

Socio-Demographic and Etiologic Profile of Penetrating Abdominal Trauma Patients Attending in a Tertiary Trauma Care Centre**Dipankar Kundu¹, Ariful Islam Sarder², GM Sadique³, Tapobrata Mitra⁴**¹Associate Professor, MS (General Surgery), Department of General Surgery, R.G. Kar Medical College and Hospital, Kolkata, West Bengal, India²MS (General Surgery), Specialist Medical Officer (MO), Department of General Surgery, Serampore Walsh Hospital (Sub Divisional Hospital), 22A, T.C. Goswami Street, Serampore, Hooghly District, West Bengal, India³Assistant Professor, MS (General Surgery), Department of General Surgery Murshidabad Medical College and Hospital, Berhampore, West Bengal, India⁴Professor, MD (Anaesthesiology), Department of Anaesthesiology, Malda Medical College and Hospital, Malda, West Bengal, India

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Conflict of interest: Nil

Abstract**Introduction:** Penetrating abdominal trauma (PAT) is a major cause of morbidity and mortality worldwide, requiring timely diagnosis and effective management. Variations in injury patterns, limited resources, and evolving treatment strategies highlight the need for updated research. This study aims to evaluate demographic factors, causes, clinical outcomes, and management approaches to improve patient care.**Aims:** This study aims to evaluate the socio-demographic profile, incidence, etiological factors, clinical outcomes, and management strategies of patients with penetrating abdominal trauma (PAT) at a tertiary trauma care center. It also seeks to compare findings with existing national and international data to identify patterns, improve treatment approaches, and enhance patient outcomes.**Materials and Methods:** This prospective study will be conducted at the Trauma Care Centre of R. G. Kar Medical College and Hospital over a period of 18 months from the acceptance of the synopsis. The study population will include patients with penetrating abdominal trauma attending the Trauma Care Centre during the study period. A total of 50 patients will be enrolled for evaluation of their socio-demographic characteristics, etiological factors, clinical profile, management, and outcomes.**Result:** Among 50 patients with penetrating abdominal trauma, males and the 20–40 years age group were predominantly affected. Stab injuries were the most common mechanism, especially among low-income, less educated, and addicted individuals. Older age and gunshot injuries showed poorer outcomes. The findings highlight the need for targeted prevention, safety measures, and improved trauma care.**Conclusion:** This thesis highlights the demographic patterns, injury causes, outcomes, and management of penetrating abdominal trauma, emphasizing young male predominance, need for targeted prevention, improved trauma care, and effective intervention strategies.**Keywords:** Penetrating abdominal trauma, Socio-demographic profile, Etiology, Trauma care, Injury patterns, Outcomes, Management, Tertiary centre, Epidemiology.**DOI:** 10.25258/ijcpr.18.9.122

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Introduction

Abdominal trauma is a significant global health concern and a major cause of morbidity and mortality, particularly among young individuals. It occurs due to external forces causing injury to abdominal structures and is broadly classified into blunt abdominal trauma (BAT) and penetrating abdominal trauma (PAT). Penetrating abdominal trauma involves the penetration of the abdominal wall by foreign objects such as knives, firearms, or

other sharp materials, resulting in potential injury to internal organs, blood vessels, and surrounding tissues.[1] In contrast, blunt abdominal trauma commonly occurs due to road traffic accidents, falls, sports injuries, and assaults, often affecting organs such as the liver and spleen.[2] Penetrating abdominal trauma remains a critical emergency due to its association with life-threatening hemorrhage, organ damage, and complications.[3] The clinical

presentation and severity depend on factors such as the mechanism of injury, anatomical location, and organs involved. Common causes include stab wounds, gunshot injuries, and occupational accidents. Early recognition, accurate assessment, and timely intervention are essential for improving survival and reducing complications.[4]

Trauma is a leading cause of death and disability worldwide, with increasing incidence in developing countries due to rapid urbanization, industrialization, and motorization. In India, the burden of trauma cases, including penetrating abdominal injuries, is rising, creating challenges for healthcare systems.[5] Effective management requires appropriate diagnostic strategies, including imaging modalities such as ultrasonography and standardized trauma protocols.[6]

Despite advancements in trauma care, PAT continues to present challenges, especially in resource-limited settings where access to advanced diagnostic and surgical facilities may be restricted.[7] The evolving approach towards selective non-operative management requires further evaluation to establish effective treatment guidelines.[8] Additionally, updated epidemiological data are needed to understand injury patterns, risk factors, and outcomes in different populations.[9]

This study aims to evaluate the socio-demographic characteristics, etiological factors, clinical outcomes, and management approaches among patients with penetrating abdominal trauma attending a tertiary trauma care centre. The findings may contribute to improved trauma care strategies, prevention planning, and development of evidence-based protocols to reduce morbidity and mortality associated with PAT. [10]

Materials and Methods

Study Design: It is a prospective study.

Place of Study: Trauma Care Centre at R. G. Kar Medical College & Hospital.

Period of Study: 18 months.

Study Population: Patients attending in Trauma Care Centre, R. G. Kar Medical College & Hospital within this study period.

Sample size: 50 Patients

Inclusion Criteria

- All patients, who have penetrating abdominal or combined injury and hospitalized for the same

- Penetrating abdominal injury should have peritoneal breach.

Exclusion Criteria

- All patients who have penetrating abdominal injury and not hospitalized for the same.
- Patient having penetrating Injury but no peritoneal breach
- All deaths on arrival Cases who were so severely injured that they did not survive attempts at resuscitation
- Patients who have taken discharged against medical advice and lost to follow ups

Study Variable

1. General Socio-demographic features

- Age
- Residence
- Level of Education
- Occupation

2. History taking

- Date & Time of Incidence
- Mode of Incidence
- Site of Incidence
- Place of Incidence
- Injury Report

3. Clinical parameters

- Recording of signs and symptoms
- Recordings of vital parameters (BP, Pulse, SpO₂, RR, Urine Output etc.)
- Reviewing investigations – Radiological & Blood Investigation Reports

Statistical Analysis: For statistical analysis, data were initially entered into a Microsoft Excel spreadsheet and then analysed using SPSS (version 27.0; SPSS Inc., Chicago, IL, USA) and GraphPad Prism (version 5). Numerical variables were summarized using means and standard deviations, while Data were entered into Excel and analyzed using SPSS and GraphPad Prism. Numerical variables were summarized using means and standard deviations, while categorical variables were described with counts and percentages. Two-sample t-tests were used to compare independent groups, while paired t-tests accounted for correlations in paired data. Chi-square tests (including Fisher's exact test for small sample sizes) were used for categorical data comparisons. P-values ≤ 0.05 were considered statistically significant.

Result

Table 1: Age vs Gender Cross-tabulation

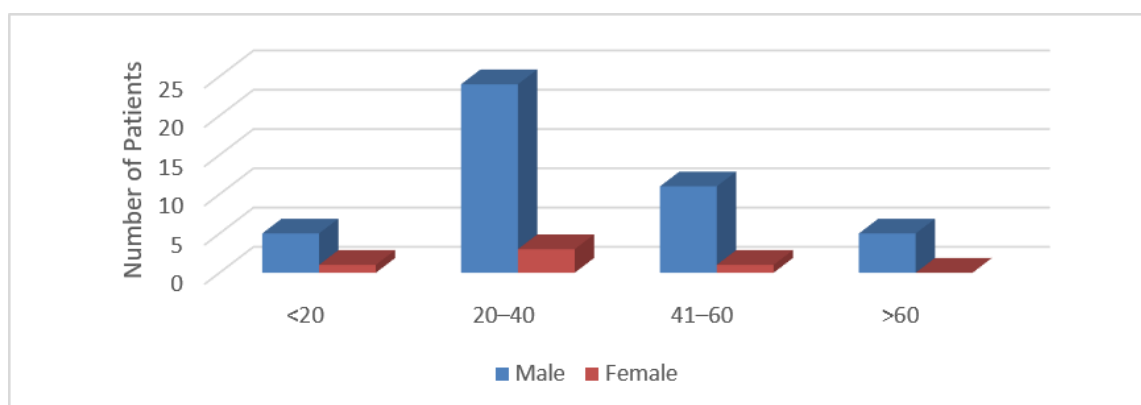
Age Group (Years)	Male	Female	Total
<20	5	1	6
20–40	24	3	27
41–60	11	1	12
>60	5	0	5
Total	45	5	50

Table 2: Socio-demographic Characteristics vs Mode of Injury Distribution among Patients (n = 50)

Variable	Category	Stab Injuries	Gunshot Injuries	Bull Gore Injuries	Road Traffic Accidents	Total
Age Group (Years)	<20	3	1	0	2	6
	20–40	20	5	0	2	27
	41–60	6	2	3	1	12
	>60	2	1	1	1	5
Gender	Male	29	8	4	4	45
	Female	2	1	0	2	5
Socio-economic Status	Low-income	16	5	4	3	28
	Middle-income	14	3	0	2	19
	High-income	1	1	0	1	3
Education Status	Did Not Attend School	3	1	1	1	6
	Less Than Class 10	10	2	2	2	16
	10th Pass	8	3	1	1	13
	12th Pass	6	2	0	1	9
	Graduate	4	1	0	1	6
Addiction Status	Not Addicted	9	3	1	3	16
	Addicted	22	6	3	3	34

Table 3: Demographic and Clinical Characteristics vs Outcome Distribution among Patients (n = 50)

Variable	Category	Survived	Death	Total
Age Group (Years)	<20	6	0	6
	20–40	26	1	27
	41–60	11	1	12
	>60	3	2	5
Mode of Injury	Stab Injuries	30	1	31
	Gunshot Injuries	7	2	9
	Bull Gore Injuries	4	0	4
	Road Traffic Accidents	5	1	6
Total		46	4	50

**Figure 1: Age vs Gender Cross-tabulation**

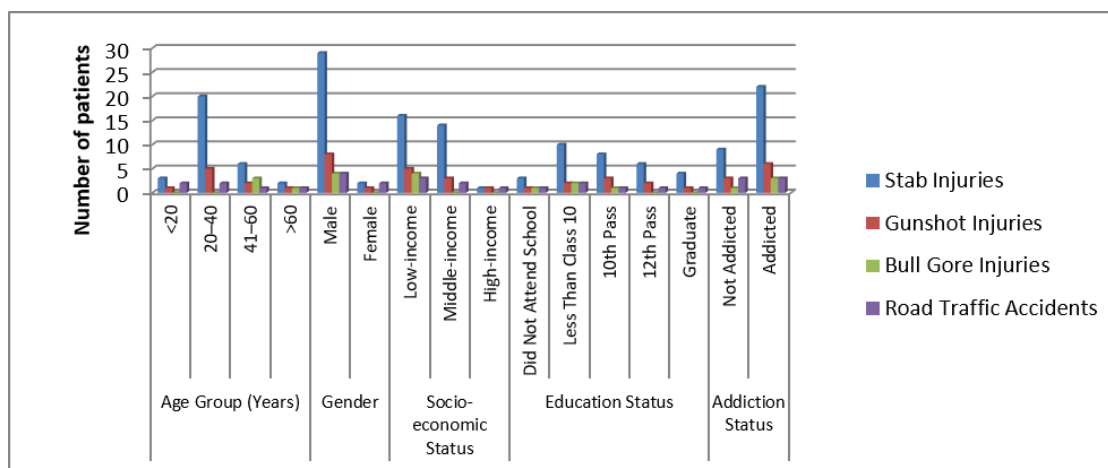


Figure 2: Demographic and Clinical Characteristics vs Mode of Injury Distribution

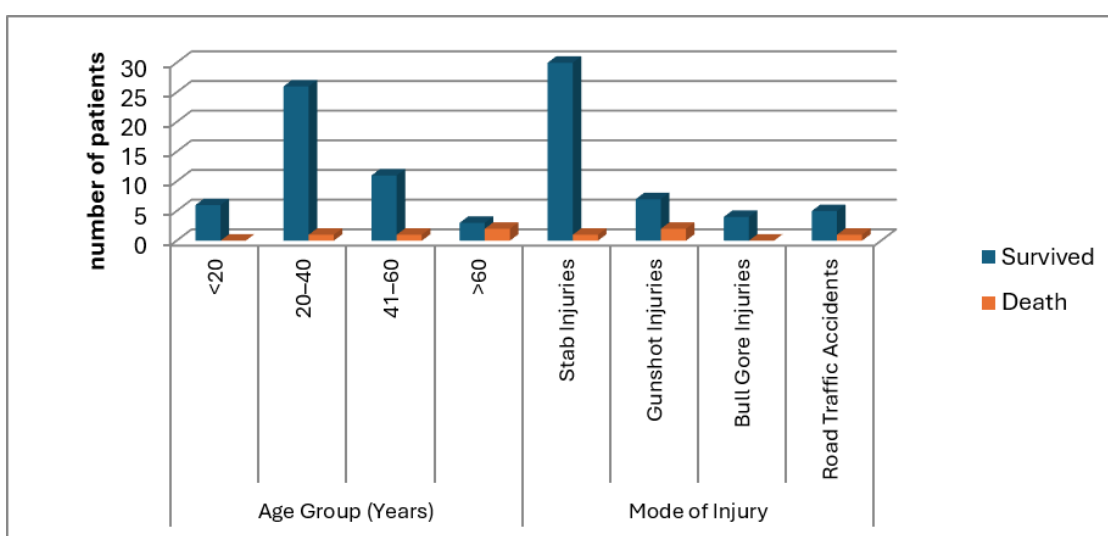


Figure 3: Demographic and Clinical Characteristics vs Outcome Distribution among Patients

The analysis categorized patients with penetrating abdominal trauma according to age, gender, mode of injury, socio-economic status, educational level, addiction status, and outcome. The age-wise gender distribution showed that males dominated across all age groups, with the highest concentration in the 20–40 years group (24 males and 3 females), followed by 41–60 years (11 males and 1 female), <20 years (5 males and 1 female), and >60 years (5 males and no females), reflecting a strong gender disparity in the incidence of penetrating abdominal trauma. The age-wise mode of injury distribution showed that stab injuries were the most common mode across all age groups, particularly in the 20–40 years group (20 cases), followed by gunshot injuries (5 cases), while bull gore injuries were mainly observed in older age groups (41–60 years and >60 years), likely due to occupational exposure. Road traffic accidents were relatively evenly distributed but remained a minor cause. Gender-wise distribution revealed that males accounted for 45 cases (90%) and females for 5 cases (10%). Among males, stab injuries were most frequent (29 cases), followed by gunshot injuries (8

cases), bull gore injuries (4 cases), and road traffic accidents (4 cases), whereas females showed 2 stab injuries, 1 gunshot injury, and 2 road traffic accidents, with no bull gore injuries. Socio-economic status analysis showed that low-income patients represented the majority of cases (56%), followed by middle-income (38%) and high-income groups (6%). Stab injuries were the predominant mode of injury among all socio-economic groups, particularly in low-income patients (16 cases), followed by gunshot injuries (5 cases), bull gore injuries (4 cases), and road traffic accidents (3 cases). Educational level distribution demonstrated that individuals with less than Class 10 education had the highest representation (32%), followed by 10th pass (26%), 12th pass (18%), and those who did not attend school and graduates (12% each). Stab injuries remained the most common mode across all educational levels, with the highest frequency among those with less than Class 10 education (10 cases). Addiction status analysis showed that addicted individuals accounted for 68% of cases compared to 32% among non-addicted individuals. Among addicted

patients, stab injuries were most common (22 cases), followed by gunshot injuries (6 cases), bull gore injuries (3 cases), and road traffic accidents (3 cases), whereas non-addicted individuals had 9 stab injuries, 3 gunshot injuries, 1 bull gore injury, and 3 road traffic accidents. Outcome analysis according to age showed that survival was highest among younger patients, with all patients <20 years surviving, followed by 20–40 years with 26 survivors and 1 death, 41–60 years with 11 survivors and 1 death, and >60 years with 3 survivors and 2 deaths, reflecting reduced physiological reserve, comorbidities, and slower recovery processes in older patients. Mode of injury versus outcome distribution showed that stab injuries had 30 survivors and 1 death with a survival rate of 96.8%, gunshot injuries had 7 survivors and 2 deaths with a survival rate of 77.8%, bull gore injuries had 4 survivors and no deaths with a survival rate of 100%, and road traffic accidents had 5 survivors and 1 death with a survival rate of 83.3%. Overall, the distribution highlights that males, particularly those aged 20–40 years, are at the greatest risk of penetrating abdominal trauma, with stab injuries being the most common mode of injury. The findings emphasize the association of penetrating abdominal trauma with interpersonal violence, high-risk occupations, socio-economic factors, lower educational attainment, and addiction status, while also demonstrating that increasing age and severe injury patterns, particularly gunshot injuries, are associated with poorer outcomes. The results underscore the need for gender-sensitive prevention strategies, addiction prevention and rehabilitation programs, educational interventions, improved community safety, occupational protections, rapid response systems, and age-specific trauma care protocols to reduce the incidence and improve outcomes of penetrating abdominal trauma.

Discussion

The present study evaluated the demographic profile, injury characteristics, associated risk factors, and outcomes among 50 patients with penetrating abdominal trauma. The findings demonstrated a marked male predominance, with 45 patients (90%) being male and 5 patients (10%) being female. The majority of patients belonged to the 20–40 years age group, and stab injury was identified as the most common mode of injury. Low socioeconomic status, lower educational attainment, and addiction status were frequently associated with penetrating abdominal trauma. Outcome assessment showed better survival among younger patients, whereas older age groups and gunshot injuries were associated with comparatively poorer outcomes, highlighting the importance of early diagnosis, appropriate trauma management, and preventive strategies.

Lotfollahzadeh et al. [11] reviewed penetrating abdominal trauma and reported that young males represent the most commonly affected population due to increased exposure to interpersonal violence, occupational hazards, and high-risk activities. In the present study, males predominated across all age groups, with the highest concentration observed in the 20–40 years age group (24 males and 3 females), followed by 41–60 years (11 males and 1 female), <20 years (5 males and 1 female), and >60 years (5 males and no females). This finding indicates a significant gender disparity in penetrating abdominal trauma and reflects the increased vulnerability of young adult males.

Butt et al. [12] studied penetrating abdominal injuries and highlighted that stab wounds are the most frequent mechanism of injury, while firearm injuries are associated with greater tissue damage and increased mortality. Similar findings were observed in the present study, where stab injuries were the predominant mode of injury across all age groups, particularly among patients aged 20–40 years with 20 cases, followed by gunshot injuries with 5 cases. Bull gore injuries were mainly observed among older age groups (41–60 years and >60 years), likely related to occupational exposure, whereas road traffic accidents represented a smaller proportion of cases.

Kejela et al. [13] evaluated clinical predictors of therapeutic laparotomy in anterior abdominal stab injuries and reported that stab injuries constitute a major proportion of penetrating abdominal trauma, requiring careful assessment for surgical intervention. In the present study, stab injuries accounted for the majority of cases, with 31 patients affected, followed by gunshot injuries in 9 patients, bull gore injuries in 4 patients, and road traffic accidents in 6 patients. The predominance of stab injuries emphasizes the continuing burden of interpersonal violence as a major contributor to penetrating abdominal trauma.

Derakhshanfar et al. [14] studied the demographics and outcomes of patients with penetrating abdominal trauma and reported that young age, male gender, and injury severity are important factors influencing clinical outcomes. In agreement with these findings, the present study showed that males accounted for 90% of cases, with the highest incidence occurring in the 20–40 years age group. Outcome analysis demonstrated that all patients aged <20 years survived, while mortality increased with advancing age, with 2 deaths among patients aged >60 years. This may be attributed to reduced physiological reserve, associated comorbidities, and delayed recovery among elderly patients.

Agbroko et al. [15] evaluated determinants of outcome in abdominal trauma and emphasized the influence of socioeconomic factors, injury

mechanism, and timely management on prognosis. In the present study, low-income patients represented the majority of cases with 28 patients (56%), followed by middle-income patients with 19 patients (38%) and high-income patients with 3 patients (6%). Stab injuries were the predominant mode among low-income patients, suggesting that socioeconomic conditions, environmental exposure, and limited preventive measures may contribute to increased trauma risk.

Curtis et al. [16] studied traumatic injuries and highlighted the importance of social determinants, education, occupational background, and preventive measures in reducing trauma incidence. Similar observations were noted in the present study, where patients with less than Class 10 education represented the largest group with 16 patients (32%), followed by 10th pass with 13 patients (26%), 12th pass with 9 patients (18%), and those who did not attend school and graduates with 6 patients each (12%). The higher representation among individuals with lower educational attainment may reflect increased exposure to unsafe environments and reduced awareness regarding injury prevention.

Ntundu et al. [17] evaluated patterns and outcomes of abdominal trauma in operative management and reported that behavioural factors, injury mechanism, and timely trauma care significantly influence patient outcomes. In the present study, addiction was observed in 34 patients (68%), compared with 16 patients (32%) who were not addicted. Among addicted individuals, stab injuries were most common with 22 cases, followed by gunshot injuries with 6 cases, bull gore injuries with 3 cases, and road traffic accidents with 3 cases. These findings suggest that addiction may increase vulnerability to trauma through association with violent encounters, high-risk behaviour, and unsafe social environments. The present study also assessed outcomes according to the mode of injury and demonstrated that stab injuries had the highest survival rate, with 30 survivors and 1 death (96.8%). Gunshot injuries showed a comparatively lower survival rate, with 7 survivors and 2 deaths (77.8%), indicating greater injury severity associated with firearm trauma. Bull gore injuries showed complete survival with 4 survivors (100%), whereas road traffic accidents had 5 survivors and 1 death (83.3%). These findings are consistent with previous literature indicating that firearm-related penetrating injuries are associated with increased morbidity and mortality due to extensive tissue destruction and associated complications.

Conclusion

This thesis evaluated the socio-demographic profile, etiological factors, and outcomes of patients with penetrating abdominal trauma at a

tertiary trauma care centre in Eastern India. The study highlighted the predominance of young males, especially aged 20–40 years, with stab injuries being the most common cause. Timely intervention, effective management, and vigilant postoperative care were essential for improving outcomes. The findings emphasize the need for targeted prevention strategies and evidence-based trauma care protocols to reduce morbidity and mortality.

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