



EXPLORING THE BIO- SOCIAL LANDSCAPE: A PROFILE STUDY OF VICTIMS WITH THORACO- ABDOMINAL INJURIES

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Abstract

Background: Thoraco-abdominal injuries represents a critical subset of injuries that demand comprehensive exploration due to their potential impact on both the biological and social dimensions of individuals affected. This study embarks on a nuanced investigation into the bio-social landscape of individuals who have experienced thoraco-abdominal injuries. By delving into the complex dynamics that contribute to the etiology, progression, and aftermath of these injuries, we aim to provide a holistic understanding that extends beyond traditional medical perspectives

Methods: Ante mortem history & ante mortem examination were conducted in the emergency department while post mortem history & post mortem examination was conducted in mortuary of S.N. Medical College Agra, Uttar Pradesh wherein data was collected on predesigned, pretested open-ended, semi-structured schedule and analysis was done with the help of MS excel program.

Results: A total of 173 victims of thoraco-abdominal injuries which included 118 cases admitted for treatment and 55 victims who were dead and brought to the mortuary for postmortem examination during the study period were included and reviewed in the study. The present study showed that accidental occurrence of thoraco-abdominal injuries was commonest (97.10%), as compared to homicidal 2.31% and only 0.5% were suicidal wherein road traffic accidents were the commonest 84.97% cause of injuries and only 0.5% had injuries due to railway accidents and industrial accidents.

Conclusion: By elucidating the complex interplay between biological and social factors, this study contributes to the growing body of literature aimed at improving holistic care and rehabilitation strategies for victims of traumatic injuries.

Keywords: Bio- Social Landscape, Victims, Thoraco- Abdominal Injuries

Introduction

Thoraco-abdominal injuries, characterized by trauma to the thoracic and abdominal regions, represent a critical subset of injuries that demand comprehensive exploration due to their potential impact on both the biological and social dimensions of individuals affected.

As the human abdomen is largely unprotected by bony structures, it contains most of the vital organs like the liver, spleen, kidney, pancreas, and hollow viscera like the stomach, intestines, and bladder. Injuries to these organs are significant, as victims with isolated injuries to the liver, spleen, kidney, stomach, and intestinal perforation can be saved if timely surgical aid is provided to such victims.

This study embarks on a nuanced investigation into the bio-social landscape of individuals who have experienced thoraco-abdominal injuries. By delving into the complex dynamics that contribute to the etiology, progression, and aftermath of these injuries, we aim to provide a holistic understanding that extends beyond traditional medical perspectives

Road traffic accidents are increasing at an alarming rate throughout the world due to the rapid growth of transportation systems related to rapid economic growth resulting in the need for more vehicles for transportation, inadequate traffic planning and lack of traffic sense have worsened the situation. According to a study by Central Road Research Institute, New Delhi and studies done by WHO road traffic accidents account for 2.5 % of total deaths; it is as high as 10% among the age group 5-44 years. Thoraco-abdominal trauma alone is responsible for over 70% of all deaths following road traffic accidents.^{1,2}

The trauma related to railway accidents is usually severe, intensely fatal, and mutilating. It involves more than one body region because enormous kinetic energy is transferred to a body when the train strikes it. Similarly, falls from buildings, trees, etc is one of the causes of thoraco-abdominal injuries.³ This may occur in accidental, suicidal, or homicidal cases, out of which accidental cases are more common. Industrial accidents also contribute to thoraco-abdominal injuries due to rapid industrialization in urban as well as rural areas throughout the country.

Stabbing is one of the most common methods of homicide in the world and the thoraco-abdominal region is commonly involved in cases of sharp force fatalities coming to the hospital.⁴

This profile study is designed to bridge the gap between clinical observations and a broader socio-ecological understanding, fostering an integrative approach that acknowledges the interconnectedness of biological and social determinants. By examining the lived experiences of victims with thoraco-abdominal injuries, we aspire to identify patterns, correlations, and potential modifiable factors that can inform targeted interventions, preventive strategies, and patient-centered care.

Material & Methods

The study was conducted in the Department of Forensic Medicine & Toxicology, Sarojini Naidu Medical College, Agra, Uttar Pradesh where victims of thoracic-abdominal injuries come or brought for treatment to the Emergency Department of Medical College or subsequently brought for post-mortem examination at the mortuary from January 2014 to July 2015 were included in the study. The objectives of the study were:

1. To study the bio-social profile along with the pattern, severity, and individual causative factors of victims of thoraco-abdominal injuries.
2. To study the vehicle and victim-related factors associated with thoraco-abdominal injuries and to suggest strategies that will help to reduce morbidity and mortality.

The study was conducted in 2 parts:-

Ante mortem history & ante mortem examination was conducted in the emergency department while post mortem history & post mortem examination were conducted in the mortuary of S.N. Medical College Agra, Uttar Pradesh

1. In Emergency department-

- a) Ante mortem history-** History was taken from the victim, relative, or person accompanying the victim & police record to know the biosocial profile of the victim & the factors related to the accident.
- Various biosocial perimeters recorded were age, sex, education, occupation, urban/rural, and marital status.
 - Factors related to the accident were the place of the accident, date and time of the accident, type of vehicle (s) involved in the accident, type of road, type of road-user victim (pedestrian/passenger etc.), the time required to reach emergency department, etc.
- b) Ante mortem examination-** Examination of the victims of thoraco-abdominal injuries, to know the distribution, type & severity of injuries.
- Injuries were distributed according to regions like the thoracic, Abdomen.
 - Types of injuries were divided into minor, major & fatal.
2. In mortuary-
- a) Post Mortem History-** Information regarding the bio-social profile of victim & the factors related to the accident were confirmed by studying medical records & police inquest reports before conducting the autopsy.
- Various other factors were noted like date & time of death, period of survival, and conditions/disease intervening survival.
- b) Post-mortem examination-** Autopsy was done to know details of injuries according to:
- Their location like Thorax, Abdomen, and their severity in an attempt to find fatal ones. Various details about injuries were noted to classify them according to their location on body-
 - Thorax: Injury to walls, ribs, lung, pericardium, and heart was noted.
 - Abdomen: Injury to abdominal walls, stomach, gall bladder, liver, pancreas, spleen, kidney, intestine, urinary bladder, and genital organ were noted.
 - Contents of the peritoneum, stomach, gallbladder, intestine, uterus, and urinary bladder was noted.
 - Photographs were taken where thought necessary.
 - Injuries were matched & Co-related with radiological findings where thought necessary.
 - In case of suspicion viscera were collected & sent toxicological examination.

Data collection and analysis: Data was collected on predesigned, pretested open ended, semi structured schedule, and analysis was done with the help of the MS excel program

Results

During this period, total of 173 victims of thoracic- abdominal injuries, which included 118 cases admitted at S.N. Medical College, Agra for treatment and 55 victims who were dead because of thoraco-abdominal injuries and brought to the mortuary for postmortem examination during the study period, were included and reviewed in the study

Table I: Age-wise distribution of cases

Age groups (years)	Number of cases		Total
	Fatal	Non-Fatal	
0-10	2(2.15%)	3(3.75%)	5(2.89%)
11-20	9(4.67%)	13(16.15%)	22(12.71%)
21-30	31(33.33%)	20(25%)	51(29.4%)
31-40	21(22.58%)	21(26.25%)	42(24.27%)
41-50	11(11.28%)	14(17.5%)	25(14.45%)
51-60	12(12.90%)	4(5%)	16(9.24%)
61-70	7(7.52%)	3(3.75%)	10(5.78%)
71 and above	-	2(2.5%)	2(1.15%)
Total	93	80	173(100%)

The above table shows that the maximum number of victims in fatal cases were from age group (21-30) years, in non-fatal cases age group (31-40) shows a maximum number of cases but the overall

age group (21-30) years showed a maximum number of (42)cases.

Table II: Gender-wise distribution of cases

Sex	Number of cases		Total
	Fatal	Non-Fatal	
Male	81(87.09%)	62(77.5%)	143(82.6%)
Female	12(12.90%)	18(22.5%)	30(17.34%)
Total	93	80	173(100%)

The above table clearly shows males outnumbering females both in fatal and non-fatal victims as 82.6% of victims were males as compared to 17.34% were females.

Table III: Manner-wise distribution of cases

Manner of injuries	No. of cases		Total
	Fatal	Non-Fatal	
Accidental	92(98.92%)	76(95%)	168(97.10%)
Suicidal	1(1.07%)	-	1(0.5%)
Homicidal	-	4(5%)	4(2.31%)
Total	93	80	173(100%)

The above table shows that accidental occurrence of thoraco- abdominal injuries are commonest in both fatal and non-fatal groups i.e. (97.10%) followed by homicidal (2.31%) and in only 1(0.5%) case the circumstance of injuries was suicidal.

Table IV: Type of accident-wise distribution of thoraco-abdominal injuries cases

Manner of thoraco-abdominal injuries	Fatal	Non-Fatal	Total
Accidents	92(53.17%)	75(43.35%)	167(96.53%)
Road traffic accidents	83(47.94%)	64(36.99%)	
Fall from height	1(0.57%)	5(2.89%)	
Agricultural accidents	2(1.15%)	2(1.15%)	
Domestic accidents	3(1.73%)	4(2.31%)	
Railway accidents	1(0.57%)	--	
Industrial accidents	1(0.57%)	--	
Other	1(0.57%)	--	
Homicide	04(2.31%)	00	04(2.31%)
Suicide	02(1.15%)	00	02(1.15%)
Total	98(56.64%)	75(43.35%)	173(100%)

Above table shows that out of 173 cases of thoraco-abdominal injuries, 167 were due to accidents and of which road traffic accidents were commonest i.e. 147 (84.97%) followed by domestic accidents (4.04%), fall from height (3.46%), agricultural accidents (2.31%), 0.57% cases were of railway accidents, industrial accidents and other accidents. Manner of injuries was homicide in 4 (2.31%) and suicide in 2 (1.15%) cases.

Table V: Type of victim-wise distribution of road traffic accident cases

Type of Victim	Number of cases		Total
	Fatal	Nonfatal	
Pedestrians	29	18	47(27.16%)
Drivers	17	10	27(15.16%)
Passengers	26	17	43(24.85%)
Two wheeler riders	10	13	23(13.29%)
Unknown	4	3	7(2.4%)
Total	86	61	147



The above table shows that among the type of victims, pedestrians were the most frequently injured (27.16%) followed by passengers who were traveling in 3 or 4-wheeler vehicles 24.85%, drivers 15.16%, 13.29% were the two-wheeler riders and 2.4% of victims were in the unknown category.

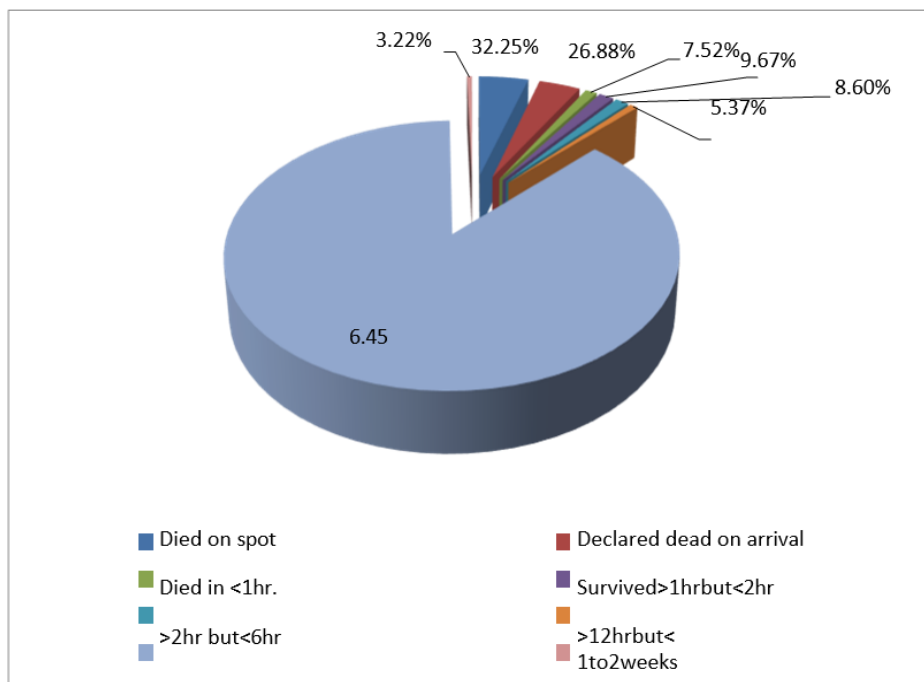


Table VI: Survival period of victims of fatal thoraco-abdominal injuries

Died on spot	Declared dead on arrival	Died in < 1hr.	Survived >1hr but <2hr	> 2hr but <6hr	>12 hr but <24hr.	>1day but <7days	1to2 weeks
30 (32.25%)	25 (26.88%)	7 (7.52%)	9 (9.67%)	8 (8.60%)	5 (5.37%)	6 (6.45)	3 (3.22%)

The above table reveals that 32.25% of victims with thoraco-abdominal trauma died on the spot, followed by 26.88% who were declared dead on arrival i.e. they died during transportation to the

hospital and 7.52% died within 1 hr of admission to hospital, 9.67% of Victims survived < 2 hrs, 8.60% of victims died within 6 hrs, 5.37% died within 24 hrs and 6.45% of victims survived < a week and only 3.22% of victims survived for > 1 week.

Table VII: Distribution of thoracic injuries

Injuries	Number of cases		
	Fatal	Non-fatal	Total
Fracture of ribs	66(65.59%)	51(63.75%)	117(67.63%)
Lungs	42(45.16%)	14(17.5%)	56(32.31%)
Heart	7(7.52%)	-	7(4.04%)
Sternum	9	-	9(5.20%)
Others	13	9	22(12.71%)

The above table shows that fracture of ribs was the most common injury of the thoracic region (67.63%) in both fatal and non-fatal groups. Among injuries to thoracic organs, lungs were most frequently affected in the form of contusion and laceration, (32.31%), followed by fracture of the sternum comprising (5.20%) and injuries to heart constituted 4.04% and injuries to the heart was seen only in fatal cases, lastly the other, group includes fracture of clavicle and injuries to great vessels and accounts 12.71%.

Table VIII: Distribution of abdominal injuries

Organ	Type of injury			Total
	Contusion	Laceration	Stab injury	
Walls	-	4	2	6(3.46%)
Liver	5	30	-	35(20.23%)
Spleen	8	20	-	28(16.18%)
Kidney	8	14	-	22(12.71%)
	Perforation			
Stomach	5		-	5(2.89%)
Intestine	13		-	13(7.51%)
Bladder	12		-	12(6.93%)

The above table shows that among solid abdominal organs, the liver was the most commonly affected abdominal solid organ (20.23%) followed by the spleen (16.18%) and kidney (12.71%), and among the hollow viscera intestine was the most commonly affected 7.51% followed by bladder 6.93% and stomach in only 2.89% of victims.

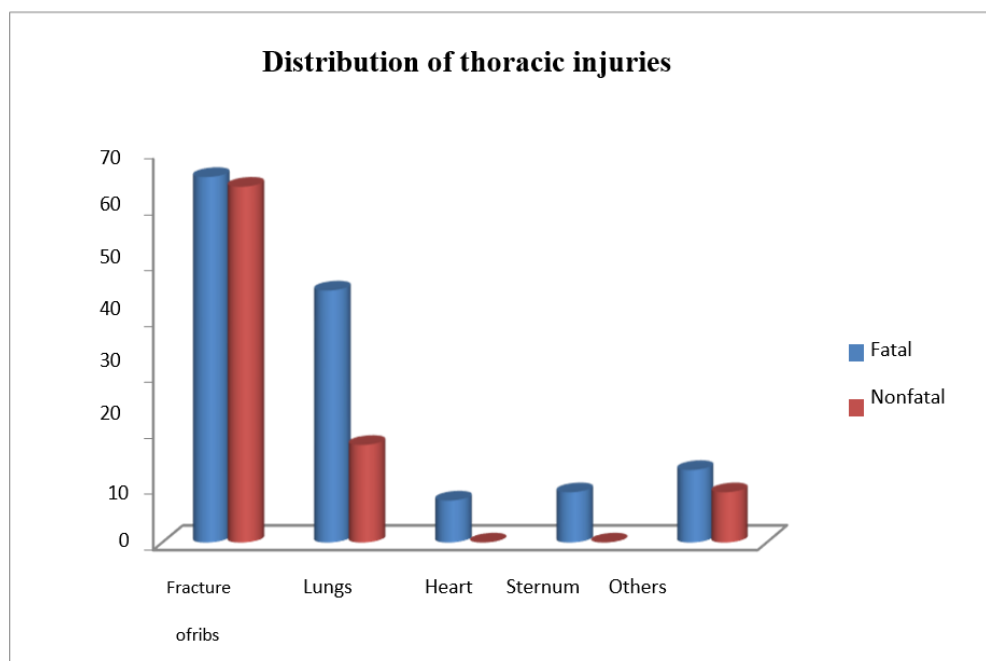
Discussion

The present study reveals that a maximum (29.4%) of victims were in the age group of 21-30 years followed by 31-40 years (24.27%). In age group of 21-40 years contains more than half of victims (53.75%), this is attributed to the fact that this age group leads a more active life are at the peak of their creativity and has the tendency to take unwanted risk thereby subjecting themselves to the danger of accident and injures. Studies done by Kumar Adarsh et al (1999)⁵, Singh Harnam et al (2004)⁶ and Meera T.H. et al (2005)⁷ also showed similar findings as the observed number of cases and mortality was maximum in the age group 21-30 years followed by 31-40 years.

The present study shows that males (82.6%) outnumber females (17.34%) both in terms of number of cases as well as a number of deaths, male: female ratio was 4.8:1.

This may be due to fact that males are more exposed to outdoor activities because in most of the families males are the earning members, so that they are more exposed to hazards of roads, industry and other violence as compared to females who are mostly indulged in household. Studies done by Banerjee K. K. et al (1997)⁸ reported that male preponderance (81.8%) as compared (18.2%)

females, Qhangle A.L. et al (2002)⁹ observed 90.3% of victims were males and only 9.6% were females and Meera T.H. et al (2005)⁷ also observed that males outnumbered females in a ratio of 3.8: 1. in accordance to our study findings.



Present study shows that accidental occurrence of thoraco- abdominal injuries were commonest (97.10%), as compared to homicidal 2.31% and only 0.5% were suicidal in nature. Injuries to chest are mostly accidental, occasionally homicidal and rarely suicidal and this may be due to fact that thoracic and abdominal region are the major site of impact because of its location and anatomical position. Aurther et al (1968)¹⁰ studied 100 cases of chest trauma and found that around 76% had accidental manner of death. MeeraT.H.et al (2005)⁷ observed majority (86.4%) of blunt thoraco abdominal injuries were due to road traffic accidents. Pathak manoj kumar et al (2006)¹¹ also observed that 60.97% of sustained injuries were due to accident.

In present study among accidents, road traffic accidents were the commonest 84.97% cause of injuries and only 0.5% had injuries due to railway accidents and industrial accidents. Kumar Adarsh et al (1999)⁵ 74.61% reported the cases were of road traffic accidents. Ahmad H salem et al¹² and Ayoade et al (2006)¹³ also reported similar findings. Among the type of victims of road traffic accident the present study shows that pedestrians were the worst sufferers of 27.16% followed by 24.85% passenger and drivers 15.16% and two wheeler riders were 13.29%. This explains lack of traffic sense and ignorance of traffic rules by pedestrians and speed of vehicles. Kumar Adarsh et al (1999)⁵ observed pedestrians were the commonest victims. Similar findings were also reported by Banerjee K.K. (1997)⁸ that 54.5% of victims were pedestrians. Singh Y.N. et al (2005) and Pathak Manoj Kumar et al (2006)¹¹ in their study observed majority of victims were pedestrians so that findings are in accordance with the findings of above-mentioned studies. The present study also shows majority (45.08%) of victims had only thoracic injuries followed by combined thoraco-abdominal injuries i.e. 23.12 % and 21.38 % of victims had only abdominal trauma respectively. Tirpude B.H. et al (1999)¹⁴ observed chest injuries were commonest 47.5% just after head injuries.

In present study fracture of ribs was the commonest thoracic injuries 67.63% and among thoracic organs lungs were most commonly affected and fracture of ribs was more common on right side 57.26% as compared to left side 33.33% and 90.59% of victims had fracture of ribs unilaterally as compared to 10.25% who had bilateral rib fractures and study revealed that the lung was most commonly affected 32.31% thoracic organ followed by heart in only 4.04% of

cases. Injuries to blood vessels and fracture of clavicle comprised 12.71%. Tirpude B.H. et al (1999)¹⁴ observed among chest injuries, fracture of ribs, with or without injuries to lung, were commonest injuries. Bansal Yogendra et al (2001)¹⁵ reported in their study 94% of victims of thoracic injuries had multiple rib fractures. Lalwani Sanjeev et al(1999)¹⁶ reported that fracture of ribs was most commonly found among skeletal damage.

Among injuries to hollow viscera of abdomen present study shows intestinal perforation was commonest 7.51% followed by perforation of urinary bladder 6.93% and 2.89 % of victims had injuries to stomach and perforation of urinary bladder in maximum number of cases 66.6% were associated with fracture of pelvis. Pelvic injury is associated with bladder injuries. Similar findings were also reported by Mukharjee et al in1994.¹⁷ Banerjee K.K. (1997)⁸ reported perforation of intestine was common followed by bladder and stomach. Ahmed H. Alsalem et al (1998)¹² reported injuries to intestine were commonest followed by bladder and stomach.

Conclusion

While our study provides valuable insights into the bio-social dynamics of thoraco-abdominal injuries, several limitations warrant consideration. Future research endeavors should strive for larger sample sizes, longitudinal designs, and comprehensive assessments encompassing diverse biopsychosocial domains. Additionally, interventions tailored to enhance social support networks and mitigate psychosocial stressors could hold promise in optimizing outcomes for individuals recovering from thoraco-abdominal injuries.

By elucidating the complex interplay between biological and social factors, this study contributes to the growing body of literature aimed at improving the holistic care and rehabilitation strategies for victims of traumatic injuries. Ultimately, fostering a deeper understanding of the bio-social landscape surrounding thoraco-abdominal injuries is essential for promoting resilience, facilitating recovery, and enhancing the overall well-being of affected individuals.

Recommendations

As road traffic accidents was found to be the commonest cause of thoraco-abdominal injuries in the present study, it continues to be growing menace, increasing heavy losses of not only valuable manpower but also drain of potential economic growth of country or world. Therefore it is essential to form strategies to control such prevailing loss due to road traffic accidents worldwide. In view of the findings of present study, following recommendations are suggested.

- Careful scrutiny of the drivers at the time of issuing driving licenses.
- Traffic rules should be enforced strictly to road users and all the people either in urban or rural areas should be taught traffic rules. This should be done by educating the people by mass media.
- At all major highways, crossings and accident prone spots the traffic police should be equipped with an ambulance to shift the injured person immediately to nearby hospital.
- All hospitals/trauma centers on the major highways should be equipped with experienced surgical, orthopedic, neurosurgical and anesthesia expert with modern investigation procedures such as CT scan and blood bank.

Limitations

- **Sample size:** The study might have a limited sample size, potentially affecting the generalizability of the findings to broader populations.
- **Selection Bias:** There could be a bias in the selection process of participants, such as excluding certain demographics or types of injuries, which may limit the applicability of the results.
- **Study Design:** The study's cross-sectional design limits the ability to establish causality or inter temporal relationships between variables.
- **Confounding Variables:** The presence of uncontrolled confounding variables, such as pre-existing medical conditions or concurrent injuries, could influence the observed associations.
- **Limited Scope:** The study might focus solely on bio-social factors while neglecting other potentially relevant factors, such as psychological or environmental influences.

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Ethical Approval: The study was conducted after taking due approval from the Institutional Ethics Committee

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