Research Article

Study of Mortality Due to Thoraco-Abdominal Injuries in Road Traffic Accidents in Mangalore City

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Abstract

Background: After the strict implementation of helmet rule the number of head injuries due to road traffic accidents has subsequently decreased, but injuries sustained to thoracic and abdominal regions are still on the rise. This post mortem study of profile of thoraco-abdominal injuries, type, pattern and nature of external and internal injuries involved will be an attempt to highlight the trends of mortality due to thoraco-abdominal injuries associated with road accidents in Mangalore city. **Material and Methods:** Present study was autopsy record based retrospective study conducted deaths associated with thoracic-abdominal injuries that have definite history of road traffic accidents. **Results:** From 247 deaths of RTA victims who sustained thoraco-abdominal injuries, most common age group was 20 – 29 (21.8%) years, male: female ratio was 5.6: 1. 21 % of cases were spot dead or dead on arrival to hospital, 60 % of cases died within 24 hours. 68.8% cases had thoracic trauma with signs of external injuries such as abrasions (60.7%), contusion (10.5%) and laceration (10.2%). External abdominal injuries were present on 54.2% cases, 48.9% cases had abrasion followed by contusion in 8.9% cases and laceration in 6.5% cases. 199 (80.6%) cases sustained internal injuries to thorax. Fractures of ribs were present on 59.5% cases. Injuries to lungs sustained in 37.2% cases and to heart in 22.6% cases. 136 (55.1%) cases of internal abdominal injuries, most common organ injured was liver (38%), followed by spleen (17%) & abdominal wall (14%). Among the 247 cases, cause of death in 47% cases was head injury followed by thoraco-abdominal injury (20%), head injury and thoracic injury (8%), only thoracic injury (7%), abdominal injury (6%). **Conclusion:** The present study maximum numbers of the victims were males, from age group of 20-39 years, reported on city roads, pedestrians, noted in summer season and cause of death was head injury followed by thoraco-abdominal injuries.

Keywords: *mortality, fatal thoraco-abdominal injuries, road traffic accidents, road safety*

Introduction

Injuries from road traffic accidents (RTA) is expected to be the third most common cause of universal disability and the second most common cause of disability in the developing world.[1] Mortality and Morbidity from road traffic accidents has greater importance in developing countries.

The number of vehicles in the country has increased by 78.0%, and the quantum of 'Road Traffic Accidents' has increased by 5.1% during the period of 2009 to 2013.[2]The population growth during the period 2003-2013 was 15.0% whereas the increase in the rate of accidental deaths during the same period was 25.5%.[2]In 2013, there was a decline of 0.9% in deaths due to causes attributable to nature and an increase of 1.5% in deaths

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due to un-natural causes as compared to 2012. 'Road Traffic Accidents' cases in the country have marginally increased by 0.7% during 2013 compared to 2012. Their proportion in total deaths due to un-natural causes has slightly increased from 35.2% in 2012 to 36.4% in 2013.[2]

The thoracic and abdominal cavities contain most of the vital organs; hence, injury to these organs leads to fatal outcome. Trauma to these cavities can be produced in various means such as road traffic accidents, railway accidents, fall from height and blunt weapons. Among this, road traffic accidents contribute maximum numbers. After the strict implementation of helmet rule the number of head injuries due to road traffic accidents has subsequently decreased, but injuries sustained to thoracic and abdominal regions are still on the rise.[3] Because of their size and anatomical position, they are major regions of trauma in road traffic accidents.

This post mortem study of profile of thoraco-abdominal injuries, type, pattern and nature of external and internal injuries involved will be an attempt to highlight the trends of mortality due to thoraco-abdominal injuries associated with road accidents in Mangalore city.

Material and Methods

Present study was autopsy record based retrospective study conducted in Department of Forensic Medicine & Toxicology of K S Hegde Medical Academy (a constituent unit of NITTE University) and Wenlock District Hospital, Mangalore. Ethical society approval was taken for present study.

Inclusion Criteria

· All cases of deaths associated with thoracic-abdominal injuries that have definite history of road traffic accidents.

Exclusion Criteria

· Cases with no specific history.

· Dismantled and dismembered bodies of which the abdominal organs are missing

· Decomposed bodies in which organs are liquefied.

Autopsies conducted during January 2009 and December 2013 was considered for this study. All the data obtained will be made anonymous to protect the identity and confidentiality medico legal information. Details of diseased person such as age, sex, information furnished by the police in the inquest papers (form 146 (i) & (ii)), autopsy findings ,investigation reports if any and cause of death were noted in proforma. The data was analysed with help of descriptive statistics.

Results

During study period 247 deaths of road traffic accident victims who sustained thoraco-abdominal injuries were noted. The most common age group was 20 – 29 (21.8%) years followed by 30 -39 years (20.2%). The age group between 20 to 49 years contributes 147 cases (59.5%).

Table 1 - Age wise distribution

Age Group	Total number of victim	Percentage
0 – 9	8	3%
10-19	18	7%
20 – 29	54	22%
30 – 39	50	20%
40 – 49	43	17%
50 – 59	36	15%
60 – 69	22	9%
70 – 79	13	5%
>80	3	1%

Male victims (85.02%) were more compared to females (14.98%) and male: female ratio was 5.6: 1.

Table 2- Gender wise distribution

Year	Male	Female
2009 (n=51)	42 (82%)	9 (18%)
2010 (n=39)	31 (79%)	8 (21%)
2011 (n=60)	53 (88%)	7 (12%)
2012 (n=56)	50 (89%)	6 (11%)
2013 (n=41)	34 (83%)	7 (17%)
Total (n=247)	210 (85%)	37 (15%)

In present study, most cases (13.3%) were observed in the month of May followed by January (11.3%) and November (10.1%). Maximum number of cases observed in summer season i.e., March, April, and May (31.9%). 21 % of cases were spot dead or dead on arrival to hospital, 60 % of cases died within 24 hours and 14% of cases survived more than 24 hours and less than 10 days. Only 5 % of cases survived more than 10 days.

Table 3- Duration of Survival

Duration Of Survival	Total number of victim	Percentage
Immediately - < 1 hour	51	21%
> 1 hour - < 24 hours	149	60%
1 day – 10 days	34	14%
> 10 days	13	5%

In present study, most cases were happened on city roads (38.5%) followed by on rural roads (36.4%) and on highways (25.1%). Among all the road users, pedestrians comprise the greatest number of victims involving 45.8% cases followed by two-wheeler rider (33.2%), pillion rider (11.3%), light vehicle occupant (8.5%), Heavy vehicle occupant (1.2%). Out of 247 cases, 68.8% cases had thoracic trauma with signs of external injuries such as abrasions (60.7%), contusion (10.5%) and laceration (10.2%). External abdominal injuries were present on 54.2% cases, 48.9% cases had abrasion followed by contusion in 8.9% cases and laceration in 6.5% cases.

Table 4- External injuries

External injuries	Thorax Total number of victim	Abdomen Total number of victim
Abrasion	150	121
Contusion	26	22
Laceration	25	16

Among 247 cases, 199 (81%) cases sustained internal injuries to thorax. Most common injuries were fractures of ribs (60%), followed by injuries to lungs (37%) cases and injuries to heart (23%). Crush injuries were observed in 6% of cases. There were 136 (55%) cases of internal abdominal injuries, most common organ injured was liver (38%), followed by spleen (17%) & abdominal wall (14%).

Table 5- Internal injuries

Thorax	Total number of victim (%)	Abdomen	Total number of victim (%)
Fracture of ribs	147 (60%)	Injuries to liver	93 (38%)
Injuries to lung	92 (37%)	Injuries to spleen	41 (17%)
Injuries to heart	56 (23%)	Injuries to wall	34 (14%)
Injuries to sternum	27 (11%)	Injuries to peritoneum	25 (10%)
Injuries to pericardium	26 (11%)	Injuries to small intestine	11 (4%)
Crush injury	16 (6%)	Injuries to kidney, diaphragm, large intestine, omentum, pelvis, stomach, bladder, lumbar vertebrae	47 (19%)
Injuries to pleurae	11 (60%)		
Injuries to vessels	8 (60%)		
Injuries to thoracic vertebrae	8		
Injuries to spinal cord	4		

Among the 247 cases, cause of death in 47% cases was head injury followed by thoraco-abdominal injury (20%), head injury and thoracic injury (8%), only thoracic injury (7%), abdominal injury (6%).

Table 6- Cause of Death

Cause Of Death	Total number of victim	Percentage
Head injury	117	47%
Thoraco-abdominal injury	50	20%
Head+thoracic injury	20	8%
Thoracic injury	17	7%
Abdominal injury	15	6%
Head + thoracic + abdominal injury	15	6%
Head+abdominal injury	13	5%

Discussion

The rapid and unplanned urbanization has resulted in an unprecedented revolution in the growth of motor vehicles globally. The alarming increase in morbidity and mortality owing to road traffic accidents over the past few decades is a matter of great concern.

The frequency of road traffic accidents in India is the highest in the world. Numerically, road traffic accidents accounts for the great majority of accidental deaths worldwide and the purpose of forensic examination in traffic accidents is to determine the nature and manner of causation of injuries on a pedestrian, or the occupant or rider of a vehicle[4].

The bony thoracic cage contains vital organs of circulation and respiration and trauma to these organs challenges the integrity and viability of entire organisms.[5] Injuries to abdomen are also significant as it contains

numerous vital organs like lungs, liver, spleen, kidneys, stomach, intestines and urinary bladder. Injuries to these organs are important as isolated injuries to liver, spleen, intestine can be saved if timely surgical aid is provided to them.[6]

In present 4 years forensic study, we noted that maximum numbers of the victims were males (85 %), from age group of 20-39 years (42%), reported on city roads (39%), pedestrians (46%), noted in summer season (32%) and cause of death was head injury (47%) followed by thoraco-abdominal injuries (20%). Similar results were noted in other Indian studies.[7-10]

In a study conducted in Bangalore, most of the victims were male and liver and spleen were the most common organs injured in road traffic accidents. Maximum number of accidents took place between 9am to 12 noon and 6pm to 9 pm, four-wheeler occupants met more accidents followed by truck, bus and jeep occupants.[7]

In the autopsy study conducted by Nuwadatta Subedi et al[8] in 122 cases of road traffic accidents, male (80%) victims were more compared to female (20%). The mean age of the victims was 30.76 years. In road user category pedestrians were involved in more (30.3%) cases followed by two wheelers (28.8%) cases. In external injuries abrasion were more followed by contusion and laceration. In this study they found that the most common organs injured in road traffic accidents were liver (57.5%) and spleen (37.5%).

A study conducted at rural medical college, Loni, maximum numbers of victims of thoraco-abdominal injuries were males (82.6 %) as compared to females (17.34 %) and most vulnerable age group were of 21–30 years in both fatal and non-fatal accidents, commonest cause for thoraco-abdominal injuries (84.9%) were road traffic accidents, 32.25% died on the spot, 23.64% died within 12 hours, 6.45% of victims survived for 1 to 7 days and only 3.22% were survived for more than a week after sustaining a injuries. The commonest injury of thoracic region were fracture of ribs and lung was the commonly affected organ. In abdominal injuries, liver was the most commonly affected followed by spleen and then kidney. The survival period is less than one hour in most of the cases.[9]

A prospective study of trends of fatal road traffic accidents in central India, during the period of January 2011 to September 2012 noted that young adult males of the age group of 21-40 years were common victims (52.71%) and peak incidence occurring between 6pm to 12 am. Male to female ratio was 4.6:1. Two-wheeler users were the most common victims followed by pedestrians. There were 24 cases of light vehicle occupant and 20 cases of heavy vehicle occupant. Most common cause of death was head injury followed by injury to vital organs, haemorrhage and shock, thoracic injury, spine injury and abdominal injury. The survival period is less than 24 hours in majority of cases (76.77%).[3]

In a study to emphasize the pattern of thoraco-abdominal injuries sustained by the victims of fatal road traffic accidents in Jaipur, Rajasthan, male predominance (81%) was observed. Road traffic accidents were the major cause of fatality due to blunt thoraco- abdominal trauma (74.50%). External thoracic injuries were more common than internal thoracic injuries whereas, in abdominal region, internal injuries were more common than external injuries. Fracture of thoracic cage was the most common thoracic injury (65%).[10]

The thoraco-abdominal injuries due to road traffic accidents require multidisciplinary approach of management. The lack of awareness and knowledge of traffic rules are also the reasons for the increasing number of Road traffic accidents This post mortem study of profile of thoraco-abdominal injuries, type-pattern and nature of external and internal injuries involved will be an attempt to highlight the trends in this region.

Conclusion

The present study maximum numbers of the victims were males, from age group of 20-39 years, reported on city roads, pedestrians, noted in summer season and cause of death was head injury followed by thoraco-abdominal injuries. Properly maintained wide roads can prevent accidents to a greater extend with strict execution of traffic rules & measures to keep the stray animals away from the roads. Trauma centers with well trained staff and facility should be established in every city can help to reduce mortality & morbidity due to road traffic accidents.

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Ethical Clearance: Taken

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