

Macroscopic Neck Findings in Asphyxial Deaths Due to Hanging and Strangulation with Special Reference to the Hyoid Bone at Police Morgue Autopsies

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Abstract:

Introduction: Asphyxial deaths from strangling or hanging are most commonly caused by neck lesions associated with laryngo-hyoid fractures. Therefore, it is unclear if these clinical characteristics are important for diagnosing the asphyxia mode.

Aims: This study aims to compare macroscopic neck findings in asphyxial deaths due to hanging and strangulation, focusing on hyoid bone fractures. It evaluates their frequency and patterns to aid in determining the manner of death, supporting accurate differentiation between suicidal, homicidal, and accidental asphyxia in forensic investigations.

Materials and Methods: For this observational cross-sectional investigation, asphyxial death cases from hanging or strangling were collected between July 2022 and December 2023. While autopsy records were used to include cases, decomposed or mangled remains and other types of asphyxia were excluded. The sample size was calculated using Solvin's technique, and statistical analysis was performed using GraphPad Prism software version 8.

Results: The most common method among the 100 instances was hanging (n=83), which was followed by throttling (n=3), partial hanging (n=5), and strangulation (n=9). 26% of instances had abrasions, whereas 69% showed none at all. Most of the knots were placed over the left mastoid (56%), followed by the right mastoid (17%) and the occipital bone 7%. Seventy-seven percent of the deceased in the hanging cases had a high level of ligature material. Grooved ligature marks were significantly more common in hanging victims than in strangled victims (56% vs. 1%, $p < 0.0001$), and they were most common in victims aged 41–50 years ($p = 0.91$). 19% of hanging and strangulation instances had abrasions, compared to 77% ($p < 0.0001$), 37.5% of strangling victims had damaged skin, but 59% of hanging victims had dry skin beneath the ligature ($p < 0.0001$).

Conclusion: By pointing up significant variations in outcomes between hanging and strangling fatalities, this study enhances forensic assessments and highlights the importance of thorough autopsy.

Keywords: Macroscopic findings, Neck injuries, Asphyxial deaths and Strangulation.

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Introduction

In the realm of forensics, asphyxial deaths occur frequently. The term "asphyxia" means "defective aeration of blood" in direct translation and is typically used to describe "lack of oxygen." A lack of oxygen in inspired air or interference with the kind and way of respiration can cause this, which leaves very little or no oxygen present at the tissue level. Violent asphyxial deaths are commonly used to describe hanging, drowning, and strangled deaths. Mechanical asphyxia, which stops breathing, happens when the neck, chest, or any other part of the body is subjected to excessive external pressure. The most common violent fatalities, which are

unnatural deaths, are strangling and hanging, which occur when there is external pressure on the neck region. Strangulation can be brought on by either by hand, which is referred to as manual strangulation, or by ligature, which is known as ligature strangulation.

A form of strangling known as "hanging" occurs when the body is partially or completely suspended, causing external constrictive forces to influence the neck.

Direct pressure on the bigger cornu or indirect strain on the thyrohyoid membrane can cause any of the aforementioned types of hyoid bone fractures.

Between the tongue root and the thyroid cartilage is a little bone called the hyoid. It consists of two main horns, two lesser horns (cornu), and a body. Fractures are quite uncommon due to their free-flowing nature, but they are important from a medicolegal perspective if they are found during autopsy.

Determining whether asphyxial fatalities are accidental, suicidal, homicidal, or natural is a critical topic in forensics, because these deaths are frequent. The most frequent suffocation fatality is hanging [1]. Even while the cause of death in a hanging may be fairly clear, the method of death (suicide, homicide, or accident) is not always clear without a detailed and comprehensive investigation [2]. This specification is necessary to properly describe the diagnostic concerns related to hanging-induced asphyxia because, in theory, hanging is almost always a suicide in terms of the mechanism of death [3]; and although they are extremely uncommon, homicide and accidents are also possible causes of mortality. There are two potential outcomes in terms of homicide [4]: (1) a genuine homicidal hanging, which assumes that the victim is significantly weaker or weakened and the perpetrator is significantly stronger or has numerous aggressors; (2) The corpse is suspended, simulating hanging with the victim dead from another cause. The two situations will clearly have distinct typical hanging results (present in case 1, absent in case 2). The literature indicates that unintentional hangings are also quite rare and frequently only happen in autoerotic deaths. In forensic pathology, the difficulty of this differential diagnosis is particularly acute when it comes to the specific subset of a body's contents. Interesting hints can be found by statistically analyzing anatomico-pathological findings in hanging, which is the aim of the current study. For the purpose of completeness, it is important to mention this feature even if differential diagnosis based solely on anatomico-pathological data is fundamentally unachievable in other manners of death. Significant differences in the incidence of aberrant findings are often reported in the pertinent literature. Furthermore, there is a wealth of facts on this topic, many of which differ greatly from one another. For example, a paradoxical contradiction in the striking range of laryngohyoid fractures in hanging victims has been noted by a number of researchers [5].

By offering figures and statistical analyses, we hope to address a crucial query for forensic pathologists about hanging: what diagnostic values can we assign to pleural and epicardial petechiae, neck lesions, and hemorrhages in hanging cases? Second, because the topic of hanging frequently comes up in the literature, we looked into whether there was any meaningful relationship between the findings of hanging and the victims' physical characteristics [6].

To the best of our knowledge, no study has ever attempted to scientifically define these attributes using statistical methods. At this time, no research has been done that uses a conventional contingency table system to analyze hanging with non-hanging injuries, nor has any forensic. Using contingency tables, the pathology literature performed a true statistical comparison. Since the great majority of current study aims to count the injuries within the same group of hanging instances, it might be categorized as reviews. Lesions of the laryngeal bones, for instance, can result from any neck stress, not just hanging. However, the osteocartilaginous laryngeal structures cannot sustain any damages as a result of the shock of hanging. In order to more thoroughly analyze this issue, we employed contingency tables.

Examining the macroscopic findings of the hyoid bone in asphyxial deaths from hanging and strangulation is the goal of this study. By comparing the outcomes between these two causes of death, the study hopes to find any significant differences in the hyoid bone injury or changes. In order to provide information on any age-related trends, the study will also look into the prevalence of hanging in various age groups.

Material and Methods

Study Subjects

The study will be conducted on cases of asphyxial deaths brought to Police Morgue of R.G. Kar Medical College and Hospital.

Study Period: 1st July 2022 to 31st December 2023.

Requirement of Control: No controls required.

Inclusion Criteria

- All cases with history of asphyxial death due to hanging or strangulation
- All cases without any history but autopsy findings are suggestive of the same.

Exclusion Criteria

- Decomposed and mutilated Bodies
- Non asphyxial deaths
- Asphyxial deaths other than hanging and strangulation.

Study Design: Observational Cross-sectional study

Sampling: Convenience sampling was done

Sample Size: As per Solvin's formula, $n = N/1 + Ne^2$, Here n = Specific study population. N - Total no. of cases. $E = 0.1$ as I'm 90% confident about my study.) n = Sample size, $N = 3622$.

$E = 0.1$. So, $n = 3622/1 + 3622(0.1)^2 = 3622/37.22$

n= 97.31, for the convenience sample of my study I take 100 as my Sample Size.

Sample size: 100

Statistical Analysis Plan: All data will be collected, compiled and subjected to suitable statistical analysis using appropriate methods. Results will be presented using charts, tables, diagrams and photographs. Finally the findings will be critically studied on background knowledge and the experience of past works done.

Ethical Clearance

Synopsis will be submitted to our institutional ethics committee for ethical clearance.

Work Plan

The research work's activity schedule will be during autopsy hours at the morgue on all working days in between.

Statistical Analysis

Data for the statistical analysis were entered into a Microsoft Excel spreadsheet and analyzed using SPSS (version 27.0) and Graph Pad Prism (version 5). Numerical variables were summarized as mean and standard deviation, while categorical variables were presented as counts and percentages.

Two-sample t-tests were used for independent samples, while paired t-tests, which offer greater power, were used for related samples. Chi-squared tests (specifically Pearson's chi-squared) assessed categorical data, with unpaired proportions compared using either the Chi-square test or Fisher's exact test. The document provides explicit formulas for various t- tests and their corresponding degrees of freedom. A t-value leads to a p-value, which, if below the significance threshold (typically 0.05), results in rejecting the null hypothesis.

Result

Table 1: Comparison between Demographic parameter and Type of incident

		Hanging	Partial hanging	Strangulation	Throttling	Total	Chi-Square Value	P-Value
Age in group	<20	15(18.1%)	1(%)	2(%)	1(%)	19(%)	13.13	0.904
	21-30	11(13.3%)	2(40%)	1(12.7%)	1(33.3%)	15(15%)		
	31-40	17(20.5%)	1(20%)	1(100%)	1(33.3%)	20(20%)		
	41-50	18(21.7%)	0(%)	1(12.5%)	0(%)	19(19%)		
	51-60	9(10.8%)	0	1(12.5%)	0(%)	10(10%)		
	61-70	8(9.6%)	1(20%)	3(37.5%)	0(0%)	12(12%)		
	71-80	4(4.8%)	0(0%)	0(0%)	0(0%)	4(4%)		
	>81	1(1.2%)	0(0%)	0(0%)	0(0%)	1(1%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
Sex	Female	31(37.3%)	0(%)	3(37.5%)	1(33.3%)	35(35%)	2.908	0.406
	Male	52(62.7%)	5(100%)	6(66.7%)	2(66.7%)	65(100%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
Socio Economic Status	Lower Middle	12(14.5%)	1(20%)	0(0%)	1(33.3%)	14(14%)	3.706	0.93
	N.A	1(1.2%)	0(0%)	0(0%)	0(0%)	1(1%)		
	Upper Lower	56(67.5%)	2(40%)	7(77.8%)	2(66.7%)	67(67%)		
	Upper Middle	14(16.9%)	2(40%)	2(22.2%)	0(0%)	18(18%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
	Hindu	80(96.4%)	5(100%)	7(77.8%)	2(66.7%)	94(94%)		
	Muslim	3(3.6%)	0(0%)	2(22.2%)	1(33.3%)	6(6%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		

Table 2: Comparison between Level, Pattern, Tissue and Type of incident

Parameter		Hanging	Partial hanging	Strangulation	Throttling	Total	Chi-Square Value	P-Value
Level of Ligature material	At thyroid Cartilage	0	0	2(22.2%)	0	2(2%)	212.53	<0.0001
	Below thyroid	0	0	4(44.4%)	0	4(4%)		
	High up	74(89.2)	3(60%)	0	0	77(77%)		
	Horizontal	0	0	1(11.1%)	0	1(1%)		
	Middle of neck	3(3.6%)	1(20%)	1(11.1%)	0	5(100%)		
	Middle, oblique	0	1(%)	0	0	1(%)		
	N.A	0	0	0	3(%)	3(%)		
	oblique	6(7.2%)	0	0	0	6(6%)		
	thyroid level	0	0	1(11.1%)	0	1(1%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
Pattern of knot	Present	14(16.9%)	0	3(33.33%)	0	17(17%)	12.44	0.133
	Absent	68(81.9%)	5(100%)	6(66.67%)	2(66.67%)	81(100%)		
Ligature material	No appreciable	1(1.2%)	0	0	1(33.3%)	2(2%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
Tissue under the Ligature Material	Bleeding muscle	0	0	1(12.5%)	0	1(1%)	162.18	<0.0001
	Bruising	1(1.2%)	1(20%)	3(37.5%)	1(33.3%)	6(6%)		
	Congested	1(1.2%)	1(20%)	1(12.5%)	0	3(3%)		
	Deep bruise	0	0	1(%)	2(66.7%)	3(3%)		
	Dry & Parch	49(59%)	0	0	0	49(49%)		
	Ecchymosed	0	0	1(12.5%)	0	1(1%)		
	Glistening	2(2.4%)	0	0	0	2(2%)		
	Mild Cong.	12(14.5%)	1(20%)	1(12.5%)	0	14(14%)		
	Normal	7(8.4%)	0	0	0	7(7%)		
	Petechial haemorrhage	0	2(40%)	1(11.11%)	0	3(3%)		
	Superficial	1(1.2%)	0	0	0	1(1%)		
	White glistering	10(12%)	0	0	0	10(10%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		

Table 3: Comparison between Position of knot, Skin Changes, Abrasion and Type of incident

Parameter		Hanging	Partial hanging	Strangulation	Throttling	Total	Chi-Square Value	P-Value
Position of knot	Back of neck	0	1(20%)	1(12.5%)	0	2(2%)	121.37	<0.0001
	Below Chin	1(1.2%)	0	0	0	1(1%)		
	Chin	2(2.4%)	0	0	0	2(2%)		
	Left angle of mandible	0	1(20%)	0	0	1(1%)		
	Left mastoid	56(67.5%)	0	0	0	56		
	Occiput	7(8.4%)	3(60%)	2(25%)	0	12(12%)		
	Rt. Mastoid	17(20.5%)	0	3(37.5%)	0	20(20%)		
	Under chin	0	0	1(12.5%)	0	1(1%)		
	N.A	0	0	2(22.2%)	3(100%)	5(5%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
	Absent	1(1.2%)	0	0	0	1(1%)		
Skin Changes	Bruise	0	0	3(33.3%)	2(66.7%)	5(5%)	107.7136	<0.0001
	Deep	8(9.6%)	0	0	0	8(8%)		
	Ecchymosed	0	0	1(11.1%)	0	1(1%)		
	Faint	10(%)	0	3(33.3%)	1(33.3%)	14(14%)		
	Faint, Reddish	0	0	1(11.1%)	0	1(1%)		
	Grooved	52(62.7%)	1(1.9%)	0	0	53(100%)		
	Mild	1(1.2%)	0	0	0	1(1%)		
	Deep							
	Narrow,	1(1.2%)	0	0	0	1(1%)		
	Grooved							
	Shallow	1(1.2%)	0	0	0	1(1%)		
	Superficial	9(10.8%)	4(80%)	1(11.11%)	0	14(14%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		
	Absent	64(77.1%)	4(80%)	1(11.1%)	0	69(69%)		
Abrasion	Nail Mark	0	0	1(11.1%)	3(100%)	4(4%)	111.77	<0.0001
	Present	19(22.9%)	0	7(77.8%)	0	26(26%)		
	Petechial hemorrhage	0	1(20%)	0	0	1(1%)		
	Total	83(100%)	5(100%)	9(100%)	3(100%)	100(100%)		

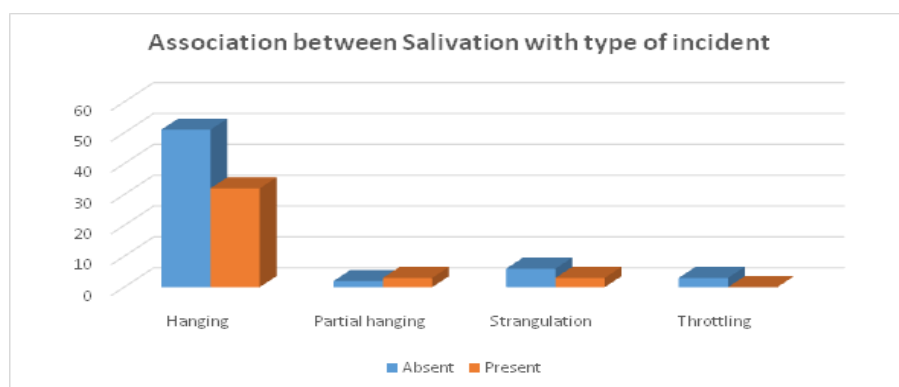


Figure 1: Association between Salivation: Type of incident

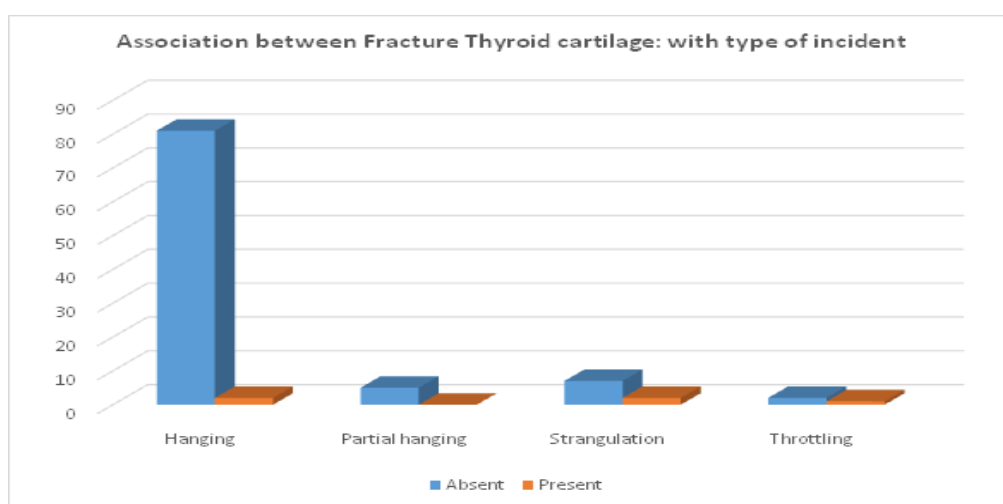


Figure 2: Association between Fracture Hyoid: Type of incident

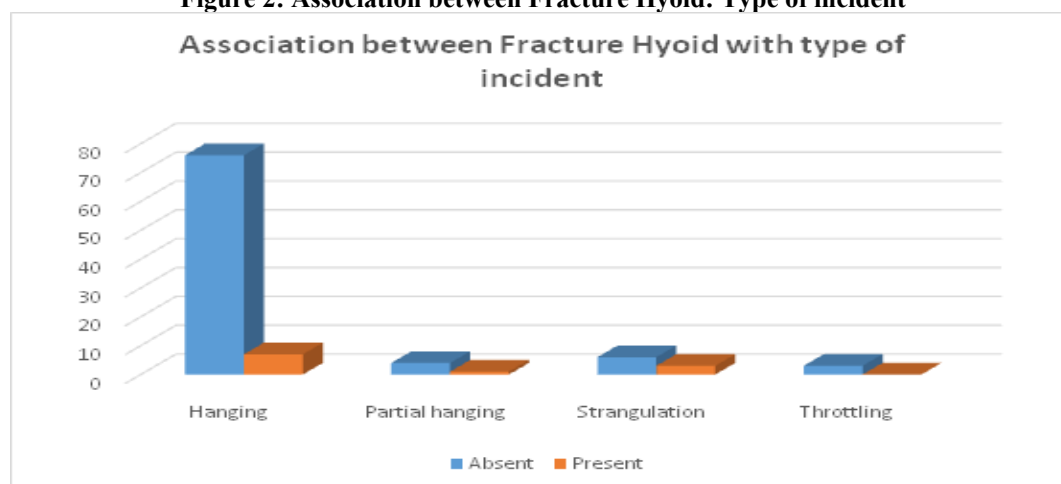


Figure 3: Association between Fracture Thyroid cartilage: Type of incident

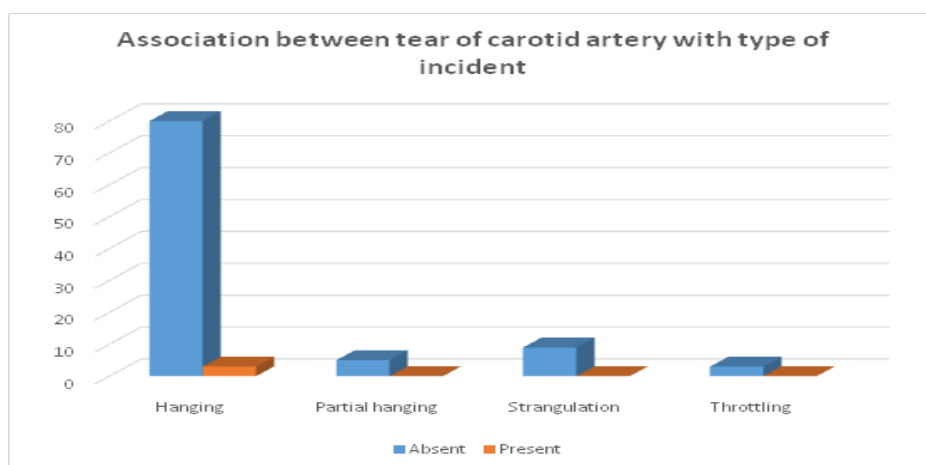


Figure 4: Association between tear of carotid artery: Type of incident

In Hanging, 15 (18.1%) deceased were <20 years of age, 11 (13.3%) patients were 21-30 years of age, 17 (20.5%) patients were 31-40 years of age, 18 (21.7%) patients were 41-50 years of age, 9 (10.8%) patients were 51-60 years of age, 8 (9.6%) patients were 61-70 years of age, 4 (4.8%) patients were 71-80 years of age and 1 (1.2%) patient was >81 years of age. In Partial hanging, 1 (20.0%) patient was <20 years of age, 2 (40.0%) patients were 21-30 years of age, 1 (20.0%) patient was 31-40 years of age and 1 (20.0%) patient was 61-70 years of age. In Strangulation 2 (25.0%) patients were <20 years of age, 1 (12.5%) patient were 21-30 years of age, 1 (12.5%) patient was 41-50 years of age, 1 (12.5%) patient was 51-60 years of age and 3 (37.5%) patients were 61-70 years of age. In Strangulation, (100.0%) patient was 31-40 years of age.

In Throttling, 1 (33.3%) patient was <20 years of age, 1 (33.3%) patient was 21-30 years of age and 1 (33.3%) patient was 31-40 years of age. Association of Age in group with Type of incident was not statistically significant ($p=0.9102$). In Hanging, 31 (37.3%) patients were Female and 52 (62.7%) patients were Male. In Partial hanging, 5 (100.0%) patients were Male. In Strangulation 3 (37.3%) patients were Female and 6 (66.7%) patients were Male. In Throttling, 1 (33.3%) patient was Female and 2 (66.7%) patients were Male. Association of Sex with Type of incident was not statistically significant ($p=0.406$). In Hanging, 12 (14.5%) patients were Lower Middle class, 56 (67.5%) patients were Upper Lower class and 14 (16.9%) patients were Upper Middle class. In Partial hanging, 1 (20.0%) patient was Lower Middle class and 2 (40.0%) patients were Upper Lower class and 2 (40.0%) patients were Upper Middle class. (77.8%) deceased belonging to Upper Lower class and 2 (25.0%) deceased were Upper Middle class who died of strangulation In Throttling, 1 (33.3%) patient was Lower Middle class and 2 (66.7%) patients were Upper Lower class. Association of Socio Economic Status with Type of incident was not statistically significant ($p=0.930$).

In Hanging, 74 (89.2%) patients had High up, 3 (3.6%) patients had Middle of neck, 6 (7.2%) patients had oblique. In Partial hanging, 3 (60%) patients had High up, 1 (20%) patient was Middle of neck and 1 (10%) patient was Middle, oblique. In Strangulation, 2 (22.2%) patients had at thy Cart, 4 (44.4%) patients had Below thyroid, 1 (11.1%) patient was Horizontal, 1 (11.1%) patient was Middle of neck and 1 (11.1%) patient was thyroid level. In Throttling, 3 (30%) patients had N.A. Association of Level of Ligature material with Type of incident was statistically significant ($p<0.0001$). In Hanging, 14 (16.9%) patients had Pattern of Ligature material. In strang, 3 (37.5%) patients had Pattern of Ligature material. Association of Pattern of Ligature material with Type of incident was not statistically significant ($p=0.133$). In Hanging, 1 (1.2%) patient was Bruising, 1 (1.2%) patient was Congested, 49 (59%) patients had Dry & Parch, 2 (2.4%) patients had Glistening, 12 (14.5%) patients had Mild Cong, 7 (8.4%) patients had Normal, 1 (1.2%) patient was Superficial and 10 (12%) patients had White glistening. Association of Pattern of Ligature material with Type of incident was statistically significant ($p<0.0001$). In Partial hanging, 1 (20%) patient was Bruising, 1 (20%) patient was Congested, 1 (20%) Mild Cong and 2 (40%) patients had Petechial haemorrhage. Association of Pattern of Ligature material with Type of incident was not statistically significant ($p=0.133$). In Strangulation, 1 (12.5%) patient was Bleeding muscle, 3 (37.5%) patients had Bruising, 1 (12.5%) patient was Congested, 1 (10%) patient was Deep bruise, 1 (12.5%) patient was Ecchymosed, 1 (12.5%) patient was Mild Cong and 1 (11.11%) patient was Petechial haemorrhage. In Throttling, 1 (33.3%) patient was Bruising and 2 (66.7%) patients had Deep bruise. Association of Tissue under the Ligature Material with Type of incident was statistically significant ($p<0.0001$).

In Hanging, 1 (1.2%) patient was Below Chin,

2(2.4%) patients had Chin, 56(67.5%) patients had Left mastoid, 7(8.4%) patients had Occiput and 17(20.5%) patients had Rt. Mastoid. In Partial hanging, 1(20%) patient was Back of neck, 1(20%) patient was Left angle of mandible, and 3 (60%) patients had Occiput. In Strangulation, 1(12.5%) patient was Back of neck, 2(25%) patients had Occiput, 3(37.5%) patients had Rt. Mastoid, 1(12.5%) patients had under chin, and 2 (22.2%) patients had N.A. In Throttling, 3(100%) patients had N.A. Association of Position of knot with Type of incident was not statistically significant ($p < 0.0001$).

In Hanging, 8(9.6%) patients had Deep, 10(12.5%) patient was Faint, 52(62.7%) patients had Grooved, 1(1.2%) patient was Mild Deep, 1(1.2%) patient was Narrow, Grooved, 1(1.2%) patient was Shallow and 9(10.8%) patients had Superficial. In Partial hanging, 1(1.9%) patient was Grooved and 4(80%) patients had Superficial. In Partial hanging, 1(1.9%) patient was Grooved and 4(80%) patients had Superficial. In Strangulation, 3(33.3%) Bruise, 1(11.1%) patient was Ecchymosed, 3(33.3%) patients had Faint, 1(11.1%) patient was Faint, Reddish and 1(11.11%) patient was Superficial. In Throttling, 2(66.7%) Bruise and 1(33.3%) patient was Faint. Association of Skin Changes with Type of incident was not statistically significant ($p < 0.0001$).

In Hanging, 19 (22.9%) patients had Abrasion. In Partial hanging, 1 (20.0%) patient was Petechial haemorrhage. In Strangulation, 1 (100.0%) patient was Nail Mark abrasion while rest 7(77.8) had usual ligature abrasion. In Throttling, 3 (100.0%) patients had Nail Mark. Association of Abrasion with Type of incident was not statistically significant ($p < 0.0001$). In Hanging, 32 (38.6%) patients had Salivation. In Partial hanging, 3 (60.0%) deceased had Salivation. In strangulation 3 (33.3%) deceased had Salivation. Association of Salivation with Type of incident was not statistically significant ($p = 0.398$). In Hanging, 7 (8.4%) patients had Fracture Hyoid. In Partial hanging, 1 (20.0%) patient had Fracture Hyoid. In Strangulation 3 (33.3%) patients had Fracture Hyoid. Association of Fracture Hyoid with Type of incident was not statistically significant ($p = 0.115$). In Hanging, 2 (2.4%) patients had Fracture Thyroid cartilage. In Strangulation 2 (22.2%) patients had Fracture Thyroid cartilage. In Throttling, 1 (33.3%) patient had Fracture Thyroid cartilage. Association of Fracture Thyroid cartilage with type of incident was statistically significant ($p = 0.007$). In Hanging, 3 (3.6%) patients had Tear of carotid absent. Association of tear of carotid with type of incident was not statistically significant ($p = 0.89$).

Discussion

The analysis of 100 patients focused on differences

in age, gender, socioeconomic status, and religious background across the groups that were throttled, hung, strangled, and partially hung. While most statistics, such as the age distribution, male-to-female ratio, and socioeconomic level, were not statistically significant, certain key discoveries were. Notably, patients in the partial hanging group were more likely to have occiput knot placements and to be Hindu, whereas patients in the strangulation group were more likely to have bruising and thyroid cartilage fractures. The study acknowledges its limitations, such as its small sample size, and suggests additional research to support its findings. Zátoková L et al [7](2018) found that 178 suicidal hanging victims (M/F = 150/28, ages 14–94, mean age = 50, complete suspension = 111 cases, partial suspension = 67 cases) were analyzed prospectively and consecutively for the incidence of laryngohyoid fractures in relation to specific variables (age, sex, weight, the completeness of body suspension, and ligature knot location).

In our study, the majority of the 100 patients [20 (20.0%)] were between the ages of 31 and 40. However, $p = 0.9102$ indicated that this was not statistically significant. Ali MA et al [8](2018) found that out of 87 cases, 53(60.9%) were male and 34(39.1%) female. We found that, the proportion of men [65 (65.0%)] was greater than that of women [35 (35.0%)]. Despite being 1.8:1, the male to female ratio was not statistically significant ($p = 0.4843$).

Ali MA et al [8](2018) found that 52 victims, or 59.8%, had lower socioeconomic class, whereas 61 victims, or 70.1%, were from urban areas, according to the police inquiry.

Our study showed that, When compared to other socioeconomic statuses, the majority of the deceased (67%) belonged to the Upper Lower Socio-Economic Status ($P = 0.930$).

Charoonnate N et al [9](2010) discovered that the knot was at the left, front, and right of the neck in four, two, and two cases, respectively, and at the back of the neck in the majority of cases (12 cases 60%), We found that, Compared to the strangulation group [2 (25.0%)], the majority of patients in the partial hanging group [3 (60.0%)] had an occiput position knot. Although this was statistically significant ($p < 0.0001$), the Hanging Group [7 (8.4%)]. We found that, only 1 patient had Horizontal Level of Ligature Material in Strangulation Group 1 (100.0%) but this was statistically significant ($p < 0.0001$). We observed that, most of patients had Bruise under skin changes in Throttling Group [2 (66.7%)] compared to strangulation group 3(33.3%) but this was statistically significant ($p < 0.0001$). We observed that, most of patients had Nail Mark abrasion in

Throttling Group and this was statistically significant ($p < 0.0001$). We found that, most of patients had Pattern of Ligature material in strangulation Group [3 (37.5%)] compared to Hanging Group [14 (16.9%)] but this was statistically significant ($p = 0.0125$). Kaushik V et al [10](2019) found that When there were additional neck injuries, such as bruising and soft tissue hemorrhage, evidence of blood clotting around the fracture site was regarded as antemortem.

We observed that, most of patients had Deep bruise in Strangulation Group [3(100.0%)] compared to Throttling Group [2 (66.7%)] but this was statistically significant ($p < 0.0001$). We showed that, most of patients had Salivation in Partial hanging Group [3 (60.0%)] compared to Hanging Group [32 (38.6%)], which was not statistically significant ($p = 0.398$). Charoonnate N et al [9](2010) found that a prospective analysis of thyroid cartilage and hyoid bone fractures in Thai individuals who passed away from hanging suicide between November 2008 and August 2009. We observed that, most of patients had Fracture Hyoid in strangulation Group [3 (27.3%)] compared to Partial hanging Group [1 (20.0%)] and Hanging Group [7 (8.4%)], but this was not statistically significant ($p = 0.115$). Dunsby AM et al [11](2011) found that There were 38 cases of thyroid cartilage fractures, 19 cases of hyoid bone fractures, and 21 cases of laryngeal and hyoid bone fractures, including one involving cricoid cartilage. We found that, Compared to the hanging group [2 (2.4%)], the majority of patients in the strangulation group [2 (22.2%)] suffered thyroid cartilage fractures. but $p = 0.007$ indicated that this was statistically significant. We observed that, most of patients had Tear of Strap Muscle in Throttling Group [1 (33.3%)], compared to strangulation Group [2 (22.2%)], Partial hanging Group [1 (20.0%)], and Hanging Group [10 (12.0%)], but this was not statistically significant ($p = 0.604$).

We found that, only 3 patients had tear of carotid in Hanging Group 3(3.6%) but this was not statistically significant ($p = 0.89$)

We found that, mean Age (years) was more in partial hanging [62.60 ± 15.63] compared to Hanging [38.58 ± 18.18], strangulation [39.00 ± 8.57] and Throttling [43.67 ± 3.05] but this was not statistically significant ($p = 0.06$).

Conclusion

The study examined macroscopic neck results from 100 people who had been strangled or hanged. Although a larger male-to-female ratio (1.8:1) was seen and the majority of patients were between the ages of 31 and 40, these results were not statistically significant. A statistically significant occiput position of the knot and a preponderance of Hindu patients in the Partial Hanging Group were among the noteworthy findings. Compared to other groups,

the Strangulation Group displayed a pattern of ligature material and a notable presence of bruises. Additionally, the Strangulation Group saw a considerably higher frequency of thyroid cartilage fractures. Even though some of the study's components—such as salivation and hyoid bone fractures—did not yield noteworthy results, overall, it provides useful information. It identifies limitations, including sample size, and suggests additional research with larger sample sizes to increase reliability and generalizability.

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