Original Research Article

# Estimation of Pattern of Skull Fractures in Homicidal Deaths: An Autopsy Based Cross Sectional Study Conducted in a Tertiary Care Hospital

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**Abstract**

The head is the most vital part of the body among various organs as the injury to the head will result in fatal outcomes compared to injuries sustained to other parts of the body. There has been an increased global incidence of head injuries in case of homicidal deaths. The present study aims to estimate the various patterns of the skull fractures in case of homicidal deaths and also the nature of injury causing such skull fractures in homicidal deaths. The present cross-sectional study revealed that out of 4036 autopsies, there were 74 cases of homicidal deaths with 67 male and 7 female cases. The skull fracture was noticed in 54 cases out of these 74 cases. The maximum number of homicidal deaths were found to be in the age group of 21 to 40 years. Among the different types of skull fractures, the isolated cut fracture contributed to 46.30% of cases followed by isolated fissured fractures and then by the combination of other types of skull fractures. The nature of injury causing skull fractures was blunt force in 51.8% of the cases then by sharp force injuries and then by the combination of these two. To bring down the incidence of homicidal deaths among the younger individuals, strict enforcements of law may be ensued on possession of blunt and sharp force weapons which are used for the brutal attacks.

**Keywords:** Homicidal deaths, Skull fractures, Blunt force.

## Introduction

The head is the most vital part of the body among the various organs as the injury to the head will result in very fatal outcomes compared to injuries sustained to other parts of the body. This is the main reason for the place of infliction of the injury especially in case of homicidal deaths. There has been an increased global incidence of the head injuries in case of homicidal deaths. This has been a serious concern to our society.

According to world report on violence and health by World Health Organisation, in 2000, about an estimated 5,20,000 people were killed in acts of the various forms of interpersonal violence with a rate of 8.8 per 100000 population. But the actual statistics of the homicidal deaths was not clear as many cases were being concealed as accidental death or attributed to natural diseases. For every person who had been killed by interpersonal violence many of them were physically injured or psychologically damaged to certain extent(1).

The various patterns of the interpersonal violence vary among the different nations of the world. In the developing nations like India, the most common pattern of interpersonal violence resulting

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in homicidal death is by inflicting the head injury. The global incidence of fatal head injuries as the result of assault is greater than the number of non-fatal cases [2].

Homicide is the common endpoint of various different behavioural pathways among which causing injury to the skull and brain is more prevalent [3]. It may be the result of arguments between acquaintances, various drug addictions, domestic violence, terrorism and antisocial activities and robberies [4]. The assailants usually select a particular region of the body where maximum and fatal injuries can be inflicted even with minimal effort such as the head [2]. The ultimate outcome of such attacks depends on a number of factors such as the type of weapon used, site of the injury in the body, number of blows, etc. the presence or absence of the skull fractures, the type and site of the skull fracture if present and the associated presence or absence and type of the intracranial haemorrhages has an immense significance in the final outcome of such cases [5].

The previous study conducted by Suraj Sundara Raj et. al showed that around 85.6% of skull fractures in homicidal deaths are produced by blunt force injury, of which the linear fracture of the skull was the commonest pattern among the skull fractures accounting for about 52.6%. Frontal bone was the commonest bone involved in homicidal deaths (16.5%) [6].

The thickness of the cranial vault is not the same in all the areas. It varies in different locations and in different age groups and also depend on the health status of the individual. It is usually thinner over the frontal and the temporal regions and is greater in strength along the suture lines in adult individuals [7]. Greater the force of impact, more severe will be the damage caused and the outcome will be fatal. As head is the most vulnerable and vital part of the body, the head injury is the most effective method of causing a homicidal death [7]. The present study aims to estimate the various patterns of the skull fractures in case of homicidal deaths and also the nature of injury causing such skull fractures in homicidal deaths.

## Materials and Methodology

The present study was conducted in the Department of Forensic Medicine and Toxicology, Government Stanley Medical College and Hospital, Chennai. It was a cross sectional study conducted during the period January 2019 – December 2020. All the cases of the homicidal deaths that were subjected to postmortem examination were studied. All the rest of the cases of natural deaths, accidental deaths and suicidal deaths were excluded from the study. The data was collected from the available postmortem records, clinical records, inquest reports and the weapon examination reports. The collected data were analysed and compared with the various national and international studies.

## Results and Observations

The present study revealed that a total of 4036 autopsies were conducted in the Department of Forensic Medicine and Toxicology, Govt. Stanley Medical College and Hospital, Chennai during the study period. Among those 4036 cases, there were about 74 cases (1.83%) which were died as result of homicide. Among the 74 cases of homicide, the head injury alone caused death in about 47 cases (63.51%). The head injury along with other injuries contributed to death in about 7 cases (9.46%). The injuries other than head injuries such as the cut throat injury, stab injury to chest and abdomen, blunt force injuries to other parts of the body contributed to death in about 20 cases of homicidal deaths (27.03%). This clearly showed that head injury was the most common cause of death among all the homicidal deaths **(Table 1)**.

Out of 74 cases, 67 (90.54%) were male and 7 (9.46%) were female. Among the cases of homicidal deaths, the skull fracture was noticed in about 54 cases (72.97%). The fracture of the skull bone was not present in rest of the 20 cases (27.03%). The homicidal death cases were divided among the different age groups of population. It showed that there were 5 cases (6.76%) in the age group of less than 20 years, 46 cases (62.16%) were in the age group of 21 to 40 years, 19 cases (25.68%) were in the age group of 41 to 60 years and 4 cases (5.4%) in the age group of more than 60 years. This shows that the

maximum number of homicidal death cases were in the age group of 21 to 40 years **(Table 2)**. Among the cases of homicidal deaths in different age groups, the skull fracture was present in all cases aged less than 20 years (100%), 33 cases in age group of 21 to 40 years (71.74%), 15 cases in the age group of 41 to 60 years (78.95%) and 2 cases in the age group of more than 60 years (50%).

Among the 54 cases of homicidal deaths with skull fracture, the isolated frontal bone fracture in 1 case, isolated parietal bone fracture in 1 case, isolated temporal bone fracture in 5 cases, isolated occipital bone fracture in 1 case and combination of multiple bones of the skull in 46 cases were noticed **(Table 3).** The base of the skull fracture was noticed in 16 cases. Among the various types of skull fractures, the isolated fissured fracture was noticed in 12 cases (22.22%) **(Figure 1)**, isolated cut fracture was noticed in 25 cases (46.30%) **(Figure 2)**, isolated comminuted fracture was present in 5 cases (9.26%) **(Figure 3)**, isolated sutural diastasis was present in 1 case (1.85%) **(Figure 4)** and a combination of different types of fractures were present in 11 cases (20.37%) **(Table. 4)**. The nature of the injury causing the skull fractures was blunt force in 28 cases (51.85%), sharp force injury in 23 cases (42.59%) and the combination of both blunt force and sharp force injuries were noticed in 3 cases (5.56%) **(Table. 5)**.

**Table 1: Cause of death in Homicidal Cases:**

| CAUSE OF DEATH | NO. OF CASES | PERCENTAGE |
|---|---|---|
| Head Injury alone | 47 | 63.51% |
| Head Injury + Other Injuries | 7 | 9.46% |
| Other Injuries alone | 20 | 27.03% |

**Table 2: Age Distribution of Homicidal Deaths:**

| AGE GROUP | NO. OF CASES | PERCENTAGE |
|---|---|---|
| <20 years | 5 | 6.76% |
| 21 – 40 years | 46 | 62.16% |
| 41 – 60 years | 19 | 25.68% |
| >60 years | 4 | 5.4% |

**Table 3: Location of skull fractures:**

| LOCATION OF SKULL FRACTURE | NO. OF CASES | PERCENTAGE |
|---|---|---|
| Isolated frontal bone | 1 | 1.85% |
| Isolated parietal bone | 1 | 1.85% |
| Isolated temporal none | 5 | 9.26% |
| Isolated occipital bone | 1 | 1.85% |
| Multiple sites | 46 | 85.18% |

**Table 4: Types of Skull Fractures:**

| TYPE OF SKULL FRACTURE | NO. OF CASES | PERCENTAGE |
|---|---|---|
| Fissured fracture | 12 | 22.22% |
| Cut fracture | 25 | 46.30% |
| Comminuted fracture | 5 | 9.26% |
| Sutural diastasis | 1 | 1.85% |
| Combination of fractures | 11 | 20.37% |

**Table 5: Nature of Injury causing Skull Fractures:**

| NATURE OF INJURY | NO. OF CASES | PERCENTAGE |
|---|---|---|
| Blunt force | 28 | 51.85% |
| Sharp force | 23 | 42.59% |
| Blunt and Sharp force | 3 | 5.56% |

**Figure 1: Fissured fracture of Skull**

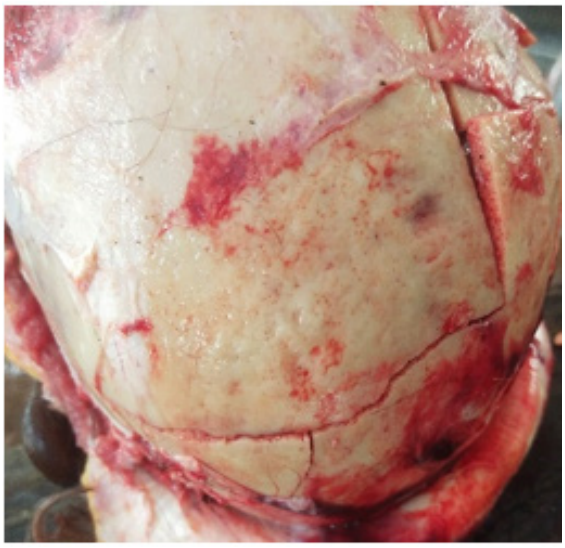

**Figure 2: Cut fracture of Skull**

**Figure 3: Comminuted fracture of Skull**

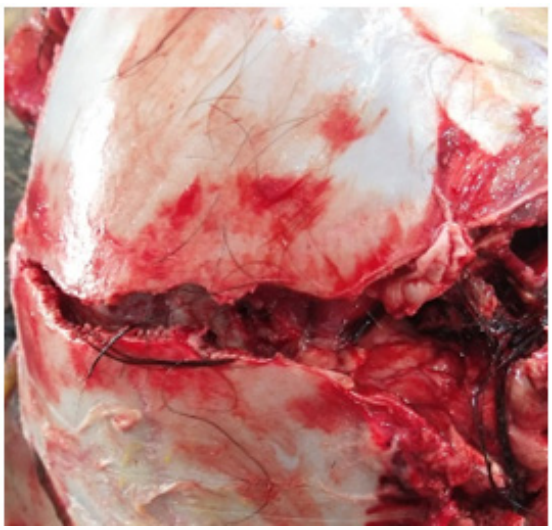

**Figure 4: Diastasis of Coronal suture of Skull**

## Discussion

In the present study, the homicidal deaths contributed to about 1.83% of the cases. The studies conducted by Suraj Sundaragiri et al [6], Mohanty et al [8] and Mishra et al [9] also revealed similar findings such as 2.1%, 3.4% and 3.8% respectively. The head injury was the cause of death in about 63.51% of the cases of homicidal deaths. This is similar to the results observed in the study conducted by Malik et al [10]. The skull fracture was noticed in about 72.97% of the cases of homicidal deaths. This result is very much similar to the results of the studies conducted by Malik et al [10] and Punia et al [11] which revealed to be 71.3% and 75% respectively. The homicidal skull fractures amounted to 93.1% in the study conducted by Chattopadhyay et al [2] and 97.2% in the study conducted by Mishra et al [9]. The present study also revealed that the most common age group for homicidal head injuries was 21 to 40 years which amounted to 62.16% of the cases followed by 41 to 60 years with 25.68%. These results are very similar to the study conducted by Suraj Sundaragiri et al [6] reported that 21 to 30 years was the most common age group of homicidal deaths. Similar results were observed in various other studies conducted by the Indian authors [11-16]. Majority of the cases were male which is similar to the reports of other studies. This male preponderance is due several socioeconomic and other factors. Most of the homicidal deaths occurred in lonely places and after evening time which is similarly observed by Henderson et al [19]. Most of the skull fractures in homicidal deaths were caused by blunt force weapons followed by sharp force weapons and then by combination of both which is in concordance with the studies conducted by Chattopadhyay et al [2], Gupta et al [13] and Singh et al [20]. The most common type of homicidal skull fracture was found to be cut fracture followed by a combination of different types of fracture. To the contrast, linear or fissured fracture was the most common type as noticed by Suraj Sundaragiri et al [6]. As there were maximum number of cases with skull fracture noted over multiple sites, this shows that multiple blows and multiple assailants were involved in case of homicides.

## Conclusion

The present study showed that younger individuals especially the male population were more vulnerable and the victims of fatal homicidal head injuries. Attacks by multiple offenders by

multiple strikes over the body was noticed in most of the cases. In majority of the cases, the injuries were very severe in nature involving all the structures of the head. The blunt force weapons like wooden log, stones, etc in majority of the cases caused isolated injuries but when combination of skull fractures included, the sharp force weapons like machete, sword, etc caused fractures in majority of the cases. The type of the skull fracture and its location and the number of cranial bones injured indirectly indicates the severity of force of the impact which leads to underlying brain damage and results in death of the individual. Culpable homicide is the worst form of all crimes. The concerned authorities should take firm steps to control this heinous crime. To bring down the incidence of homicidal deaths among the younger individuals, strict enforcements of law may be ensued on possession of blunt and sharp force weapons which are used for the brutal attacks.

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