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EPIDEMIOLOGICAL VARIABLES AND PATTERNS OF ROAD TRAFFIC ACCIDENT FATALITIES

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ABSTRACT

Background: Road traffic accidents (RTAs) exhibit a rising trend in disability, mortality and morbidity, which is a major public health concern. Though there have been significant improvements in urbanization and motorization, there is still a lack of comprehensive analysis of RTA patterns, their determinants, health impacts and other factors. **Objective:** The study aims to analyze the epidemiological characteristics of RTA fatalities and the injury patterns found on their bodies brought for postmortem examination at the Department of Forensic Medicine and Toxicology, Comilla Medical College, Comilla. **Materials and Method:** We conducted a retrospective study at the department of Forensic Medicine and Toxicology, Comilla Medical College, Comilla from January 2024 to December 2024. Total 724 postmortem examinations were performed during the mentioned period among which 57 amounted to RTA fatalities. The study included a number of variables, including age, sex, religion, educational status, professional background, marital status, types of vehicles, and different types of injuries found in the deceased. **Results:** In terms of sex, the majority of victims were male (65%), and the 21–40-year age group was most commonly affected (53%).Three main groups of people were among the deceased: pedestrians, drivers and passengers, with pedestrians ranking highest (44%) compared with drivers and passengers. Types of vehicles more prone to accident were auto vehicles (42%). **Conclusion:** By enforcing strict traffic laws, raising public awareness through traffic rule–related programs, and strictly prohibiting the issuance of licenses to unskilled drivers or for unfit vehicles, RTAs can be minimized.

Keywords: Road Traffic Accident, Epidemiology, Post Mortem Examination.

INTRODUCTION

Road traffic accidents (RTA) are one of the major public health challenges in Bangladesh and are responsible for substantial socioeconomic burdens due to their associated fatalities and injuries. The World Health Organization estimates that RTA amount to approximately 25000 lives annually in Bangladesh representing one of the highest mortality rates in South Asia[1]. Over the last three decades the incidence of RTAs has been increasing each year[2]. More than 9 /10 of the world's fatalities due to RTAs occur in low income and middle income countries. Bangladesh faces a high toll of injuries and deaths each year due to RTAs[3]. Globally, over half of deaths due to RTAs occur among vulnerable road users such as cyclists, motorcyclists and pedestrians[4].

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In Bangladesh, light-vehicle passengers and pedestrians have been found to be the most affected by RTAs. Lack of knowledge and violation of traffic rules and driving unregistered and unfitted vehicles are some of the common factors experienced in developing countries like Bangladesh[5].Although pedestrians face the most fatalities, drivers are assumed to be the primary mediators and vehicular crashes[6].

Dhaka-Comilla-Chittagong highway is prone to road traffic accidents due to a combination of factors, including the high volume of traffic on the highway, driver negligence (especially dangerous overtaking), inadequate infrastructure, the presence of slow-moving vehicles, and a lack of adherence to traffic laws by road users. These issues create a dangerous environment, particularly on major arterial routes that connect Dhaka and Chittagong[2,7].

Though in RTAs related postmortem examinations, usually the manner of death is not mentioned, but autopsy findings in RTAs fatalities carry significance for determining the cause of death, patterns of injury and also to differentiate the accidental injuriesfrom homicidal and suicidal injuries. Injuries that are characteristic of road traffic accidents include abrasions, bruises, lacerations, fractures, dislocations of joints, head injuries, trauma to the chest and abdomen, rupture of viscera or vital structures, and crush syndrome[8].

This study aims to establish authentic postmortem based epidemiological data from tertiary center such as Comilla Medical College and Hospital, which receives a significant number of medico legal cases from across eastern part of Bangladesh. These type of data are essential for identifying the high risk groups, common age groups for road traffic accidents, patterns of injuries, types of vehicles involved in fatal accidents.

Focusing these epidemiological traits, patterns of injuries found in postmortem examination,this study aims to contribute evidence based knowledge for stakeholders including policy makers, public health officials, traffic authorities and emergency service providers. Furthermore this study intends to establish a framework for ongoing surveillance, which is crucial for monitoring progress towards international safety commitments.

MATERIALS AND METHOD

A descriptive cross-sectional study was conducted based on a retrospective review of records which was performed in the Department of Forensic Medicine and Toxicology at Comilla Medical College, Comilla over 1 year from January 2024 to December 2024.A total of 57 cases of road traffic accidents were included in the current study.They were all cases of death due to road traffic accidents confirmed through police reports and autopsy findings where complete data were available. Data were collected from autopsy reports, police investigation files, hospital records & also conversation with their attendants where applicable. The collected data were analyzed using Microsoft Excel and SPSS software.

RESULTS

A total of 57 road traffic accident (RTAs) fatality cases were included in this retrospective study conducted at Comilla Medical College Hospital from January 2024 to December 2024. The findings are presented below.

Table 1: Age and Sex Distribution of Victims (n= 100)

AgeGroup(Years)	Male(n=37)	Female(n=20)	Total (%)
0–20	5	4	16%
21–40	20	10	53%
41–60	10	4	24%
>60	2	2	7%
Total	**37**	**20**	**100**

N= Total number of cases; n=number of cases in each group; %=percentage.

Among the 57 RTA fatalities, 37 were male and 20 were female. The most affected age group was 21–40 years, accounting for 53% of total deaths, with 37 males and 20 females. This highlights that young adult males are particularly vulnerable due to increased mobility and exposure to traffic risks.

Table 2: Type of Vehicle Involved in Fatal Accidents (N=57)

VehicleType	Number of Cases	Percentage (%)
Auto Vehicle	24	42%
Motorcycle	20	35%
Truck/Lorry	5	9%
Bus	5	9%
Rickshaw/CNG	2	3%
Private Car	1	2%
Total	**57**	**100%**

N=Total number of cases

Auto Vehicles were involved in the highest number of fatal crashes (24 cases, 42%), followed by Motorcycles (20 cases, 35%), Truck/Lorry (5 cases, 9%) and buses (5 cases, 9%).

Table 3: Role of Victims in the Accident (N=57)

Role of Victim	Number of Cases	Percentage (%)
Pedestrian	25	44%
Rider/Driver	19	33%
Passenger	13	23%
Total	**57**	**100%**

N=Total number of cases

Pedestrians constituted the largest group of victims (44%), followed by riders/drivers (33%) and passengers (23%). The high pedestrian fatality rate underscores the lack of safe walkways and crossing infrastructure in Bangladesh.

Table 4: Primary Cause of Death Based on Autopsy Findings (N=57)

Cause of Death	Number of Cases	Percentage (%)
HeadInjury (TBI)	38	66%
Polytrauma	10	17%
Thoracic Injury	5	10%
Abdominal Injury	4	7%
Total	**57**	**100%**

N=Total number of cases

Head injury was the leading cause of death in 38 cases (66%), followed by polytrauma (17%) andthoracic injuries (10%).

DISCUSSION

The findings of the study reveal critical insights into the public health burden of road traffic accidents in Bangladesh, focusing on common age groups, sex distribution, occupational backgrounds of those involved, and vehicle types at specific risk. Therefore, this study conducted in Forensic Medicine & Toxicology department at Comilla Medical College provides valuable insights into the epidemiological and forensic profile of 57 fatal RTA cases over 1 year period.

The study revealed that majority of the victims are male (65%) and the most commonly affected age group is (21 to 40) years (about 53%). Men aged 21–40 years are frequently the primary income earners and spend significantly more time on the road, which increases their exposure to accidents. People in this age group tend to violate traffic rules, such as improper overtaking or moving through red lights, which also contributes to accidents.Apart from this, the use of mobile phones and other distractions may also contribute to a higher accident rate.Alcohol addiction, tobacco smoking among this age group are also considered as important factors[8,9].

Several studies from Bangladesh and other settings have similarly reported that young males are disproportionately involved in RTAs and frequently engage in high-risk behaviors such as speeding, dangerous overtaking and deliberate violation of traffic rules. A mixed-methods study from a high-risk zone of Bangladesh found that male drivers, particularly in younger age groups with average age of 31.50±9.16 years, commonly admitted to ignoring traffic rules, overtaking and crossing speed limits, which significantly increased their injury risk [2]. In addition, research on young drivers shows that mobile phone use while driving and alcohol consumption further elevate crash risk by increasing distraction and promoting other unsafe behaviors such as speeding and red-light violations [10,11].

Auto vehicles are more prone to road traffic accidents in comparison with other vehicles that is about 42%. This is basically due to a combination of factors like massive number of illegal and technically flawed vehicles, poor enforcement of traffic laws,unsafe driving behaviors like wrong way driving and lane changes without signaling. Inadequate breaking systems and the lack of proper regulation for battery run rickshaws are also major contributors to high accident rate[9].

Several recent studies support the explanation that auto-type and battery-run three-wheelers are disproportionately involved in crashes, and that illegal/unfit vehicles plus weak enforcement and poor braking systems contribute to high accident rates [12-14].

A study from India by Schmucker et al. describing crashes involving motorized rickshaws (auto-rickshaws) showed that these three-wheeled vehicles are common in mixed traffic and are associated with substantial morbidity, highlighting their high vulnerability in collisions[13].

Percentage of pedestrians (44%) ranked high in comparison with other victims affected by road traffic accidents. Factors responsible for these are mainly poor road infrastructure, lack of adequate footpaths and inadequate safety features at crossings, combined with reckless driving behavior like excessive speeding. Factors like poor traffic management, encroached pavements and a high volume of both motorized and non motorized vehicles further increase the risk. Additionally some pedestrians are also engaged in risky behaviors[9,15].

Several studies report pedestrian shares of road traffic deaths that are similar to, or even higher than, the 44% observed in this study[16-18].

A Bangladeshi analysis presented at the "Towards sustainable pedestrian safety: the Bangladesh context" session reported that pedestrians accounted for more than half (52%) of reported road traffic fatalities in Bangladesh, and up to 80% of fatalities in urban areas. The authors highlighted that pedestrian–vehicle conflicts are "the greatest safety problem in Bangladesh" and called for urgent infrastructure improvements such as footpaths, refuge islands and safe crossings [17]. A Dhaka-based study of pedestrian road traffic injury reported that pedestrians constitute about 73% of road accident fatalities in the city, with most injuries occurring in the 18–45 year age group. The authors concluded that pedestrians are the most vulnerable road users in Dhaka and emphasised inadequate pedestrian facilities and reckless driving as key contributors [18].

In relation to postmortem findings, head injuries were identified as the major cause of death, accounting for 66% of cases. Several autopsy-based studies from Bangladesh have similarly reported head injury as the predominant cause of death in RTA victims, with proportions ranging from about 43% to over 70% of cases. These findings are in line with the present study, where head injuries accounted for 66% of deaths, reinforcing that traumatic head involvement remains the leading fatal injury pattern in RTAs in this region[19-21].

Pedestrians get head injuries due to a lack of protection when hit by a vehicle, causing them to be directly impacted or thrown, leading to severe impacts on the head. Not only pedestrians but also drivers get head injuries from secondary impacts within the vehicles,such as hitting against the steering wheel, dashboard or wind shield, often from sudden declaration or forces from other vehicles in a crush[15].

ETHICAL CONSIDERATIONS

The confidentiality of cases was maintained, when the data were obtained from record books of the Department of Forensic Medicine and Toxicology, Comilla Medical College Comilla Bangladesh after receiving the ethical clearance from the concerned.

CONCLUSION

This study highlights critical road safety challenges in Bangladesh, revealing high-risk groups, vehicle categories, and patterns of injuries found in postmortem examinations of RTA fatalities. The disproportionate deaths from unregulated vehicles and motorcycle-related casualties demand urgent intervention. The findings of the study provide a foundation for evidence based policies targeting improved vehicle regulation, infrastructure development and public awareness.Addressing these issues through coordinated efforts can significantly reduce the burden of road traffic accidents in Bangladesh and improve public health outcomes

RECOMMENDATIONS

Targeted interventions such as awareness campaign focusing on helmet and seat belt usage, strict regulation of heavy vehicle movement and development of pedestrian friendly Infrastructures are urgently needed[22]. Law enforcement agencies must prioritize the implementation of traffic rules particularly during evening hours when accidents peak[23]. Fitness of drivers and fitness of vehicles should be strictly maintained as well as modernization of licensing process to enhance the skillfulness of drivers[23,24].

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CONFLICT OF INTEREST

There is no conflict of interest.

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