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FORENSIC ANALYSIS OF SUICIDAL AND HOMICIDAL FIREARM INJURIES: RETROSPECTIVE STUDY CONDUCTED AT MEDICO-LEGAL SECTION LUMHS HYDERABAD

Iftikhar Lakho[*1], Ishrat Bibi[2], Zahid Ali Zounr[3], Muhammad Ali[4], Tayaba Noor[5], Saima Jatoi[6], Iqra Kanwal[7], Sindh Siyal[8], Farzana Unar[9], Sapna Chandio[10]

*[*1,4,5,6,7,8,9,10]Department of Forensic Medicine and Toxicology, LUMHS University, Jamshoro, Sindh*

[2]Supervisor, MBBS, MD, CHPE, Associate Professor Department of Forensic Medicine, Forensic Science & Toxicology, LUMHS Jamshoro

[3]Co Supervisor, MSc. MPhil, Ph.D. (Chemistry), Medical Technologist, Department of Forensic Medicine, Forensic Science & Toxicology, LUMHS Jamshoro

[*1]ifeea411@gmail.com

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Corresponding Author: *
Iftikhar Lakho

Abstract

Background: *Firearms injuries are of great medico-legal importance and mostly result from homicidal or suicidal intent. The demographic profile, anatomical sites and manner of firearm injuries are of great significance from a forensic point of view.*

Objectives: *The present study was undertaken to determine firearm injuries based on body regions involved, gender, and frequency of suicidal and homicidal firearm injuries.*

Methods: *A retrospective study was performed on 100 firearm injury cases received at the Medico-Legal Section, LUMHS, Hyderabad. Data was extracted from medico-legal case records using a predesigned proforma. Cases were analyzed and results were generated in terms of frequencies and percentages to see the gender distribution, nature of injury and primary anatomical sites involved.*

Results: *A total of 96 (96%) cases were male and 4 (4%) were female. In terms of nature of injury, 76 (76%) cases were homicidal, 13 (13%) were suicidal and 11 (11%) were undetermined. The primary anatomical sites involved were lower limbs (55%), upper limbs (22%), thorax/chest (9%), face (5%), head/skull (4%), neck (3%) and abdomen (2%).*

Conclusion: *Firearm injuries were more frequently observed among males than females and homicidal injuries are common as compared to suicidal injuries. The study highlights important statistical data related to suicidal and homicidal firearm injuries which can help medico-legal authorities and law-enforcement agencies in dealing with such cases in an effective manner.*

1. Introduction:

Firearm injuries are an important medico-legal concern in forensic medicine and may result from homicide, suicide, or accidental events. Different firearms, including pistols, revolvers, rifles, and shotguns, can cause injuries that vary in pattern and anatomical location [3,6]. Suicidal firearm injuries are self-inflicted and commonly involve accessible sites such as the head, chest, or mouth, whereas homicidal firearm injuries may involve different body regions and may be associated with multiple or defensive injuries [5,13,14]. Careful examination and documentation of firearm injuries are essential for determining the manner of injury and supporting forensic

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investigation [1,7,16]. However, local information on the pattern and distribution of suicidal and homicidal firearm injuries is important for understanding the characteristics of cases presenting to medico-legal facilities. Therefore, this study was conducted at the Medico-Legal Section, Liaquat University of Medical & Health Sciences (LUMHS), Hyderabad, to analyze the gender distribution, manner of firearm injury, and anatomical sites involved in suicidal and homicidal firearm-injury cases [2,10,12–20].

2. Literature Review

Suicidal and homicidal firearm injuries are important areas of forensic medicine because their examination can provide valuable information about the circumstances and manner of injury [3,4,8]. Previous studies have reported differences between suicidal and homicidal firearm injuries in terms of the anatomical site involved, injury pattern, and circumstances of the incident.

Homicidal firearm injuries may involve different parts of the body and can be associated with multiple or defensive injuries, depending on the circumstances of the attack. In comparison, suicidal firearm injuries are self-inflicted and commonly involve easily accessible areas, such as the head, chest, or mouth. These differences can provide useful information during medico-legal examination and forensic interpretation [1,7,9,11].

Previous research has also shown that gender and anatomical site are important factors in the study of firearm injuries. Males have generally been reported to constitute the majority of firearm-injury cases, while the anatomical distribution may vary according to whether the injury is suicidal or homicidal and the circumstances surrounding the incident [12,16,17].

The comparison of suicidal and homicidal firearm injuries is therefore important for accurate forensic assessment and medico-legal decision-making. Reviewing the patterns reported in previous studies provides a basis for examining these characteristics in the local population. The present study focuses on the gender distribution, manner of injury, and anatomical sites involved among firearm-injury cases reported to the Medico-Legal Section, LUMHS, Hyderabad [15–20].

3. Rationale

The purpose of this study was to determine a pattern in suicide and homicide related firearm injuries in medico-legal cases. In some cases, it may not be easy to differentiate between suicidal and homicidal firearm injuries, which could affect the outcome of an investigation and trial. The difference in the anatomical location of injuries, gender distribution pattern, and frequency of suicidal and homicidal injuries might contribute to the identification process in medico-legal practice. Therefore, this study was conducted to analyze these patterns among firearm-injury cases reported to the Medico-Legal Section, Liaquat University of Medical & Health Sciences (LUMHS), Hyderabad. The findings may contribute to better understanding, documentation, and interpretation of firearm injuries and support forensic and medico-legal investigations.

4. Objectives of the Study

The study was conducted with the following objectives:

1. To identify the anatomical regions affected in firearm-injury cases.
2. To determine the gender distribution of firearm-injury cases.
3. To compare the frequency of suicidal and homicidal firearm-injury cases.

5. Hypothesis

No formal hypothesis was proposed, as this study was descriptive in nature and focused on determining the frequency and distribution of suicidal and homicidal firearm injuries according to gender, manner of injury, and anatomical site.

6. Materials and Methods

6.1 Study Design

A retrospective descriptive study was conducted to analyze suicidal and homicidal firearm-injury cases.

6.2 Study Setting

The study was conducted at the Medico-Legal Section, Liaquat University of Medical & Health Sciences (LUMHS), Hyderabad, Sindh, Pakistan.

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6.3 Study Duration

The study was conducted from February 2022 to December 2025.

6.4 Sample Size

A total of 100 medico-legal firearm-injury cases were included in the study.

Inclusion Criteria

Cases were included if they were:

1. Medico-legal firearm-injury cases recorded at the Medico-Legal Section, LUMHS, Hyderabad.
2. Cases classified as suicidal, homicidal, or undetermined based on the available medico-legal records.
3. Cases with sufficient information regarding gender, manner of injury, and primary anatomical site.
4. Cases recorded during the study period and meeting the study requirements.

Exclusion Criteria

Cases were excluded if they were:

1. Non-firearm injury cases.
2. Duplicate records of the same case.
3. Records with incomplete or insufficient information regarding the study variables.
4. Cases in which the manner of injury or primary anatomical site could not be determined from the available records.

6.5 Case Selection

Relevant firearm-injury cases were selected from available medico-legal and hospital records according to the study criteria.

6.6 Data Collection

Required information was collected from medico-legal records using a structured proforma. The proforma included information regarding gender, manner of firearm injury, and primary anatomical site of injury.

PROFORMA

STUDY OF SUICIDAL AND HOMICIDAL FIREARM INJURY CASES AT MEDICO LEGAL SECTION CIVIL HOSPITAL HYDERABAD

1. Case Identification

Case No: _____

Hospital / Police Station: _____

Date of Admission / Examination: _____

Examiner Name: _____

2. Demographic Data

Gender: [ ] Male | [ ] Female | [ ] Other

Age of injured: _____

Address: [ ] Urban [ ] Rural

3. Type of Case

Nature of Firearm Injury:

[ ] Suicidal

[ ] Homicidal

[ ] Undetermined

4. Body Region Involved *(Primary Site of Injury)*

[ ] Head / Skull [ ] Face

[ ] Neck

[ ] Chest / Thorax [ ] Abdomen

[ ] Upper limb: [ ] Right [ ] Left

[ ] Lower limb: [ ] Right [ ] Left

[ ] Multiple regions *(specify)*: ____

5. Outcome

[ ] Alive

[ ] Dead on arrival

[ ] Died during treatment [ ] Recovered

6.7 Classification of Cases

Cases were classified according to the available case history and medico-legal/forensic findings as suicidal, homicidal, or undetermined.

6.8 Data Analysis

The collected data were analyzed using frequencies and percentages. The findings were presented in tables and graphs to describe the gender distribution, manner of firearm injury, and anatomical sites involved.

6.9 Ethical Considerations

1. Approval for the study was obtained from the Institutional Review Board (IRB) or Ethical Review Committee (ERC) before the study began.
2. The confidentiality and privacy of all medico-legal records were maintained throughout the study.
3. No personally identifiable information of the cases was included in the study report.
4. The collected information was used

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only for research purposes

7. Results

7.1 Gender Distribution of Firearm Injury Cases:

Out of the 100 firearm-injury cases included in the study, 96 (96%) were males and 4 (4%) were females. The findings showed a marked male predominance among the firearm-injury cases.

Table 1. Gender Distribution of Firearm Injury Cases

Gender	Frequency (n)	Percentage (%)
Male	96	96%
Female	4	4%
Total	100	100%

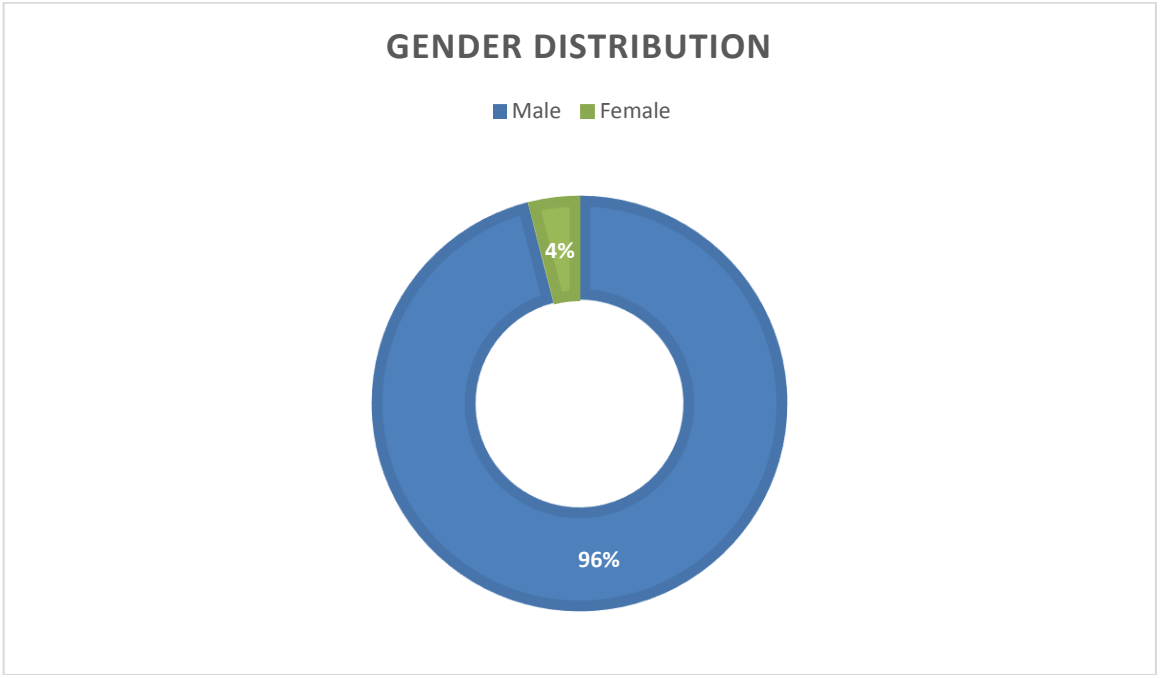


Figure 1. Gender Distribution of Firearm Injury Cases

7.2 Type/Manner of Firearm Injury Cases:

Regarding the type/manner of firearm injury, 76 (76%) cases were homicidal, 13 (13%) were suicidal, and 11 (11%) were undetermined. Homicidal firearm injuries were therefore the most frequently observed type in the study.

Table 2. Type/Manner of Firearm Injury Cases

Nature of firearm injury	Frequency (n)	Percentage (%)
Homicidal	76	76%
Suicidal	13	13%
Undetermined	11	11%
Total	100	100%

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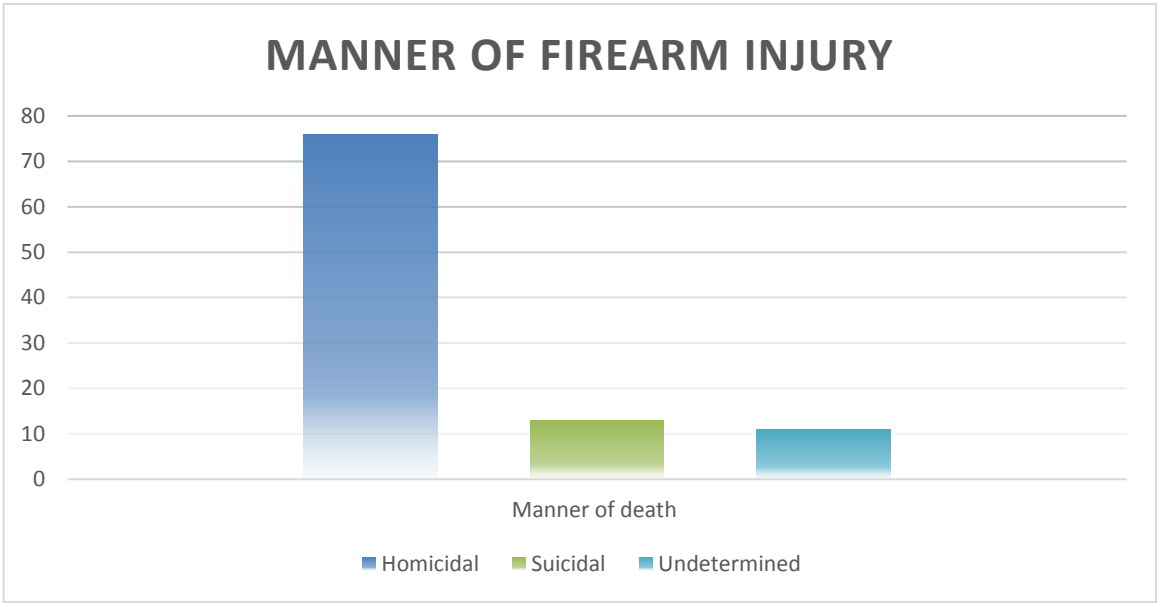


Figure 2. Distribution of Firearm Injury Cases According to Type/Manner

7.3 Distribution of Firearm Injuries According to Anatomical Site:

Regarding the anatomical site involved, the lower limb was the most frequently affected site, accounting for 55 (55%) cases, followed by the upper limb with 22 (22%) cases and the chest/thorax with 9 (9%) cases. The face was involved in 5 (5%) cases, while the head/skull, neck, and abdomen were involved in 4 (4%), 3 (3%), and 2 (2%) cases, respectively.

Table 3. Distribution of Firearm Injuries According to Anatomical Site

Anatomical site	*Frequency (n)*	*Percentage (%)*
Head/Skull	4	4%
Face	5	5%
Neck	3	3%
Chest/Thorax	9	9%
Abdomen	2	2%
Upper limb	22	22%
Lower limb	55	55%
Total	100	100%

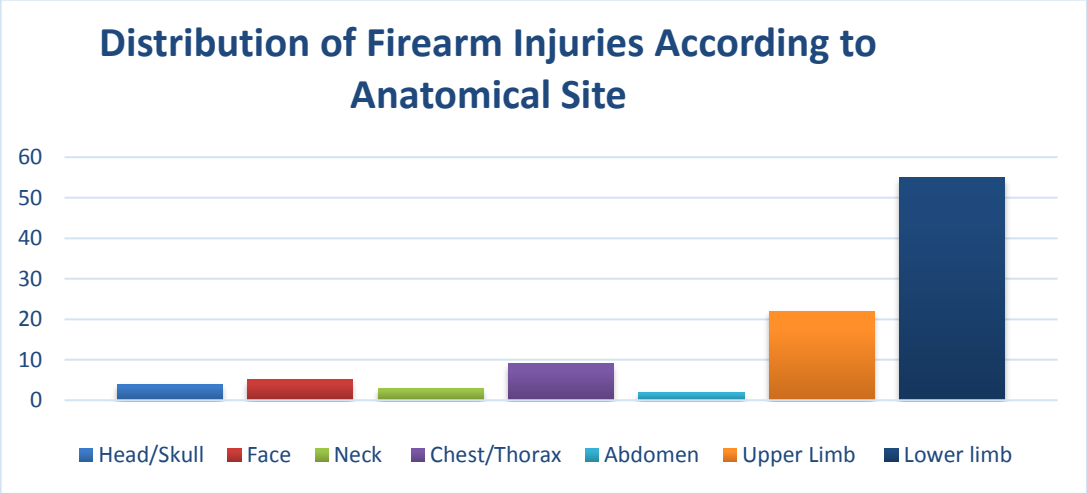


Figure 3. Distribution of Firearm Injuries According to Anatomical Site

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8. Discussion

In the present study, firearm injuries showed a clear male predominance, with males accounting for 96% of cases and females for 4%. This finding is consistent with previous studies reporting that males constitute the majority of firearm-injury cases. The higher involvement of males has also been reported in medico-legal and autopsy-based studies from different populations [2,10,13,16,18,19].

Regarding the manner of firearm injury, homicidal cases were predominant in the present study, accounting for 76% of cases, while 13% were suicidal and 11% were undetermined. The predominance of homicidal firearm injuries has also been reported in previous medico-legal studies [2,10,12,16,17,18]. Differentiating between suicidal and homicidal firearm injuries is an important part of forensic examination because the interpretation of wound characteristics, site, and circumstances can contribute to determining the manner of injury [1,4,7,8,9,11].

The anatomical distribution of firearm injuries in the present study showed that the lower limb was the most frequently affected site (55%), followed by the upper limb (22%) and chest/thorax (9%). The face, head/skull, neck, and abdomen accounted for 5%, 4%, 3%, and 2% of cases, respectively. Previous studies have also demonstrated variation in the anatomical distribution of firearm injuries, with extremities being frequently involved in some study populations [2,10,19,20]. Differences in anatomical distribution may be related to the circumstances of the incident, the manner of injury, and the direction and circumstances of firearm discharge [4,13,14,17].

Previous forensic literature indicates that suicidal firearm injuries commonly involve accessible anatomical sites, particularly the head, mouth, and chest, whereas homicidal injuries may involve a wider range of body regions and may present with multiple wounds or other findings that assist in forensic interpretation [1,4,7,9,11,14]. These differences emphasize the importance of considering the anatomical site together with the case history and other medico-legal findings rather than relying on a single feature when determining the manner of firearm injury.

Overall, the findings of the present study are broadly consistent with previous research showing a marked male predominance and a higher frequency of homicidal firearm injuries. The frequent involvement of the extremities in the present study is also comparable with findings reported in previous firearm-injury studies [2,10,19,20]. The present study provides local medico-legal data from LUMHS, Hyderabad, which may contribute to a better understanding of firearm-injury patterns encountered in forensic practice.

9. Conclusion

The current retrospective study highlights the demographic, manner, and anatomical profile of firearm injuries in the patients who presented at the Medico-Legal Section, Liaquat University of Medical & Health Sciences (LUMHS), Hyderabad. Out of a total of 100 cases, 96% were male and 4% were female.

Regarding the manner of injury, 76% of cases were homicidal, followed by 13% suicidal and 11% of undetermined manner. Therefore, it can be concluded that homicidal firearm injuries are more common and that medico-legal evaluation is crucial to determine the precise manner of injury. Moreover, 55% of the bullet injuries were observed in the lower limbs, 22% in the upper limbs, and 9% in the thorax/chest. However, the remaining 14% of injuries included the face, head/skull, neck, and abdomen.

In summary, the current study revealed that the male population dominates in firearm injuries with a higher prevalence of homicidal manner and extremity involvement. The data contribute to the body of knowledge about local patterns of firearm injuries, which can help in future medico-legal investigations and research studies with a bigger sample size and numerous variables.

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