

## ORIGINAL RESEARCH

# A Study of Postmortem Findings of Asphyxial Deaths due to Hanging: An Institutional Based Study

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## ABSTRACT

**Background:** Suicide remains a global epidemic. Worldwide, hanging by the neck is the leading method of suicide. Strangulation is defined as asphyxia by closure of the blood vessels and/ or air passages of the neck as a result of external pressure on the neck. The present study was conducted for evaluating postmortem findings of Asphyxial Deaths due to Hanging.

**Materials & Methods:** A total of 100 cases were enrolled. When a death occurs suddenly, unexpectedly, suspiciously, or unnaturally, a postmortem examination is necessary. Every hanging death is deemed abnormal and necessitates an autopsy. Using information from the police-provided inquest documents and autopsy data, a comprehensive victim profile was created. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

**Results:** Majority of the cases belonged to the age group of 20 to 40 years with mean age of 39.4 years. Major external features of hanging were congestion of face, petechial hemorrhage, cyanosis of nailbed or lips and salivary stain mark. Major internal features of hanging were White glistening subcutaneous tissue beneath ligature mark, Neck muscle hemorrhage, Thyroid gland hemorrhage, Salivary gland hemorrhage, Fracture of hyoid, Fracture of vertebra and Brain edema.

**Conclusion:** In order to stop suicidal behavior, extensive research is needed to identify people who are at high risk of suicide, comprehend the elements that contribute to suicide, and look into the underlying causes of the problem.

**Key words:** Asphyxial. Death. Postmortem.

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## INTRODUCTION

Suicide remains a global epidemic; in 2016 suicidal deaths accounted for 1.4% of deaths globally. Worldwide, hanging by the neck is the leading method of suicide. Strangulation is defined as asphyxia by closure of the blood vessels and/ or air passages of the neck as a result of external pressure on the neck.<sup>1, 2</sup> It is subdivided into three main categories: hanging, ligature strangulation and manual strangulation. The distinction between these three entities is attributed to the cause of the external pressure on the neck — either a constricting band tightened by the gravitational weight of the body or part of the body (hanging); a constricting band tightened by a force other than the body weight (ligature strangulation); or an external pressure by hands, forearms or other limbs (manual strangulation).<sup>3, 4</sup> A global increase in suicides

due to hanging has been observed. In a Turkish study, Taktak reported a two-fold increase in hanging deaths among females, and a five- to six-fold increase among men over a period of 33 years. A consistently reported finding includes that males predominate among the victims who commit suicide by hanging, representing between 68.3% and 84.0% of victims. The highest number of suicidal hangings occur in the age group 20–40 years, in some studies accounting for as much as 50% of the hanging victims.<sup>6- 10</sup> Hence; the present study was conducted for evaluating postmortem findings of Asphyxial Deaths due to Hanging.

## MATERIALS & METHODS

The present study was conducted in Department of Forensic Medicine, Nalbari Medical College, Nalbari, Assam (India) for evaluating postmortem findings of

Asphyxial Deaths due to Hanging. The study comprised all autopsies performed at the department of forensic medicine, where the cause of death was hanging. A total of 100 cases were enrolled. When a death occurs suddenly, unexpectedly, suspiciously, or unnaturally, a postmortem examination is necessary. Every hanging death is deemed abnormal and necessitates an autopsy. Using information from the police-provided inquest documents and autopsy data, a comprehensive victim profile was created. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software. Univariate analysis were conducted for evaluating the level of significance.

the cases were males. In majority of the cases, nylon rope was used as ligature material. Impression of ligature material was prominent in 62 percent of the cases. Position of knot was in the left and right mastoid region in 26 percent and 21 percent of the cases respectively. It was in left and right mandibular region in 21 percent and 11 percent of the cases respectively. Major external features of hanging were congestion of face, petechial hemorrhage, cyanosis of nailbed or lips and salivary stain mark. Major internal features of hanging were White glistening subcutaneous tissue beneath ligature mark, Neck muscle hemorrhage, Thyroid gland hemorrhage, Salivary gland hemorrhage, Fracture of hyoid, Fracture of vertebra and Brain edema.

## RESULTS

Majority of the cases belonged to the age group of 20 to 40 years with mean age of 39.4 years. 77 percent of

**Table 1: Age-wise distribution**

Age group (years)	Number	Percentage
Less than 20	29	29
20 to 40	38	38
51 to 60	21	21
More than 60	12	12
Total	100	100

**Table 2: Gender-wise distribution**

Gender	Number	Percentage
Males	77	77
Females	23	23
Total	100	100

**Table 3: Type of ligature material used**

Type of ligature material	Number	Percentage
Nylone rope	51	51
Cotton rope	29	29
Others	20	20
Total	100	100

**Table 4: Impression of ligature material**

Type of ligature material	Number	Percentage
Faint	13	13
Prominent	62	62
Grooved	25	25
Total	100	100

**Table 5: Position of ligature mark**

Position of knot/direction	Number	Percentage
Back of neck	12	12
Left mastoid	26	26
Right mastoid	21	21
Left mandibular	21	21
Right mandibular	11	11
Chin	9	9
Total	100	100

**Table 6: External features of hanging**

External features of hanging	Number	Percentage
Salivary stain mark	16	16
Congestion of face	42	42
Petechial hemorrhage	29	29
Cyanosis of nailbed or lips	45	45
Typical postmortem lividity	28	28

**Table 7: Internal features of hanging**

Internal features of hanging	Number	Percentage
White glistening subcutaneous tissue beneath ligature mark	71	71
Neck muscle hemorrhage	29	29
Thyroid gland hemorrhage	12	12
Salivary gland hemorrhage	10	10
Fracture of hyoid	5	5
Fracture of vertebra	6	6
Brain edema	75	75

## DISCUSSION

Asphyxial death is a common incident in forensic practice, and determination of the manner of death is very important. The manners of death can be accidental, suicidal, homicidal, or natural due to main methods of asphyxia. In such deaths, autopsy plays a major role to solve the case; the scene investigation and collection of samples are also of importance. Asphyxial deaths are divided into different methods, such as strangulations, suffocations, chemical asphyxia, and drownings. Additionally, in some cases, the victim dies as a result of the combination of different mechanisms of asphyxia. A case study from Romania indicates that a victim was killed by 3 different mechanisms of asphyxia: smothering with the hand, manual strangulation with the other hand, and traumatic asphyxia by thoracic compression with the knees.<sup>11-13</sup> Majority of the cases belonged to the age group of 20 to 40 years with mean age of 39.4 years. 77 percent of the cases were males. In majority of the cases, nylon rope was used as ligature material. Impression of ligature material was prominent in 62 percent of the cases. Position of knot was in the left and right mastoid region in 26 percent and 21 percent of the cases respectively. It was in left and right mandibular region in 21 percent and 11 percent of the cases respectively. Major external features of hanging were congestion of face, petechial hemorrhage, cyanosis of nailbed or lips and salivary stain mark. In a study conducted by Azmak D et al, 134 asphyxial deaths were autopsied by the Department of Forensic Medicine. Asphyxial deaths comprise 15.7% of all forensic autopsies; 20.8% of the cases are aged between 30 and 39 years, and the average age was 41.9 years. Males constitute 79.8% of all the cases. The most frequent method of asphyxiation death is hanging (56 cases, 41.8%), followed by drowning (30.5%) and carbon monoxide poisoning (8.2%). More violent methods, such as ligature or manual strangulations, constitute 2.9% and 2.3% of all

asphyxial deaths, respectively.<sup>14</sup> Nagar, N et al examined the seasonal distribution of suicide-hanging fatalities in Rishikesh, Uttarakhand, as well as the male and female incidence. A four-year retrospective examination of autopsy data was done. A total of 1720 autopsies were performed during this period with 130 (7.56%) suicidal hangings. Males were disproportionately impacted (n=100, 76.92%). The ratio of men to women is 3.33:1. The mean ages of the males and females were  $33.09 \pm 12.59$  and  $24.9 \pm 7.84$  years, respectively. The majority of deaths occur in the third decade of life. The summer months saw the highest number of deaths.<sup>15</sup> In the present study, major internal features of hanging were White glistening subcutaneous tissue beneath ligature mark, Neck muscle hemorrhage, Thyroid gland hemorrhage, Salivary gland hemorrhage, Fracture of hyoid, Fracture of vertebra and Brain edema. In another similar study conducted by Sane MR et al, authors evaluated the demographics, mortality patterns and cause of delayed deaths in near hanging victims. Records of 14,000 autopsies was reviewed, and 10 deceased having died delayed deaths after near hanging episode were identified. Complete suspension was present in 3 cases, while partial suspension was present in 7 cases. Survivals in delayed death after near hanging episode have ranged from 9 h to 72 d. Hypoxic encephalopathy was the most common cause of death, followed by pneumonia.<sup>16</sup> Another previous study conducted by Ambade VN et al, authors determined the characteristic features of hanging and its association with ligature material or mode of suspension. Of a total medicolegal death reported at an Apex Medical Centre, hanging was noted in 4.1% cases, all suicidal with mortality rate of 1.5 per 100,000 population per year. The hanging was complete in 67.7% with nylon rope as the commonest type of ligature material used for ligation. The hanging mark was usually single, situated above thyroid cartilage, incomplete, prominent, and directed

toward nape of neck. The mark of dribbling of saliva was seen in 11.8% cases. Facial congestion, petechial hemorrhage, and cyanosis were significantly seen in partial hanging.<sup>17</sup> The factors affecting mortality and morbidity in patients admitted with suicidal hanging to the Intensive Care Unit (ICU) was analyzed in another previous study conducted by Renuka, M. et al. They analyzed data of 106 patients. The median age was 27 years. The median lead time to ER admission was 1 with median ICU stay of 3 days. Vasopressors were administered to 27.4% of patients. GCS was  $\leq 7$  in 65% patients, and 84.9% patients received mechanical ventilation. The mortality rate was 10.3%. Survivors recovered with normal organ function. Suicidal hanging is associated with significant mortality.<sup>18</sup>

### CONCLUSION

In order to stop suicidal behavior, extensive research is needed to identify people who are at high risk of suicide, comprehend the elements that contribute to suicide, and look into the underlying causes of the problem.

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