

## Factors Influencing The Pattern Of Firearm Injuries In Ganjam – A Ten Years Retrospective Study

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### ABSTRACT

A retrospective study from July 2002 to June 2012 was carried out to evaluate firearm injuries and associated factors. Among the victims included non fatal cases admitted and treated in MKCG Medical College, Hospital, Berhampur and fatal firearm cases referred for autopsy to the Forensic Medicine & Toxicology Department, MKCG Medical College, Berhampur. The total number of cases was 179 out of which 73 were fatal and 106 cases were non fatal. The total incidence in Ganjam district has doubled from 0.45/100,000 in 2008 to 0.9/100,000 in 2011-12. Most of the victims were middle-aged males (51 cases; 70%). The male to female ratio was 24:1. Sixty instances (82%) of firearm deaths occurred in the rural areas, with majority of them happening at night (39 cases; 53%). Most cases were homicides (69 cases; 95%). Three cases (4.0%) were suicides and one case (1.0%) was accidental. The most common site of entry was the chest (26 cases; 36.0%), the head (20 cases; 27.0%). Lungs is the most common organs affected in twenty nine cases (40%). Handguns like pistols and revolvers were responsible for 42 cases (58.0%) and Shotguns in 17 cases (23.0%) of firearm injuries. 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.

### Keywords:

Factors influencing, Firearm injury, Fatal gunshot, Homicidal firearm, Gun control.

### Introduction

Out of the 30 states in India, Odisha is one of the states which is located in the south-east region of the country alongside the coast of Bay of Bengal, Ganjam being a District (Province) in the state of Odisha. The pattern of crime worldwide is changing day by day. Violent crimes like murder, dacoity, kidnapping and riots, abduction are now-a-days frequently encountered. Among the violent crimes affecting life, homicide/murder is the most heinous crime under law. Violence and injuries account for 9% of global mortality and 12% of all disability adjusted life years (DALY).<sup>1</sup> As per Global Burden of Armed Violence Report, 2011, the average annual global violent death rate between 2004 and 2009 was 7.9 per 1 lakh. Globally around 520000 people die each year as a result of interpersonal violence which equates to 1400 deaths every single day<sup>2</sup>.

As per National Crime Record Bureau, violent crimes reported in India were 10.9% of the total Indian Penal Code crimes. The total number of murders recorded all over India in 2010 is 33335 and in our state, Odisha it is 1308 which still increasing every year.<sup>3</sup>

Amongst the various means utilized for committing violent crimes like murder , those resulting from firearms are on the rise. In 2008, India officially

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reported a national firearm murder rate of 0.36 per 1, 00,000 people .The average number of deaths involving firearms worldwide is 4.9 per 1, 00,000 population<sup>1</sup>. Compared to firearm fatality rates in much of the world, India's are not particularly high. .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<sup>2</sup>. The Ganjam district of Odisha, in India, having a population of about 20, 00,000 is no exception to this.

Although crimes executed using conventional weapons still accounts for majority of deaths in this part of the world, a good number of crimes in the recent times were seen to have been carried out using different types of firearms. In contrast to the national average annual incidence resulting from firearms showing a decreasing trend from 11,519 deaths in 2000 to 6219 in 2008<sup>1,2</sup>, this part of the world i.e. Ganjam district of Odisha, India, reports a steady rising trend.

The state of Odisha has always been a relatively silent zone when it comes to firearm fatalities in comparison to the other states in India like Bihar, Jharkhand and Uttar Pradesh. The increasing use of sharp cutting weapons by the people of this region could well be explained by the fact that these weapons are more dangerous than blunt weapons and are easily available due to agricultural background and at the same time non availability of lethal weapons like firearm In the states of Arunachal Pradesh, Bihar, Jammu and Kashmir, Manipur, Nagaland, Uttar Pradesh, and Uttarakhand, international borders represent a complicating factor that facilitates smuggling of firearms. Chhattisgarh and Jharkhand are especially affected by Naxalite–Maoist violence, whereas Jammu and Kashmir, Manipur, and Nagaland are subjected to separatist violence and Bihar experiences especially serious caste-related conflicts<sup>1,2</sup>.

In Odisha, it is the Ganjam district that has shown an extraordinary rise in number of deaths due to firearm injuries especially in the past few years which is a matter of concern not only for the public living in this region but also a challenge for the Government and the various law enforcing agencies. Moreover, for every person who dies as a result of violence, many more are injured and suffer from a range of physical, sexual, reproductive and mental health problems. This places a massive burden on national economies, costing countries billions of US dollars each year in health care, law enforcement and lost productivity. In addition homicide, results in significant personal, social and economic cost<sup>4,5</sup>.

A number of studies have been conducted in India relating to firearm cases but no significant study has been carried out in this part of the world where reports of firearm fatalities are steadily increasing especially in the past decade.

In fact, the above mentioned reasons have inspired us to take up this study with an objective to find out the different sociodemographic variables responsible for deaths in firearm injuries. The result of this study will be of immense help to identify the most vulnerable group of victims and to evaluate the factors for such rise in firearm deaths in the recent times in this region so that effective remedial measures can be put in place to curb the menace.

### **Materials And Methods**

M.K.C.G Medical College & Hospital, Berhampur is the highest referral center in Ganjam district of Odisha (India) and all the cases related to firearm injuries in this region are dealt in this referral institute. All the firearm cases both non fatal and fatal either admitted for treatment or subjected to autopsy following death at M.K.C.G Medical College, Berhampur in last 10 years were studied in detail retrospectively.

From the various records available in the medical record section of the hospital as well as in the department of forensic medicine, relevant history pertaining to the individual profile of the injured like sex, age, occupation, socio-economic status, religion, rural or urban dwelling, time and place of occurrence, duration of survival, Glasgow Coma scale ,manner of death(in fatal cases), motive of injury, history of addiction, educational status, marital status and type of firearm used were noted in predesigned proforma.

In addition, from the available data in the hospital records, a special note was made with respect to the wound characteristics like presence of entry wound, its number, position, shape and size. Any fatal injury to vital organs, bone and other internal tissues were also noted. Recovery of any foreign body or projectile was recorded.

The data thus obtained were compiled, analyzed and compared with similar studies

by different authors using Statistical Programme for Social Science software.

## Results

Fig: 1 shows year wise distribution of both fatal and non fatal firearm cases. Whereas only one fatal case was recorded way back in between July 2002 to June 2003, the count increased to 18 in 2011-12. Accordingly, non fatal cases increased from 4 in 2002-03 to 22 in 2011-12.

Male victims (96%) clearly outnumbered the females (4%) with male to female ratio of 24:1 (Table-1). Maximum number of victims of firearm injury belong to the age group between 21-30 years accounting for 37.4% of total cases, followed by the age group between 31-40 years (28%). The least affected groups of individuals were reported between the age group of 0-10 followed by 61 years and above comprising 1% and 2% of total cases respectively (Table-1). Victims of firearm cases who were less than 40 years of age comprise 78% and 64% of the total fatal and nonfatal cases respectively ( $P = 0.0488$ ). (Table- 2)

Homicidal firearm injuries accounted for 96% of total cases followed by 3% suicidal cases. Accidental firearm deaths (1%) were reported least. (Fig:2). Interestingly, all the victims of suicidal and accidental firearm injuries were males. As evident from table-3, out of total homicidal firearm cases majority (83%) were encountered in the rural areas. However, suicidal firing was equally encountered in rural and urban regions. ( $P = 0.0176$ )

Short barreled rifled weapons i.e Handguns like pistols and revolvers were mostly used i.e. in 59% cases. Shotguns constituting mainly the country made guns were encountered in 20% cases whereas long barreled rifled weapons were used in 21% cases. (Fig:3).

In 142(79%) cases the place of occurrence was outdoor and indoor occurrence was in merely 37(21%) cases. (Table-4). In 95(53%) cases the incident took place in the night time i.e. after sunset and in rest 84(47%) cases occurrence was in broad daylight.

A number of possible motives behind the firing were enquired. Amongst the fatal category, personal enmity or rivalry stands out as the commonest motive and tops the list with 51% cases. Next in the list is political rivalry accounting for 19.2% cases. Impulsive behavior triggered by emotional outburst is seen in 8.2% cases which lead to few suicidal and homicidal deaths. Cross firing in anti Maoist combing operations, robbery and police firing share 4.1% cases each. The least encountered one, where perhaps no motive could be found was a single 1.3% case of accidental firing. In the nonfatal category robbery is the most common motive with 44% cases followed by political rivalry (16%) and cross firing in anti maoist operations (13%). (Fig:4)

Fatal entry wounds were found on the chest in 38% cases followed by the head (30%). Abdomen and pelvis are not far behind in the list with 25% of fatal entry wounds to their share. The least affected area of the body is the limbs which were involved in only 7% cases. As such, fatal entry wounds to the upper half of the body accounts for 93% of the total. Amongst the nonfatal category 92% of entry wounds were limited to the limbs. (Table-5)

Multiple organs are injured in most instances but amongst the common organs affected by fatal firearm injury, highest involvement is detected in the Lungs (29%). The next common organs injured are Brain and the stomach with Intestine amounting for 16% each. Not far behind in the list is the Heart and the Liver showing fatal injuries in 13% firearm deaths each. Kidney and Spleen are the least common organs affected with 5% and 2% involvement respectively. Other structures like testes, major vessels, spinal cord, bones etc. were involved in rest 6% cases. (Table- 6).

Evaluation and categorisation according to Glasgow coma scale (GCS) revealed, out of total 179 fatal and nonfatal cases, 33.5% with GCS score 3 or less, 7% have GCS score 4 to 7, 3% of cases had GCS score between 8 to 10 and 56% had GCS score 11 to 14. (Table-7).

## Discussion

In our study, the average number of deaths involving firearms per 1,00,000 population in 2007-08 and 2008-09 is 0.45 and 0.4 respectively. This rate is marginally lower in comparison to the national average of 0.55 in 2008<sup>2</sup> and quite less than the average worldwide rate, which is 4.9 per 1,00,000 population<sup>1</sup>. But, surprisingly it is significantly high when compared with the Odisha state average for the year 2008 when it was 0.02 per 1,00,000 population<sup>2</sup>. Our findings suggest that although the state of Odisha is rather a silent zone, when it comes to firearm deaths in entire India, the Ganjam district of Odisha records a rate

which is almost on par with the national average and is a matter of great concern. This may be because of easy availability and unchecked illegal smuggling of unlicensed firearms that has gone up in the recent times.

Male victims (96%) clearly outnumbered the females (4%) with male to female ratio of 24:1 which is similar to studies conducted by Anil Kohli et al<sup>6</sup> and Abeer Mohamed Hagra et al<sup>7</sup> where males were affected in 90.7% & 96.6% cases respectively. This may be attributed to greater male exposure, mobility and proactive involvement in all affairs and restriction of females to mere household domestic activities. Our study differed from studies in the Europe<sup>8-10</sup> like Sweden<sup>8</sup> where 41% of the homicide victims were females, Germany<sup>9</sup> where females constituted 26.3% of the homicide victims and 10.6% of the suicides and London<sup>10</sup> study where 2% suicidal victims were females.

Maximum number of victims of fatal firearm belonged to the age group between 21-30 years accounting for 37.4% of total cases, followed by the age group between 31-40 years (28%) which is close to studies conducted by Anil Kohli et al<sup>6</sup> where 46.7% victims were aged between 20 and 30 years. This may be attributed to swift indulgence of young adults in disputes due to disproportionate outrageous, violent, aggressive attitude and impulsive, prejudiced & revengeful temperament seen in the assailant. Our findings were different from study of Druid H of Sweden where the mean age was 37 years for homicide<sup>8</sup>. Our findings were slightly higher than study of Murad Zafar Marri et al<sup>4</sup> in Pakistan where 32.3% victims were affected in the age group 20-30 years and the most common age group affected was 20-39 years (62.11%). However, it differed from other studies of India<sup>11,12</sup> and similar to some studies abroad<sup>13,14</sup>. Moreover, in our study, victims in the age group 21 to 40 amount to 62% which is marginally less than another study in India where the most common victims were in the age group between 21 - 40 (71.07%) years<sup>15</sup> and is almost in agreement with the findings of other authors in the country<sup>16-19</sup>. In our study, Victims of firearm cases who were less than 40 years of age comprise 78% and 64% of the total fatal and nonfatal cases respectively is similar to findings of many authors in India and abroad<sup>15,16</sup>. Our findings are also found to be statistically significant with p value 0.0488.

Homicidal firearm injuries accounted for 96% of total cases followed by 3% suicidal cases. Accidental firearm cases (1%) were reported least. Interestingly, all the victims of suicidal and accidental firearm were males. Gupta<sup>12</sup> detected almost similar statistics where 92.6% were victims of homicidal attacks, 6.5% suicidal and 0.9% accidental. However, Abeer Mohamed Hagra et al<sup>7</sup> in Egypt found lesser (176 cases; 65.7%) homicidal firearm deaths in comparison. In contrast to our study, et al<sup>20</sup> of Italy detected that the most common manner of death was suicide (60.4%), followed by homicide (35.9%). Low suicide rate using firearms in our study may be attributed to the fact that in the Indian subcontinent, committing suicides using firearms is not considered to be a suitable method, as it is violent and brutal. In this study, out of total homicidal firearm cases majority (85%) were encountered in the rural areas. Similarly, majority (67%) of suicidal firing was seen in the urban regions. P value was 0.0176 which is statistically significant. This finding may be due to better policing in urban areas in comparison to rural areas.

In this study we found short barreled rifled firearms i.e handguns like pistols and revolvers being mostly used i.e. in 105 (59%) cases. Shotguns constituting mainly the country made guns were encountered in 36 (20%) cases whereas long barreled rifled weapons were used in 38 (21%) cases in contrast to study by Patowary A.J.<sup>21</sup> where rifled firearms were much commoner due to ongoing extremist activities and Egypt study<sup>7</sup> where automatic (machine) guns were responsible for 72 cases (26.9%) and locally made shotguns were responsible for 61 cases (22.8%) due to easy availability. Edirisinghe P.A et al of Srilanka<sup>22</sup> detected 98% deaths caused by rifles. Our findings are similar to studies in Europe where handguns, single-action, short-barreled guns & short-barreled firearms were the most frequently used weapons<sup>8,20,23</sup>. This may be attributed to the fact that small handguns are easy to smuggle and procure. Also, the handguns are easy to carry and escape detection by police.

In 142(79%) cases the place of occurrence was outdoor and indoor occurrence was in merely 37(21%) cases. In 53% cases the incident took place in the night time i.e. after sunset and in rest 47% cases occurrence was in broad daylight. Daylight hours (6.00 a.m. to 6.00 p.m.) were preferred by rebels, while there was no relation to the time of day in the other firearm deaths according to study in Srilanka<sup>22</sup>.

We observed that personal rivalry with previous enmity (27%) and property dispute (10%) are the major precipitating factors of this locality for homicide (Fig:4). Worldwide

literature on this showed a varied picture. A study in Germany<sup>24</sup> found that most acts were conducted to conceal crime followed by personal conflicts. Study at Alabama, USA<sup>27</sup> cited robbery was the motive behind the crime while study in Ireland<sup>23</sup> suggested arguments followed by domestic quarrel being the chief cause. Indian scenario on this also varies. Similar to our study, previous enmity was observed at Bengaluru<sup>6</sup> and at Aurangabad<sup>10</sup> whereas study at Ahmedabad<sup>5</sup> reported domestic quarrel (41%) followed by money matters (16%), Delhi<sup>7</sup> observed violent rage or quarrel and provocation, Surat<sup>8</sup> observed revenge (31.61%), Mumbai<sup>11</sup> found revenge and property dispute, Berhampur, Odisha<sup>12</sup> opined personal factors (58.21%) and revenge are the most common precipitating factors behind the heinous crime. Previous enmity being the major causal factor could be explained by male dominated society, outdoor activities, political and religious crisis. Familial disharmony arises due to lack of mutual understanding among couples, poverty, and sexual starvation, lack of issue for years and fear of infidelity ultimately ending with the violent act.

A number of possible motives behind the firing were enquired. Personal enmity or rivalry stands out as the commonest motive and tops the list with 37(51%) cases in the fatal group. Next in the list is political rivalry accounting for 14(19.2%) cases. Impulsive behavior triggered by emotional outburst is seen in 6(8.2%) cases which lead to few suicidal and homicidal deaths. Cross firing in anti Maoist combing operations and police firing share 3(4.1%) cases each. In the nonfatal category robbery stands out as the commonest cause with 47(44%) cases. In contrast to our study Patowary A.J.<sup>21</sup> found extremist violence encounters in 81.5% of the cases. According to study in Srilanka<sup>22</sup> almost half of the firearm homicides (47%; N = 39) were associated with previous enmity, while 33% (N = 27) were due to ethnic rebel killings. According to Solarino B et al of Italy<sup>23</sup> homicide cases described were most often related to continual, ongoing fights among local criminal gangs (75%). In this region personal enmity still stands out as the leading motive although political rivalry also exists.

Our study reveals that fatal entry wounds were found on the chest in 36% cases followed by the head (27%) similar to another study in India<sup>21</sup>. Abdomen and pelvis are not far behind in the list with 22% of fatal entry wounds to their share. The least affected area of the body is the limbs which were involved in 15% cases. As such, fatal entry wounds to the upper half of the body accounted for 85% of the total. Abeer Mohamed Hagraas et al in Egypt<sup>7</sup>, detected the most common site of entry was the chest (25.0%) followed by the head (19.8%). Anil Kohli et al<sup>6</sup> in India found Chest (39%) and head (29.6%) as the two most common entry sites for the bullets. Our study was also comparable to study in Srilanka where the most common site is either the head or chest<sup>22</sup>. In Sweden study 38% of the homicidal gunshot wounds had their entrances at anatomical regions typical of suicide<sup>8</sup>. Chest was the primarily targeted area of the body in another Pakistan based study<sup>4</sup>. Study conducted in Germany showed more than one gunshot injury in 53.9% of the homicides<sup>9</sup>. In London based study multiple entrance wounds were seen in 42% of homicidal shootings and injuries to hands were seen in seven homicidal fatalities<sup>10</sup>. However, our findings differed from a study in India where head is the commonest target site<sup>15,19</sup>. Chest and head were the most preferred target sites in our study because most of the cases were homicidal in nature and the assailant's intention is to ensure death of the victim by hitting the most vital organs which are located in the chest and cranial cavity.

In our study multiple organs are injured in most instances but amongst the common organs affected by fatal firearm injury, highest involvement is detected in the Lungs (29%). The next common organs injured are Brain and the stomach with Intestine amounting for 16% each. Not far behind in the list is the Heart and the Liver showing fatal injuries in 13% firearm deaths each. Kidney and Spleen are the least common organs affected with 5% and 2% involvement respectively. Other structures like testes, major vessels, spinal cord, bones etc. were involved in rest 6% cases. Nikolaos Katzilakis et al of Greece<sup>24</sup> found that the most commonly affected organs by penetrating firearm injury in children are the small bowel, colon, liver and stomach followed by the spleen, kidney and pancreas. As chest is the most common site of affection in this study, lungs are the most common injured organs.

## Conclusion

The major conclusions that can be drawn from this study is that young males of tender age are the common victims with handguns like pistols and revolvers accounting for most incidents. Personal enmity along with political motive is responsible for the homicides in most (60%) instances that is more encountered in rural areas. Maoist killings and deaths in police

cross firing although reported, but is only occasional and sporadic. However, the overall alarming rise in firearm deaths in Ganjam, Odisha in the recent times is a wakeup call and an eye opener for all actors in civil society.

The principal objective of this study was to bring out the magnitude of the problem in this part of the world in today's date. The issue is still very much in reach and can be controlled, as states with tougher gun control laws appear to have fewer gun related deaths. The disclaimer here is that correlation is not causation. But, correlations can be suggestive. The major impediment coming in the way of enforcement of strict legislation is that gun control is not politically popular. Hence, we put forth few suggestions for the Government and the various law enforcing agencies operating here to focus upon which include:

- 1) Developing effective means of controlling the possession of firearms, and checking the illegal trade of unlicensed firearms.
- 2) Strengthening the existing legislations for illegal procurement, and possession of unlicensed firearms.
- 3) Working on improvement of the youth by way of promoting education and creating better job opportunities in order to divert and engage them in positive productive mode which should dissociate them from indulging in criminal activities.
- 4) Upgrading the existing emergency medical services to save the critically injured ones .
- 5) Bringing overall socioeconomic development oriented towards changing the mindset of individuals at large so that people become more tolerant and patient rather than being impulsive and outrageous.

Lastly, research has so far been unable to adequately specify theoretically or empirically, the nature of the link between firearms and violence. But, at least, the presence of violence can be conceptualised as either the cause or the result of increased prevalence of firearms in our society.

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