

Frequency of Firearm Injuries, Deaths and Related Factors in Kanpur, India; an Original Study with Review of Literature

Sachan R¹, Kumar A^{2*}, Verma A³

¹Govt. Medical Officer Kanpur

²Addl. Prof. Forensic Medicine and Toxicology

³Associate Prof. Neurology, U.P. RIMS & R Saifai, Etawah, India

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Background: Studies on fatal firearm injuries have been published in various countries. However, their pattern and incidence in various regions of India has largely gone unreported.

Methods: Present study was conducted to evaluate fatal firearm injuries, their pattern, associated factors, cause of death and postmortem findings among their victims referred to the mortuary of Kanpur medical college and comparing it with the pattern seen in other countries.

Results: Sixty six firearm fatalities autopsied during the August 2008 to July 2010 were studied. 92% were victims of homicidal attacks, 2% suicidal and 2% accidental. In 4% deaths motive could not be ascertained.

Conclusion: This is in sharp contrast to the pattern seen in other countries where suicides were the predominant group. In maximum cases, illegal country made firearms was involved with the norm of single firing. Abdomen (39%) and head (30.30%) were the two most common entry sites for the bullets, a pattern somewhat similar to that of other countries. Survival time, cause of death and motives of incidence were also studied.

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► *Implication for health policy/practice/research/medical education:*

Firearm Injuries, Deaths and Related Factors

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1. Introduction:

Violent injuries are the eighth leading cause of death, worldwide (1). Besides high death toll firearm injuries cause

Corresponding author: Kumar A, MD.

Addl. Prof. & Head, Forensic Medicine & Toxicology

U.P. Rural Institute of Medical Sciences & Research

Saifai, Etawah – 206130 (U.P.) India.

E-mail: drsalok@rediffmail.com

significant morbidity, long-term physical and psychological disability for individuals, families, communities and societies (2).

The incidences of violent crimes with gunshot injuries have become increasingly more common, reflecting the deterioration of law and order in our society. These are common in the low and middle income

countries. In 2000, the rate of violence-related death in low to middle-income countries as a whole was more than twice that in high-income countries, although rates vary between regions and within countries (3).

In a US study including 3049 patients treated at a trauma center, there were 1347 stab wounds and 1702 gunshot wounds; clearly signifying the contribution of Firearm-related injuries (4). In 2010, guns took the lives of 31,076 Americans in homicides, suicides and unintentional shootings. This is the equivalent of more than 85 deaths each day and more than three deaths each hour (5). Gun related violence is the most common in poor urban areas and in conjunction with gang violence, often involving juveniles or young adults (6, 7). In the United States, the risk of death from firearms injuries versus death by RTA is relatively high (8, 9). On the other hand, in European countries; rates of death from firearm injuries are lower. In Sweden, for example, the mortality rate due to firearm injuries is about 200 per year, mainly due to suicides (10). The same is true for Finland (11) and Denmark (12). In Egypt in 2000, there were about 117 fatal cases (83 accidental, 18 suicides, and 16 homicides) (13).

A retrospective study from Brescia (Northern Italy) analyzes post-mortem examination data of 164 firearm-related casualties. This study revealed that the 2006 firearm-related mortality rate amounted to 0.84 per 100,000 residents, with an average of 12.6 cases per year (14).

Compared to firearm fatality rates in much of the world, India's are not particularly high. In 2008, India officially reported a national firearm murder rate of 0.36 per 100,000 people against an average national murder rate of 2.8 murders per 100,000 people annually (15). Equivalent to roughly one-tenth of the rate of firearm murders in the United States, India's rate is instead comparable to much of Europe's (16).

India's rates of violence vary greatly and in majority of firearm related injuries illegal, unlicensed weapons are used. As at 2006, India was home to roughly 40 million civilian firearms, out of an estimated 650 million civilian owned guns then believed to exist worldwide (17). But only 6.3 million (just over 15 per cent) are licensed (18). In the capital Delhi alone, the number of illegal firearms were estimated to be at 300,000 (19).

These figures convey a sense of relative scale between legal, illegal, and overall Indian civilian gun ownership. Unlicensed weapons are not only the most common, but also appear to be the most lethal, both overall and individually. They account for 86 to 92 per cent of reported firearm-related murders, depending on the year. They are the logical target for more aggressive efforts to reduce firearm-related death and injury (20). Firearm injuries are invariably associated with a high degree of mortality and morbidity; rarely they remain asymptomatic or give delayed manifestation. Such a case of firearm injury without any remarkable expression is an extremely rare event (20). Despite of these dreadful facts, relevant studies, data and information are sorely lacking, particularly in the Kanpur region of central India where incidence and pattern of firearm fatalities have not previously been studied. This paper is aimed at determining the cause of death and injuries caused by firearms. The objective of the study is to outline the pattern of firearms injuries and deaths in this area and compare it with the pattern seen in other parts of the world.

2. Materials and Methods:

The materials for this study comprised all firearm fatalities, presented to the mortuary of the GSVM medical college Kanpur, during the period of study i.e. August 2008 to July 2009. Our study attempted to define the circumstances, motives, extent and severity of firearm-related injuries in their victims. All firearm death records were thoroughly reviewed for the following information:

- Demographic data of the victim and time interval between incidence, death and postmortem examination
- Examination of the characteristics of firearm injuries like range and number of entry/exit wound
- The type of weapon used and the cause of death.

The study included the cases in which the death was immediately occurred after infliction of injury i.e. spot death or death was on the way to hospital in the second situation. In the third situation the victim died after hospitalization, with or without surgical intervention. So in all the three situations the body was sent to mortuary for postmortem examination. A detailed history was taken from attendants or the persons accompanying the dead body. Police papers like, inquest report (*Panchnama*) was thoroughly studied and relevant findings were noted at same time. This is a descriptive study and data of 66 cases of deaths due to firearms were recorded, compiled and analyzed.

3. Results:

Total 3154 dead bodies were brought to mortuary of LLRHospital for postmortem examination during the study period i.e. from August 2008 to July 2010. Out of these 3154 unnatural deaths 66 (2.09 %) deaths were due to fire arm injuries.

Out of total 66 cases of firearm fatality 21 (31.82%) died instantaneously i.e. spot deaths or within one hour. While 22 cases (33.33) expired between 1–12 hours. 8 (12.12) cases died between 12 -24 hours. Only 9 cases survived for more than 3 days.

In 38 cases (57.57) autopsy was done within 12 hours, 17 cases were examined between 12-24 hours, while time passed science death was more than 24 hours in 11 cases.

The cause of death was determined by a thorough postmortem examination, history given by the relatives, and clinical case sheets. In 51 (77.27%) cases cause of death was shock and hemorrhage, injury to

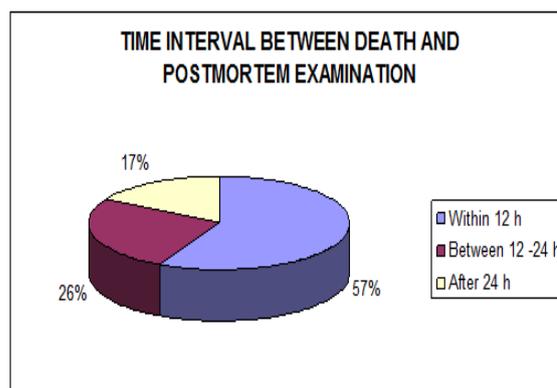


Fig. 1. Distribution of cases according to the time taken for PM examination.

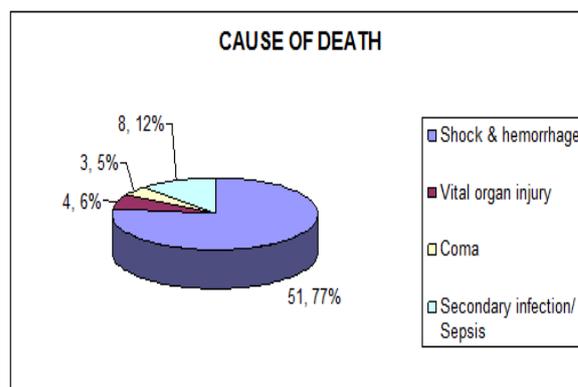


Fig. 2. Distribution of cases according to the cause of death.

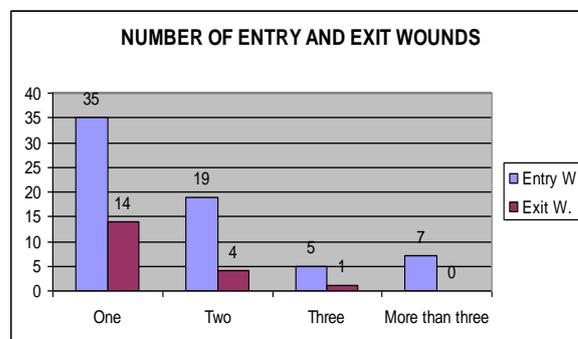


Fig. 3. Distribution of cases according to the number of entry and exit wounds.

vital organs contributed for 4 (6.06 %) cases. 8 deaths resulted due to secondary infection like peritonitis etc.

In maximum number (60.60%) of cases the fire was close range (40 cases out of 66), contact range fire could be seen only in two cases. Fire was from distant range in 11 (16.67%) cases while range was not determined in 13 (19.70%) cases.

Dispute over property was underlying in 18 (29.51%) cases. While 13 (21.31%) cases were victim in incidence like dacoity

Table 1: Showing time interval between fire arm injuries and death.

S. No.	Time interval	Number	Percentage
1.	Instantaneous (within 1 h.)	21	31.82
2.	Within 12 h.	22	33.33
3.	Between 12 – 24 h.	8	12.12
4.	Between 1 -3 days	6	9.09
5.	More than 3 days	9	13.64
	Total	66	100.00

etc. personal enmity contributed for fire arm deaths in 8 cases (13.11%) while group quarrel resulted in 14 (22.95%) deaths.

Entry wounds were analyzed on the basis of their characteristics appearance to naked eyes, presence of blackening. Scorching, tattooing and singeing were in cases of close range fire at the same time presence of inverted margins and abrasion color etc. in distant range fire.

4. Discussion:

Firearm Injuries are commonly encountered and a major health problem that severely affects the criminal justice and health-care systems. Studies from the United States and other developed countries reported that firearms are used in more than 60% of all homicides, over 25% of all assaults, more than 35% of all robberies and almost half of all suicides (21).

For 2008, the NCRB reports a total of 4,101 people murdered by firearms in India, or 12.2 % of all 33,727 murder victims that year (15). The total number of reported firearm victims-including suicides and accidental deaths-was 6,219. Murders constituted the largest proportion (66%) of all firearm deaths followed by suicides and accidental deaths (34%) (15). In 2008 the state of Uttar Pradesh reported the highest

incidence of murder cases of all states for the year, with 4,564 reported from all causes, accounting for almost 14 per cent of total cases in the country. This one state represented just fewer than 36 per cent of the victims murdered with firearms nationally. Uttar Pradesh, Bihar, and Jharkhand together accounted for 62.4% of all victims killed by firearms in 2008. This rate was undoubtedly affected by the easy availability of illegal firearms in these states, yet it also reflects political violence, caste conflicts, and Naxalite attacks, in all of which the use of firearms is common (22). Despite the magnitude of this problem, little is known about their epidemiologic characteristics especially in central India, where this study was performed.

Our studies show that out of 3154 unnatural deaths 66 (2.09 %) deaths were due to fire arm injuries, which is higher as seen in a study of firearm fatalities in Delhi which finds 107 firearm fatalities (1.5 %) among a total of 7,034 autopsies performed (23). Out of total 66 cases of firearm fatality 21 (31.82%) died instantaneously i.e. spot deaths or within one hour. While 22 cases (33.33%) expired between 1-12 hours. 8 (12.12%) cases died between 12-24 hours. Only 9 cases survived for more than 3 days. 92% were victims of homicidal attacks, 2% suicidal,

Table 2: Showing motive of incidence.

S. No.	Motive	Number	Percentage
1.	Dispute of property	18	29.51
2.	Dacoity / robberies	13	21.31
3.	Personal enmity	8	13.11
4.	Group quarrel	14	22.95
5.	Police encounter	1	1.64
6.	Sexual jealousy/ love affair	4	6.56
7.	Unknown	3	4.92
	Total	61	100.00

and 2% accidental and in 4% deaths, motive could not be ascertained. This is in sharp contrast to the pattern in other countries where suicides were the predominant group and homicides accounted for a small number of cases.

In another study, death occurred in hospital and during the transfer to the hospital in 14.5% and 7.4% of the cases, respectively and 70.9% of the victims had a single entrance wound site and most common site was head (39.2%) (24).

In 38 cases (57.57%) autopsy was done within 12 hours, 17 cases were examined between 12 -24 hours, while time passed since death was more than 24 hours in 11 cases. In 51 (77.27%) cases cause of death was shock and hemorrhage, injury to vital organs contributed for 4 (6.06 %) cases. 8 deaths resulted due to secondary infection like peritonitis etc. In maximum number (60.60%) of cases the fire was close range (40 cases out of 66), contact range fire could be seen only in two cases. Fire was from distant range in 11 (16.67%) cases while in 13 (19.70%) cases range could not be determined.

Dispute over property was underlying in 18 (29.51%) cases. While 13 (21.31%) cases were victim in incidence like dacoity etc. personal enmity contributed for fire arm deaths in 8 cases (13.11%) while group quarrel resulted in 14 (22.95%) deaths. Abdomen was involved in 32 cases (48.49%), whereas head and neck region was involved in 20 cases (27.27%). Injury was present on thorax in 18 cases. Upper extremity was involved in 9 (13.62%) cases while lower extremity was involved in only 7 (10.60%) cases.

In a study in Dammam, Saudi Arabia, The most common sites for the firearm entrance wounds were the head (45 cases) and the chest (35 cases). In the majority of cases (56.3%) a single shot was fired while in 15.6% of cases there were two shots. In 51.5% of cases no bullet was recovered from the body while a single bullet was recovered in 31.5% and two bullets in 6.2% of the cases. Distant range fire was observed in 65.6% of cases. Exit wounds were found on the head in 36.7% and on the chest in 28.7% of cases (25).

In a Sri Lankan study, Almost half of the firearm homicides (47%; N=39) were

associated with previous enmity, while 33% (N=27) were due to ethnic rebel killings. The weapon of choice was a rifled firearm(98%). While 70% of war-related deaths had one or two fatal shots, either to the head or chest, homicides motivated by personal enmity had multiple wounds, with an average of 5.7 fatal shots per victim. This study demonstrates that firearm homicides in Sri Lanka mainly involve young men and that when related to arm conflict the fatal injury usually consists of a single shot to the head or chest (26).

Our results are in partial agreement with preliminary study of firearm injuries and death in Qena Governorate in Egypt reported that the most common site of entrance wounds was the chest and the abdomen, representing 23.3% and 22.3%, respectively (27). Also, in a similar study in El-Fayoum Governorate, the most common site was the chest (21 cases; 29.6%), followed by the abdomen and the head (18 cases each; 25.4%), then back (6 cases; 8.5%) and finally the mouth in one case (1.4%).²⁰ In Turkey, the most common site for entrance wounds is the chest, representing 32% of the total firearm injuries (28). In Dammam, Saudi Arabia, the most common sites of firearm injury were the head (36.7%) and the chest (28.7%) (29). It can be said that in homicide deaths, the assailant tends to hit the victim in a fatal area such as the chest or head.

Our findings are in partial disparity with a retrospective study in Egypt where. The most common site of injury was the chest (67 cases; 25.0%), followed by head injuries in 53 cases (19.8%). In 38 cases (14.2%), the site of injury was the chest and abdomen; and in seven cases (2.6%), the site of injury was the mouth, all of which were suicides. In 24 cases (9.0%), the site of injury was the upper limbs; and in 12 cases (4.5%), the site of injury was the lower limbs (30).

It can be explained as a persons who commit suicide tend to shoot themselves in dangerous areas such as the head and the mouth, but in accidental injuries or in

cases in which assailants use firearms only to threaten, victims are usually injured in a less dangerous site such as the upper or lower limbs.

In contrast to the findings of US and other developed countries, the use of firearm in suicides is negligible. After accidents and maternal mortality; suicide is the leading cause of death among the young in India, in fact it is the third leading cause of death in age group 15-44 years (31), but the method of choice is ingestion of poison, mainly pesticides like Organophosphates (most common in India), Organochlorines, and Aluminium Phosphide compounds; which are an integral part of agriculture & are readily available at a cheap rate (32). Though the trends of poisoning are being changed and people are looking for the newer compounds (33), resulting into emergence of rare toxicities like Imidacloprid, Pendimethalin, and Pencycuron poisoning (34); still fire arms are not in vogue for suicidal purposes.

In our study, locally made shotguns were responsible for maximum 58 (87.87%) casualties. These illegal firearms are commonly used in criminal cases in developing countries (27).

In India, most of the victims of firearm murder are killed by unlicensed firearms. According to the NCRB, only 14 per cent of the murder victims in 2008 were killed by licensed firearms (15). Unlike licensed firearms, unlicensed weapons are generally craft-made and fire single shots; assailants can dispose of them easily and without much loss. They typically cannot be traced to any owner or by ballistic fingerprinting. They are very cheap and are readily available for criminals. Also, obtaining a licensed firearm is difficult. These features make unlicensed firearms ideal for criminal use. Firearms are made in the country blunt submitted by non-standard caliber cartridge two or more of the instrument. Projectiles used in firearms manufactured domestically are not subject to the fixed standards in the manufacture. The construction of these firearms is so poor that the fired cartridges can be easily

distinguished from the very distinct markings found on them. These firearms are not very effective in the long run and are unreliable, due to their poor quality and cheap material (35). Assailants tend to buy cheaper homemade guns. No licenses are given out to them, so tracing gun ownership is almost impossible. Being cheap, they also get damaged and are often discarded after the crime. Hence, it becomes easier to commit crimes and flee without being detected. Magnitude of crimes involving firearms indicate that firearms are sold legally and illegally across the country without a lot of control (36).

There is a powerful correlation between the acquisition of a firearm and its use in suicides, murders, assaults, and unintentional deaths. As a result of the invention of more advanced firearms and availability at the global level, death rates due to firearm injuries have increased dramatically (21). These results support the argument that rigorous pursuit of campaign firearms without a license and arresting them is useful in reducing the number of firearm deaths in society.

Educational efforts, and individual, community and societal approaches are needed to alleviate firearm-related injuries. This paper provides valuable information on firearm-related injuries in a low-income setting. In addition, it provides some of the approaches to prevent these kinds of injuries.

5. Conclusion:

Our study and other research on firearm injuries prove that certain changes may minimize mortality, disability, and costs to the community. There is a need to decrease the number of firearms used and sold in India. We need to eradicate illicit local community gun manufacturing units. It is obvious that private gun ownership should be strictly limited and the illegal availability should be prevented. Elimination of these illegal countries made fire arms is of the utmost importance in

order to curb the high homicidal firearm fatality rate in this region.

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