

Original Article

Pattern of Road Traffic Injuries and Disability Burden among Accident Victims

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Abstract

Worldwide road traffic injuries cause more than 1.2 million deaths every year and alarming rise has been observed in road accidents in Bangladesh over the past few years. A cross-sectional study was carried out from January to December 2017 to determine the pattern of road traffic injuries with disability burden among accident victims. 190 respondents were selected from Center for the rehabilitation of the paralyzed (CRP) at Savar and Mirpur in Dhaka by purposive sampling. Data was collected by face to face interview by using semi-structured pre-tested questionnaire. A large number of accident victims in this study were male (79.5%), Muslim (93.2%), married (85.3%) with middle age group (35.8%). Most of the accident victims came from rural area (62.6%) and place of most accident occurred in subway (73.1%). Highest number of accident occurred by motorized two wheels (47.3%). Fracture (48.9%) were most common types of injury among accident victims and affected part were most commonly the extremities (32.9%) and injury category were maximum injury (38.9%). Years of life lived with disability was highest in spinal cord injury (172.36). Among those who were in middle age group, suffered longer than other injury with years of

life lived with disability. It found people who were injured from motorized two wheels had suffered longer years lived with disabilities of life than other types of vehicle injury (82.02). The result indicates the pattern of injuries and accident victims who were lived with disability for long time.

Keywords: Road traffic accident, CRP, YLD.

INTRODUCTION

Road traffic accident (RTA) may be defined as an event that occurs on a way or street open to public traffic, resulting in one or more person being injured or killed where at least on moving vehicle, pedestrian, animal, road debris or other stationary obstruction, such as a tree or utility pole. RTA is one of the leading causes of deaths that occurs in the developing countries.¹ Disability may result from the interaction between persons with impairments and attitudinal and environmental barriers, hindering their full and effective participation in society on an equal basis with others. According to WHO and World Bank (2011), disabilities include:

- Activity limitations- difficulties in executing activities of daily living, e.g. walking or eating;
- Participation restrictions- problems with involvement in any area of life, e.g. facing discrimination in employment or transportation.

Every year 1.24 million people die due to road traffic injuries in addition to 20-50 million non-fatal injuries occurring around the world.⁴ Road traffic injury is also recognized as a major contributor to disability ranging from brief short-term impairments to serious lifelong conditions. Road traffic injuries ranked as the 10th highest cause of the loss of Disability Adjusted Life Years (DALYs) worldwide; where it was the 5th ranked cause in Southeast Asia in 2010.⁵

As there are some limitations and difficulties in measuring non-fatal outcomes of injuries, the prevalence estimates of post-crash disability vary dramatically - from 2% to 87%.⁶ Studies in Thailand, the Netherlands and South Africa showed that long-term disabilities due to road crashes accounted for 68-76% of all years lived with a disability, even though only 1-2% of injuries result in lifelong impairment.⁷ People, become disabled due to road crashes may experience inequality in accessing health care, education, job opportunities and disability assistance.⁶ Such as the employment rate among persons of working age with disabilities (44%) is much less

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than for people without disabilities (75%) across 27 developed countries in the list of the Organization for Economic Cooperation and Development (OECD) member countries.⁶ According to WHO, the economic burden due to road traffic accidents of developing countries is 2-3% of GDP.

There were 2,958 deaths in Bangladesh in 2009, 15% being females 41% of the deaths were pedestrians. Estimated GDP loss due to RTA was 1.6%. Accident Research Institute of BUET and WHO claims that every year about more than 50000 injured by road traffic accident. According to UNICEF, roughly 38000 children become orphans every year because of road traffic fatalities.

A high growth in urbanization and motorization can be identified as one of the important factors leading to the higher number of road traffic accidents. In recent studies found that the annual urban growth rate in Bangladesh stood at 4% in 2010, whereas the present growth in motor vehicle stands at 8%. Consequently the road systems are experiencing severe congestion, physical deterioration and safety problems. According to a World Bank report, only 40% of the main roads (National highway and the district roads) are in good condition.⁸

MATERIALS AND METHODS

A cross sectional study was conducted at Centre for the Rehabilitation of the Paralyzed (CRP), Mirpur and Savar in Dhaka for the period of January to December 2017. The study populations were both male and female victims due to RTA. By purposive sampling, total 190 respondents were selected. A pretested, semi-structured questionnaire was used for data collection which contains question regarding socio-demographic status, their medical history and a scale named The Maximum Abbreviated Injury Scale (MAIS).⁹

The MAIS is an anatomical-based coding system created by the association for the advancement of automotive medicine to classify and describe the severity of injuries. It respects the threat of life associated with the injury rather than the comprehensive assessment of the severity of the injury. MAIS is one of the most common anatomical scale for traumatic injury. The score limit of scale is 0 to 77 and injury severity is categorized as minor, moderate, serious, severe, critical and maximum in accordance to their score. A 7 digit code is used to describe the injury as type of injury, location of injury and severity of injury. YLDs were calculated for each victim by multiplying the type of injury with the disability weight and average duration of that injury.

Data were collected by face to face interview and record review. Data were processed and analyzed by using software SPSS, version 23.0. Both descriptive and inferential analysis were done according to the objective of the study. The level of significance was set at 0.05.

Prior to commencement of the study, the research protocol was approved by the Ethical Review Board (ERB) of National Institute of Preventive and Social Medicine (NIPSOM).

RESULTS

A cross sectional study was conducted among 190 respondents of Centre for the Rehabilitation of the Paralyzed (CRP), Mirpur and Savar in Dhaka to find out the pattern of road traffic injuries and disability burden (years of life lived with disability) among accident victims. In this study, 97.5% of respondents were male and 21.5% were female; 93.2% were Muslim and 6.8% were in other religion; 85.3% were married and 14.7% were unmarried; the highest number of the patients were with 30-39 age group (37.90%) and the other age groups were distributed as within 20-29 years (28.42%) and rest were age group 40-49 years (23.68%), age group 60-69 years (7.37%), age group 10-19 years (2.63%). Minimum age group of the respondents were 0-9 years and maximum age of the respondents were 60-69 years. The mean age of the respondents were 35.83 (± 9.69) and 62.6% of respondents were from urban area. Monthly income of the family was 18615.78 \pm 6830.89 BDT. Majority of the accidents occurred on Tuesday (22.6%) and Wednesdays (17.4%) while less number of accidents were reported on Saturdays (9.01%) and Sundays (10.0%).

The study revealed that 47.9% of accident occurred while motorized two wheels riding, 16.3% were suffered as pedestrians, 14.7% occurred while three wheels vehicles riding, 13.2% occurred while four wheels vehicles riding and 7.4% were occurred by bicycles. Among the respondents, 83.8% suffered from RTA accident for 1-5 years, 9.6% for 6-10 years, 2.2% for 11-15 years and 1.4% for 16-20 years. Among all of the RTA patient's, 48.9% suffered from fracture, 20% from cut wound, 15% with dislocation, 10% with internal hemorrhage and 5% from blunt injury.

Out of 190 RTA respondents, distribution of affected part of the body given below (Table-I)

Table I: Distribution of RTA patients affected part of the body (n=190)

Affected part	Frequency (f)	Percent (%)
Head	15	7.5
Face	5	2.5
Neck	10	5.0
Thorax	20	10.0
Abdomen	9	4.9
Spine	40	20.0
Extremity	65	32.9
Pelvis	25	12.9

Among the respondents, one third had maximum Injury (38.9%) and the lowest (0.00%) had minor injury (Table-II).

Table II: Injury Severity Score Category (n=190)

Injury Score	Severity Category	Frequency	Percentage
1.	Minor	0	0.00
2.	Moderate	1	0.53
3.	Serious	44	23.16
4.	Severe	34	17.89
5.	Critical	37	19.47
6.	Maximum	74	38.9

YLD (years of life lived with disability) among RTA patients: The mean of YLD of respondents was 8.68±16.57. Among them who suffered from spinal cord injury(YLD=172.36) are more than other RTA injuries. The YLD of other injuries were finger amputation-1.17, muscle injury-0.06933, hand injury-0.36, hip injury-0.81, foot injury-0.49, scapula and humerus injury-1.28, one arm amputation-4.589, one leg amputation-5.63, severe chest injury-2.96883, neck injury-1.00, face injury-0.78, skull injury-4.13, two leg amputation-14.2267, nerve injury-3.77, two arm amputation-9.71867, knee injury-1.95, pelvis injury-8.5712, minor and moderate traumatic brain injury-9.856, severe traumatic brain injury-28.4527.

YLD with injury severity categories: In this study YLD score of the respondents was maximum among maximal injured(19.083±10.84) and lowest among minor injured (0) (Table-III).

Table III: YLD with Injury Severity Category (n=190)

Severity	YLD per injury			Number of injuries	Percent
	Average	Median	±SD		
Minor	0	0		0	0.00
Moderate	0.032	0.032		1	0.53
Serious	1.306	0.624	±1.70	44	23.16
Severe	2.637	1.23	±4.45	34	17.89
Critical	1.866	0.994	±1.86	37	19.47
Maximal	19.083	10.84	±22.70	74	38.95
Total				190	100.00

YLD with age category among the respondents were given below (Table-IV):

Table IV: YLD with Age Category

Injury Type	Age group						YLD against injury
	10-19 years	20-29 years	30-39 years	40-49 years	50-59 years	60-69 years	
Finger amputation	0	0.27	6.766	0	0	0	1.17
Muscle injury	0	0.048	0.128	0	0	0.24	0.06933
Hand injury	0.672	0.826	0.168	0.28	0	0.224	0.36
Hip injury	0.864	1.056	1.184	1.346	0	0.384	0.81
Foot injury	0.286	1.716	0.468	0.456	0	0	0.49
Scapula and humerus injury	0	3.185	0.42	4.06	0	0	1.28
One arm amputation	0	2.73	5.304	13.884	0	5.616	4.589
One leg amputation	0	3.9	9.438	14.82	0	5.616	5.63
Severe chest injury	0	5.123	5.546	2.914	0	4.23	2.96883
Neck injury	0	1.566	1.66	2.784	0	0	1.00
Face injury	2.01	0	0	0	0	2.68	0.78
Skull injury	0	4.686	7.171	12.922	0	0	4.13
Two leg amputation	0	0	36.96	24.64	0	23.76	14.2267
Nerve injury	0	2.034	5.876	7.91	0	6.78	3.77
Two arm amputation	0	4.92	10.588	32.964	0	9.84	9.71867
Knee injury	0	4.16	2.6	0.78	0	4.16	1.95
Pelvis injury	0	16.016	12.28	14.56	0	8.992	8.5712
Minor and moderate traumatic brain injury	2.772	19.404	23.562	9.702	0	3.696	9.856
Spinal cord injury	0	120.768	369.408	544.018	0	0	172.366
Severe traumatic brain injury	0	35.672	26.754	108.29	0	0	28.4527

This study revealed that different types of vehicles with their YLD described given below (Table-V).

Table-V: Deferent types of vehicles with YLD

Vehicle type	Frequency (f)	Percent (%)	YLD
Pedestrians	32	16.3	15.22
Motorized two wheels	91	47.9	82.02
Three wheels	28	14.7	38.95
Four wheels	25	13.2	33.08
Bicycles	14	7.4	14.30

DISCUSSION

This was a cross sectional study carried out on 190 road traffic accident victims. Respondents were selected purposively from Centre for rehabilitation of the paralyzed (CRP) at Mirpur and Savar in Dhaka. This study aimed to determine the pattern of injuries and disability burden (YLD) among accident victims. In this study two third of the patients were male (79.5%) which is similar to the study done in India.¹ This higher percentage of males can be attributed to high mobility of males and their high exposure to road. Mean age of the respondents were 35.83 ± 9.69 , the highest number of the victims age group was (30-39) years that is (37.90%). This showed that the people of Bangladesh are most active and productive in this age group who are involved in RTAs which add a serious economic loss of the community. This study also showed that there were less number of accidents in the age group of 10-19 and 60-69. The reason may be that children are taken care of by elders and less exposed to vehicles. Lower cases of RTAs in group 60-69 years could be due to less mobility of people of that group in Bangladesh. In this study the average monthly family income was TK 18615 ± 6830.89 . About three fourth, 72.6% patients had monthly income between 10,001-20,000 BDT and this was similar to other study.¹ this could be due to higher proportion of the middle class relying on motorized two wheels that are more vulnerable to accidents. In this study, motorized two wheelers riders constituted 47.9% of the RTA cases and another 16.3% were pedestrians, 14.7% three wheelers, 13.2% four wheelers and 7.4% bicycle riders. Similar observation was reported in other studies.¹ The study revealed that majority 83.8% of RTA patient were suffering from the injury for 1-5 years and rest are 9.6% suffered from accident 6-10 years, 2.2% were suffered from accident 11-15 years, 1.4% patient suffered from accident 16 to 20 years. Low income people live in poverty cannot afford the cost of treatment of the accident because it is long term

treatment procedure. Fracture was the most common type of injury (48.9%) followed by cut wound/laceration (20%) and internal hemorrhage (10%) among RTA cases. Similar trend has been reported in India.¹ Extremities were most common site (32.9%) of injury followed by spine (20%), pelvis (12%), thorax (10%), head (7.5%), neck (5%) and face (2.5%). These findings were similar to study done in India.¹⁰ This study showed mean YLD 8.67 (± 16.56) the accident victim suffered from spinal cord injury YLD was higher (172.36) than other types of RTA injuries and other findings as followed severe traumatic brain injury YLD 28.45, two leg amputation YLD 14.22, two arm amputation and minor and moderate traumatic brain injury YLD 9.85, pelvic injury YLD 8.57, one leg amputation YLD 5.63. YLD were higher that means burden of those injuries patient in the family, society and nation. The study revealed that the patient who were maximal injury category his/her YLD (38.95) was higher than other injury category. That means YLD not depend on injury severity.¹¹ In this study, the victims age group 20-29 were more YLD than other age group. Bangladesh is a developing country, this age group people were most demanding in our country. The victim who had injured from motorized two wheelers had higher YLD (82.02). This study estimated the severity differences of injuries for different modes of transport and expressed these differences in YLD. On an average two times difference was observed in YLDs due to lifelong injuries depending on the mode of transport while injured. So, the results of this study can be used to predict the health consequences of transport mode. As far known, this is the first analysis in road accident research on the association between MAIS and YLD. Both methods have been developed for different purposes. MAIS is an indicator of acute severity, while YLD takes into account short and long term disability flowing injury. Therefore, a high MAIS does not necessarily result in high burden of disease, as confirmed by this study result. Some injuries may be very severe at the moment of the injuries (leading to high MAIS), but do not necessarily lead to high disability if the patient rehabilitates completely after the acute phase. Alternatively using YLD as indicator for road safety performance as input for policy making should be considered.

CONCLUSIONS

This study provides information that road traffic accidents were common in middle age group, suffered mostly from two wheelers motorized vehicle and YLD were highest among respondents suffered by spinal cord injury. So, this findings will contribute to the development of policy making leading

towards a safer system for all road users, including persons with disabilities.

REFERENCES

1. Jaiswal K, Kumar S, Sant SK, Singh AK, Kumar A, Singh A. Injury pattern of road traffic accident cases in a rural hospital of central Uttar Pradesh. *International Journal of Medical Science and Public Health*. 2015 Oct 1;4(10):1347-50.
2. Mertens DM, Sullivan M, Stace H. Disability communities: Transformative research for social justice. *The Sage handbook of qualitative research*. 2011;4:227-42.
3. Biyanwila J. Poverty and Disability in the Global South.
4. World Health Organization. World health statistics 2010. World Health Organization; 2010.
5. Murray CJ, Vos T, Lozano R, Naghavi M, Flaxman AD, Michaud C, Ezzati M, Shibuya K, Salomon JA, Abdalla S, Aboyans V. Disability-adjusted life years (DALYs) for 291 diseases and injuries in 21 regions, 1990–2010: a systematic analysis for the Global Burden of Disease Study 2010. *The lancet*. 2012 Dec 15; 380 (9859):2197-223.
6. World Health Organization. World Bank. World report on disability. 2011 Jun; 206.
7. Haagsma JA, Polinder S, Lyons RA, Lund J, Ditsuwana V, Prinsloo M, Veerman JL, van Beeck EF. Improved and standardized method for assessing years lived with disability after injury. *Bulletin of the World Health Organization*. 2012 Jul;90(7):513-21.
8. Rahman T. Road Accidents in Bangladesh: An Alarming Issue.
9. Polinder S, Haagsma J, Bos N, Panneman M, Wolt KK, Brugmans M, et al. Burden of road traffic injuries: Disability-adjusted life years in relation to hospitalization and the maximum abbreviated injury scale. *Accident Analysis & Prevention*. 2015 Jul 1;80:193-200.
10. Bayan P, Bhawalkar JS, Jadhav SL, Banerjee A. Profile of non-fatal injuries due to road traffic accidents from a industrial town in India. *International journal of critical illness and injury science*. 2013 Jan;3(1):8.
11. Mishra B, Sinha ND, Sukhla SK, Sinha AK. Epidemiological study of road traffic accident cases from Western Nepal. *Indian journal of community medicine: official publication of Indian Association of Preventive & Social Medicine*. 2010 Jan;35(1):115.