# Pattern of Firearm Injuries: A Five Year Retrospective Study at a Tertiary Care Centre in Central India

**Juglan Sarthak[1], Mustaria Pankaj Kumar Shushil[2], Singh Sandeep[3], Dhingra Vinod[4]**

*[1]Associate Professor & Head, Department of Forensic Medicine and Toxicology, Gajra Raja Medical College, Gwalior (M.P.). [2]Assistant Professor, Department of Forensic Medicine and Toxicology, Maharani Laxmibai Medical College, Jhansi (U.P.)., [3]Professor & Head, Department of Forensic Medicine and Toxicology, Laxminarayan Medical College, Bhopal (M.P.)., [4]Senior Scientific Officer, Scene of Crime Unit, S.P. Office, Gwalior (M.P.)*

## Abstract

Firearm injuries are reported all over the world. From very basic thermodynamic structures to the most sophisticated semi-automatic and automatic guns of the present times, firearms are one of the common causes of significant mortality. In our country there is rampant use of unlicensed country - made firearms, particularly in rural areas. The present study was conducted at a teaching cum tertiary care hospital in Gwalior region of Central India, a region which is notoriously famous for the use of illicit firearms.

The study was retrospectively done analysing the firearm injury cases brought to the mortuary of G.R. Medical College, Gwalior from January 2015 - December 2019 for post-mortem examination. All relevant information regarding autopsy cases were gathered from relatives, police paper; inquest reports, ballistic reports, crime scene findings, autopsy reports. A scientific tabulation of all relevant information was done to arrive at various epidemiological markers relating to firearm injury cases.

In the present study it was concluded that young males were more vulnerable for firearm related deaths with 21-30 years age range showing maximal preponderance. While country made weapons and shotguns accounted for greater majority of cases, rifled weapons were involved either. A plethora of underlying social and psychological factors accounted for such death though region specific familial rivalries stood first in order. Maximum observed diurnal frequency of firearm deaths were reported in relatively calm hours of night, though no time segment was spared. While in most cases single shots were reported, few other had multiple inflictions. Head (including face) was the commonest site involved followed by thoraco-abdominal injuries. Homicide was the most common manner of firearm deaths.

***Keywords:*** *Firearms, shotguns, autopsy reports*

## Introduction

With the progression of human civilization, the quest for weapons have seen an unprecedented high in the present times.[1] Right from periods of early and medieval history to present day, firearms of one type or the other have resulted in great mortalities. As on date there is a sharp increase in demand/usage of firearms by commoners of society. In our country, particularly in rural settings firearms are often associated with pride. With the easy availability of country made weapons in country like ours mingled with increase in day to day interpersonal conflicts, familial issues, social stress, infidelity, thinning familial and moral fabric, firearm mortalities have reached an all time high.[2] The disastrous effect of projectile fired from firearm emanates out from the tissue injuries caused by reciprocal interaction of body tissues and projectile and transient cavitatory

**Corresponding author:**
**Mustaria Pankaj Kumar Shushil,**
Assistant Professor, Department of Forensic Medicine and Toxicology, Maharani Laxmibai Medical College, Jhansi (U.P.). email id: juglan@gmail.com

effects of the vibrant release of energy.[3,4]

In Gwalior region of Central India firearm culture is very old with known in famous dacoities and kidnaps including social stigmata's and pride. However, no scientifically assembled datas exists in this regard.

The present study was done to study various epidemiological parameters related to firearm injuries to quantity the magnitude of problem as existing in the society.

## Aims and Objectives

The present study was undertaken to find various epidemiological markers related to firearm injuries as follows:

- To study the sex wise distribution of firearm cases.
- To study age wise distribution of firearm cases.
- To find out the location of firearm injury cases (rural settings/urban happenings).
- To study the type of weapon used.
- To study the motive behind the firearm injury cases.
- To study the intra-day distribution of firearm cases.
- To study the site of firearm injury cases.
- To know the number of shots associated with firearm cases.

## Methodology

This study was done retrospectively analysing the medico-legal post-mortem reports of firearm injury cases in last five years from January 2015 to December 2019 brought for autopsy at mortuary of Gajra Raja Medical College, Gwalior (M.P.). All firearm injury cases which witnessed spot death and were brought for examination with virgin firearm wounds and without any exploration were incorporated in the present study. Maximal para-death information was collected based on history (if available), spot examination reports, police information, panchnamas, requisition papers, final reports produced by police, weapon reports and personal information of the deceased as received from the relatives. Decision as regard to type of firearm was based upon the detailed examination of wounds, status of burning, blackening, tattooing around the wound, opinion of the ballistic experts. Classification of injury as homicidal, suicidal or accidental was based upon close and detailed analysis of all available documents. In few cases were no opinion could be arrived at were labelled as uncertain.

## Results

A total number of 70 cases of death due to firearm injuries were analysed. Out of 70 cases only 59 cases were of males and 11 cases were of females. Maximum number of cases (31 cases) were reported to be in the age group 21-30 years, in the age group 11-20 years there were 14 cases, 11 cases in group 31-40 years while 10 cases were reported in 41-50 years age group. No cases were reported in age range 61-90 years and one case was reported between 91-100 years of age. Of all the cases studied, 37 injury cases (52.86%) were from distant range, 24 (34.29%) from close range and 9 cases (12.86%) were from contact range.

**Table 1 : Distribution of cases according to gender**

| Gender | No. of cases | Percentage |
|---|---|---|
| Male | 59 | 84.29 |
| Female | 11 | 15.71 |
| Total | 70 | 100 |

**Table 2 : Distribution of cases according to age**

| Age group (yrs) | No. of cases | Percentage |
|---|---|---|
| 1-10 | 1 | 1.43 |
| 11-20 | 14 | 20 |
| 21-30 | 31 | 44.29 |
| 31-40 | 11 | 15.71 |
| 41-50 | 10 | 14.29 |
| 51-60 | 2 | 2.86 |
| 61-70 | 0 | 0 |
| 71-80 | 0 | 0 |
| 81-90 | 0 | 0 |
| 91-100 | 1 | 1.43 |
| Total | 70 | 100 |

A total of 26 cases were from country made weapons while 24 cases were from rifled firearms and remaining 15 cases were by shot guns, in 5 cases the type of weapon remained unidentified. In the greater majority of cases i.e. 54 (77.14%) there was single injury mark present while in 16 cases (22.86%) multiple injuries marks were present. A total of 37 cases (52.86%) were from rural background while 33 cases (47.14%) were reported from urban areas.

**Table 3 : Distribution of cases according to types of weapon**

| Nature of weapon | No. of cases | Percentage |
|---|---|---|
| Rifled | 24 | 34.29 |
| Shot gun | 15 | 21.43 |
| Country gun | 26 | 37.14 |
| Unidentified | 5 | 7.14 |
| Total | 70 | 100 |

Head including face was by far the most important site of injury with 26 cases (it included both distant range shots and contact blasts) followed by thorax including 17 cases. Neck was the site of injury in 8 cases. Seven cases of death due to firearm injuries over extremities were recorded. Spinal column turned out to be the least common site involved with 3 cases in the present study.

**Table 4 : Distribution of cases according to location of site**

| Location of site | No. of cases | Percentage |
|---|---|---|
| Abdomen | 9 | 12.86 |
| Thorax | 17 | 24.29 |
| Head and face | 26 | 37.14 |
| Neck | 8 | 11.43 |
| Limbs | 7 | 10 |
| Spine | 3 | 4.29 |
| Total | 70 | 100 |

Property dispute in families was by far the most commonest reason for reported firearm injuries (37 cases). Personal revenge and extra-marital affairs amounted to second most commonest cause of firearm injuries (12 each). Impulse and harsh fire respectively were there in 4 and 2 cases. Three cases were reported whereby robbery was the underlying intent.

**Table 5 : Distribution of cases according to motive**

| **Motive** | **No. of cases** | **Percentage** |
|---|---|---|
| Extra marital affair | 12 | 17.14 |
| Disputed ancestral property | 37 | 52.86 |
| Revenge | 12 | 17.14 |
| Impulse rage | 4 | 5.71 |
| Harsh fire | 2 | 2.86 |
| Robbery | 3 | 4.29 |
| Total | 70 | 100 |

A maximum number of 24 cases of firearm injuries were observed from 6 p.m. - 12 midnight followed by 22 cases from 12 midnight to 6 in the morning. From 12 noon to 6 p.m. a total of 13 cases were observed and least number of cases in the study were recorded from 6 a.m. to 12.00 noon.

**Table 6 : Distribution of cases according to time**

| **Time** | **No. of cases** | **Percentage** |
|---|---|---|
| 12 mid night to 6 am | 22 | 31.43 |
| 6 am to 12 noon | 11 | 15.71 |
| 12 noon to 6 pm | 13 | 18.57 |
| 6 pm to 12 mid night | 24 | 34.29 |
| Total | 70 | 100 |

On overall analysis of the data a total of 40 cases (57.14%) turnout to be homicidal, 15 cases (21.43%) were of suicidal nature while in 15 cases (21.43%) the dilemma remained and they were categorized uncertain.

## Discussion

Gun shot injuries due to firearms is a world wide phenomena. Globally such injuries have been reported in almost each and every part of the world. From Sub-Saharan Africa[5,6] to United States[7] from United Kingdom[8] to Pakistan[9] there are reports of firearm injuries. Homicidal and suicidal firearm injuries are commonly reported from developed countries.

As per latest data, India ranks third all over the world in firearm related deaths, next only to Brazil and United States. Nearly 9 in 10 killed in India were men and most commonly involved people aged 20-24 years.[10]

According to the United Nations Organizations, young males were more vulnerable to the victims of such violent crimes due to their high risk taking behaviours ranging from street quarrels to drugs, from possession of weapons to gang memberships.[11]

In our study, males out numbered females with male:female ratio 5.36:1. More so, relatively young people in the age range of 11-30 years were victims in the largest proportions. Similar results were obtained in the study conducted by Fazle Ras Malik et al.[12]

Country-made weapons were the most common type used to produce gun shot wounds. Similar results were obtained in the study conducted by Fazle Ras Malik et al[12] and Sangeeta Kumari et al[2]. In developed countries most common firearm weapon are rifled guns. A possible reason for such difference is because there is easy availability of local manufacturers of country made weapons and shot guns in developing countries like ours as against extra technically sound rifled weapons. Also, it is rather easier to get license of shot guns. Sangeeta Kumari et al[2] reports that 55% of cases were from rural background. In our study also a total of 37 of 70 cases were from rural background while 33 cases were from urban areas among to a total of 52.8%.

In our study, mostly shots were aimed from distant range in majority of cases. In study by Sachan R et al[13] close range was found to be the commonest. However, in our study close range was the next after distant range. 7 cases of contact blast were also observed in our study.

Majority of cases in our study were homicidal deaths. These included deaths from distant range and close range combined together. A total of 15 cases could not be labelled as homicidal/suicidal. In the study by Fazle Ras Malik et al[12] too the homicidal cases outnumbered other manners of death. Sangeeta Kumari et al[2] reports 'homicidal' as the most commonest manner of death. Kohli et al[14] and Singh BP et al[15] reports similar observations. In most of such homicidal cases single site entry wound/injury marks were present. However, in 16 cases there were multiple injury marks which were due to firearm injuries associated with assault. In the study by Brain Guetsclow et al[16] suicidal deaths outnumbered homicidal deaths in past 30 years experience in United States.

According to Hagras et al[3] most firearm injury cases happened during night. Second in line were reported in afternoon while others were reported in morning. In our study also most of the cases were observed at night. According to Sangeeta Kumari et al[13] 50% of the cases were observed in night.

Sachan R et al[13] reported that property dispute were the underlying cause in most of the cases to be followed by incidences like dacoities and personal animity. This is in alignment with the present study were disputed ancestral property issues were the commonest of all reasons for firearm fatalities in our regions. Also, most of these cases were reported from relatively rural background and familial rivalries were seen transcending through generations. This in turn is also attributable to easily availability of country made weapons.

Revenge and extra-marital affairs was yet another of an important reason underlying firearm injury cases in present study. However, the trend here was more often observed from relatively urban areas and more often then not were seen caused by rifled weapons. Impulse rage and harsh fire were also observed in the present study.

Similar findings were observed by Iram Khan et al[17] whereby they observed family feud to be the commonest of all reasons for firearm related deaths. Conflict and robberies were amongst the next few causes in this study.

In the present study head including face turned out to be the commonest involved site in firearm injuries cases. An equal number of cases of injury to thorax and abdomen when combined together were observed in the study. Regional injuries over neck, limbs and spine were amongst other bodily location observed. Head and face were more commonly involved in gun shot injury cases with suicidal manners while thoracoabdominal involvement was more commoner in distant range shots with homicidal manner. This is in accordance with the principle of common knowledge that head (face and temple) are the sites of easiest access for suicidal attempts. Also, due to greater surface area available thoracoabdominal injuries are more often involved in distant range shots.

In the study by Iram Khan et al[17] similar results were obtained as they mention head and neck region to be the most preferred location for execution of suicidal ideations while relatively broad areas of trunk (chest + back + abdomen) providing greater available surface for aiming to be most commonest location in homicidal infections.

In a study in Saudi Arabia[18] head and chest was found to be a common site for firearm entrance wounds. According to Hussain et al[9] head and neck injuries accounted for most deaths attributable to firearms.

## Conclusion

The present study highlights the facts that in the developing country like ours homicidal firearm injuries are more than suicidal ones as against the trends in developed countries. Male gender, young age alongwith easy availability of country made firearm weapons account for most mortality. Underlying cause of such inflictions includes trivial fights with minimal provocation to more sinister family feuds, continuing generations, mingled with elevated sense of pride in a society, full up of social/familial stigmatas. Though, cases were found distributed all throughout the day, night were more suited for silent and easy execution of such intends which, at least, can be partly attributable to intoxication. Involvement of vital cavities of body including cranium, chest, abdomen and visceral organs therein make it easier for the perpetrator to materialize their motives with ease.

Given the ever increasing trends of firearm injuries, it is of utmost important that government authorities put a strict vigilance and control over assemblage, production, distribution, circulation and licensing of such deadly weapons coupled with stringent measures to curb such menace with commitment. On the other hand, strengthening the social fabric and reducing interpersonal conflicts are to be attempted as social levels to change the mindset of the people in general.

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