

Pattern of Isolated Fatal Mechanical Injury in Homicidal Deaths: A Cross-Sectional Study

KIRAN KUMAR PATNAIK¹, SUDEEPA DAS², SACHIDANANDA MOHANTY³, HEMANTA PANIGRAHI⁴

ABSTRACT

Introduction: Homicide is the death of one human being as a result of conduct of another. Multiple assaults on the body are seen in 70% cases, which indicate determination on the part of the accused to end the life of the victim.

Aim: To identify the pattern, distribution and means of inflicting fatal isolated mechanical injury on the body in cases of homicide.

Materials and Methods: This cross-sectional study was conducted on total 728 homicide deaths, out of which 63 cases had an isolated fatal mechanical injury over the body and the rest 665 cases had multiple injuries. The data collected from the study sample were recorded in a case record form and was analysed using Graphpad Prism 5.0.

Results: Homicidal deaths occurring due to an isolated bodily

injury were 8.65%. Most of the victims (82%) were males. Those in the age group more than 60 years and less than 10 years together constituted 38% of the cases having isolated fatal homicidal injury. Sharp cutting weapons were used in most of the cases (46.03%) followed by use of hard and blunt weapon in 20.63%. The most common site of isolated injury causing homicide was head (41.26%) followed by the neck in 31.74%. The least common site of injury was the groin/scrotum (7.93%). The leading mode of death was coma (38.09%) followed by haemorrhagic shock in 34.92%.

Conclusion: Victims of homicidal deaths with isolated bodily injury showed a distinct pattern in comparison to deaths due to homicide with multiple injuries, which can be an indicator of the degree of aggression, magnitude of violence and the determination or intention of the assailant to kill.

Keywords: Assault, Victim, Weapon

INTRODUCTION

Homicide is the death of one human being as a result of conduct of another [1]. It represents one of the leading causes of death caused by expression of aggression in its most extreme form [2]. Multiple assaults on the body are seen in 70% cases, which indicate determination on the part of the accused to end the life of the victim [3]. Multiplicity of injuries in homicide is a significant finding and an indicator of the degree of aggression, magnitude of violence and the determination of the assailant to kill but isolated assaults leading to death have also been reported in some cases [4].

Studies on victims of homicidal deaths so far revealed a male preponderance in the third and fourth decades of their life [2-8]. Fatal wounds were found mostly in the head followed by neck and chest. Although less common, existence of isolated fatal injuries is seen with homicidal deaths and may be linked to the magnitude of violence caused [9,10]. Such single or isolated fatal homicidal injuries may also be influenced by various individual and demographic parameters with respect to the victim and the assailant. Presence of a single or isolated assault injury causing death of a person, its pattern, distribution, type of weapon used, site of assault and mode of death may influence the culpability of the assailant in the crime. However, there are no published studies on homicidal deaths due to an isolated mechanical injury on the body with respect the said parameters.

With this background, the present study was carried out with an objective to identify the pattern, distribution and means of inflicting fatal isolated mechanical injury on the body and its impact on the gravity and magnitude of the criminal act which can be useful not only to the medicolegal experts in evaluation and interpretation of such injuries but also assist the law enforcing agencies especially, the judiciary involved in trial of homicide cases and administration of justice.

MATERIALS AND METHODS

This cross-sectional study was conducted in the Department of Forensic Medicine, MKCG Medical College, Berhampur, Odisha, India, during a span of 10 years from 01-01-2006 to 31-12-2015 on 63 cases having an isolated fatal mechanical injury and 665 cases having multiple injuries over the body. The study is based on information in the documents (Inquest report and Dead body chalan) submitted by the investigating police at the time of autopsy of the dead bodies and the facts incorporated in the respective autopsy reports. Ethical approval was obtained from Institutional Ethical Committee.

Out of total 728 confirmed deaths resulting from homicide subjected to medicolegal autopsy, records of 63 cases having an isolated fatal mechanical injury and 665 cases having multiple injuries over the body were perused and were chosen as the study sample. By mechanical injury, we mean only those visible body damages produced due to breach in the natural continuity of the body tissues by application of mechanical force [4]. Homicidal deaths resulting due to non mechanical causes like poisonings, burns (both thermal and chemical) and drowning were excluded from the study group.

The data collected from the study sample were recorded in a case record form. While the first part of the case record form collected information on demographic details like gender, age, place and time of occurrence and number of assailants, the second part collected data on weapons used to cause the fatal injury, site of injury, mode of death. Detailed information regarding the circumstance of the crime was also sought from the police, victim's relatives and friends.

The data collected was analysed using Graphpad Prism 5.0 free trial version. Descriptive analytical statistics was used to report the pattern, distribution and means of inflicting fatal isolated mechanical injury on the body. Chi-square test was used to analyse the dichotomous data summarized as proportions. A p-value of <0.05 was taken as statistically significant.

Age Group (in Years)	Number of cases with isolated fatal injuries (n=63)	Number of cases with multiple injuries (n=665)
0-10	11 (17.46%)	26 (3.90%)
11-20	07 (11.11%)	52 (7.81%)
21-30	09 (14.28%)	166 (24.96%)
31-40	08 (12.70%)	185 (27.81%)
41-50	08 (12.70%)	177 (26.61%)
51-60	07 (11.11%)	43 (6.46%)
>60	13 (20.63%)	16 (2.40%)

[Table/Fig-1]: Age of victims with isolated fatal mechanical injury and with multiple injuries.

$\chi^2 = 83.452$, df = 6, p-value <0.01.

Type of weapon	Number of cases with isolated fatal injuries (n=63)	Number of cases with multiple injuries (n=665)
Sharp Cutting	29 (46.03%)	249 (37.44%)
Hard and Blunt	13 (20.63%)	215 (32.33%)
Strangulation	05 (07.93%)	38 (5.71%)
Sharp Penetrating	06 (09.52%)	119 (17.89%)
Firing	05 (07.93%)	27 (4.06%)
Kicks/Blows/Slap	05 (07.93%)	17 (2.55%)

[Table/Fig-2]: Type of weapon used for isolated fatal mechanical injury and with multiple injuries.

$\chi^2 = 13.807$, df = 5, p-value = 0.0168.

Site of injury	Number of cases with isolated fatal injuries (n=63)	Number of cases with multiple injuries (n=665)
Head	26 (41.26%)	290 (43.60%)
Neck	20 (31.74%)	178 (26.76%)
Chest	06 (09.52%)	78 (11.72%)
Abdomen	06 (09.52%)	106 (15.93%)
Groin/Scrotum	05 (07.93%)	13 (01.95%)

[Table/Fig-3]: Site of injury in isolated fatal mechanical assault and in multiple injuries.

$\chi^2 = 10.239$, df = 4, p-value = 0.036.

Modes of death	Number of cases with isolated fatal injuries (n=63)	Number of cases with multiple injuries (n=665)
Haemorrhagic Shock	22 (34.92%)	279 (41.95%)
Neurogenic Shock	07 (11.11%)	56 (08.42%)
Coma	24 (38.09%)	287 (43.15%)
Vagal Inhibition	05 (07.93%)	06 (00.90%)
Asphyxia	05 (07.93%)	37 (05.56%)

[Table/Fig-4]: Mode of death in isolated fatal mechanical assault and in multiple assaults.

$\chi^2 = 17.013$, df = 4, p-value = 0.0019.

RESULTS

In the present study, it was observed that out of the total 728 established cases of homicide, 63 deaths were reported due to an isolated bodily injury. Majority, 52 of the victims died due to such injury were males. Thus, females were less predisposed to homicide ($p=0.16$).

Majority, 13 of the victims of isolated fatal injury were in the seventh decade whereas 185 of those with multiple injuries were in the fourth decade of their life. There was significant association between the age of the victims and the nature of fatal injury ($p<0.01$) [Table/Fig-1].

Sharp cutting weapons were used in 29 cases of isolated fatal injury and in 249 cases with multiple injuries. Kicks, blows or slap accounted in least number of cases accounting for 05 and 17 cases of isolated and those with multiple injuries respectively. There was significant association between the type of weapon and the nature of fatal injury ($p=0.0168$) [Table/Fig-2].

The most common site of isolated injury causing homicide was head involved in 26 cases. In multiple injuries on the body also the most common site of fatal injury was found on the head in 290 cases. The least common site of injury in isolated fatal cases and multiple injuries was the groin/scrotum in 05 and 13 cases respectively. A significant association was found between the site of injury and the nature of fatal injury ($p=0.036$) [Table/Fig-3].

The leading mode of death in this study was coma constituting 24 cases having isolated fatal injury and 287 cases having multiple injuries on the body showing a significant association between the mode of death and the nature of fatal injury ($p=0.0019$) [Table/Fig-4].

DISCUSSION

In the present study, isolated fatal homicidal injury were detected in 8.65% of cases. Mohanty S et al., of India have found that multiple assaults on the body in homicide were encountered in most (70%) cases [3]. It is pertinent to state here that multiple injuries in homicide are justifiable by the assailant's clear intention and determination to kill. But the low quantum of isolated fatal injuries in homicide may be due to insufficient intention or lack of motive on the part of the assailant to kill. Sometimes the assailant may not necessarily want to kill the victim but may only have an intention to cause some bodily harm. Moreover, at other times the assailant may cause such bodily injury either in self defense or in an attempt to escape.

Most of the victims in this study were males clearly outnumbering the females with a male to female ratio of 4:1 and the maximum number of victims amongst the isolated fatal injury group were more than 60-year-old (20.63%) followed by 0-10 years (17.46%), whereas in homicides with multiple injuries, individuals in the fourth decade (27.81%) followed by fifth (26.61%) and third (24.96%) decades respectively are most commonly affected [Table/Fig-1]. Edirisinghe PA et al., of Sri Lanka detected male preponderance similar to this study [8]. Muhammad ZB et al., Mohanty S et al., Hilal A et al., of India, and Vij A et al., of Pakistan, Bhupinder S et al., and Kumar V et al., in a study conducted in Malaysia have found similar trends in the context of most common age group affected with respect to multiple injuries on the body causing homicide [2,3,9-12]. Meel B in a study done in African countries suggested male preponderance and common age group affected between 20-40 years [13]. High prevalence of isolated fatal mechanical injury among children and old individuals may be attributed to the fact that persons in their extremes of age are relatively weak in physical strength and incapable of imparting sufficient resistance. Moreover, a trivial isolated trauma in the extremes of age may sometimes prove to be fatal, thereby increasing the mortality as compared to the adult healthy counterparts.

Sharp cutting weapons were implicated in most instances in both isolated (46.03%) fatal homicidal injuries and with multiple (37.44%) injuries followed by hard and blunt weapons in 20.63% and 32.33% cases respectively. Death by strangulation, firing and kicks, blows or slap alone were encountered in a very small number of cases [Table/Fig-2]. In another study conducted in this Medical College by Mohanty S et al., sharp cutting weapons were implicated in 36.61% cases followed by hard and blunt weapons (24.41%) [14]. Similarly, sharp cutting followed by hard and blunt were the most

common weapons in homicide in studies conducted by Kumar V et al., in Malaysia, Lee GM et al., of Ireland and Avis SP of Canada [12,15,16]. But studies conducted by Muhammad ZB et al., and Hilal A of Turkey, Marri MZ et al., of Pakistan and Eze UO et al., of Nigeria revealed that firearms were the most common weapon followed by sharp cutting ones [2,9,8,17]. The use of sharp cutting weapons as means of execution ahead of hard and blunt weapons is obvious and can be attributed to maximum lethality and easy availability than sophisticated weapons like firearms in this part of the world. However, the point of importance in this study are the 7.93% cases having isolated mechanical injuries in the form of kicks or blows or slap which turned fatal despite being non brutal in nature. This may be an indicator not only of the low degree of aggression but also the lesser magnitude of violence shown by the assailant. These injuries also suggest that the assailant had no intention to kill the victim.

In the present study, the head was the most common site involved both in isolated (41.26%) and multiple (43.60%) injuries followed by the neck in (31.74%) and (26.76%) cases respectively. Injury to the groin/scrotum was detected in 07.93% cases of isolated injuries [Table/Fig-3]. Studies conducted in other parts of India by Vij A et al., and Gadse S et al., are similar to findings of our study [10,18]. Study in Pakistan by Marri MZ et al., revealed injury to chest as the most common site, explained by common use of firearms [8]. However, another study conducted in this Medical College by Mohanty S et al., revealed majority of injuries were at multiple sites followed by injury to the head and neck [14]. Head and neck are the most common sites as they are the most vital and dangerous areas of the body where death is most likely by injury even if trivial. Few isolated injuries to the chest and abdomen were also fatal which were caused by firing or stabbing. In some cases (11.11%) isolated injury to the groin/scrotum were also implicated where death was due to neurogenic shock. Such injuries caused on the private part although dangerous is an indication of the assailant's intention either to escape or render the victim temporarily incapacitated but does not substantiate his motive to kill or cause death.

The leading mode of death in isolated bodily injury causing homicide was coma constituting 38.09% of the cases followed by haemorrhagic shock in 34.92% of cases. Neurogenic shock (11.11%), asphyxia (7.93%) and vagal inhibition (7.93%) were the other modes of deaths [Table/Fig-4]. Almost similar observations were made in multiple injuries causing homicide also, but the incidences of death due to vagal inhibition were negligible (00.90%). Studies conducted on homicide by Vij A et al., Mohanty S et al., Padmaraj RY et al., Gupta S et al., Buchade D et al., and Gilani FN et al., suggested that haemorrhagic shock was the most common cause of death followed by craniocerebral injuries where coma is the mode of death [10,14,19-22]. The results of this study are different from that of others because the most common site of injury in this case is the head i.e., cranio-cerebral injuries where the mode of death is coma. However, in this study haemorrhagic shock as mode of death is not far behind. Again, in our study, vagal inhibition is found in quite a good number of cases in isolated injury causing homicide which is negligible in multiple injuries. It is one of the significant findings in terms of assessing the culprit's intention or motive or determination to kill the victim. Deaths resulting from vagal inhibition may be a spontaneous outcome of trivial trauma not intended to cause death.

LIMITATION

The study was confined within a particular geographical area. The study was based on information in the documents (Inquest report and Dead body chalan) submitted by the investigating police at the

time of autopsy of the dead bodies and the facts incorporated in the respective autopsy reports. Scene of crime was visited only in very few cases.

CONCLUSION

In present study, we have found that homicidal deaths with isolated bodily injury showed a distinct pattern in comparison to homicides with multiple injuries. This study revealed that individuals in the extremes of their ages were the vulnerable. Easy access and high lethality make sharp cutting weapons the most widely used instruments for assault. The most preferred sites of assault were head and neck and even an isolated injury over these areas can prove fatal. Although most of the victims died due to coma, haemorrhagic shock, death due to vagal inhibition or neurogenic shock following injury to some sensitive sites like groin/scrotum cannot be discounted.

The outcome of the study is vital in the sense that there can be instances where the assailant has no intention to kill but injuries on the vital areas of the body may prove fatal by default. Careful evaluation of isolated injuries in homicidal deaths can be useful in predicting the degree of aggression, magnitude of violence and the determination or intention of the assailant to kill, thus assessing the culpability of the assailant in the crime. The Judiciary may also derive benefit in terms of differentiating between homicides amounting to murder from those not amounting to murder.

REFERENCES

- [1] Mant AK. Taylor's Principles and practice of medical jurisprudence. 13th edition, New Delhi, B.I. Churchill Livingstone. 1994: 215.
- [2] Muhammad ZB, Ahmed S, Khan D, Aslam M, Javed I, Ahmed M. Pattern of homicidal deaths in Faisalabad. 2001-2002. Journal of Ayub Medical College, Abbotabad. 2004;16:57-59.
- [3] Mohanty S, Mohanty MK, Panigrahi MK, Das SK. Fatal head injury in homicidal victims. Med Sci law. 2005;45(3):244.
- [4] Bashir MZ, Saeed A, Khan D, Aslam M, Iqbal J, Ahmed M. Pattern of homicidal deaths in Faisalabad, Pakistan. Journal of Ayub Medical College, Abbotabad; 2004;16(2):57-59.
- [5] Aggrawal A. Essentials of Forensic medicine and toxicology. First edition; 2014;168.
- [6] Edirisinghe PA, Kitulwatte ID. Extreme violence homicide: An analysis of 265 cases from the offices of JMO Colombo and Ragama: A study from Sri Lanka. Legal Medicine. 2009;11:363-65.
- [7] Mohanty MK, Panigrahi MK, Mohanty S, Dash JK, Dash SK. Self defense injuries in homicidal deaths. Journal of Forensic and Legal Medicine. 2007;14(4):213-15.
- [8] Marri MZ, Bashir MZ, Munawar AZ, Khalil ZH, Khalil IR. Analysis of homicidal deaths in Peshawar. Pakistan, Journal of Ayub Medical College, Abbotabad. 2006;18:30-33.
- [9] Hilal A, Cekin N, Gulmen MK, Ozdemir MH, Karanfil R. Homicide in Adana Turkey: A five year review.
- [10] Vij A, Menon A, Menezes RG, Kanchan T, Rastogi P. A retrospective review of Homicide in Mangalore, south India. Journal of Forensic and Legal Medicine. 2010;17:312-15.
- [11] Bhupinder S, Kumara TK, Syed AM. Pattern of homicidal deaths autopsied at Penang Hospital, Malaysia. 2007-2009, A preliminary study. Malaysian Journal of Pathology. 2010;32:81-86.
- [12] Kumar V, Mae Li, Zaniat AZ, Lee DA, Saleh SA. A study of homicidal deaths in medicolegal autopsies at UMMC, Kuala Lumpur. Journal of Clinical Forensic Medicine. 2005;12:254-57.
- [13] Meel B. Trends in firearm related deaths in the Transkei region of South Africa. American Journal of Forensic Medicine and Pathology. 2007;28:86-90.
- [14] Mohanty S, Mohanty SK, Patnaik KK. Homicide in Southern India: A five year retrospective study. J of For Med and Anat Research. 2013;1(2):18-24.
- [15] Lee GM, MacNeill S, Rizet D, McDermott SD. Homicide/Suspicious death statistics for cases submitted to the forensic science laboratory in the republic of Ireland for 2004-2008. Med Sci and the Law. 2011;51:146-50.
- [16] Avis SP. Homicide in New Foundland: A 9-year review. Journal of Forensic Science. 1996;41:101-05.
- [17] Eze UO, Akang EEU, Odesanmi WO. Pattern of homicide coronor's autopsies at university college hospital. Ibadane, Nigeria, 1997-2006. Med Sci and the Law. 2011;51:43-48.
- [18] Gadge S, Zine KU, Batra AK, Kuchewar SV, Meshram RD, Dhawane SG. Medico-legal study of Homicide in and around GMC Aurangabad. Medico-Legal Update. 2011;1:56-58.

- [19] Padmaraj RY, Tandon RN. Pattern of homicide at mortuary of civic hospital Ahmedabad. *Journal of Forensic Medicine and Toxicology*. 2010;27:51-55.
- [20] Gupta S, Prajapati P. Homicide trends at Surat region of Gujarat, India. *Journal of Forensic Medicine and Toxicology*. 2009;26:45-48.
- [21] Buchade D, Mohite S. Trends in culpable homicide amounting to murder in the city of greater Mumbai: A five year study. *Medico-Legal Update*. 2010;10:12-14.
- [22] Gilani FN, Goudar ES, Afroz Z. Unusual homicidal case of firearm, cut throat and stab injury. *IOSR Journal of Dental and Medical Sciences*. 2015;14(6):06-13.

PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Forensic Medicine and Toxicology, Maharaja Krishna Chandra Gajapati Medical College, Berhampur, Odisha, India.
2. Associate Professor, Department of Forensic Medicine and Toxicology, Maharaja Krishna Chandra Gajapati Medical College, Berhampur, Odisha, India.
3. Professor, Department of Forensic Medicine and Toxicology, Maharaja Krishna Chandra Gajapati Medical College, Berhampur, Odisha, India.
4. Assistant Professor, Department of Forensic Medicine and Toxicology, Maharaja Krishna Chandra Gajapati Medical College, Berhampur, Odisha, India.

NAME, ADDRESS, E-MAIL ID OF THE CORRESPONDING AUTHOR:

Dr. Sudeepa Das,
Associate Professor, Department of Forensic Medicine and Toxicology, Maharaja Krishna Chandra Gajapati Medical College,
Berhampur-760004, Odisha, India.
E-mail : kkp_123@rediffmail.com

Date of Submission: **Dec 27, 2016**Date of Peer Review: **Mar 02, 2017**Date of Acceptance: **Jun 07, 2017**Date of Publishing: **Sep 01, 2017****FINANCIAL OR OTHER COMPETING INTERESTS:** None.