

## Original Research Paper

# Pattern of Mechanical Injuries of Fatal Interpersonal Violence Cases in a Tertiary Care Centre

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### Abstract

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. Violence places a massive burden on national economies, costing countries billions of money expenditure each year in health care, law enforcement and lost productivity. In India the share of violent crimes in total crimes was 10.9% during 2009-2010, 11.0% in 2011, 11.5% in 2012 and 11.3 % (total 3, 00, 357) in 2013 respectively. The present prospective study on Interpersonal Violence cases was conducted in the Department of Forensic Medicine and Toxicology, Patna Medical College and Hospital Patna from September, 2008-2010 on 80 cases. The primary aim of present study is to find out Pattern of fatalities after death in the region due to violence affecting human body. Our study showed that maximum number of injury was seen on upper limb 86.25%, but maximum number of death was due to injury to head and neck 75%. Abrasion 92.5% was the most common type of external injury followed by contusion 56.25%, skull fractures 51.25% and firearm injuries 8.75%.

**Key Words:** Violent crimes, Homicide, Injury Pattern, Head Injury

### Introduction:

WHO defines violence as follows: "The intentional use of physical force or power, threatened or actual, against oneself, another person, or against a group or community that either results in or has a high likelihood of resulting in injury, death, psychological harm, mal-development, or deprivation". [1]

More than 1.3 million people worldwide die each year as a result of violence in all its forms i.e. self-directed, IPV (Interpersonal) and collective, accounting for 2.5% of global mortality. For people aged 15–44 years, violence is the fourth leading cause of death worldwide. [11,12] IPV disproportionately affects Low and Middle Income Countries (LMICs). The WHO report on violence and health estimates that more than 90% of all violence-related deaths occur in LMICs.

The estimated rate of violent death in LMICs was 32.1 per 100,000 people in year 2000, compared with 14.4 per 100,000 in high-income countries. [9] Violence directly affects health care expenditures worldwide.

Indirectly, violence has a negative effect on national and local economies-stunting economic development, increasing economic inequality, eroding human and social capital, and increasing law enforcement expenditures. [14]

Studies show a strong, inverse relationship between homicide rates and both economic development and economic equality.

Poorer countries, especially those with large gaps between the rich and the poor, tend to have higher rates of homicide than wealthier countries. [5] The South-East Asia and Western Pacific Regions account for the highest number of injury deaths worldwide.

As per the NCRB report of 2013, the share of violent crimes affecting human body shows a rising trend from year 2009 to 2013. All India 'incidence' of violent crimes affecting human body increased from 107580 to 145542 while 'rate' increased from 9.2 to 11.9. [2]

According to report, among all IPC Crimes, crime rate for violent crimes in Bihar in year 2013 was 30 against national average of 24.4 and in state wise violent crime rank; Bihar attained 11<sup>th</sup> rank whilst highest violent crime rate was reported in Delhi. [2]

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Overall IPC crime rate in Patna in year 2013 was 702.8 while Bihar average was 166.3. In Patna alone total 317 murder cases reported out of total 3403 cases from Bihar in year 2014. [3] If we are to envision a less violent world, we must first understand how violent the world is.

In 1996, the World Health assembly declared violence a leading global public health problem. [1]

### **Material and Method:**

The present prospective study was conducted in the Department of Forensic Medicine Patna Medical College and Hospital, Patna during the period from September 2008 to September 2010, a period of two years.

All the cases brought to the Department for medico-legal autopsy with alleged history of IPV and also the cases which later registered as IPV cases were studied and cases subjected for autopsy with alleged history of IPV but which were later registered as non-homicidal based on the autopsy findings, circumstantial evidence and investigation by the police were excluded.

Ethical clearance was obtained. Detailed information regarding the circumstances of crime was sought from the police, victim's relatives and friends, visits to the scene of occurrence or deduced by the photographs of the scene of occurrence. Post-mortem examination of the case was carried out as per the standards.

Descriptive statistics for qualitative type of data was summarized using frequency and percentage along with 95% confidence interval.

### **Results:**

Total 5121 Post-mortems was done during the study period, out of which total number of injury cases was 721(14.07% of total autopsy) and IPV cases amounts 92 (1.79%).

A total of 80 IPV cases were selected for study excluding cases with incomplete data.

It was observed that maximum number of injury were seen on upper limb 77.5% (n=62), but maximum number of death were due to injury to head and neck 75%. Most of the external injuries over head were contusion, lacerated wounds by hard and blunt force followed by chop and incised wounds by sharp cutting weapons.

Lower limb, Thorax and Abdominal region accounted for rest of the most injuries. (Graph 1) In the present study abrasion 92.5% (74) was the most common type of external injury. Contusion, laceration, fracture/dislocation and skull fracture, each type of injury was found in almost half of the total case. In almost all cases with fracture skull 58.75%, intracranial injuries were main cause of death. (Table 1)

Maximum contusions were present on limbs followed by head-neck, thorax, and abdomen. Maximum lacerations were present on head-neck followed by limbs and equally on thorax and abdomen.

Maximum abrasions were present on limbs followed by head- neck, thorax and abdomen. In our study out of all Intracranial injury (58) cases most common pattern of intracranial hemorrhage was combination of Subdural and Subarachnoid hemorrhages 33.75%. It was followed by combination of Subdural, Extradural and Subarachnoid hemorrhages 17.5%.

In most cases of head injuries all three structures were involved i.e. scalp, skull and brain. Fracture skull was present in 58.75% (47) cases, while brain injuries were found in 30% (24) cases. (Table 2)

Among 47 cases of skull fracture most common fracture seen was linear 51.06% followed by 36.17% cases of comminuted fracture. But no cranial fracture was found in 36.17% cases of intracranial injuries. Firearm fractures 14.89% cases included fracture in cranium due to entry and exit wounds. (Table 3)

In the present study, it was observed that defense wounds were present in 43.75% victims while it was absent in the majority of 56.25% cases. (Graph 2)

This study showed that maximum cases had internal injury in head neck followed by thorax, abdomen and limb. Two cases had no any internal injury.

### **Discussion:**

In this study there was considerable overlap of different type of injuries in different areas of body, hence we have calculated percentage for each injury type from total number of cases. In our study slightly more number of injuries were seen on upper limb 77.5% (n=62) than injury to head and neck 75% (60), but maximum number of death were due to injury to head and neck. This was in accordance with study conducted by Carmo et al who observed that upper limbs were most frequent injury location. [6]

In a large study Waldis et al found that with the mean age of 30 years, craniofacial injury (72%) was the most common type of injury followed by Injuries to extremities. [14] In a study of the burden of intentional injuries in Mwanza City by Phillippo and Japhet the head/neck and upper limbs were the most common body regions affected in 49.2% and 43.3% respectively. [13]

According to Adelson [4] dominance of head injuries is because the head is the target of choice in the great majority of assaults involving blunt trauma. When the victim is pushed or knocked to the ground, he often strikes his head and the brain and its coverings are vulnerable degrees of blunt trauma that would rarely be lethal if applied to other areas.

The injuries in multiple region of body suggest the degree of anger, aggressive and intention of the assailant to kill their victim. Abrasion being the most common, combination of each type of injuries Contusion, laceration, fracture/dislocation and skull fracture was found in almost half of the total cases.

Carmo noted similar finding of abrasion being most common injury. [6] Burnett in his article on Domestic Violence Clinical Presentation, mention that blunt force trauma to the skin includes the most common injury, contusion, as well as abrasions and lacerations, and Pattern injuries suggest violence by different weapons. [10]

It was observed in our study that the chances of fatality following head injury are greater when multiple cranial bones are involved. Overall in 58.75% cases cranial fracture was detected. This also pointed toward intention that most common area of target was the head.

Study of cranial and intracranial injuries showed that most common pattern was combination of Subdural and Subarachnoid hemorrhages followed by combination of Subdural, Extradural and Subarachnoid hemorrhages. In most of the intracranial injuries all three head structures, i.e. scalp, skull and intracranial structure were involved.

A similar trend has also been observed by various studies. [7, 8] This indicates that the use of strength by the assailants was maximum during the material moment to make sureness of the death of the victims.

Most common skull fracture seen was linear 41.38% followed by 29.31% cases of comminuted fracture among intracranial injuries. But no cranial fracture was found in 29.31% cases. Also, bleeding from ear, Nose and mouth was present in 11%, of cases.

Characteristic injuries bilateral injuries, especially to the extremities, back & eyes, injuries at multiple sites Fingernail scratches, cigarette burns, rope burns Abrasions, minor lacerations, welts, Black eye with or without sub-conjunctival hemorrhage suggests a vigorous struggle between victim and assailant.

Very little information about the extent and nature of injuries in homicides is available from any national crime data set. It is known to researchers that how statistics and data from thousands of homicide cases each year is useful in assisting law enforcement, criminal justice system and public policy making.

Much more research is needed for understanding of how these lethal criminal incidents occur and to enhance the likelihood of apprehending the perpetrators of crimes.

### Conclusion:

Violence and crime is an integral part of the society from the primitive era. In the context of evolving the societal response to the violence and crime in society, formulating data driven policy making and evolving effective intervention strategies and for undertaking actionable and policy-oriented research by the people related with criminal and justice system, administrators and academia, a vast amount of data on various aspects of crime is required.

Patna, from where most of the cases examined for the present study, leads the other cities in violence and crime data in State of Bihar but unfortunately there is very little information and research done about nature and extent of injuries in Interpersonal violence cases.

According to present study our findings are in agreement with records available from different sources for crime in this area.

The strategies to control homicide rates should focus on the individuals and their living context or the social circumstances in which it occur. Development, employment generation, awareness campaign against alcohol and substance abuse, political stability in State, political solution to insurgent problem and improve in law and order situation may reduce Interpersonal Violence related Deaths significantly.

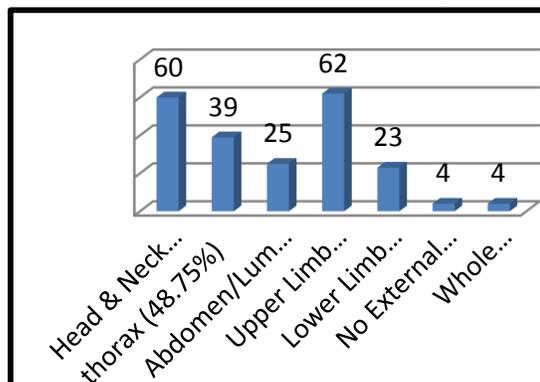
Imparting high moral values especially in young male population and discouraging violence culture in every forum will go long way in controlling crime in the society.

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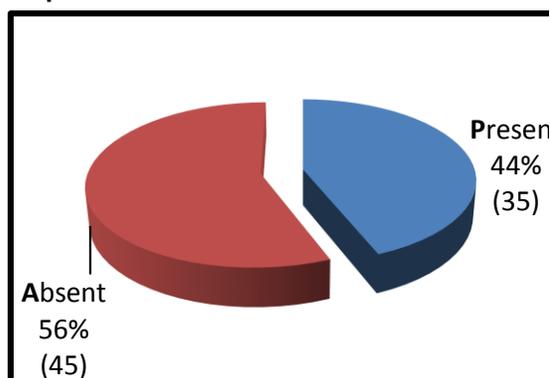
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**Graph 1: Distribution of External Injuries**



**Graph 2: Defence Wound**



**Table 1: Type of External Injuries**

External Injury type	Cases	Out of total IPV cases (%)
Abrasion	74	92.5
Contusion	45	56.25
Laceration	33	41.35
Fracture/ dislocation	34	42.5
Fracture skull	47	58.75
Sharp cut & stab	12	15%
Fire arm injuries	7	8.75%

**Table 2: Type of Intracranial Injuries**

Type of Intracranial Injuries	Cases	Out of total IPV cases (%)	Out of total Intracranial Injuries cases (%)
EDH	2	2.50	3.45
SDH	4	5	6.90
SAH	5	6.25	8.62
EDH + SAH	4	5	6.90
SDH + SAH	27	33.75	46.55
EDH + SDH + SAH	14	17.50	24.14
Brain injuries	24	30	41.38
Fracture skull	47	58.75	81.03
Total Intracranial injuries cases	58	72.5	100

**Table 3: Type of Skull Fracture**

Type of Skull Fracture	Cases	Out of total Intracranial Injuries cases (N=58) (%)	Out of Total Skull Fracture cases (N=47) (%)
Linear Fracture	24	41.38	51.06
Basilar Fracture	4	6.90	8.51
Comminuted Fracture	17	29.31	36.17
Depressed Fracture	4	6.90	8.51
Firearm Fracture	7	12.07	14.89
Crush Fracture	0	0	0
No Fracture	17	29.31	36.17
Total skull Fracture	47	81.03	100