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A NON DISSECTIVE ANALYSIS OF ASPHYXIAL DEATHS IN DELHI REGION OF NORTH INDIA

Toxicology

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ABSTRACT

INTRODUCTION *:* Asphyxial deaths due to constriction of neck is common in all parts of the world. In day to day medicolegal practice, it is very common to face cases of asphyxial death. Identification of the manner of death i.e. suicidal or homicidal is very crucial for legal judgments. In the present study, cases of asphyxial deaths were distributed on the basis of some factors e.g. (i) type of asphyxia, (ii) age groups and gender, (iii) ligature material used, (iv) position of knot in all asphyxial death cases as well as in hanging, (v) position of ligature mark in relation to thyroid cartilage, (vi) degree of suspension in hanging cases and (vii) saliva stain.

AIMS AND OBJECTIVES*:* To study and analyse various external findings around the neck in cases of asphyxial deaths coming for medicolegal postmortem examination in Delhi region of North India.

MATERIAL AND METHODS*:* The descriptive cross sectional study was conducted in the Department of Forensic medicine, Maulana Azad Medical College, New Delhi. Fifty eight (58) cases of asphyxial deaths coming for medicolegal postmortem examination were *included* in the study. Decomposed bodies and asphyxial cases due to drowning and suffocation were *excluded* from the study.

RESULTS: The *incidence of hanging* was the highest (71.23 %) among the other types of asphyxia. there was *male predominance* in all the cases of asphyxia (65.51 %) as compared to females (32.75 %), the ratio being 2 :1. *Complete hanging* was found in 98.07 % cases while partial hanging only in 1.92 % cases. *Atypical hanging* was seen in 46 (88.45 %) cases where the knot was present at the left side of neck in 41.50 % cases, at right side of neck in 43.39 % cases and at chin in 3.77 % cases.

CONCLUSION: In Delhi, incidence of asphyxial deaths due to constriction of neck is more in males as compared to females and in most of these cases, the mode of death is hanging. Maximum numbers of cases are seen in young adults (20-29 years). The typical position of the knot is found in few cases. In maximum number of cases, the hanging is complete. The ligature mark was present in all the cases of hanging and ligature strangulation and in most cases it was at the level of thyroid cartilage followed by above the level of thyroid cartilage.

KEYWORDS

Asphyxial Deaths, Ligature Strangulation, Manual Strangulation, Hanging

Asphyxial deaths are common in forensic practice. The term “asphyxia” commonly means “lack of oxygen” and literally means 'defective aeration of blood' due to any cause. However, the term has been translated from the original Greek, implying “pulselessness / absence of pulsation”. Adelson defined 'asphyxia' as the physiological and chemical state in a living organism in which acute lack of oxygen available for cell metabolism is associated with inability to eliminate excess of CO_2.

Despite the differences of opinion regarding the term 'asphyxia' in medical literature, it is widely used for medico legal purposes and is categorized as mechanical and non-mechanical asphyxia. In *Mechanical* asphyxia, flow of air into the body is interfered through some physical impediments like (1) pressure upon exterior of neck, e.g. hanging and strangulation, (2) obstruction of airways from exterior, e.g. suffocation and smothering, (3) obstruction of airways from interior e.g. gagging, choking, (4) pressure upon chest, e.g. traumatic asphyxia, (5) submersion death, e.g. drowning. In *Non-mechanical* asphyxia, physiological impediments causes exclusion of oxygen by its depletion and replacement by another gas or by chemical interference with its uptake and utilization by the body itself or where there is insufficient oxygen in the atmosphere itself, e.g. CO poisoning, CN poisoning. Presently the term Asphyxia has been used to denote death or sub-lethal injury from mechanically induced cerebral hypoxia accompanied by signs of impeded venous return.

The most common causes of asphyxial deaths differ among age groups. Drowning accounts for the overwhelming majority of asphyxial deaths in 1-4 year age group, whereas hanging, strangulation, and drowning are most common in 35-44 year age group. Homicidal asphyxia is relatively uncommon and accounts for less than 5% of homicide cases ranking behind firearm injuries, sharp force wounds, and blunt force injuries.

Application of force to the neck in such a way that the force applied is the result of other than the weight of the victim's body defines *strangulation*. Strangulation can be "manual" i.e. *MS* (using hands to compress the neck, also known as throttling), or "ligature" i.e. *LS* (using an object such as a cord, wire, cloth, etc, to constrict the neck), or mugging (using the forearm to apply neck pressure). *Hanging* consists of the application of force to the neck in such a way that the force applied is primarily the result of the weight of the victim's body. It can be typical or atypical (based on position of knot) and complete or partial.

In day to day medico legal practice, it is very common to face the cases of asphyxial death. Identification of the manner of death i.e. suicidal or homicidal is very crucial for legal judgments. In the present study, different types of injuries to the neck organs were examined and correlated.

AIMS AND OBJECTIVES

To study and analyse various external findings around the neck in cases of asphyxial deaths coming for medicolegal postmortem examination in Delhi region of North India.

REVIEW OF LITERATURE

Paparo et al. (1984) conducted both retrospective and prospective studies of suicidal hangings over a 10-year period. ***Nikolic*** *S* et al (2003) conducted a retrospective study of suicidal hangings on 175 cases (133 male, 42 female) in a 5-year period (1997 to 2002). The mean age was 47.33 +/- 17.51 years. The sample was divided in 4 groups according to the position of the ligature knot (anterior, right, left, and posterior hanging). According to ***Sharma B R*** et. al (2005) many a times, a ligature mark may be the only evidence available in cases of asphyxial deaths due either to hanging or strangulation. In year 2005, ***Naik*** et al. did a study in 257 cases of hanging, 7 cases of ligature strangulation and 5 cases of throttling. ***Verma S. K***.(2006) studied the pattern of the strangulation deaths in the capital city of Delhi, a retrospective analysis of 10 years records from the period 1993–2002. The study showed that : (a) incidence of strangulation have increased many folds in comparison in 1970s; (b) maximum incidence

of strangulation is amongst individuals in third decade of life; (c) male, female ratio was 3:2; (d) ligating material was found present in neck in 40% cases;

MATERIAL AND METHODS

The study was conducted in the Department of Forensic Medicine, Maulana Azad Medical College, New Delhi

Study Design **:** Descriptive Cross sectional study, conducted between September 2010 to March 2012

Study Population **:** 58 Cases of asphyxial deaths coming for medico legal postmortem examination.

Inclusion Criteria**:**

1. Asphyxial deaths (Hanging and strangulation) coming for medico legal postmortem examination.

Exclusion Criteria**:**

1. Decomposed bodies.
2. Asphyxial cases due to Drowning and Suffocation

A careful external examination was conducted with special reference to the neck and all characteristics were noted and tabulated in different cases of asphyxia. The characteristics taken into account were ligature material used, position of knot in all asphyxial death cases as well as in hanging, position of ligature mark in relation to thyroid cartilage, degree of suspension in hanging cases, and distribution of cases of hanging according to saliva stain. Ligature when present around the neck was released by preventing the noose. First the knot was secured by tying with a thread. Then noose was cut away from the knot and the ends were secured with a thread i.e. tie the cut ends of the noose with a thread. Position of ligature mark was noted in relation to the thyroid cartilage. Position of knot was noted whether typical or atypical. Also the saliva stain was carefully noted whether present or absent.

OBSERVATIONS AND RESULTS

Table 1 : Distribution of cases of asphyxia

Type Of Asphyxia	*Number Of Cases*	*Percentage*
Hanging	52	89.65
MS	5	8.62
LS	1	1.72
TOTAL	**58**	**100**

Table 2 : Distribution of cases according to age groups and gender

Age Group	*Male*	*Female*	*Kinner*	*Total*	*Percentage*
0-10 yrs	0	1	0	**1**	**1.72**
10-19 yrs	3	3	0	**6**	**10.34**
20-29 yrs	20	9	1	**30**	**51.72**
30-39 yrs	7	3	0	**9**	**15.51**
40-49 yrs	3	1	0	**4**	**6.89**
50-59 yrs	3	1	0	**4**	**6.89**
60-69 yrs	1	0	0	**1**	**1.72**
70-79 yrs	1	1	0	**2**	**3.44**
Total	**38**	**19**	**1**	**58**	
Percentage	**65.51 %**	**32.75 %**	**1.72 %**		**100**

Table 3: Distribution of cases according to ligature material used

Ligature Material Used	*Number Of Cases*	*Percentage*
Cloth	28	48.27
Rope	19	32.75
Wire	4	6.89
Rubber fan belt	2	3.44
Not known	5	8.62
Total	58	100

Table 4: Distribution of cases according to the position of knot

Position Of Knot In Hanging And LS Cases	*No. Of Cases (N = 52 +1)*	*Percentage*
Below chin	2	3.77
Right side of neck	23	43.39
Occiput	6	11.32
Left side of neck	22	41.50
TOTAL	**53**	**100**

Table.5 : Distribution of cases according to position of knot in hanging cases

Type Of Hanging	*Number Of Cases*	*Percentage*
Typical	6	11.53
Atypical	46	88.46
TOTAL	**52**	**100**

Table 6 : Distribution of position of ligature mark in relation to thyroid cartilage

Position Of Ligature Mark	*Number Of Hanging Cases (N = 52)*	*Number Of LS Cases (N = 1)*
Above	26 (50 %)	0
At	25 (48.07 %)	0
Below	1 (1.92 %)	1 (100 %)

Table 7 : Distribution of hanging cases on the basis of degree of suspension

Type Of Hanging	*Number Of Cases*	*Percentage*
Complete	51	98.07
Incomplete/Partial	1	1.92
Total	**52**	**100**

Table 8 : Distribution of hanging cases according to saliva stain

Saliva Stain	*No. Of Cases*	*Percentage*
Present	25	48.07
Absent	27	51.92
Total	**52**	**100**

DISCUSSION

Asphyxial deaths due to constriction of neck are common in all parts of the world. In our study, asphyxial deaths contributed to 3.86 % deaths. Asphyxial deaths due to hanging were commonest and seen in 52 cases (71.23 %) followed by MS in 5 (6.84 %) cases and LS in 1 (1.36 %) cases. The *incidence of hanging* was the highest (71.23 %) among the other types of asphyxia. According to Sharma et al[18], 5% cases contribute to asphyxial deaths, hanging was the commonest mode observed in 66 (69 %) cases, followed by drowning in 10 (11 %).

In our study there was *male predominance* in all the cases of asphyxia (65.51 %) as compared to females (32.75 %), the ratio being 2 :1. This is similar to studies reported by various authors. Male predominance in cases of hanging can be explained by the fact that it is not a commonly opted method of suicide by females as compared to poison intake and burning. This figure contrasts with high incidence of hanging in woman (40%) reported in Denmark by Simonsen.

Complete hanging was found in 98.07 % cases while partial hanging only in 1.92 % cases. These incidences were found lower for complete hanging by Suarez Penaranda JM et al i.e. 62.4 % but slightly higher by Sharma B R et. al i.e. 68 %

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In the study typical hanging was seen in 6 (11.53 %) cases. *Atypical hanging* was seen in 46 (88.45 %) cases where the knot was present at the left side of neck in 41.50 % cases, at right side of neck in 43.39 % cases and at chin in 3.77 % cases. These findings are similar to the study reported by Naik S K et. al.

In our study, *ligature mark* was present in all the cases of hanging and ligature strangulation. The ligature mark in hanging was present above the level of thyroid cartilage in 50 % cases, at the level of thyroid cartilage in 48.07 % cases. In one case of ligature strangulation (1.92 %) the ligature mark was present below the level of thyroid cartilage. These findings are consistent with Sharma B R et. al.

SUMMARY

Incidence of asphyxial deaths due to constriction of neck is more in males as compared to females and in most of these cases, the mode of death is hanging. Maximum numbers of cases are seen in young adults (20-29 years). Maximum numbers of cases are seen in the month of March. In most of the cases, soft cloth was used as ligature material. The knot of the ligature material was mostly either on right side or left side in comparison to front and back of neck. The typical position of the knot is found in a few cases. In maximum number of cases, the hanging is complete. The ligature mark was present in all the cases of hanging and LS and in most cases it was at the level of thyroid cartilage followed by above the level of thyroid cartilage.

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