Nathaniel C. Motorcycle trauma in a St Lucian hospital. West Indian Medical Journal. 2011 Oct 1;60(5):557-561.
20. Oluwadiya KS, Kolawole IK, Adegbehingbe OO, Olasinde AA, Agodirin O, Uwaezuoke SC. Motorcycle crash characteristics in Nigeria: implication for control. Accident Analysis & Prevention. 2009 Mar 31;41(2):294-8.
21. WHO. Helmets: a road safety manual for decision-makers and practitioners [internet]. [cited 2016 Feb 26]; Available from: http://www.who.int/roadsafety/projects/manuals/helmet_manual/en/.
22. Albuquerque CE, Arcanjo FP, Cristino-Filho G, Lopes-Filho AM, de Almeida PC, Prado R, Pereira-Stabile CL. How safe is your motorcycle helmet?. Journal of Oral and Maxillofacial Surgery. 2014 Mar 31;72(3):542-9.
23. Yu WY, Chen CY, Chiu WT, Lin MR. Effectiveness of different types of motorcycle helmets and effects of their improper use on head injuries. International Journal of Epidemiology. 2011 Jun 1;40(3):794-803.
24. Chiang VX, Cheng JY, Zhang ZC, Teo LT. Comparison of severity and pattern of injuries between motorcycle riders and their pillions: A matched study. Injury. 2014 Jan 31;45(1):333-7.
25. Lardelli-Claret P, Jimenez-Moleon JJ, de Dios Luna-del-Castillo J, García-Martín M, Bueno-Cavanillas A, Gálvez-Vargas R. Driver dependent factors and the risk of causing a collision for two wheeled motor vehicles. Injury Prevention. 2005 Aug 1;11(4):225-31.
26. Creaser JI, Ward NJ, Rakauskas ME, Shankwitz C, Boer ER. Effects of alcohol impairment on motorcycle riding skills. Accident Analysis & Prevention. 2009 Sep 30;41(5):906-13.