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ORIGINAL ARTICLE

EPIDEMIOLOGICAL DISTRIBUTION OF ROAD TRAFFIC ACCIDENTS IN TERTIARY CARE SETUPS OF LAHORE, PAKISTAN

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ABSTRACT

Background and Objectives: Road traffic accidents (RTAs), a soaring and lethal epidemic will rise as the 7th highest cause of death globally by 2030, with around 20 to 50 million injuries and 1.24 million deaths per year worldwide. Pakistan a developing country with 60% of youth population loses an average of 5 of them daily to this deadly yet preventable cause. Objectives of this study is to assess the time, place and person distribution of road traffic accidents in selected tertiary care setups of Lahore.

Methodology: This cross sectional study was carried out within four months in tertiary care setups; Mayo, Jinnah and Lahore General Hospital, Lahore. Interviews of 252 patients presenting to the emergency with road traffic accidents were conducted using a pretested questionnaire. Consents of patients, institutions and review board were taken.

Results: Male predominance; 191 (75.8%). Majority accidents took place during 12pm to 12am commonest on main roads 194 (77%), motorbike with motorbike 70.5 (28.8%) and motorbike with car 70.3 (27.9%) as the most common entities. Strong association ($p \leq 0.05$) between mode of transport and time interval between accident and arrival to emergency with nature of collision resulting in permanent disability ($p = 0.01$) was observed. Lacerations 70 (27.8%) being commonest injury. Although 168 (66.7%) participants were aware of road safety measure, few used safety gear something that merits change.

Conclusion: RTAs contribute majorly to morbidity and mortality at tertiary care hospitals. Majority accidents attributed to two wheelers, head on collisions occurring at night time on main roads. Implementation of strict legislative measures, proper certification of driving licenses, better emergency facileties are recommended.

Keywords: RTA, Epidemiological, Tertiary Care, Lahore.

INTRODUCTION

Road traffic accidents (RTAs) already considered a soaring and lethal epidemic, will rise to become the 7th highest leading cause of death globally by 2030.[1] WHO definition "A road traffic injury is a fatal or non-fatal injury occurring as a result of a collision on a public road involving at least one moving vehicle."[2] Global picture of RTAs is quite alarming, as they justifiably have been one of the most imperative concerns for WHO for over the last four decades.[3] The explicitly apparent increase in the traffic load globally can be attributed to more modernized transport system, the impact of which is seen when road safety measures are so recklessly compromised upon, a trend more evident in the developing countries. The consequence; a worrying increase in the mortality and morbidity outcomes of RTAs.[4] In lieu of the drastic increase in RTAs, WHO is implementing the Decade of Action for Road Safety 2011-2020, targeted at reducing RTAs globally by envisioning and implementing advanced and improved road safety systems and measures.[5]

According to the WHO report on road safety, road traffic casualties account for around 20 to 50 million injuries each year and a staggering figure of 1.24 million deaths worldwide.[6] WHO's fact sheet of 2011 stating that 90% global deaths on roads occur in low and middle income countries, an interesting fact as they cumulatively have less than half of the world's vehicles combined.[7] China, Russia, India, Indonesia and the US are among the top five countries with the highest Disability-adjusted life year (DALY) of RTAs, alleged for 5% of the total DALY loss. China and India have the highest economic loss and DALY due to RTAs, while neighboring Iran alone has a DALY of over 1.07 million.[8] Topographically speaking, most of the RTAs are localized in the South-East Asia region. In the Eastern

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Mediterranean Region, the mortality rate of RTA is 26.4 per 100,000 whereas in Europe, the corresponding value is 17.4 per 100,000, compared to the worldwide figure of 19 per 100,000. These road traffic accidents are predicted to result in the deaths of around 1.9 million people annually by 2020.[6]

Pakistan has a cumulative number of 25,781 RTA fatalities, as reported by WHO in 2013, with an average of 14.2 RTA fatalities per 100,000 compared with global prevalence rate 17.4 per 100,000 population.[9] Punjab and Sindh most densely populated provinces saw a total of 4,289 and 1,512 RTAs, in 2013, respectively.[10] An epidemiological survey of Karachi, Pakistan's largest city, reported 1130 RTA fatalities in 2013.[11] In Lahore, a city that in recent times has seen a dramatic increase in the traffic load, a total of 132,504 victims of RTA's was reported from 2005 to 2010.[12]

In a nutshell, road traffic accidents constitute a prime yet avoidable cause of death and disability in developing countries, like Pakistan.[13] A marked increase in RTA induced injuries and their causative factors has been observed over the past few decades in Pakistan, from 1960–1994,[14] possibly reflecting the changes in lifestyles, urbanization, rural development, increase in the motor vehicles and introduction of mechanized farming in the agriculture sector, as well as the reluctance of policy makers and health professionals in recognizing the public health importance of these injuries.[15] All of this is contributing to the prevalence of this emerging yet preventable epidemic.

About 1.25 million people die of Road Traffic Accidents each year, and 90% of these fatalities occur in low or middle-income countries. Pakistan as a developing country with 60% of youth population loses an average of 5 of them daily in RTA, holding 67th place in the world. Pakistan lacks statistical data regarding age and gender distribution in RTA scattering our approach towards prevention. This study would give us an overview of the current scenario of distribution of RTA's in accordance to the socio demographic profile. In addition it would help generate data for application of public health interventions, planners and policy makers. This study aimed to assess the time, place and person distribution of road traffic accidents in selected tertiary care setups of Lahore.

PARTICIPANTS AND METHODS

Cross sectional study was conducted within a period of four months in 2017 targeting major tertiary care setups in Lahore, Pakistan, Mayo, Jinnah and Lahore General Hospital.

Target Population and Sample Size

Males and females involved in road traffic accidents presenting at the emergencies of tertiary care hospitals were enrolled within the study. Sample of 291 was calculated at 95% confidence interval, with 5% margin of error and 80% power of the study based on the anticipated population proportion 0.253, data was collected form 252 as a non-response rate of 14% was experienced Non-probability purposive sampling was employed keeping in consideration feasibility of the study.

Data Collection and Analysis

A pretested structured questionnaire was developed. Interviews were conducted by the investigators themselves within a duration of four months. SPSS version 2.0 was applied to analyze the data. Frequencies and percentages for qualitative/categorical data were calculated. Chi-square was the chosen test of significance to determine associations and p-value of < 0.05 was considered significant statistically.

Ethical Considerations

Permission from the selected hospitals was obtained and consent was taken from all the participants before interviewing by the investigators themselves. Institutional review board approval was taken before conduction of the study.

RESULTS

The current research pertains to data regarding road traffic accidents that presented to three major tertiary care hospitals of Lahore, namely; Jinnah, Mayo and Lahore General Hospital. We studied a total of 252 patients that were admitted to these institutions. We found that majority of the victims, 191 (75.8%) were males while only 61 (24.2%) were females.

Various factors were attributed to cause of accidents including weather, type of road and time of day. Maximum accidents took place during 12PM to 12AM with most of them being on the main roads (inter-city), (Table 1). A total of 39 (15.4%) participants were having vision defects. The most common offender were two wheelers with most common RTA's recorded between motorbike with motorbike 72.5 (28.8%), motorbike with car 70.3 (27.9%) and motorbike with rickshaw 46 (18.2%). Mode of transport to hospital most often used was private conveyance 101 (40.1%) as compared to ambulance 61 (24.2%) and rescue service (1122) 90 (35.7%). Mainly participants were front seat occupants 133 (52.8%) and nature of collision was head on 109 (43.3%) (Table 1).

Lacerations 70 (27.8%) were the commonest type of injury seen in the participants followed by contusions and lacerations combined 65 (25.8%), fractures 53 (21%). Furthermore only 34 (13.5%) were permanently disabled. Also shown above is that the lower limb 74 (29.4%) and head and neck regions 47.8 (19%) were most frequently injured as a result of the collisions, whereas 98 (38.9%) of the victims sustained a combination of multiple injuries (Figure 1).

As far as safety devices were concerned, only 7 (7.1%) were wearing seat belts, 17 (10.2%) wearing hel-

Table 1: *Epidemiological Distribution of Road Traffic Accidents in Tertiary Care Setups of Lahore.*

1	*Time of accident*	*n (252)*	*%*
	12AM to 12 PM	85	33.7
	12PM to 12AM	167	66.3
2	*Mode of transport to the hospital*		
	Ambulance	61	24.2
	Rescue	90	35.7
	Private conveyance	101	40.1
3	*Type of road*		
	Street	44	17.5
	Highway	14	5.6
	Main road	194	77
4	*Occupant of*		
	Front seat	133	52.8
	Back seat	56	22.2
	Pedestrian	63	25
5	*Nature of collision*		
	Head on	109	43.3
	Rear	63	25
	From Side	80	31.7

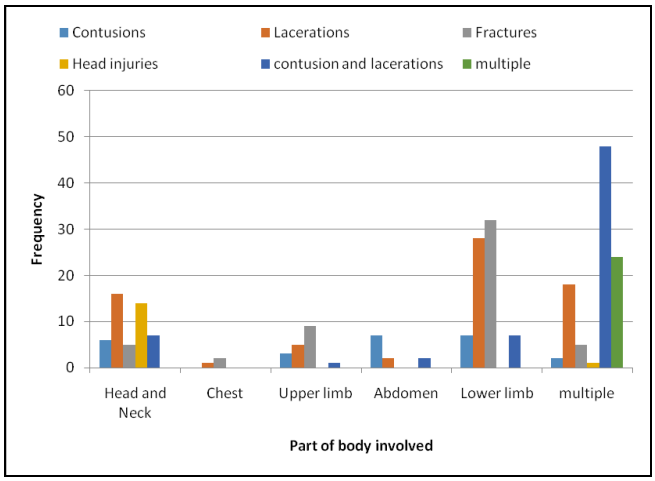

Fig. 1: *Commonest Injuries and Parts of the Body Involved.*

mets. Road safety awareness and use of safety measures was observed in 168 (66.7%), 202 (80.2%) were aware of rescue service and 168 (66.7%) victims had knowledge of importance of license respectively. License holders amounted to 141 (56%) (Figure 2).

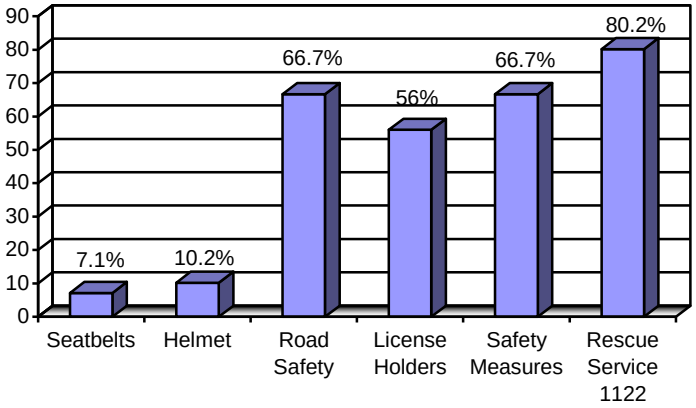

Fig. 2: *Safety Measures: Awareness and Practices.*

A significant association (p-value ≤ 0.01) between the nature of collision and disability among victims was established. Disability was associated in higher proportion with fractures (p-value ≤ 0.01). Strong association between time interval of accident and arrival to emergency with distance from accident site (p 0.01) and mode of transport (p 0.05) was observed in addition to between type of road and type of injuries (p 0.05) (Table 2).

Figure 1: As depicted above, lacerations 70 (27.8%) were the commonest type of injury seen in the participants followed by contusions and lacerations combined 65 (25.8%), fractures 53 (21%). Furthermore only 34 (13.5%) were permanently disabled. Also shown above is that the lower limb 74 (29.4%) and head and neck regions 47.8 (19%) were most frequently injured as a result of the collisions, whereas 98 (38.9%) of the victims sustained a combination of multiple injuries.

Figure 2: As depicted a variability in the awareness regarding safety measures was observed being very low for seatbelts and helmets. More than half were license holders with majority having awareness regarding road safety, other safety measures and availability of rescue service 1122.

DISCUSSION

Developing countries like Pakistan are still facing the wrath of communicable diseases in these circumstances the burden of non-communicable diseases such as Road Traffic Accidents is a havoc to the economic conditions. Our study was conducted to find the epidemiological distribution of Road Traffic Accidents in Lahore taking into account the Tertiary Care hospitals, it depicted interesting findings and associations which could be helpful in further exploration of this subject.

In the present study, average age was 26 -30 years with a predominance of males supported by other

Table 2: *Relationship of Types of Injuries with Type of road, Time interval between hospital arrival of patient and accident with distance from site of accident and mode of transport.*

Types of Injuries	*Type of Road*			*p value*
	Street	*Main road*	*Highway*	
Contusions	7	16	2	0.05
Lacerations	21	47	2	
Fractures	6	44	3	
Head injuries	3	11	1	
Contusion and Lacerations	5	55	5	
Multiple	2	21	1	
Time interval between accident and arrival of patient to hospital	*Mode of Transport*			
	Ambulance	*Rescue service*	*Private conveyance*	
Within 15 min	7	6	7	0.05
15 to 30 min	14	19	27	
30 to 45 min	6	19	20	
45 to 60 min	4	22	17	
60 to 90 min	8	6	7	
Above 90	22	18	23	

Time interval between accident and arrival of patient to hospital	*Distance to the nearby hospital from the site of accident*					
	Within 1 km	*1-5 km*	*5-10 km*	*10-15 km*	*> 15 km*	
Within 15 minutes	5	10	2	2	1	0.01
15 to 30 minutes	10	22	20	5	3	
30 to 45 minutes	4	22	12	1	6	
45 to 60 minutes	2	8	15	6	12	
60 to 90 minutes	0	5	3	6	7	
More than 90 minutes	0	15	9	8	31	

studies having an average age of 20-29 years, which was mainly due to the variation in sample size and study population and can be attributed to the fact that majority drivers are male as reported in a study based in Karachi.[16-19] The current study witnessed majority accidents within 12 pm to 12 am involving two wheelers followed by pedestrians with most of the participants having no vision defect supported by studies.[15,18]

Although not significant, but a relationship was highlighted between nearsightedness and increased number of RTAs at night time with more head on collisions. Concurrence was observed in studies attributing this relationship to poor visibility at night, rush hours, not following traffic rules and more traffic on roads.[20-23] A review article in Iran depicted that weather conditions and number of RTA's exhibit a trend, sunny> rainy>foggy>snowy,[20,23] while in our study no such trend was observed as mostly the weather at the time, the study was conducted was clear and most of the accidents took place on main roads.

As stated by Shabbir in his study health and safety are the most important but neglected issues in Pakistan, the trend of using safety gears (seat belts and helmets) was previously very low but for the past decade due to strict implementation of the law by the traffic police the trend is changing.[23] Abstinence from usage of safety gears such as seat belts and helmets (p value 0.03) was emphasized upon in our study, although more than half of the participants were aware of the road safety measures. It is worthy to note that partici-

pants wearing seat belts suffered less number of injuries having less severity (like laceration and contusions). Similar results were observed in a study conducted in India and Iran in which it was evident that seat belts reduced the mortality and morbidity rate.[21,26,27] Head injuries were found to be more common among people not wearing seat belts while multiple traumas were more common in people not using helmets as supported by studies of Karachi and India.[15, 16,28,29]

In our study, occupants of the front seat suffered more injuries including lacerations and fractures respectively concurrent with the results to a study conducted in urban India.[15] Majority of the participants did not have license with two wheelers exhibiting predominance attributed to easy approachability of vehicles and casual attitude of drivers in obtaining of license, findings were concurrent to a retrospective and descriptive study.[28,30]

Our study targeted tertiary care hospitals of Lahore and established a strong association between time of arrival at hospital and types of injuries (p-value 0.001) of the victims with lacerations and contusions topping the list. This is in contrast with other studies where head injuries were the most common injuries.[31] Our study depicted that in majority victims multiple parts of the body were injured contrasting to an Indian study concluding that the most involved part of body was head, neck and lower limb.[32]

Pre-hospital emergency services in low and middle income countries like Pakistan are either not obtainable or are largely under utilized.[33] Our study highlighted a significant association (p-value 0.05) between time of arrival to the hospital and mode of transport, majority participants using private conveyance as rescue and ambulance services were not present within 15-30 minutes after the accident. Similar findings were depicted in an Indian study where cause or mortality in road traffic accidents was strongly associated (p-value 0.01) with unavailability of emergency services.[18,34,35]

According to the data collected it was quite interesting to find that most of the accidents occurred within 5 km radius (p value 0.01) of our tertiary care units which signifies the ease of access to the health care facility and satisfactory coverage of the area. Chandrasekharan et al, stated in their study that accidents happening in less than 10 km from the trauma center with delayed arrival of patients to hospitals were co-related to increased deaths among the victims which throws light on the basic essence of healthcare facilities that should be easy to access ensuring availability of emergency health care services.[18]

A significant association (p value 0.01) between the nature of collision and disability among victims was established. Disability was associated in higher proportion with fractures (p value 0.01). However, literature reflects upon head trauma to be the major cause of mortality and morbidity in road traffic accidents.[17,18]

The novelty of this study is that it emphasizes on the need for betterment of emergency services as well as access to health care delivery provided there is satisfactory coverage of the catchment population which needs further exploration by conducting researches.

Our study ***concludes*** that Road Traffic Accidents are an important contributor as far as morbidities at tertiary care hospitals are concerned. Majority accidents can be attributed to two wheelers, head on collisions occurring at night time on main roads. Most of the drivers did not possess a valid license. Rescue services were not up to the mark. There is a dire need of strict legislative measures to ensure certification of driving licenses and policy implementation of strict traffic rules. Emergency and first aid services are essential for proper management of road traffic accidents. Moreover there should be wide spread health education campaigns addressing preventive and safety measures. It should be further substantiated by rigorous and continuous training of law enforcement agencies controlling the city traffic. This study opens up avenues for further research in highlighting important aspects associated with road traffic accidents.

Limitations

A self – funded study based on the feasibility it was conducted on a limited sample size and at selected tertiary care hospitals.

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Authors' Contributions

SAZ: Concept, Questionnaire development, Analysis of Results. MTA: Concept, Questionnaire development, Discussion. NO: Concept, Questionnaire development, Drafting of article. IA: Discussion. AL: Introduction, Literature review. AAK: Introduction, References. AS: Interpretation of results and Tables. AF: Conclusion and references. KM: Recommendations.

Conflict of Interest: None.

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