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Original Research Article

A Correlation between Fatal Road Traffic Accidents and Head Injuries: An Autopsy Study

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ABSTRACT

INTRODUCTION: Head Injury has been defined as, "a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of skull, produced by mechanical forces".
MATERIALS AND METHODS: In this retrospective study, all the fatal head injury cases due to road traffic accident, brought for post-mortem examination at mortuary of Adichunchanagiri Institute of Medical Sciences, Mandya District, Karnataka, India, between 2008 to 2012 were studied. During this study several epidemiological observations and their results were considered.
RESULTS: Total number of autopsies done in the last five years was 492. RTA constitutes 63% (310 cases).
CONCLUSIONS: To be effective, policies on injury prevention and safety in developing countries must be based on local evidence and research, and designed to suit the social, political, and economic circumstances found in developing countries.

KEY WORDS: Road Traffic Accident, Head Injury, Fractures, Hemorrhages.

INTRODUCTION

Head Injury has been defined as, "a morbid state, resulting from gross or subtle structural changes in the scalp, skull, and/or the contents of skull, produced by mechanical forces". It has also been defined as physical damage to the scalp, skull or brain produced by an external force. However, such force/impact, responsible for the injury needs not be applied directly to the head. Depending upon whether or not the duramatter was torn, head injury may be termed as open or close type. The extent and degree of injury to the skull and its contents is not necessarily proportional to the quantum of force applied to the head. [1]

National statistical trends in road accidents, injuries and fatalities: A Road Traffic Accident (RTA) can be defined as, 'An event that occurs on a way or street open to public traffic; resulting in one or more persons being injured or killed, where at least one moving vehicle is involved. Thus RTA is a collision between vehicles; between vehicles and pedestrians; between vehicles and animals; or between vehicles and geographical or architectural obstacles. [2]

During 2008, Road Traffic Injuries (RTI) ranked fourth among the leading causes of death in the world. Nearly 1.3 million people die every year on the world's roads and 20 to 50 million people suffer non-fatal injuries, with many sustaining a disability as a result of their injury. Road traffic injuries are the leading cause of death among young people aged 15-29 years and cost countries 1-3% of the gross domestic product (GDP). [3-5]

MATERIALS AND METHODS

In this retrospective study, all the fatal head injury cases due to road traffic accident, brought for post-mortem examination at mortuary of Adichunchanagiri Institute of Medical Sciences, Mandya District, Karnataka, India, between 2008 to 2012 were studied. During this study several epidemiological observations and their results were considered.

RESULTS

Table 1: Total number of autopsies done in the last five years was 492. RTA constitutes 63% (310 cases).
Table-2: The majority of victims belonged to the age group 31-40 years (75 cases; 30%). Female were less involved than men with ratio of 1: 4.
Table-3: Drivers of 3 and 4 wheeler were most commonly involved (95 cases; 31%) followed by Occupants of 3 and 4 wheeler (60 cases; 19%) and Motor-cyclists in fatal RTA (55 cases; 18%).
Table-4: Intracranial hemorrhages were the most common findings followed by Skull fractures.
Table-5: Frontal bone fracture was the common injury (75 cases).
Table-6: Fissure and depressed fracture were the most common type of fractures.

Table 1- Year wise distribution of Cases.

Year	Total No. of autopsies	No. of RTA* Cases	% of RTA Cases	Males		Females	
				No.	%	No.	%
2012	100	63	63%	52	83%	11	17%
2011	76	44	58%	31	70%	13	30%
2010	96	61	64%	48	79%	13	21%
2009	106	68	64%	58	85%	10	15%
2008	114	74	65%	64	86%	10	14%
Total	**492**	**310**	**63%**	**253**	**82%**	**57**	**18%**

Table 2 -Age and Sex wise distribution of Cases.

Age Group (In years)	Males		Females		Total
	No.	%	No.	%	No.
< 10 years	0	0	0	0	0
11 -20 years	05	2%	2	04%	07
21-30 years	53	21%	15	26%	68
31-40 years	75	30%	20	35%	95
41-50 years	65	25%	12	21%	77
>51 years	55	22%	08	14%	63
Total	**253**	**100**	**57**	**100**	**310**

Table 3 - Victims of Road Traffic Accident.

Type of Road User No	**No.**	**%**
Pedestrians	15	05%
Cyclists	05	02%
Motor-cyclists	55	18%
Pillion rider	35	11%
Driver of 3 and 4 wheeler	95	31%
Occupants of 3 and 4 wheeler	60	19%
Bus/Mini bus Passengers	45	14%
Total	**310**	**100%**

Table 4 - Autopsy Findings.

Findings	**No.**
Scalp Abrasions	115
Scalp Lacerations	140
Scalp Hematoma	80
Skull Fractures	**235**
Intracranial hemorrhages	
Extradural Hemorrhage	108
Subdural Hemorrhage	130
Subarachnoid Hemorrhage	126
Intracerebral Hemorrhage	101
Cerebral Contusion/Laceration	77
Cerebral Edema	43
Brain Abscess	87
Associated Fracture of Cervical Spine	42

Table 5- Anatomical Location of Skull Fractures.

Location of Fracture	No.
Frontal	75
Fronto-Parietal	65
Parietal	46
Parieto-Temporal	32
Parieto-Occipital	34
Temporal	56
Occipital	32
Temporo-Occipital	33
Base of Skull	11

Table 6: Type of skull fracture.

Type of skull fracture	No.
Only fissure	143
Comminuted	77
Depressed comminuted	11
Fissure + depressed comminuted	112
Fissure + Sutural diastasis	77

DISCUSSION

Road traffic accidents are a human tragedy. They involve high human suffering and socioeconomic costs in terms of premature deaths, injuries, loss of productivity, and so on. [1] Expansion in the road network, a surge in motorization and the rising population in the country contribute toward the increasing numbers of road accidents, road accident injuries and road accident fatalities. The road network in India, the numbers of registered motor vehicles in the country and the country's population have increased at a compound annual growth rate (CAGR) of 3.4%, 9.9% and 1.6% respectively, during the decade 2001 to 2011. During the same period, the number of road accidents in the country increased at a CAGR of 2.1%. Similarly, the number of road accident fatalities and the number of persons injured in road accidents in the country between 2001 and 2011 increased by 5.8% and 2.4% respectively. [1] Even as the CAGR of the number of accidents and the number of road accident injuries has moderated during the decade 2001 to 2011, as compared to the previous decade 1991 to 2001, there has been a spurt in the CAGR of the number of road accident fatalities during the latter period. [1] Between 1970 and 2011, the number of accidents increased 4.4 times accompanied with 9.8 times increase in fatalities and 7.3 times increase in the number of persons injured, against the backdrop of more than a 100-fold increase in the number of registered motor vehicles and close to a four-fold increase in the road network. [1] During 2011, a total of 4, 97,686 road accidents were reported by all States/UTs. The proportion of fatal accidents in the total road accidents has consistently increased since 2002 from 18.1 to 24.4% in 2011. The severity of road accidents measured in terms of persons killed per 100 accidents has also increased from 20.8 in 2002 to 28.6 in 2011. [2]

Severe head injury, with or without peripheral trauma, is the commonest cause of death and/or disability up to the age of 45 years in developed countries. According to one study in Chandigarh6 head injury accounted for 73% of all fatal road traffic accident cases. In a comparative study conducted by the authors, head injury was responsible for 63% road traffic accident fatalities in Jammu, 60% in Delhi and 58% in Chandigarh. It was a contributing factor to death in 11%, 13% and 15% of cases, respectively, at these places. [6,7]

The detailed age profile of accident victims other than the drivers, for the year 2011, revealed that the age group between 25 and 65 years accounted for the largest share, 51.9%, of total road accident casualties, followed by the age group between 15 and 24 years, with a share of 30.3%. More than half of the road traffic casualties were in the wage-earning age group. Only 15% of the road accident victims were females during the calendar year 2012. During 2012, road traffic accidents shared 35.2% of the accidental deaths; 23.2% of the victims of road accidents were occupants of 'two wheelers'. Although the break-up of total government and private vehicles is not available, it is

pertinent to note that the majority of victims were traveling in private vehicles. During 2012, Delhi city, among the 53 mega cities, accounted for 16.1% of the deaths of pedestrians', 10.0% deaths due to car accidents and 9.5% deaths due to two wheelers. [8]

According to study done by Muhammad TK, Usman H, Sheeba I, Tariq S, Most of the deceased suffered from multiple skull bone fractures (n=24, 42.1%). There was no skull bone fracture in 26.4% of cases. Out of the cases which suffered from single bone fractures, the most frequent bone fractured was temporal bone (n=8, 44.4%), followed by occipital bone (n=5, 27.8%). The multiple compartment hemorrhages were more frequent as compared to single compartment hemorrhages. Most of the deceased (n=30, 52.6%) suffered from combinations of vascular hemorrhages. The most frequent combination was of extradural and intracerebral hemorrhage. Out of the remaining cases with single compartment hemorrhages, the most frequent was extradural hemorrhage followed by subdural hemorrhage. [9]

CONCLUSIONS

To be effective, policies on injury prevention and safety in developing countries must be based on local evidence and research, and designed to suit the social, political, and economic circumstances found in developing countries. As a result, strategies to increase research itself must develop alongside steps to stimulate policymakers and practitioners to demand and use research evidence. Strengthening and undertaking research on the public health burden and impact, understanding the risk factors, characteristics of trauma, and measuring the impact of interventions through well-designed public health and clinical research methods (trauma registry, surveillance programs, hospital- and population-based studies etc.) is the need of the hour. Health professionals and their professional bodies across wide disciplines need to take an initiative for the same, with active commitment.

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