

A Prospective Study of Gunshot Injuries among the Patients Admitted to the Emergency Department

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Abstract

Background: Increased incidence of firearm injuries in developing countries has been attributed to poverty, unemployment, political instability, lack of education and unequal distribution of wealth. It is one of the important causes of morbidity and mortality in our country.

Material and methods: This prospective study was conducted at Jawaharlal Nehru Medical College Hospital, AMU, Aligarh in the department of Forensic Medicine and in the Trauma and Emergency department between October 2018 to September 2020. 130 patients of Gunshot injuries were included after obtaining informed consent.

Results: Males (n=115; 88.46 %) were the predominant victims of gunshot injuries while female patients comprise of 11.54 % (n=15) only. Male to female ratio was 7.67:1. Majority (n=115; 88.46 %) of the gunshot injury cases were the result of homicidal motive. Lower (n=50; 35.46 %) and upper extremities (n=41; 31.53 %) were the most common sites of injury.

Conclusion: 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.

Keywords: Gunshot, Country made Guns, Illegal Weapons

Introduction

Firearm injury is one of the important causes of morbidity and mortality in our country. There has been a continuous increase in the incidence of these injuries in recent years because of an ease

of availability of illegal sophisticated modern and country made guns and ammunition nowadays in the illegal market. In 2016, India officially reported total national firearm murder cases 3775 (12.39%) out of 30450 homicidal deaths which was around 10.5 % in 2015.¹

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Incidences of interpersonal violence, dacoity, robberies, terrorism, have shown to adopt these new weapon as a choice as they are small, lethal and handy to use from a distance. Accidental shooting deaths from people firing guns into the air have become so common at weddings in the National Capital Region (NCR) area that firearms have been banned by some villages in the region at marriage celebrations. Prohibition or restriction by the government's law enforcement agencies find it difficult to curb these weapons.

According to statistical data of National Crime Record Bureau, number of victim murdered by firearm during 2014 in India were 3655, out of which 540 killed by licensed firearm and 3115 killed by unlicensed firearm. In 2016, a total of 3775 victims were murdered by using firearm weapons out of which 3453 were non licensed weapons.¹

Increased incidence of firearm injuries in developing countries has been attributed to poverty, unemployment, political instability, lack of education and unequal distribution of wealth.² Easier availability of handguns and rifles is rising and as a result there is a rise in gunshot wound victims seen at hospitals.³

Examination of the victim of firearm injuries need to ascertain the characteristics of entry wound such as muzzle imprint, burning, smudging, tattooing or stippling and the collar of abrasion. The exit wound will not show these characteristics, except the everted margins of different sizes. With the above background knowledge of firearm injuries and its consequences on the patient and society, the present study was conducted to study the present state of patients presenting with gunshot injuries reporting at Jawaharlal Nehru Medical College, Aligarh Muslim University, Aligarh and to study the impact on healthcare system and the society at large.

Material and Methods

This prospective study was conducted at Jawaharlal Nehru Medical College Hospital, AMU, Aligarh in the department of Forensic Medicine and in the Trauma and Emergency department between October 2018 to September 2020. Written consent was taken from the victim or family member for inclusion in the study. Medicolegal details were recorded as per the prepared proforma which included name, age, gender, address, qualification, history of the incident including details of assailant, act and weapon; vitals, GCS score and brief systemic examination findings; Site, type, size of the gunshot wounds along with other features were noted

Inclusion Criteria

1. Patients or his/her relatives giving informed Consent for inclusion in the study.
2. Patients of all age groups.
3. Patients with gunshot wounds in any part of the body.

Exclusion Criteria

1. Patient or his/her relatives not giving consent for inclusion in the study.
2. Patients brought dead to the Casualty.
3. Patients of trauma without gunshot injury.

Results

This prospective study was carried out at Jawaharlal Nehru Medical College hospital, Aligarh Muslim University, Aligarh from October 2018 to September 2020. 130 patients of Gunshot injuries were included after obtaining informed consent. These patients presented to Emergency department of JNMCH for treatment during the study period.

Table 1: Distribution of patients on the basis of age and sex

Age Group	Males	Females	Total	Percentage
0-10 Yrs	3	0	3	2.30%
11-20 Yrs	16	4	20	15.38%
21-30 Yrs	37	2	39	30%
31-40 Yrs	32	4	36	27.69%
41-50 Yrs	17	3	20	15.38%

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51-60 Yrs	8	1	9	6.92%
61-70 Yrs	1	1	2	1.53%
> 70 Yrs	1	0	1	0.76%
Total	115 (88.46 %)	15 (11.53 %)	130	100

Table 1 shows the distribution of patients of gunshot injuries on the basis of age and sex. Age of the patients ranges from 2½ to 75 years. Peak incidence was observed in age group 21-30 years comprising of 30 % (n=39) of the patients. 27.79 % (n=36) of the patients were in 31-40 years age group. Next common age groups were 11-20 years and 41-50 years comprising of 15.38 % (n=20) patients each. There was only 1 patient (0.76 %) in >70 years age group. Mean age for gunshot victim was 32.16 ±12.85 years. Males (n=115; 88.46 %) were the predominant victims of gunshot injuries while female patients comprise of 11.54 % (n=15) only. Male to female ratio was 7.67:1.

Table 2: Distribution of patients on the basis of educational status

Educational status	No. of patients (n=130)	Percentage
Illiterate	4	3.07%
Primary school	12	9.23%
Middle school	30	23.07%
High school	27	20.76%
Intermediate/ diploma	27	20.76%
Non-professional graduates	25	19.23%
Professional graduates	4	3.07%
Above graduate	1	0.76%

Table 2 shows that maximum number (n=30; 23.07%) of victims were having middle school qualification. Number of victims having high school and intermediate qualification were 27 (20.76 %). 22.30 % (n=29) of the victims were having graduate level qualification out of which 4 patients (3.07 %) were having professional qualification (B.tech, BBA, BCA, etc). Twelve (9.23 %) patients were having primary school qualification. Least number of victims were of illiterate class (n=4; 3.07 %) and above graduate class (n=1; 0.76 %).

Table 3: Distribution of patients on the basis of motive of gunshot injury

Motive of injury	No. of patients (n=130)	Percentage
Homicidal	115	88.46%
Accidental	7	5.38%
Suicidal/Self inflicted	1	0.76%
Caught in cross firing	4	3.07%
Not known	3	2.30%

Table 3 show that majority (n=115; 88.46%) of the gunshot injury cases were the result of homicidal motive. In 7 (5.38 %) cases, there was no motive to cause injury but injury was caused due to accident (mishandling, party fire). Four (3.07 %) patients were caught in cross firing and sustained gunshot injuries. In one (0.76 %) case, patient inflicted gunshot injury to himself. In 3 cases, motive was not known.

Table 4: Distribution of patients on the basis of ammunition

Ammunition	No. of patients (n=130)	Percentage
Bullet (Rifled)	103	80%
Pellets (Shotgun)	26	19.23%
Airgun	1	0.76%

Table 4 show the distribution of patients on the basis of ammunition used to cause the injury. In 80 % (n=103) of the cases, it was bullet that caused the gunshot injury and hence rifled firearm might have been used to fire the bullet. In 26 (19.23 %) cases, gunshot injury was caused by pellets fired from a shotgun firearm. In one (0.76 %) case, it was an airgun pellet that caused the injury to a boy while playing with friends.

Table 5: Distribution of patients on the basis of number of entry and exit wounds

Number of entry & exit wounds	No. of patients	Percentage
Single entry wound (Bullet)	96	73.84 %
Double entry wounds (Bullet)	2	1.53 %
Multiple pellets entries	26	20 %
Single pellet entry	1	0.76 %
Graze	5	3.84 %
No exit wound	75	57.69 %
Single exit wound	49	37.69 %

Table 5 show the distribution of patients on the basis of number of entry and exit wounds. In 96 patients (73.84 %), there was a single entry wound. In two cases (1.53 %), 2 entry wounds were identified. In 26 cases (20 %), there were multiple pellet entries. In 5 cases (3.84 %), a graze wound was identified which was caused by the passage of bullet tangential to the skin. In one case (0.76 %), only one pellet was found that was fired from an airgun. In 49 cases (37.69 %), there was one exit wound while in 75 cases (57.69 %) there was no exit wound. In one case (0.76 %), there were more than one exit wounds.

Table 6: Distribution of wounds on the basis of features of entry wound

Features of entry wound	No. of wounds (n=105)	Percentage
Muzzle impression	0	0 %
Burning	5	4.76 %
Blackening	11	10.47 %
Tattooing	35	33.3 %
Abrasion collar	27	25.7 %
No feature	52	49.5 %

Out of the total 105 bullet wounds (100 entry wounds plus 5 graze wounds), there were 35 wounds (33.3%) in which tattooing was seen. Blackening was seen in 11 entry wounds (10.47%) and Burning was seen in 5 entry wounds (4.76%). Muzzle impression was not found in any of the entry wound which means that there was no patient in which shot was fired with gun in contact with the skin. Abrasion collar was seen in 27 entry wounds (25.7%). In remaining 52 entry

wounds (49.5%) there was none of these features was present as depicted in table 6.

Table 7: Distribution of patients on the basis of site of injury

Site of injury	No. of patients (n=130)	Percentage
Head, Face and Neck	12	9.23%
Chest	19	14.61%
Abdomen	20	15.38%
Upper extremity	41	31.53%
Lower extremity	50	38.46%
Back	12	9.23%
Multiple sites	18	13.84%

Table 7 show that lower (n=50; 35.46 %) and upper extremities (n=41; 31.53 %) were the most common sites of injury. Next most commonly injured sites were abdomen (n=20; 15.38 %) and chest (n=19; 14.61 %). Injury to multiple sites was seen in 18 (13.84 %) cases while injury to Head, neck, face (n=12; 9.23 %) and back (n=12; 9.23 %) was least commonly seen.

Table 8: Distribution of patients on the basis of final outcome

Final outcome	No. of patients	Percentage
Discharge	126	96.90%
Death	3	2.31%
Referred	1	0.76%

Table 8 shows the distribution of patients on the basis of final outcome. 126 patients (96.9 %) were discharged after treatment in the hospital. One patient (0.76 %) was referred to higher centre while 3 patients (2.31 %) died during their treatment in the hospital.

Discussion

Firearm injuries are commonly encountered and are a major health problem that severely affects the criminal justice and health-care systems. Violence is among the leading causes of death worldwide. Young males are the usual victims. Loss of the country's youth results in loss of energetic workforce posing a great economic burden on the society and economy.

Our study showed that majority of the victims were males (88.46 %). In other studies, the males affected were in the similar range.^{4,5} In our study, the victims between 21-40 years were found to be most commonly victimized. It is consistent with most of the studies conducted in India and other parts of the world.^{6,7,8} The youngest victim of the present study was a child of 2½ years and the oldest victim was of 75 years of age. The finding of high proportion of firearm related injuries among males could be due to their gender role which compel them to be more exposed to the outside environment than females. They are more often involved in interpersonal violence and are perpetrators of civil conflicts.

Throughout the world, the motive is homicidal in majority of cases of gunshot injuries. In our study also, in majority of cases (88.46 %), the motive was homicidal followed by accidental (5.36 %) and suicidal (0.76 %). Our results regarding suicide are in contrast with the studies done in developed countries by Natthida Owattanapanich et al⁹ in US(2020)- 17 %. In India also, cities like Mumbai⁷ and Pune⁵ have a higher suicide rate by firearms.

The incidence of homicidal injuries in our region is due to uncontrolled use of unlicensed, country made guns, which are cheap, easily available.⁴ In our study, suicide is less common because people tend to use other methods such as hanging and poisoning which are easily available.⁴ Incidence of suicide by firearm is more in developed countries where guns are freely available and cause instantaneous death without much suffering. In USA, guns can be purchased from the super markets. There is gun culture in some developed countries resulting in high homicide and suicide rate using guns.

In our study there was only one patient who was 25 year male who shot himself on his hand resulting in self-inflicted injury. These are generally because of personal or social issues. In 4 (3.07 %) out of 7 cases of accidental gunshot injuries, incident happened during a party while in 2 cases (1.53 %), accident happened by mishandling of firearm. In one case, accident happened among playing children when a child accidentally shot other by airgun. In our study there were 4 cases (3.07 %) of gunshot injuries in which victim was caught in cross firing between two parties.

We observed in our study that in 80 % of the cases, it was bullet that caused the gunshot injury and hence rifled firearm might have been used to fire the bullet while in 26 (19.23 %) cases, gunshot injury was caused by pellets fired from a shotgun firearm and in one (0.76 %) case, it was an airgun pellet that caused the injury to a boy while playing with friends. Our results are at variance with those of Sangeeta Kumari et al¹⁰ who reported that Shotgun injuries were 60% and rifled firearm injuries in 36.67% and Shailendra Pal Singh et al⁴ observed shotgun injuries in 84.5% and rifled firearm injuries in 13.6% cases.

In our study, we observed that in 96 patients (73.84 %), there was a single entry wound. There were two cases (1.53 %) in which two entry wounds were identified. In 26 cases (20 %), there were multiple pellet entries. In 5 cases (3.84 %), a graze wound was identified. In one case (0.76 %), there was only one pellet entry wound was found that was fired from an airgun. In 49 cases (37.69 %), there was one exit wound while in 75 cases (57.69 %) there was no exit wound. In one case (0.76 %), there were more than one exit wounds. Our results are in consistency with those of Sangeeta Kumari et al¹⁰ (Single entry- 74.6 %, double entry- 6.8 %, multiple entries- 18.6 %). Our observations are not consistent with M Bapin Kumar et al⁶ (Single entry-30.94 %, double entries- 16.98 % and multiple entries 52.08 %). In 57.69 % of the patients in our study, there was no exit wound. This might be because of the use of country made firearms by the assailants which are generally low velocity firearms.

In our study, muzzle impression was not found in any of the entry wounds which means that there was no patient in which shot was fired with gun in contact with the skin. Burning was seen in 5 (4.76 %) entry wounds and hence these were probably the near contact shots. Blackening was seen in 11 (10.47 %) entry wounds and therefore these were the close range shots. We observed that there were 35 (33.3 %) wounds in which tattooing was seen and hence these were probably near range shots. In remaining 52 (49.5 %) entry wounds none of these features was present. So in majority of the cases, shot was fired from a distance from the victim. These observations may direct us toward the intention of the assailant which might have been either just fire and run or fire from hidden places in majority of the cases.

In our study it was found that lower (n=50; 35.46 %) and upper extremities (n=41; 31.53 %) were the most common sites of injury. Next most commonly injured sites were abdomen (n=20; 15.38 %) and chest (n=19; 14.61 %). Our results are in agreement with other authors.¹¹⁻¹⁴

Shailendra Pal singh et al⁴ reported that trunk (34.8%), lower extremity (32.6%) and upper extremity (21.7%) were the most common sites. In our study, as most common sites were upper and lower limbs, hence it can be concluded that the either the assailants were not trained shooters or the intention of the assailant was not to kill. Rather the assailant might have fired the shot in the heat of the moment. This behaviour can be attributed to the availability of illegal and country made cheap firearms in our region.

Conclusion

Our study proves that gunshot injuries are a risk to life and society. 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 country made firearms is of utmost importance in order to curb the homicidal firearm mortality and morbidity rate. Further, display and firing of firearms in marriages and parties should be strictly banned and persons indulging in such activities should be punished under relevant sections of Indian Penal Code.

Ethical Clearance: Taken from Institutional Ethical Committee (No. 255/FM dated 24/02/2021)

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