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**RESEARCH ARTICLE**
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# BLUNT AND SHARP WEAPON DYNAMICS IN HOMICIDAL FATAL TRAUMA FORENSICS: INSIGHTS FROM THE MORTUARY OF SHEIKH ZAYED MEDICAL COLLEGE, RAHIM YAR KHAN.

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**Abstract**

**Objective**: To analyze the patterns of homicidal fatal blunt and sharp injuries and their correlation with weapon types using data from the mortuary of Sheikh Zayed Medical College, Rahim Yar Khan. **Study Design:** Cross sectional (descriptive) study. **Settings:** Department of Forensic Medicine & Toxicology, Sheikh Zayed Medical College, Rahim Yar Khan Pakistan. **Duration:** Five years, (1st January, 2019 to 31st December, 2023) **Methods:** Non-probability convenient sampling technique. Information collected from police papers, hospital record & autopsy reports entered on pre-designed performa. Statistical analysis is done by SPSS version 26. **Results:** Male victims were 72.1% as compared to 27.9% Females. The age group 21-30 and 31-40 years both account for the highest number of cases, with average age of 34.78 years. Most victims belong to peri-urban areas 65.11%. Hard blunt weapons are the most frequently associated fatal injuries, both single and multiple, accounting for 72.09% of the total, with a larger proportion of cases resulting in multiple fatal injuries 55.81%. Head injuries account for the majority of both single and multiple fatal injury cases, with 65.11%.

**Conclusion:** Blunt objects were the more common cause of fatal injuries as compared to sharp edged weapons. Males were predominantly affected, particularly young adults. This study provides insights into the dynamics of homicidal fatal blunt and sharp injuries and the weapons involved, which can inform authorized personnel for strategies to prevent and for further Forensic investigations.

**Keywords**: Homicidal, Fatal Injuries, Blunt Objects, Sharp Edged Weapon, Mortuary, Violence, Trauma Forensics

## Introduction

Homicide refers to the act of one person taking the life of another and violence is the expression of aggressive behavior, leading to a high occurrence of unnatural deaths. The presence of multiple injuries in a homicide is a notable observation, indicating the level of aggression, intensity of violence, and the assailant's intent to kill. In 70% of such cases, multiple injuries are present; suggesting that the perpetrator intended to kill the victim[1].

Although any physical object capable of causing harm to the body is labeled as weapon but some weapons are manufactured specially for the above stated purpose. Weapons of the old era were simple; at first started from stones and then knives, swords, and arrows to the nowadays developed weapons like the firearms. Trauma forensics involves the meticulous examination of trauma through a medicolegal lens within a specified jurisdiction. Blunt and sharp force traumas are categorized according to their distinct mechanisms of causation, which hold significant medicolegal implication [2].

Trauma stands out as the foremost contributor to morbidity and mortality among individuals below the age of 35, ranking as the sixth most common cause of death worldwide [2] Injuries and violence account for approximately five million deaths annually worldwide, constituting approximately 9% of global mortality[3].

Sharp-edged weapons are having blade or edge that is designed to cut or stab, such as knives, swords, or machetes. Three specific subtypes of sharp force injuries exist, as follows: stab wounds, incised wounds, and chop wounds[4]. Blunt impact refers to injuries caused by a non-penetrating or penetrating force from an object that lacks a sharp edge. It characterizes injuries resulting from direct blows, assaults, or collisions with objects that do not have a sharp edge. The pattern and nature of the injury is influenced by the force transmitted, weight of object / weapon and nature of the surface of blunt object.[5] Blunt impact injuries generally can be classified into four categories: contusion, abrasion, laceration, and fracture. [6, 7 &8]

Proper interpretation of injuries at autopsy is essential for accurate medicolegal testimony. Specific characteristics of injuries may aid in determining the specific type of weapon or implement used to create the wound. Injury prevention is critical to decrease morbidity and mortality due to traumatic injury. Understanding the dynamics of these injuries and the types of weapon involved is crucial for developing effective prevention strategies and improving medicolegal examinations.

Against this backdrop, the current study is conducted to analyze the incidence, the most vulnerable gender and age groups, weapon type, pattern and distribution of fatal mechanical injuries to the human body in homicides. This research aims to shed light on the severity and scale of such criminal acts and investigates the correlation between the pattern, nature, and configuration of the injury and the alleged weapon or object used to inflict it. The findings can benefit medicolegal experts in assessing and interpreting such injuries, as well as aid law enforcement agencies and the judiciary in the trial and administration of justice in homicidal cases.

## Methods

This descriptive (cross-sectional) non-interventional study was conducted at the Department of Forensic Medicine, Sheikh Zayed Medical College, Rahim Yar Khan, included all homicidal mechanical injury cases of 05-year period from January 1, 2019, to December 31, 2023. Data were collected from documents such as inquest reports, dead body chalans and the autopsy reports. Ethical approval was obtained from the Institutional Review Board vide Letter no: 66/IRB/SZMC/SZH, Dated 27-04-2024.

The sampling technique was purposive non-probability. The sample size for this research, given a 95% confidence level, a 5% margin of error, was 82, via epi info software ($n= p(1-p)z^2/e^2$) considering the prevalence of variables of interest i.e. fatal sharp weapon injury is 5.67% with

reference to a related published study [9]. (Naheed K, Pal MI, Saeed A. Empirical Analysis of Deaths Due to Sharp Weapons in Faisalabad. APMC 2017; 11(4):300-3)

Out of a total of 207 unnatural deaths subjected to medicolegal autopsy; 43 cases with fatal mechanical injuries (both isolated and multiple) were selected for the study. To account for statistical test application, we doubled the sample size, resulting in a final working sample size of 86.

Isolated mechanical injuries refer to visible body damage caused by a mechanical force, excluding deaths from, firearms, non-mechanical causes like poisonings, burns (thermal and chemical), asphyxia and drowning. Demographic details such as gender, age, and residence and assault details such as type of weapon used, site/location of injury, and number of injuries were entered in predesigned performa. Data analysis was performed using Statistical Package for Social Science (SPSS) version 26.0. Descriptive analytical statistics were used to report the pattern, distribution, and means of inflicting fatal isolated mechanical injury. The chi-square test was used to analyze dichotomous data presented as proportions, with a p-value of $<0.05$ considered statistically significant.

## Results

**Table 1: Demographic Profile of Victims**

| SR.No | DEMOGRAPHICS CHARACTERISTICS | VALUES |
|---|---|---|
| 1 | Total Cases | 86 |
| 2 | Gender | Male= 62 (72.1%) Female = 24 (27.9%) |
| 3 | Mean Age With SD | 34.78 ± 14.09 years. |
| 4 | Residence | Urban = 30 (34.88%)<br>Peri-urban = 56 (65.11%) |

The analysis included a total of 86 homicidal cases of blunt and sharp injuries. A significant majority of cases were males i.e.72% while females account for only 27.9%. The chi-square test ($p < 0.05$) indicates that the observed male-to-female ratio is statistically different from an expected equal distribution. The young adults being the most affected age group i.e. 21-40 years. The average age of the victims is 34.78 years, with a standard deviation of ± 14.09 years. The t-test is statistically significant ($p < 0.05$) compares the mean age of the victims (34.78 years) to a hypothesized population mean of 30 years. Most of the cases were from rural (peri-urban) background (65.11%) **(Table 1)**

**Table 2: Association Of Age & Sex Of Victims With Type Of Injuries.**

| SR.NO | AGE GROUP (Years) | BLUNT WEAPON INJURY CASES | | SHARP WEAPON INJURY CASES | | TOTAL |
|---|---|---|---|---|---|---|
| | | MALE | FEMALE | MALE | FEMALE | |
| 1 | 0-10 | - | - | - | 04 | 04 (4.56%) |
| 2 | 11-20 | - | 02 | 06 | - | 08 (9.30%) |
| 3 | 21-30 | 14 | 06 | - | 02 | 22 (25.58%) |
| 4 | 31-40 | 12 | 04 | 02 | 04 | 22 (25.58%) |
| 5 | 41-50 | 14 | 02 | 02 | 02 | 20 (23.26%) |
| 6 | 51-60 | 04 | - | 02 | - | 06 (6.98%) |
| 7 | 61-70 | 04 | - | - | - | 04 (4.65%) |
| TOTAL | | 48 (55.81%) | 14 (16.27%) | 12 (13.95%) | 12 (13.95%) | 86 (100%) |
| | | 62(72.09%) | | 24(27.9%) | | |

This table shows the distribution of blunt and sharp weapon injury cases across different age groups and genders among the 86 victims of unnatural deaths. The age group 21-30 and 31-40 years both account for the highest number of cases, with 22 cases each (25.58% of the total) 27.9%. Blunt weapon injuries are the most common type, predominantly in males (55.81% of the total) than female cases (16.27%) and 72.09% in total. Sharp weapon injuries are distributed equally among males (13.95%) and females (13.95%), indicating no clear gender disparity for sharp weapon injuries. The both chi-square test for association between of Gender to Injury and age to injury, indicate a

significant association between age, sex, and type of injury ($p < 0.05$) The results highlight that both age and sex are influential factors in the type of injuries victims sustain**. (Table 2)**

**Table 3: Year Wise Distribution Of Blunt & Sharp Injuries**

| SR NO | YEAR | BLUNT WEAPON INJURY CASES | SHARP WEAPON INJURY CASES | TOTAL |
|---|---|---|---|---|
| 1 | 2019 | 24 | 04 | 28 (32.5%) |
| 2 | 2020 | 08 | - | 08 (9.30%) |
| 3 | 2021 | 06 | 10 | 16 (18.60%) |
| 4 | 2022 | 14 | - | 14 (16.27%) |
| 5 | 2023 | 12 | 08 | 20 (23.25%) |
| 64 (74.41%) | | 22 (25.58%) | 86 (100%) | |

The table presents the distribution of 86 injury cases over a five-year period (2019 to 2023), categorized by the type of weapon involved (blunt or sharp). The highest number of cases occurred in 2019, accounting for 32.5% of the total cases the peak year for blunt weapon injuries. The data shows a fluctuating trend in injury types, with blunt weapon injuries remaining the dominant form of injury, but sharp weapon injuries gaining prominence in certain years**. (Table 3)**

**Table 4: Association of Type Of Weapon With Number Of Injuries.**

| SR.NO | TYPE OF WEAPON | SINGLE FATAL INJURY CASES | MULTIPLE FATAL INJURIES CASES | TOTAL |
|---|---|---|---|---|
| 1 | HARD BLUNT | 26 | 38 | 64 (74.4%) |
| 2 | SHARP CUTTING | 08 | 04 | 12 (13.95%) |
| 3 | SHARP PENETRATING | 04 | 06 | 10 (11.6%) |
| 4 | BLOWS/SLAPS | - | - | - |
| TOTAL | | 38 (44.18%) | 48 (55.81%) | 86 (100%) |

The table shows the association between the type of weapon used and the number of injuries in fatal cases. Hard blunt weapons are the most frequently associated with both fatal injuries, accounting for 74.4%, with a larger proportion of cases resulting in multiple fatal injuries 55.81%. Chi-square test applied to assess the association between the type of weapon and the number of injuries but the distribution of single and multiple fatal injuries does not differ significantly across different types of weapons**. (Table 4)**

**Table 5: Relationship Of Site Of Injury In Isolated & Multiple Fatal Injuries.**

| SR.NO | LOCATION | SINGLE FATAL INJURYCASES | MULTIPLE FATAL INJURY CAES | TOTAL |
|---|---|---|---|---|
| 1 | HEAD | 30 | 26 | 56 (65.11%) |
| 2 | NECK | 10 | 02 | 12 (13.95%) |
| 3 | CHEST | - | 08 | 08 (9.30%) |
| 4 | ABDOMEN | - | - | - |
| 5 | LIMBS | - | 08 | 08 (9.30%) |
| 6 | GENITALS | - | 02 | 02 (2.32%) |
| TOTAL | | 40(46.5%) | 46 (53.4%) | 86 (100%) |

This table shows the relationship between the site of injury and the occurrence of isolated (single) and multiple fatal injuries Head injuries account for the majority of both single and multiple fatal injury cases, with 65.11% of the total injurie. Neck injuries contributed to 13.95% with the majority being single fatal injury cases followed by Chest injuries and limb injuries representing 9.30% each. Genital injuries contributed to only 2.32% cases. In The Chi-square test the p-value is much lower than 0.05, which suggests that there is a significant association between injury types (single or multiple fatal injuries) and the body regions where these injuries occurred.

## Discussion

The findings of this study provide valuable insights into the patterns of homicidal fatal blunt and sharp injuries and the types of weapons involved. In our study the predominant cases were males (72.1%) with young adults of (21-40 years) being the most affected age group. This finding aligns with existing literature on homicidal deaths, where males are more frequently exposed to violence due to social roles and greater involvement in high-risk activities, the age is in the third and fourth decades of their life[9, 10]. Similar study done in India showed males outnumbered females and majority of the cases were in age group of 21-30 years[11].The average age of the victims in our study is 34.78 years, with a standard deviation of ± 14.09 years, indicating a wide span of different ages involved. The relatively low mean age suggests that the population of unnatural death victims skews toward younger adults, possibly those engaged in high-risk activities (e.g., work, travel). The majority of cases are from rural (peri-urban) background (57.5%)

The distribution of injuries shows a complex relationship between gender, age, and injury type. Blunt weapon injuries were predominantly observed in males (55.81%), while sharp weapon injuries were distributed equally between males and females (13.95% each). This suggests that males are more likely to encounter violence in situations involving blunt objects, while sharp weapon injuries may arise from domestic or interpersonal violence where both genders are equally at risk however violence against women leading to deaths has been reported in many countries across the globe including India[12&13]. Similar findings are noted in studies done by Huggar BS et al [14] Mohanty S et al **[15]** Patel DJ et al [16]. Most of the females being housewives in the society understudy are subjected to domestic violence either by spouse or in-laws and the males being the bread winners for the family are more active in outdoors however this trend could be attributed to frustration in life, marital disharmony, lack of understanding and poverty in the lower socio-economic group to prompt a criminal behavior. In this study the significant association which is shown by low p value between age, sex, and type of injury emphasizes the importance of considering these factors in both criminal profiling and forensic investigations. Most of the cases were from rural (peri –urban) background (65.11%) similar to other studies [17].

The data revealed fluctuating trends in the occurrence of homicidal injuries over the five-year period (2019–2023). Blunt injuries remained dominant across all years, but sharp injuries gained prominence in 2021 and 2023, suggesting possible shifts in weapon preference or changes in the socio-political environment that may influence violent crime. The mortality also varies with injury type, gender, age, and urban–rural distribution [18]. The peak in blunt weapon injuries in 2019 (32.5%) might be linked to specific local factors, such as increased crime rates or socioeconomic instability during that period Statistically, Pakistan saw 853 fatalities (up from 600 last year) and 1,690 injuries directly due to violent incidents in 2021, a 42% increase over the previous year[19].

Blunt weapons are associated with the highest proportion of multiple fatal injuries (55.81%), particularly in cases involving hard blunt objects (74.4%). These findings are consistent with studies that demonstrate the lethality of blunt force trauma, especially when multiple injuries are inflicted[20]. Sharp weapons, while less frequently used (25.58%), still caused significant fatal injuries, [21]emphasizing the need to account for various weapon types in homicide investigations and public safety measures.

The lethality of an attack is not solely dependent on the type of weapon but also on other factors such as intent and opportunity. The absence of significant differences in the distribution of single and multiple fatal injuries across weapon types in our study also suggests same. Head injuries are the most frequent cause of death with 65.11%, dominating both single and multiple fatal injury cases. This finding highlights the critical importance of head protection in violence-related injuries. Injuries to the neck, chest, and limbs accounted for fewer cases but were still significant, particularly chest and limb injuries in cases involving multiple fatal injuries. The strong association between location of Injury and fatality highlights the importance of targeting these regions in medicolegal and forensic evaluations. Action is needed because violence can be analyzed and addressed by using data, evidence and science to inform policy makers and advocate for change. In addition, measures such as mental

health and psychosocial support for victims of violence, and improved emergency response can be put in place to minimize its impact [22].

## Conclusion

This study contributes to the understanding about dynamics of fatal blunt and sharp injuries with reference to the demographic profile of victims in homicidal deaths. The significant association between age, gender, weapon type, and injury location offers a basic framework for medicolegal investigation and public health policies in the region. Efforts to reduce violent deaths should focus on the most vulnerable groups (males and young adults), while addressing the lethality of blunt force trauma. Further research is needed to explore temporal changes in violent crime patterns and their underlying causes.

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