

Morbidity and Mortality of Firearm Injury at A Tertiary Care Hospital in Lahore

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ABSTRACT

Background: Throughout the world violent crimes due to firearm weapons have increased tremendously which are destabilizing political, social, and economic systems, and causing increase in morbidity and mortality.

Objective: The aim of the study was to determine the pattern of firearm injuries and to assess their outcome at a tertiary care hospital in Lahore.

Materials and Methods: This retrospective study was conducted in Surgical Unit- IV of Services hospital, Lahore from January 2011 to December 2013. Data was collected regarding age, gender, date of incident, manner of infliction of injuries, site of external and internal injuries, number of wounds and outcome. It was tabulated and statistically analyzed on SPSS version 17.

Results: Total number of cases of firearm injury was 150 with male to female ratio 11.5 : 1. Commonest age group affected was third decade (52, 34.6%). The most commonly involved body region was abdomen (54, 36%). The incidence of homicidal cases was 99% while that of accidental was 1%. No suicidal cases were reported. 56% sustained internal injuries with small bowel (50.9%) and liver (16.9%) most frequently injured in abdomen and lungs (71.4%) extra abdominally. The overall mortality rate was 5.3%.

Conclusion: Firearms and their use are modifiable risk factors which if recognized and addressed can significantly reduce the firearm related morbidity and mortality in the country.

Key words: Firearm injury, homicide, entry wound, exit wound, internal injuries, morbidity, mortality

INTRODUCTION

Firearm injuries are the leading cause of trauma besides road traffic accidents brought to the tertiary care hospitals worldwide¹. Firearm related morbidity and mortality are serious growing public health problems globally that show wide regional variations^{2,3}. Besides high mortality rate, firearm injuries cause significant morbidity, long term physical and psychological disability for victims, families and societies⁴. These injuries cause a considerable quandary in developing countries like ours which has been attributed to sectarian religious clashes, political crises, armed robberies, student activities and rarely sports⁵⁻⁷.

Firearms have been used in suicidal and homicidal attempts rendering easy and quick mode of injury or death⁸⁻¹¹. Intimately related to firearm use is the availability of firearm weapons of various types to the public¹². The severity of firearm injuries is determined not only by the caliber of the weapon but also by the extent of damage of the tissues caused by the mechanical interaction

between the projectile and the tissues, and the effects of the temporary cavity produced by the projectile¹³.

The incidences of violent crimes with firearm injuries are on the rise, reflecting the deterioration of law and order in our society. The studies from Pakistan also highlight the contributions of firearm injuries to morbidity and mortality¹⁴⁻¹⁷. The medical, legal and emotional costs of this violence impose an enormous burden on urban and rural hospitals.

OBJECTIVE

The aim of the study was to determine the pattern of firearm injuries and to assess their outcome with regard to the demographic characteristics, target area, number of wounds, internal injuries, manner of infliction and mortality in victims brought to tertiary care hospital in Lahore.

MATERIAL AND METHODS

This retrospective study was conducted in Surgical Unit- IV of Services hospital, Lahore from

January 2011 to December 2013. A total of 150 cases of firearm injury who presented through emergency department to Surgical Unit- IV of Services hospital were included in the study. All cases above 12 years of age with firearm injuries were included. Cases under 12 years of age and those with incomplete record were excluded. Data was collected by thorough review of the medicolegal registers and case files including the operation notes. All the findings pertinent to age, gender, date of incident, manner of infliction of injuries, site of external and internal injuries were recorded on a predesigned printed pro forma. Data thus collected was tabulated and statistically analyzed on SPSS version 17.

RESULTS

A total 150 victims of firearm injuries were studied during the three year period from January 2011 to December 2013. Highest number of firearm injuries were recorded in 2013 with 68 cases (45.33%) followed by 2012 and 2011 reporting 52 cases (34.66%) and 30 cases (20%) respectively.

The most commonly affected age group was 20-29 years (52, 34.6%) followed by 30-39 years (36, 24%) with 40-49 years (28, 18.6%) and 12-19 years (24, 16%) following closely behind while 50-59 years (6, 4%) and those more than 60 years (4, 2.6%) showed the least incidence as shown in fig.1

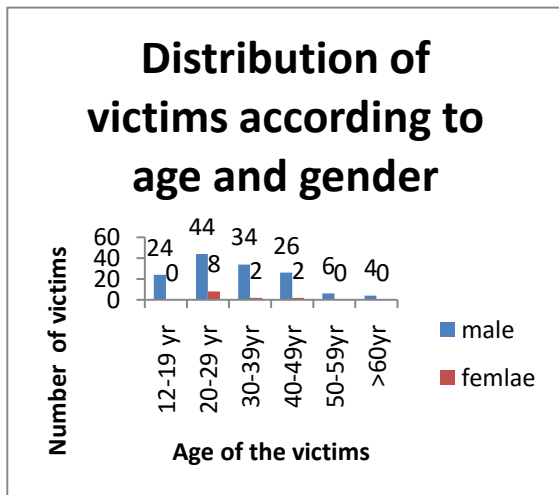


Figure 1: Male predominance was noted in our study with male to female ratio of 11.5 : 1 (fig. 1)

The most commonly involved body region was abdomen (54, 36%) followed by lower limbs (48, 32%), chest (16, 10.6%), upper limbs (14,

9.3%) and head, neck and face (6, 4%). 12 victims (8%) had injuries involving multiple areas. (table.1)

Table 1: Body Region involved

Sr. No	Body Region	No. of victims (n=150)	Percentage
1.	Head, neck and face	6	4
2.	Chest	16	10.6
3.	Abdomen	54	36
4.	Upper limbs	14	9.3
5.	Lower limbs	48	32
6.	Multiple	12	8

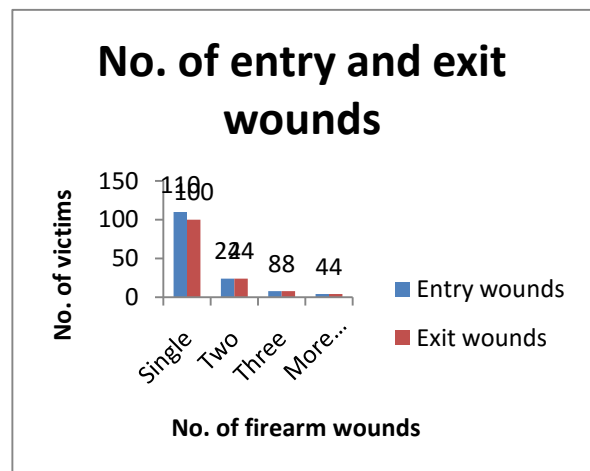


Figure 2: The incidence of homicidal cases was 99% while that of accidental was 1% only. No suicidal cases were reported (figure.3)

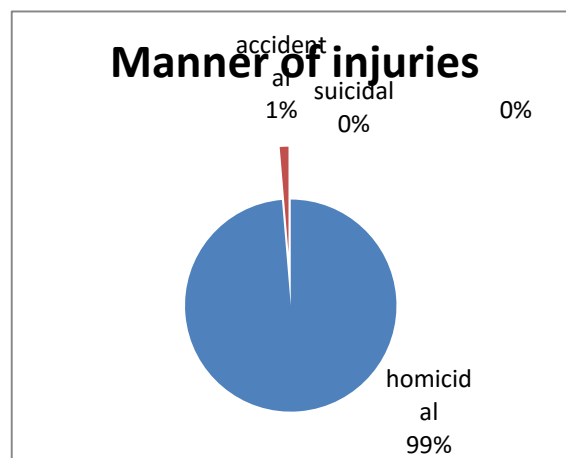


Figure 3: 84 cases (56%) sustained internal injuries.

A total of 282 firearm wounds were sustained comprising of 146 entry wounds(51.77%) and 136 exit wounds(48.22%). Out of 146 entry wounds, single wounds were present in 110(75.3%), two wounds in 24 (16.4%) and three wounds in 8(5.4%) cases while 4 victims had more than three entry wounds (2.7%). Out of 136 exit wounds, 10 cases (7.3%) had no exit wound while single wounds were found in 100(73.5%), two wounds in 24 (17.6%) and three wounds in 8(5.8%) cases. 4 victims had more than three exit wounds(2.9%) as shown in fig.2

The most commonly injured internal organs were bowel (54, 50.9%) and liver (18, 16.9%) in abdomen and lungs (20, 71.4%) in chest. (table.2)

Table 2: Internal Organ Injuries

Internal organ injured	No. of victims(n=150)	Percentage
Abdominal organs injury (n=106)		
Bowel	54	50.9
Liver	18	16.9
Spleen	2	1.8
Stomach	8	7.5
Kidney	8	7.5
Pancreas	2	1.8
Urinary bladder	6	5.6
Gall bladder	4	3.7
Retroperitoneal hematoma	2	1.8
Thoracic (n=28)		
Lungs	20	71.4
Diaphragm	6	21.4
Heart	2	7.1
Vascular (n=18)		
Peripheral vessels	18	100

The outcome was non- fatal in 142 cases (94.6%) who were discharged after appropriate surgical treatment where as 8 cases expired with mortality rate of 5.3%.

DISCUSSION

Injuries from firearms are a major health problem severely affecting the legal and health-care systems. Despite the magnitude of this problem, little is known about the epidemiologic characteristics of these injuries¹⁸. Firearm injuries are major contributors to the number of trauma patients worldwide.

The retrospective analysis of 150 cases of firearm injury presented to emergency department of Surgical Unit- IV of Services hospital, Lahore concluded that majority of victims were males (132, 92%) in the age group 20-29 years (52, 34.6%) followed by 30-39 years (36, 24%) while the elderly(60 years and above) were least affected(4, 2.6%). This is in accordance with studies done in other countries around the world. A survey in England reported the highest incidence of firearm injuries in males (94.5%) with an average age of 28 yrs in males and 36 yrs in females¹⁹. Hagraas et al (2012)²⁰ conducted a five year study in Suez Canal area in Egypt. There, the most affected age group was the age group of third decade (119 cases; 44.4%), followed by fourth decade (57 cases; 21.3%) and the majority of victims were male (259; 96.6%). Similar pattern has been reported by researchers in India^{21, 22}, Germany²³ and Nigeria²⁴. Studies from Pakistan also highlighted this predominance of young males as victims of firearm morbidity and mortality. Bashir at al¹⁴ noted highest percentage of males who sustained firearm injuries in the third decade of life (42%) in a twelve year study in Lahore. Marri et al (2006)²⁵ noted that vast majority of cases with firearm injuries were males(86%) in 20-29 yr age group(33%), thus in accordance with our findings. Several studies from other parts of the country were also consistent with our study^{26, 27}.

Illegal possession of guns, male gender, and youth has been well documented as risk factors for firearm injuries²⁸. Furthermore, youth are more aggressive and show resistance to perceived threats. On the contrary, the elderly are wiser and inclined to avoid fights rather than provoke them. The reason for male predilection is that males are the proactive members of the society and thus are more involved in violence whereas females tend to stay at home and are usually innocent bystanders in such incidents. They mainly receive injuries while defending themselves or their families.

In our study, 99% of firearm injuries were homicidal while accidental cases were only 1%. This homicidal predominance has been reflected in studies in Tehran²⁹, Turkey³⁰, Saudi Arabia³¹ and Italy³². The highest incidence of homicidal firearm injuries has been reported in Pakistan also. Mujahid et al (2008)³³ in a one year study in Peshawar showed that the main motive of firearm injury was homicide (60.8%). Maqsood et al (2011)³⁴ also reported similar findings (61.32%). Furthermore, incidence of firearm injuries was

61.8% in Sindh²⁷, 64.9% in DI Khan¹⁷ and 77.7%¹⁶ and 78.5%²⁵ in Peshawar respectively.

An overwhelming majority of 73.3% cases had single firearm injuries. This differs from other studies where multiple injuries were documented due to common use of automatic weapons²⁵.

According to our study, the most commonly involved body region was abdomen (36%) followed by lower limbs (32%) and chest (10.6%). Sachan et al (2013)²¹ concluded that abdomen was the most common target area in a two year study in Kanpur, India supporting our findings. In Pakistan, Memon et al (2009)³⁵ and Mujahid et al (2008)³³ also outlined that the most common site of firearm injury was abdomen in their respective studies. Our results are in partial agreement with study of firearm injuries and death in Qena Governorate in Egypt³⁶ reporting that the commonest site of entry wounds was the chest (23.3%) and the abdomen (22.3%). However, our findings are in contrast to other studies. An epidemiological study of gunshot injuries in Sialkot³⁷ showed that the majority of firearm injuries were sustained on the lower limbs(47.5%) followed by upper limbs(17.7%) and abdomen(12.9%). Also, in a study in El-Fayoum Governorate, the commonest site was the chest (21 cases; 29.6%), followed by the abdomen and the head (18 cases each; 25.4%)³⁸. Limbs were involved in 148 (50%) patients; abdomen in 92 (31%) patients; thorax in 35 (12%) patients; head and neck in 18 (6%) patients in a study in Bahawalpur³⁹. A study in Dammam, Saudi Arabia argued that the commonest sites of firearm injury were the head (36.7%) and the chest (28.7%)³¹. In a previous study from Peshawar carried from June 2005 to February 2006, chest was most frequently involved⁴⁰. Other studies reported the head, neck and face as the most frequently injured areas^{6,16,17}.

It can be said that where the motive is to kill the victim, the assailant tends to target a fatal area such as the chest or head whereas cases in which assailants use firearms only to threaten, victims are usually injured in a less dangerous site such as the upper or lower limbs³⁷. Mostly it happened during armed robberies.

Our results showed that 56% of the cases sustained internal injuries. In abdomen, the bowel (50.9%) and liver(16.9%) were the most commonly involved organs and in chest, the lungs (71.4%) showed the highest frequency. This is in agreement with Memon et al (2009)³⁵ who concluded that the most commonly injured

abdominal organ was bowel (53.57%) followed by liver (16.07%) while lungs were most frequently injured (25.53%) extra abdominally. Niaz et al (2013)³⁹ also noted that the most commonly injured abdominal viscerae were small intestine and liver thus supporting our results.

142 cases (94.6%) were discharged after appropriate surgical treatment where as 8 cases expired giving overall mortality rate of 5.3% which is considerably low as reported in other studies^{41, 42}. This can be attributed to young age, early reporting/referrals to other hospitals, prompt surgical intervention, improved pre-, intra- and post-operative patient care.

CONCLUSION

Our study showed that the firearm injury is more frequent in third decade of life and the males are more commonly affected. The most common site of firearm injury is abdomen and frequently injured intra-abdominal organs are bowel and liver, while lungs are the commonly injured extra-abdominal organs.

It can be concluded, the young males should be educated to make lifestyle adjustments such as training to refrain from anger or disputes usually over petty things. There is an urgent need for proper implementation of laws in the society and gun-violence reduction programs. There should be coordinated national data-collection systems to facilitate effective control measures. Since a successful firearm-surveillance system will not only reduce the morbidity and mortality but will additionally reduce the national and regional fiscal burden. These efforts must be supported by measures at the international level to prevent illegal firearm influx.

Finally, high-quality trauma care centers should be established all over the country to reduce the firearm related morbidity and mortality. Although this is capital-intensive, the resultant reduction in mortality, morbidity and burden of firearm-related trauma will justify such an allocation of resources.

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