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Behind the Bullet: Forensic Analysis of Firearm Injury Patterns and Demographic Trends in Peshawar

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ABSTRACT

Background: Violent injuries rank among the top ten causes of death worldwide. Violence has been identified as a major global issue. Firearm injury is a global issue that poses a significant challenge in a developing country like ours, where poverty and violence are prevalent. Aside from being a cause of mortality, firearm injuries can result in substantial morbidities, psychological and physical problems for individuals and communities.

Objective: the objective of the study is to assess pattern of injury along with manner of death and its associated demographic factors in firearm injuries in Peshawar.

Methods: The descriptive cross-sectional study was done from July 1, 2024, and December 31, 2024, in the Forensic Medicine and toxicology Department Khyber Medical College, Peshawar. All firearm deaths presented to department during said period was included in the study and cases with incomplete documentations and referred from other districts were excluded from study.

Results: The study included 398 individuals, with 94.6% males and 5.3% as female. The mean age of the participants were 36.6 years, with a standard deviation of 13.6. A significant majority of casualties (87.8%) were from urban regions, with the most prevalent injuries impacting the lungs (54.6%), heart (36.0%), and brain (33.2%). Majority of victims suffered from multiple injuries (79.7%), and the majority of fatalities (94.2%) were immediate, with homicide identified as the predominant cause. Suicides represented merely 2.4% of the overall total.

Conclusion: Our results showed that most victims were men. The majority of them were having an age between 16 and 30. Most victims sustained multiple injuries. Homicide was the leading cause of death, and the lungs were the most frequently injured organ.

Introduction

Violent injuries are among the top 10 causes of death in the globe. Violence has been declared one of the world's most serious problems1. Avoiding firearm injuries and associated issues can help to reduce the number of deaths caused by violent deaths.

Firearm injury is a global issue that poses a significant challenge in a developing country like ours, where poverty and violence are prevalent2. Aside from being the cause of mortality, firearm injuries can result in major disease morbidities, psychological and physical problems for individuals and communities3. The prevalence of violent deaths, particularly gunshot injuries, is dramatically increased, indicating the worsening legal conditions in society4. Several factors influence the patterns of firearm deaths, including demographic characteristics (age, gender, socioeconomic level) and environmental factors (urban vs. rural settings, local regulations, and firearm access). 5

According to research, firearm 5,6 injuries disproportionately impact younger guys, particularly in metropolitan locations with higher crime rates. Furthermore, socioeconomic factors such as poverty and a lack of education have been related to an elevated risk of firearm violence6, 7.

The violent deaths rates and firearm-related injuries in developing societies is twice that of high-income countries9. A study conducted in Northern Italy found that the death rate was roughly 0.84 per 100,000 persons in 2006, with an average of 12.6 cases each year5,6.

According to the WHO, weapons are used in two-thirds of homicides and one-fifth of suicides8. The rate of violent deaths and gunshot injuries in underdeveloped nations is twice as high as in high-income countries. 9 Every year, 30,000 people are killed by firearms in the United States.10 A research in Italy found that the firearm-related death rate was 0.84 per 100,000 people.11. In Turkey, injuries due to firearm are the top cause of homicide and the third most prevalent means of suicide, following poisoning and hanging (12). Deaths from firearms are on the rise in developing countries like ours, owing to an increase in sectarian religious confrontations, political issues, and armed robbery.

Limited studies have been done to know pattern of injuries along with manner of death and their associated demographic factor. This study will add in knowledge of forensic science data enabling the experts, legislation and health care providers to develop urgent steps in prevention of these deaths. To evaluate pattern of injury and manner of death in firearm death brought to forensic medicine department Khyber medical college Peshawar To determine associated demographic factors in firearm death of district Peshawar

Materials And Methods

Study Design: Descriptive Cross sectional study

Study Setting: Department of forensic medicine and toxicology Khyber Medical College Peshawar

Study Duration: 1st July 2024 to 31st Dec 2024

Sample Size: All firearm cases presented to department during said period

Inclusion criteria: All firearm deaths presented to department

Cases with complete documentation

Exclusion criteria: Cases with incomplete documentation

Cases referred from other districts

Results

Out of the total 398 individuals, 94.7% (377/398) were male and 5.3% (21/398) were female. Figure 1. showing gender distribution of subjects

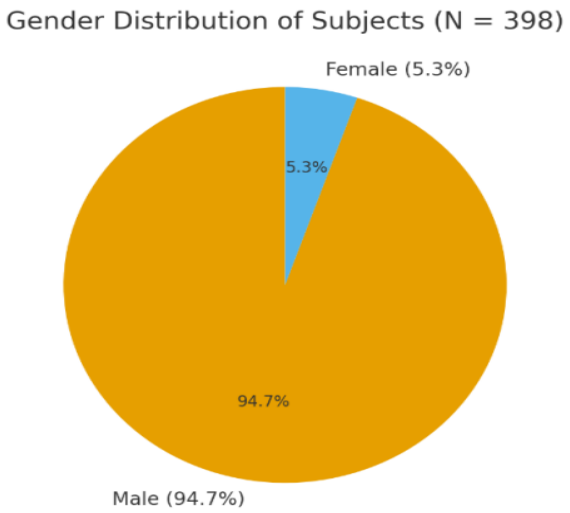

Figure 1, showing gender distribution of subjects

The average age was 36.6 ± 13.6 years, with a range of 16–80 years. The age distribution is illustrated in Table 1. Furthermore, 87.8% (350/398) of the participants were from cities, whereas 12.2% (48/398) were from rural areas.

Table 1 Age Distribution of the Study Population

Age (in groups)	Frequency (n=797)	Percentages (%)
16-30 years	204	51.19197
31-45 years	180	45.29486
46-60 years	86	21.45546
more than 60 years	14	3.513174

The organs involved in in firearm injury are elaborated in table 4. Additionally, 20.3% (81/398) of the subjects sustained a single injury, while 79.7% (317/398) had multiple injuries. Table 4 also displays the frequency of organs injured in these cases.

Table 2: Deaths by Manner of Death

Manner of Death	Frequency (n=398)	Percentage (%)
Suicide	9	2.4
Homicide	350	87.9
Accidental	39	9.8

Table 3: Deaths by Fatal Period

Type of Death	Frequency (n=398)	Percentage (%)
Immediate Death	350	94.2
Delayed Death	23	5.8
Instantaneous Death	0	0.0

Table 4 Anatomical Pattern of Injury in Firearm Deaths

Organs injured	Frequency	Percentages (%)
Lungs	217	54.6
Heart	144	36.0
Brain	132	33.2
Liver	161	29.1
Gut	84	21.1
Great vessels	48	12.2
Limbs	35	8.7
Spleen	11	2.9
Head and Neck	12	2.9
Pancreas	7	1.8

Discussion

Results of this research on gunshot injuries in District Peshawar emphasize the significance of demographic indicators, patterns of injury, and outcomes of these incidents. Results confirm common and unique regional patterns and demonstrate trends similar to and different from other research conducted on firearm-related trauma.

The high proportion of male participants in the study at hand, i.e., 94.7%, resembles worldwide figures among firearm-injury patients. Research has shown that men are more risky and more likely to be subject to violence and hence more likely to be exposed to firearm injuries than women. For instance, Miller et al. (13) observed that over 90% of firearm injury-causing deaths were among men within American cities.

A high percentage of young adults (51.2% aged between 16 and 30) and an average age of 36.65 years correspond to patterns reported in other fields. According to studies by Hemenway et al. (13), the young and the middle-aged are at high risk of suffering firearm violence. Our results suggest that this group is inclined to be engaged in violent confrontations and take part in risky behaviors. The reduced percentage of those over the age of 60 is similar to earlier studies, which indicate that the elderly are at low risk of suffering injuries related to guns (5).

Gun violence appears more prevalent within urban areas. Investigation identified an elevated incidence of gunshot injuries within urban areas (87.8%) versus rural areas (12.2%), consistent with global patterns. Urban areas have more violent and serious crimes and firearm rates due to increased concentrations and socioeconomic disparities (6,7). Other research conducted within urban areas showed comparable urban-rural disparities also supports the finding (8,9). Finkelstein et al., for instance, identified substantially elevated rates of firearm violence within urban areas within the United States versus rural areas.

Our study showed that most of the individuals sustained multiple injuries as compared to single injury. It may be due to reason that most individuals thinks that this is first and last chance to kill their enemies and individual should not survive as result of it. According to Morrison et al. (7), injuries to these critical organs often produce high mortality rates and represent critical challenges to the management of injuries.

The deadly outcomes related to gunshot injuries are reflected by the significantly elevated immediate mortality rate of 94.2% among the study subjects. Death due to firearm is mostly immediate death followed by delayed death in which individuals survives and is hospitalized .Studies also show same pattern that most common immediate death occurs followed by delayed death.14

These study findings have significant public health policy implications. High levels of gunshot injuries among urban young men indicate the necessity for targeted prevention strategies to enhance trauma care, reduce violence, and manage the socioeconomic determinants behind firearm violence15. Also underscored by the severity of the injuries is the necessity for robust trauma preparation and response systems that can handle violent firearm events.16

Conclusion

Our results showed that most victims were men. The majority of them were having an age between 16 and 30. Most victims sustained multiple injuries. Homicide being leading cause of death, and the lungs were the most frequently injured organ.

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