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STUDY OF VARIOUS ASPECTS OF FIREARM INJURIES ON DEAD BODIES BROUGHT FROM RURAL AND URBAN AREAS OF PATNA CITY

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ABSTRACT

Introduction
Firearm injuries are a global public health problem and pose therapeutic challenges all over the world. Civilian firearm injuries are increasing globally. Increased incidence of firearm injuries in developing countries has been attributed to poverty, unemployment, political instability, lack of education, and unequal distribution of wealth. Use of firearms and explosives for homicide is a worldwide phenomenon. This is due to the increasing number of urban terrorism, robberies, dacoity, rioting, political motivation, smuggling of drugs, personal and group rivalry, quarrel over property, caste feuds and the like.

Materials and Methods
The Retrospective observational study was carried out on 65 victims of fatal firearm injury of different age groups, brought to the mortuary for autopsy in the Department of FMT, NALANDA MEDICAL COLLEGE, Patna, between 1st November 2018 to 31st October 2020. The data were recorded according to a standard proforma and analyzed.

Results
The most common age group affected was 31-40 years and had completed 12th Standard to Graduation level of qualification . Most of the victims, approximately 33.84%, were unemployed. The commonest cause behind the firearm injury was personal rivalry (40%) followed by looting & dacoity(24.62%). Among the cases of firearm injuries, in 92.31% were caused by rifled firearms, and the common target of firing was the head.

Conclusions
Firearm injuries have become a major cause of morbidity and mortality among young males in our society. The homicidal attack was carried out with the motive of personal or political rivalry or dacoity and robbery, mostly using rifle firearms. High rates of unemployment and poverty have been reported to be responsible for increasing the incidence of youth restiveness, armed robbery, and associated firearm injuries in our society.

Keywords: *Firearm, Socio-demographic Profile, Motive, Wound, features*
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INTRODUCTION

Firearm injuries are a global public health problem and pose therapeutic challenges all over the world. Civilian firearm injuries are increasing globally[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].

Ballistics is the scientific study of the motion of projectiles. The most typical ballistic traumas are those caused by firearms and explosions (blasts). Ballistic trauma is at present an international concern for numerous agencies, both civilian and military. It is estimated that millions of people around the world are hospitalized each year due to non-fatal firearm-related injury[3].

In our country the present socio-economic structure shows that we are in a highly unbalanced level of socio-economic development. The low socio-economic profile of people

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indicates that there is an exploitative mode of production that exists in the society which stimulates growth of crime[4].

Use of firearms and explosives for homicide is a world wide phenomena and Bihar in no exception. This is due to increasing number of urban terrorism, robberies , dacoity, rioting, political motivation , smuggling of drugs, personal and group rivalry, quarrel over property, caste feuds and the like[5]. Homicide by firearms and explosives have become so common that hardly a day or two passes without the news of such a death being flashed in the columns of the popularnewspapers. The socio-economic loss in terms of valuable lives cut short and expenditure incurred in the treatment of the injured and rehabilitation of the disabled have been great[6].

Aims and Objectives

- The aim of this study is to try to know the different aspects of the severity & outcome of wounds caused by firearms.
- Type of weapon involved in the production of the wound.
- To study the medico-legal aspects of different firearm injuries.
- To study the relationship between different firearm injuries and various factors like age, sex, educational status, time of incidence.

MATERIALS AND METHODS

The Retrospective observational study was carried out on the victims of fatal firearm injury of different age groups, brought to the mortuary for autopsy in the Department of FMT, NALANDA MEDICALCOLLEGE, Patna. Some of the cases were admitted here in NALANDA MEDICAL COLLEGE HOSPITAL, referred from various places in rural and urban areas of Patna City, Bihar.

Total number of cases

65 cases

Study design

Retrospective observational study

Duration of study

2 years (1st November 2018 to 31st October 2020)

The various informations about the Firearm injury cases relevant to the study were collected from different sources as follows:

1. The inquest report and other relevant papers brought by the police along with the dead body.
2. Interviewing the police personnel accompanying the dead body, specially the Investigating Officer (I.O.).
3. Interrogating the relatives, friends and neighbors etc. accompanying the deceased.
4. Autopsy examination proper (Internal and external).

Inclusion criteria

- All age groups
- Both sex
- Spot deaths
- Deaths occurring during transit
- Deaths during treatment

Exclusion criteria

- Deaths occurring due to any weapon other than Firearm.
- Decomposed bodies and bodies with no specific history have not been included in this study.
- Causes of death other than Firearm were excluded.

Data collection and statistical analysis

The data was recorded in the proforma drawn up specifically for the purpose of this study,checked manually for correction of some minor errors like digit mistake, wrong unit of measurement, data format mistakes etc.

The data was put in MS Excel spread sheet and statistical analysis performed using SPSS (Statistic Package for Social Sciences) version 20.0 software. and are presented in the various tables and figures.

RESULTS

The most common age group affected was 31-40 years with an overall involvement rate of 27.69%. Though in general 23.07% and 18.46% of the victims belonged to age group of 21-30 years and 41-50 years respectively. Among the fatal cases 21-30 years age group was second in frequency. Least number of cases were noted in extremes of age group e.g. <10 years &> 60 years.Thus it can be said that over majority of the victims (50.76%) were between 21-40 years of age, the most productive years of life.

Out of the total (65) firearm injury cases an overwhelming majority i.e. 81.54% of the victims were males and only 18.46% victims were females.

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Table 1: Educational status of the victims

Educational status	Number of cases	Percentage
Below 12th standard	9	13.84
12thStandard to Graduate	23	35.38
Above Graduate	12	18.46
Illiterate	13	20
Unknown	8	12.30
Total	65	100

Overall, 13.84% of the cases had level of education below 12th standard, 35.38% had completed 12th Standard to Graduation level of qualification and 18.46% had completed their post graduation studies but 20% were illiterate.In about 12.30% cases, literacy of the victims remained unknown.

Table 2: Distribution of victims on the basis of occupation

Occupation	Number of cases	Percentage
Service	3	4.62
Self-employed	18	27.70
Farmer	5	7.69
Student	17	26.15
Unemployed	22	33.84
Total	65	100

Approximately 33.84% of the victims were unemployed. After that, 27.70% were self-employed. 26.15% were students. The minimum number of victims were either farmers (7.69%) or servicemen(4.62%).

Table-3: Cause of firing

Cause	Number of cases	Percentage
Personal rivalry	26	40
Looting/ Dacoity	16	24.62
Political rivalry	7	10.76
Others	5	7.70
Not known	11	16.92
Total	65	100

The commonest cause behind the firearm injury was personal rivalry (40%) followed by looting &dacoity(24.62%). In 16.92% cases motive behind the firing remained unknown. Political rivalry constituted about 10.76%. Rest were caused due to others(7.70%) reasons.

Table 4: Distribution on the basis of motive of gunshot injury

Motive of injury	No. of patients (n=65)	Percentage
Homicidal	53	81.53
Suicidal	7	10.76
Accidental	3	4.61
Others	2	3.07

Table 4 shows that majority (81.53%) of the gunshot injury cases were homicidal motive. In 7 cases (10.76%) patient inflicted gunshot injury to himself. In 3 cases(4.61%) , there were no motives but injury was accidental (mishandling, party fire). In 2 cases, motive was not known

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Table 5: Type of firearm

Firearm type	Number of cases	Percentage
Rifle	60	92.31
Smooth bore	5	7.69
Total	65	100

Among the cases of firearm injuries, 92.31% cases were caused by rifled firearms. In only 7.69% of cases smooth bore guns were used. Thus, it can be said that the assailants usually prefer the rifled firearm for homicides.

Table 6: Site of entry of firearms (n=121)

POINT OF ENTRY	NUMBER OF ENTRY	PERCENTAGE
HEAD	40	33.06
NECK	8	6.61
CHEST	21	17.35
ABDOMEN	29	23.97
UPPER LIMB	13	10.75
LOWER LIMB	10	8.26
TOTAL	121	100

In our study it was seen that most common target of firing was the head i.e. 33.06%.Next preferred area was abdomen, comprising of 23.97% cases. Least number of cases were noted in lower limbs, 8.26%.

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Table 7: Associated features at entry point (n=121)

FEATURES	NUMBER OF FEATURES	PERCENTAGE
BURNING	18	14.88
SINGEING	11	9.09
BLACKENING	19	15.70
TATTOOING	25	20.67
SURGICAL INTERVENTION	3	2.48
MUZZLE IMPRESSION	4	3.30
NONE	41	33.88
TOTAL	121	100

In 20.67% cases tattooing was noted around the entry wound. In majority of the cases, 33.88%, no associated findings like blackening,tattooing,burning, singeing, grease collar, bruising, abrasion etc were noted. In very small number of cases (2.48%) surgical intervention was seen. Burning(14.88%) & singeing (9.09%) combined were the significant findings, next to tattooing. muzzle impression was seen in 3.30% cases.

DISCUSSION

The frequency of suicide and crime is on the increment around the world, counting India. Firearm injuries are major health problem that severely affects the criminal justice and health-care systems.

In our study the commonest age group was found to be 31-40 years, comprising of 27.69% of overall cases. This was followed by the age group of 21-30 years, 23.07%, the most productive age group. As individuals of these age groups are the most active & involved in various types of activities e.g. social, political, and illegal & also involving outdoor activities and frequently interacting with others. They also bear the liability of their family, self and other social liabilities. It has also been observed that fatality in the younger age group is less because in the younger age group are not involved socio-political & economic affairs, hence they fall victims in lesser number in firearm injuries. The extremes of age group were very less, especially in the age group of < 10 years, and in the age of > 70 years were 1.54%. In the present study, males outnumber females. It was observed that overall 81.54% of the victims were males and only 18.46% were females. Preponderance of males over females as victims may be due to the fact that males commonly engage in outdoor pursuits and indulge more in violent activities due to their aggressive nature as compared to their female counterparts. Similar findings were suggested by Schellenberg M in 2020, that the median age was 29 years (21–43) and most were male[7]. Study done by Meral O, et al., (2020) also shows that 85.4 % cases are males[8].

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Regarding the educational status of the victims it was found that (20%) of the victims were either illiterate, 13.84% or were poorly literate having only 12th of education.High percentage of victims (35.38%) are those who had completed 12th Standard to Graduation level of qualification9(Table1).The study done in 2016 by Pargi S, et al. Shows similar findings as literate 79.13 % and 20.87 % illiterate[9].

It was noted that maximum (33.84%) victims were unemployed, followed by self-employed (27.70%) and students (26.15%), other cases were less in number(Table2). This may be because of engagement of people over personal dispute or political collision between rival parties even on trifle things those can be solved by negotiation or if with bipartite discussions. It may be because of easy availability or illegal possession of guns with huge sum of money transection to create fear or to evacuate boarders/ occupants of small house for high rise construction or otherwise. Also in the city based unemployed persons to earn their livelihood easily. Similar findings were reported by Chaurasia N et al (90.6% victims from non service sector)[10]

In the present study it was observed that the most common motive behind the crime was personal rivalry (40%). Dacoity and looting were found in 24.62% cases(Table3). Thus economy related causes accounted for the least number of known cases in the present study. Sachan R et al also has similar results as property disputes causes 29.51% gun-shot injuries; dacoity for 21.1%; 13.11% due to personal rivalry & others 22.95%[11].

Political gun fighting to prove superiority/to get more proximity to the power were the second most common cause of death of the victims, as it is easier to motivate illiterate/local miscreants to work for the political parties to prove supremacy.

Our studies show that firearm injuries are the leading cause of homicidal deaths with 53 cases (81.53%), while suicide represents 7 cases (10.76%) and accidental deaths represent 3 cases (4.61%), in 2 cases, motive was not known (Table4). Pathak S et al show that most cases of the gunshot injury (88.46%) were homicidal ,in 7 (5.38 %) cases was accidental . Four cases were caught in cross firing, one case (0.76 %) suicidal and in 3 cases, motive was unknown [2].

In our study we found that the most common weapon used were the rifle firearms (92.31%) which, proved to be fatal in maximum cases. Smoothbore weapons were very less common, constituting only 7.69%(Table5).

The preference of rifled firearms over smooth bore guns for homicide is due to their effectivity i.e. surety of death. It also corroborates the conspiracy, preplanning and determination of the assailants to kill.

They can be used from a distance and are also easily available these days. In some cases, it has been observed that in the smooth bore gun cartridge instead of pellets, bullets are being used as a result of which bullet along with wads are being recovered from the same wound. This creates a doubt during the autopsy examination regarding the type of firearm used. Moreover, it is even more difficult to prove such cases beyond doubt and to convince the legal people during trial in the court of law.

Thus, it is seen that in the fatal cases where the crime was planed and the intention was to kill the weapon used was mostly the firearms and the target site was the head. This resulted in a high fatality rate due to the effectiveness of the weapons used. On the other hand, in the non fatal cases the intention was to heart the victim and not to kill so the weapons used were of less fatality e.g. smooth bore weapons. Which resulted in severe injury to the victims but they survived instantly but died ultimately or recovered.

Our study is similar with Pathak S et al who reported that rifled firearm injuries in 80% and Shotgun injuries were 19.23% and in one (0.76 %) case, an airgun pellet was present[2].

In the present study it has been observed that among the firearm injury cases in almost 1/3rd cases (33.06%) the entrance wound was only on the head followed by abdomen (23.97%)& chest(17.35%).

It is quite an alarming finding because it seems that the assailants are specifically targeting the head and as it has already been observed that in many of the cases only a single shot is fired hence they are quite sure of being successful in their intention to kill the victims.

In other cases there was entrance wound on the neck(6.61%), upper limb(10.75%) and lower limb(8.26%)(Table6). Other study done by Kumari S et al shows that abdomen was most common site seen in 30.9% cases, followed by thorax(21%) and head (16 %) [12].In Dammam, Saudi Arabia, the most common sites of firearm injury were the head (36.7%) and the chest (28.7%)[13] Shailendra Pal singh et al observed that most common site is trunk (34.8%) followed by lower extremity (32.6%) and upper extremity (21.7%)[14].

In our study it is seen that in 20.67% cases there were tattooing, in 3.30% cases there was muzzle impression, indicating that firing were made either from contact or close range(Table7.In another study, muzzle impression was not present at the entry site, burning was seen in 5 (4.76 %) cases ,Blackening was seen in 11 (10.47 %) , 35 (33.3 %) wounds in which tattooing present, and in 52 (49.5 %) entry wounds no any features was present[2].

CONCLUSIONS

Firearm injuries have become a major cause of morbidity and mortality among young males in our society where resources for pre-hospital and hospital trauma care are limited, and interpersonal violence are the major causes of these injuries

From this study it has been observed that the most common victim of homicide was a young adult male. The homicidal attack was carried out with the motive of personal or

political rivalry or dacoity and robbery, mostly using the rifle firearms.

High rates of unemployment and poverty have been reported to be responsible for increasing incidence of youth restiveness, armed robbery and associated firearm injuries in our society. Addressing the root causes of violence such as poverty, unemployment and other associated causes will reduce the incidence of firearm injuries in our environment. Establishment of efficient emergency health care services for pre-hospital care and effective ambulance system for rapid transport of injured victims to hospital will reduce morbidity and mortality associated with these injuries. Surgeons with subspecialty in vascular surgery, orthopaedic and neurosurgery should work as a team. When these specialized facilities are not available at any centre then it challenging to a surgeon to manage all possible injuries associated with firearm.

Country made firearms are cheap, easily available and easier to be destroyed. Strict laws may help reducing the production of country made firearms. license issuingauthorities for firearms possession need to be more vigilant and stricter. These steps may help in reducing the burden of firearm injury cases

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