

Original Article



Road traffic injury among pedestrians: an emerging research focus in Bangladesh

Mushtaq Ahmad¹, Farial Naima Rahman², Md. Zubaidur Rahman³, Prodip Biswas⁴

Abstract

Background: Road traffic accidents (RTA) are responsible for greatest number of injuries and fatalities world wide by killing around 1.2 million people each year and injuring 50 million. Pedestrians are the most common victims of RTAs. **Objectives:** This study has been done to find out the epidemiological factors, socio demographic characteristics and the clinical injury pattern among pedestrians injured by Road Traffic Accidents in Dhaka City. **Materials & Methods:** This descriptive cross sectional study done from December 2015 to September 2016 at three tertiary level referral hospital in Dhaka. One hundred fifty two (pedestrians) were selected purposively as research sample with 95% confidence level and 5% confidence interval. The primary data was collected from the patients who were discharged from hospital by face to face exit interview using a semi-structured questionnaire. **Results:** Among 152 pedestrian victims interviewed; 88(58%) were male. Maximum accidents occurred at daytime 63 (41.45 %), and on city main roads 68 (44 %). Highest number of accidents were caused by buses 44 (36.09 %) and highest incidence of RTA 60(39.47%) was observed among the age group 21 to 30 yrs. Most of the victims 129(84.85%) were knocked down by the vehicles while crossing the roads (hit and run injury), 114(75.00%) were from earning group below 15,000 taka per month, 121(79.61%) never use foot over bridge, 78(51.32)% were using mobile phone while crossing the road. 152(100%) victims had multiple abrasion and bruise, 94(61.84%) had lacerations, 64(42.10%) had fracture of upper limb bones, 53(34.87%) had fracture of lower limb bones and 53(34.87%) had haematoma in soft tissue over skull. **Conclusion:** Road accident and its severity can be prevented by strict application of traffic rules , motivation of public and proper training of drivers.

Keywords: Bangladesh, Pedestrians, Road traffic injury.

Date of received: 12. 09. 2017

Date of acceptance: 05. 01. 2018

Introduction

Road traffic accidents (RTA) are responsible for greatest number of injuries and fatalities world wide by killing around 1.2 million people each year and injuring 50 million who occupy 30-70 % of orthopedic beds in developing countries hospitals.¹ The financial costs to the communities for road traffic accidents is much greater than required for the treatment of any other major disease. These are the most common causes of death below the age 50 years in developed countries. With continuation of present trends, road traffic injuries are predicted to be the third leading contributor to the global burden of disease, just behind clinical depression and heart disease by 2020.² In developing countries 90 percent of the disability-adjusted life years (DALYs) lost occur because of road traffic injury.³ One DALY is roughly equivalent to one

healthy year of life lost. In developing and poor countries, three-quarters of all poor families who had a member affected by road traffic accident reported a decrease in their standard of living, and 61 percent reported they had to borrow money to cover expenses following their loss. World bank estimates, road traffic injuries cost 1 percent to 2 percent of the gross national product (GNP) of developing countries, or twice the total amount of development aid received worldwide by developing countries.⁴ Road traffic injuries in developing countries mostly affect pedestrians, passengers, and cyclists comprising 90% cases of injuries.⁵ This study has been done to find out the epidemiological factors related to pedestrians injury by Road Traffic Accidents in Dhaka City, determine the socio demographic characteristics of pedestrians and the clinical injury pattern among them.

1. Associate Professor & Head, Department of Forensic Medicine, Armed Forces Medical College, Dhaka, Bangladesh.

2. Lecturer, Department of Forensic Medicine, Armed Forces Medical College, Dhaka, Bangladesh.

3. Assistant Professor & Head, Department of Forensic Medicine, Manikgonj Medical College, Bangladesh.

4. Lecturer, Department of Forensic Medicine, Dhaka Medical College, Dhaka, Bangladesh.

Correspondence: Lt. Col. Dr. Mushtaq Ahmad, Associate Professor & Head, Department of Forensic Medicine, Armed Forces Medical College, Dhaka, Bangladesh. Phone: +88 01711140546, e-mail: mushtaq863@yahoo.com

The findings of this study may help the policy makers and planners at the national level to determine the target population for prevention of injuries and fatalities by RTAs, growing awareness among public to avoid incidences of RTA cases.

Materials and Methods

This is a descriptive type of cross sectional study done during December 2015 to September 2016 at three tertiary level referral hospital Dhaka Medical College Hospital, National Institute for Traumatology and Orthopaedic Research (NITOR) and Kurmitola 500 bedded General Hospital, Dhaka. One hundred fifty-two (pedestrians) were selected purposively as research sample with 95% confidence interval. The primary data were collected from the patients who were discharged from hospital by face to face exit interview using a semi-structured questionnaire. Ethical permission of authority concerned and verbal consent was obtained from every respondent pedestrians injured in RTA, who was informed that the researcher would maintain confidentiality of identity and data related to every things and the collected information would be used for research purpose only.

Results

Among 152 pedestrian victims interviewed; 88(57.89%) were male and 64 (42.10%) female (Figure 1).

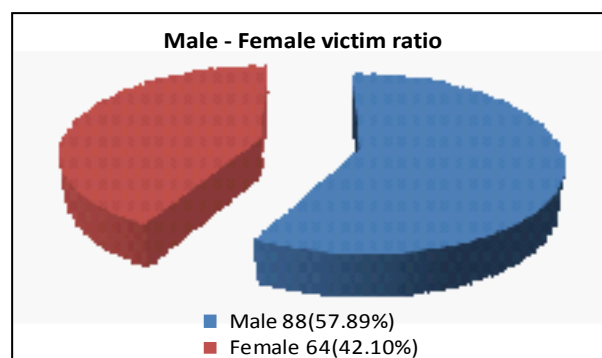


Figure 1: Distribution of male female ratio among victims of RTA (n=152)

Maximum accidents occurred at daytime 63 (41.45 %), followed by evening 45 (29.61 %) (Table I).

Table I: Distribution of time of RTAs (n-152)

Time of accidents	Number of victims	Percentage
Morning, 0501-0800 hrs	25	16.44
Day time, 0801- 1800 hrs	63	41.45
Evening 1801-1930 hrs	45	29.61
Night 1931- 0500 hrs	19	12.50

Maximum accidents took place on city main roads 68 (44.74 %), followed by internal roads 33 (21.71%) and cross junction 27 (17.76%) (Table-II).

Table II: Distribution of Places of occurrences (n-152)

Places of occurrences	Number of victims	Percentage
City main roads	68	44.74
Internal roads	33	21.71
Cross junction	27	17.76
Footpath	18	11.84
Railway crossings	6	3.95

Highest number of accidents were caused by buses 44 (36.09 %), followed by mini bus 32 (21.05 %), truck 27 (17.76%) and motor cycle 18 (11.84%) (Table III).

Table III: Distribution of Types of vehicles involved in accidents (n-152)

Name of vehicles	Number of victims	Percentage
Bus	44	28.95
Mini bus	32	21.05
Truck	27	17.76
Motor cycle	18	11.84
Pick up	11	7.24
Micro bus	9	5.92
Private cars	7	4.60
CNG	4	2.63

Highest incidence of RTA 60(39.47%) was observed among the age group 21 to 30 yrs, followed by 52(34.21%) among age group 31 to 40 years (Table IV).

Table IV: Age distribution of RTA victims (n-152)

Age in years	Number of victims	Percentage
5 - 10	3	1.97
11 - 20	10	6.58
21 - 30	60	39.47
31 - 40	52	34.21
41 - 50	17	11.18
51 - 60	8	5.26
60 - 65	2	1.33

One hundred fifty two (100%) victims had multiple abrasion and bruise all over the body, 94 (61.84%) had lacerations in different body area, 64 (42.10%) had fracture of upper limb bones, 53 (34.87%) had fracture of lower limb bones and 53 (34.87%) had collection of blood- haematoma in soft tissue over skull (Table V).

Table V: Distribution of Pattern of injury in victims (n-152)

Pattern of injury in drivers	Number of victims	Percentage
Multiple abrasions	152	100
Multiple bruise	152	100
Laceration	94	61.84
Fracture of upper limbs bones	64	42.10
Fracture of lower limbs bones	53	34.87
Haematoma over soft tissue skull	41	26.97
Intracranial injury	32	21.05
Fracture of ribs	19	12.5
Injury to Abdominal viscera	18	11.84
Fracture of pelvis	9	5.92
Steering wheel injury	8	5.26
Fracture of skull	5	3.29

N.B: Same victim had multiple types of injury

Discussion

Road traffic injuries in developing countries particularly affect the productive (working) age group (15-44 years) and children.⁶⁻¹¹ Fatality rates among children are especially high in developing countries. In 1998 the fatality rate for children aged 0-4 years was 29.5 per 1,00,000 population in South East Asia and low income countries of the western Pacific region, compared with 4.5 deaths per 1,00,000 population in high income countries. For older children, aged 5-14 years, the fatality rate was 28.1 per 1,00,000 population in Africa.¹² In the United States, for example, more than 60% of road crash fatalities occur in drivers, whereas drivers make up less than 10% of the deaths due to road traffic injuries in the least motorized countries.¹³⁻²¹

The trend of increasing numbers of injuries is likely to continue as the number of motor vehicles rises. People in developing countries, which comprise 84% of the global population, currently own around 40% of the world's motor vehicles.²² The higher number of people killed or injured per crash is a reason for the high number of road traffic injuries in developing countries. Another burden is poor enforcement of traffic safety regulations in low income countries due to inadequate resources and administrative problems. Corruption is a huge problem in some countries. In established democracies, victims of road traffic accidents have access to redress when factors responsible for an accident are identified.^{23,24} Compensation claims are expected to rise with new interpretations and forensic analyses.^{25,26} Furthermore, clinicians attending to RTA victims are exposed to litigation for alleged negligence.^{27,28} Bangladesh is densely populated country where due to poverty and unemployment people from rural areas rush towards city. Unplanned roads and highways, incompetent traffic system, violation of traffic laws by the drivers and pedestrians, over crowding, reckless driving etc all are the possible explanations for this highest figure of road traffic accidents in city areas. The available data covering a period of 13 years indicate that the total number of road traffic accident were 38,464 and the number killed was 26,363. The estimated national cost of road accident is Tk. 38 billion or US\$ 644 million. This is said to be 1.5 percent of GDP and three times annual expenditure of the RHD.²⁹ Earlier studies of road accidents in Dhaka revealed that heavy vehicles such as buses, trucks and minibuses are major contributors to road accidents.^{30,31} Pedestrian related accidents are by far the greatest among all accident types. In urban areas of Bangladesh only pedestrians represent often up to 70 percent of road accident fatalities. Current statistics revealed a deteriorating situation in metropolitan Dhaka.

For example, pedestrians as a proportion of deaths increased from 43 percent in 1986-87 to 73 percent in 2002-03. In years 1996-98 the number of pedestrian casualties (fatalities and injuries) has increased markedly from 443 in 1996 to 588 in 1998, an increase of about 29 percent. Pedestrians are now making up approximately 73 percent of road accident fatalities, 26 percent of injuries and are involved in about 43 percent of all reported accidents. Indeed, with fatal accidents 70 percent was pedestrian-motorized vehicle collisions. In

rural areas, pedestrians account for about 41 percent highway accidents.³² In 2014, 2067 people died and 1535 injured due to 2027 RTA in Bangladesh and 2376 people died and 1958 injured due to 2394 RTA in 2015, according to police case report.³³ The number of death and injuries are gradually increasing. A total of 265 people was killed and 1,153 others injured in 210 accidents across the country in 12 days of Eid Ul Azha vacation from September 07, 2016.³⁴ Maximum victims in road traffic accident usually die due to excessive haemorrhage, neurogenic shock due to pain, septicemic shock due to infection, or traumatic asphyxia by getting impacted between vehicles. Diagnosis of victim's injury and giving timely required treatment can save a number of lives. Run over injury (hit and run injury) and crushing under the wheels are the commonest type of injury in our country.³⁵⁻³⁷ Pedestrians are the most vulnerable road users in Bangladesh. In Dhaka, Metropolitan City roads are hostile to pedestrians, and the danger and inconvenience of walking in turn leads people to use rickshaws CNG, baby taxis or other motor vehicles just make the traffic worse and the city more hostile to pedestrians - a vicious circle.³⁸⁻⁴¹

Approximately 33% of the beds in primary and secondary level hospitals in Bangladesh were occupied by injury-related patients, and more than 19% of the injury patients had been injured in a road traffic accident. People aged 18-45 years were the major victims of RTA, and constituted 70% of the total RTA-related admissions in primary and secondary level hospitals. More than two-thirds of RTA patients were male. In this study, among 152 pedestrian victims interviewed; 88 (57.89%) were male and 64 (42.10%) female.

Men are at higher risk of injuries than women because in our country they are predominantly the earning member of the family. They also have greater exposure to traffic and more risky behavior than females such as running to catch a bus, hanging on the side of bus, impatience, lack of attention and drinking alcohol (in case of drivers) prior to driving etc. Maximum accidents occurred at daytime 63 (41.45%), followed by evening 45 (29.61%), which corresponds with increase traffic load on road at daytime due to rush of passengers towards offices, educational institutes and industries. Sleeping tendency among drivers at night, poor visibility, lack of luminescence marking on road, potholes and open manholes in roads, overtaking of vehicles, increase number of cargo vehicles on road are the possible explanations of accidents at night.

Maximum accidents took place on city main roads 68 (44.74%), followed by internal roads 33 (21.71%) and cross junction 27 (17.76%) which are places in city areas where heavy vehicles run throughout the day and night. Regarding vehicles; Highest number of accidents were caused by buses 44 (36.09%), followed by mini bus 32 (21.05%), truck 27 (17.76%) and motor cycle 18 (11.84%) This could be attributed to the fact, that victims in this study are from city area, where this kind of public vehicle are numerous. This study showed that buses and trucks are involved in a much greater proportion of crashes, yet lack relevant safety standards.

In this study, Highest incidence of RTA 60 (39.47%) was observed among the age group 21 to 30 yrs, followed by 52 (34.21%) among age group 31 to 40 years. Majority of the victim belong to their most productive earning years. Moreover, the disability burden for this age group accounts for 60 percent of all DALYs lost because of road traffic accidents Lower proportion of age group below 10 years and above 60 years could be explained by the fact that children are usually taken care of by elders during travel and lesser mobility of geriatric people.

Regarding injury to different body parts, all the victims had multiple abrasions and bruise in all over the body, followed by lacerations 94 (61.84%) Internal injury to abdominal organs occurred due to fall on ground and sudden impact by vehicles. Fracture of upper limbs bones and lower limbs bones occur mostly by crush injury caused by vehicles wheels. Fracture and haematoma over skull occurs due to fall on ground and sudden impact. Linear fracture is the commonest one because due to RTA head strikes by forcible contact with broad resisting surface like the roads. The thinnest area in our skull is the temporal bone (4 mm) followed by frontal bone (6 mm), parietal bone 10 mm) and occipital bone (15 mm). Fracture depends on the position of head fallen on ground and received impact injury. Maximum victims in road traffic accident usually die due to excessive haemorrhage, neurogenic shock due to pain, septicaemic shock due to infection, or traumatic asphyxia by getting impacted between vehicles. Diagnosis of victim's injury and giving timely required treatment can save a number of lives. Run over injury (hit and run injury) and crushing under the wheels are the commonest type of injury in our country.^{35,36,42} Result & findings of this research coincides with previous researches done on this subjects both home & abroad.

Conclusion

Road accident and its severity can be minimized through systematic investigation and scientific research on road traffic accident which result from failure in the interaction of triad-human, vehicle and environment. Community clinic can be installed beside road to reduce the causality of victims. Number of traffic police and should be increased. Mobile court can be installed at each and every road to check the rules and regulations. Raising public awareness about accidents and road safety through motivational program, training of drivers, removal of unfit vehicles from city roads repair of roads etc are needed.

Acknowledgements

The author expresses his acknowledgement to Prof. Dr. Mohammad Ali (AFMC), Prof. Dr. Md. Nazrul Islam, PhD and Prof. Dr. Kapil Ahmed, Ph.D for their constant guidance, supervision and encouragement while writing this research paper.

References

- Dinesh M, Road safety in less motorized environments: Future Concerns *Int J Epidem.* 2002; 31(3):527-532.
- Christopher JL, Murray A, Alan DL, The Global Burden of Disease. A Comprehensive Assessment of Mortality and Disability from Diseases, Injuries, and Risk factors in 1990 and projected in 2020. *Harvard School Public Health.* 1996;1:1-25.
- WHO and World Bank World. Report on Road Traffic Injury Prevention. World Health Organization, Geneva. 2006;1:01-25.
- Margie P, Adnan AH, Road traffic Injuries are a Global Public Health Problem. *BMJ.* 7346;2002: 1153.
- Hijaar MC. Traffic injuries in Latin American and the Caribbean countries, 1999. www.globalforumhealth.org/Non_compliant_pages/forum3/Forum3doc962.htm (accessed 11 May 2014).
- Jha N, Srinivasa DK, Roy G, Jagdish S. Injury pattern among road traffic accident cases: A study from South India. *Indian J Comm Med.* 2003;28:85-90.
- Ansari S, Akhdar F, Mandoorah M, Moutaery K. Causes and effects of road traffic accidents in Saudi Arabia. *Public Health.* 2000;114:37-39.
- Romao F, Nizamo H, Mapasse D, Rafico MM, Jose J, Mataruca S, Efron ML, Omondi LO, Leifert T, Bicho JM. Road traffic injuries in Mozambique. *Inj Control Saf Promot.* 2003;10:63-67.
- Majumdar B, Karmakar R, Bose T, Dasgupta S, Basu R. Some host factors and seasonal variations in the fatal road traffic accidents occurring in eastern suburban Calcutta. *Indian J Public Health.* 1996;40:46-49.
- Maheshwari J, Mohan D. Road traffic injuries in Delhi: A hospital based study. *J Traffic Medicine* 1989;17:3-4.
- Banerjee KK, Agarwal BB, Kohli A, Aggarwal NK. Study of head injury victims in fatal road traffic accidents in Delhi. *Indian J Med Sci.* 1998;52:395-398.
- BBC News. On the buses in Lagos. 2001. http://news.bbc.co.uk/hi/english/world/africa/newsid_1186000/1186572.stm (accessed 4 March, 2014).
- Sharma BR, Harish D, Sharma V, Vij K. Road-traffic accidents- a demographic and topographic analysis. *Med Sci Law.* 2001;41:266-274.
- Mehta SP. An epidemiological study of road traffic accident cases admitted in Safdarjung Hospital, New Delhi. *Indian J Med Res.* 1968;56:456-466.
- Ghosh PK. Epidemiological study of the victims of vehicular accidents in Delhi. *J Indian Med Assoc.* 1992;90:309-312.
- Wick M, Muller EJ, Ekkernkamp A, Muhr G. The motorcyclist: easy rider or easy victim? An analysis of motorcycle accidents in Germany. *Am J Emerg Med.* 1998;16:320-323.
- Mirza S, Mirza M, Chotani H, Luby S. Risky behavior of bus commuters and bus drivers in Karachi, Pakistan. *Accid Anal Prev.* 1999;31:329-333.

18. Ballesteros MF, Dischinger PC. Characteristics of traffic crashes in Maryland (1996-1998): differences among the youngest drivers. *Accid Anal Prev.* 2002;34:279-284.
19. Valent F, Schiava F, Savonitto C, Gallo T, Brusaferrero S, Barbone F. Risk factors for fatal road traffic accidents in Udine, Italy. *Accid Anal Prev.* 2002;34:71-74.
20. Al-Balbissi AH. Role of gender in road accidents. *Traffic Inj Prev.* 2003;4:64-73.
21. Peek-Asa C, Kraus JF. Injuries sustained by motorcycle riders in the approaching turn crash configuration. *Accid Anal Prev.* 1996;28:561-569.
22. Global Road Safety Partnership. Moving ahead: emerging lessons. Geneva: GRSP, 2001. www.grsproadsafety.org (accessed 24 May 2014).
23. Bryant B, Mayou R, Lloyd-Bostock S. Compensation claims following road accidents: a six-year follow-up study. *Med Sci Law.* 1997;37:326-336.
24. Bennun IS, Bell P. Psychological consequences of road traffic accidents. *Med Sci Law.* 1999;39:167-172.
25. Grobbelaar AO, Albertyn R, Bass DH. Financial compensation following road traffic injury: who is footing the bill? *S Afr Med J.* 1992;82:271-272.
26. Batten PJ, Penn DW, Bloom JD. A 36-year history of fatal road rage in Marion County, Oregon: 1963-1998. *J Forensic Sci.* 2000;45:397-399.
27. Corcoran M. What is negligence? *BJU Int.* 2000;86:280-285.
28. Goodwin H. Litigation and surgical practice in the UK. *Br J Surg.* 2000;87:977-979.
29. Ali AMMS, The Economic Cost of Road Accidents in Bangladesh, *The Daily Star* 2004;April18,1:1-6.
30. Hoque MM, Road safety audit in developing countries. *J Science and Technology.* 1997;6(4):493-505.
31. Hoque MM, Road planning and engineering for promoting pedestrian safety in Bangladesh. Proceedings of 10th Road Engineering Association of Asia and Australia (REAAA) Conference, Tokyo.2000.
32. Hoque MM, The road to road Safety: Issues and Initiatives in Bangladesh Proceedings of the 2nd Asian Regional Conference on Safe Community and 1st Bangladesh Conference on Injury Prevention, Dhaka 2004.
33. BRTA Accident Report 2016. Available from: www.brta.gov.bd/road-safety.html; accessed on 06 August 2016.
34. *The Daily Star*; 22 September 2016 Col 8 Page-1 210 accidents, 65 deaths in 12 days.
35. Ahmad M, Rahman FN, Azad MASA, Islam AKMS, Chowdhury MH, Rahman M. Medico Legal Issues in Fatal Road Traffic Accident- Analysis of a Case Report. *JAFMC, Bangladesh.* 2007;3:39-46.
36. MZ Rahman, M Ahmad, FN Rahman, SMK Islam, KGM Rahman, MR Haque. Abundance of Road Traffic Accidents among Medico legal Postmortem Cases. *Faridpur Med Coll J.* 2011;6:28-31.
37. Ahmad M, Rahman FN, Haq MR, Nargis N, Karim I. Injuries among Drivers in RTA. *BJMS.* 2015;14:346-351.
38. Hoque MM, Pedestrian Safety in Dhaka, proceedings of the 7th Road Engg. Association of Asia and Australasia Conference, Singapore, June 1992.
39. Hoque MM, The road accident situation in Bangladesh, Technical paper, Conference of Asian Road Safety (CARS), Kuala Lumpur, October 1993.
40. Hoque MM, Strategies for road safety: the Bangladesh situation, Proc. The Third International Conference on Safe Communities, Harstad, Norway, 6-8 June 1994.
41. Hoque MM, Understanding Road Traffic Accident Problem, A paper presented on road Road safety training course at ARC, BUET, Dhaka, 2003.
42. Ahmad M, Rahman FN, Sarker MMI, Karim KA, Azad MASA, Chowdhury MH. Pattern of Injury in Fatal Road Traffic Accidents: A Study of 100 Postmortem Cases. *JMCWH.* 2007;5:78-84.