



STUDY ON EXTRA CERVICAL FEATURES AMONG MECHANICAL ASPHYXIAL DEATHS FROM NORTH EAST DELHI

Forensic Medicine

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ABSTRACT

Introduction: Common usage has led to the term 'asphyxia' being equated with 'lack of oxygen' though etymologically the word means 'absence of pulsation'. The following conditions may legitimately be considered to be defects in the chain of respiration and hence are examples of asphyxia: Absence or reduction of oxygen tension in the external atmosphere, such as reduced barometric pressure or replacement of oxygen by an inert gas, such as nitrogen or carbon dioxide. **Aim:** Study of extra cervical features in mechanical asphyxial deaths in North East Delhi. **Objectives:** To find the difference between epidemiological profile among different types of mechanical asphyxial deaths & to find prevalence and relationship of extra cervical features in different types of mechanical asphyxial deaths. **Materials And Methods:** A total of 200 death victims were included due to mechanical asphyxia. General external examination from head to toe was done to look specifically for Appearance of face, (petechiae on forehead Petechiae on skin behind ears and petechiae on circumoral skin), upper Eye lid, lower eyelid and the body. **Results:** Visceral Petechial Emorrhages At Interlobar Fissures was seen in all the cases. Post Mortem Staining On Back (98.5%), Flaccid Penis (97.3%), Visceral Petechial Emorrhages At Epicardium (90.5%) & Visceral Petechial Emorrhages At Hilum (80%) was the most common finding seen. **Conclusion:** The study concluded that the characteristics features seen in the cases are resulted asphyxial deaths.

KEYWORDS

Asphyxia, Petechiae, Virchow's method, Asphyxial deaths, Obstruction

INTRODUCTION –

Early investigators assessing cases of asphyxia due to hanging or suffocation tended to use the term asphyxia interchangeably with respiratory arrest or apnoea, considering that the primary problem lay in the lungs, with a resultant 'want of aeration of the blood.' (1) The following conditions may legitimately be considered to be defects in the chain of respiration and hence are examples of asphyxia: *Absence or reduction of oxygen tension in the external atmosphere, such as reduced barometric pressure or replacement of oxygen by an inert gas, such as nitrogen or carbon dioxide. *Obstruction of the external respiratory orifices, as in smothering. *Blockage of the internal respiratory passages, at either pharyngeal, laryngeal, tracheal or bronchial level. *Restriction of the respiratory movements of the thorax, preventing the inspiration of air through patent respiratory passages, as in the so-called 'traumatic asphyxia' or in paralysis from brainstem or cord damage, or the use of curare-like drugs. Asphyxia can be applied to a number of mechanisms in the clinical setting where respiration/ventilation is affected, including: Suffocation, Smothering, Strangulation, Garroting & Mugging. (2)

Asphyxial deaths are common in forensic practice. In a 21-year study by Azmak, in 2006, these deaths represented 15.7% of forensic autopsies. (2) "Classic" signs of asphyxia have been described for many years that consist of tiny pinpoint (petechial) haemorrhages of the face, engorgement with blood (congestion), fluid overload of the tissues (edema), fluidity of the blood, blue discoloration of the skin (cyanosis), and engorgement of the right side of the heart with blood. (3) However, it is now recognized that these are in no way sensitive or specific for asphyxia. Interference of oxygen and carbon dioxide exchange can be by mechanical means (mechanical asphyxia). Obstruction to airflow can occur at any level from the nose and mouth down to the alveoli (anoxic anoxia). (4) The amount of force required to compress neck structures has been determined experimentally: jugular vein, 2 kg (4.5 lb); carotid artery, 5 kg (11 lb); trachea, 9 kg (20 lb); and vertebral artery, 30 kg (66 lb). (5)

MATERIALS AND METHODS –

The study was conducted at Department of Forensic Medicine, University College of Medical Sciences & GTB Hospital from January 2021 to August 2022. All deaths victim due to mechanical asphyxia were selected. A total of 200 cases were included for the study purpose. A morphological general external examination from head to toe was done to look specifically for Appearance of face, petechiae on forehead Petechiae on skin behind ears and petechiae on circumoral skin. Upper Eye lid, and lower eyelid was checked Petechiae on sclera. The body was looked for any linear scratches/ fingernail abrasions, discoid bruising on jawline and neck, or any resuscitation injuries on chest. Internal examination was performed using standard operating procedures and by Virchow's method for organ retrieval and examination. A proforma was designed to record the various parameter

of study like age, sex, type of asphyxia death, post-mortem findings and cause of death. All autopsies of asphyxial deaths were meticulously conducted. After collection of the data, statistical analysis was performed to achieve the aim and objectives of this study.

RESULTS –

Out of the total 200 participants, 8.5% or 17 individuals were less than 18 Years of age. Maximums were between 18 and 30 years with 53.55%, 21.0% were between 31-40 years of age. Total of 26 individuals or 13.0% of the participants were between 41-50 Years of age (Table 1 & Figure 1). 74.0% were male, while 26.0% were female (Table 2 & Figure 2). 64.5% of the participants were married (Figure 3). 45% were educated up to high school, 22% up to middle school, 10% had passed primary schooling (Table 3 & Figure 4). All of our 200 participants were found to be fully clothed, 37.0% had History of Alcohol, 24.5% had History of Medical Care, 20.5% or 41 in number of the participants had Time of Incidence: 0000-0600hrs, 21.5% or 43 of the participants had Time of Incidence: 0600 – 1200 hrs, 30.5% or 61 of the participants had Time of Incidence: 1200 – 1800 hrs, 27.5% or 55 of the participants had Time of Incidence: 1800 – 0000 hrs (Table 4 & Figure 5). In our study 98.0% were found at Home. 1.5% were found in their Office/ Work, while only 01 person or 0.5 percent was found in Public Place. None of the participants were found at their relative's place (Table 5 & Figure 6).

Table1. Distribution Of The Participants In Terms Of Age

Age	Frequency	Percentage	95% CI
<18 Years	17	8.5%	5.2% - 13.5%
18-30 Years	107	53.5%	46.3% - 60.5%
31-40 Years	42	21.0%	15.7% - 27.4%
41-50 Years	26	13.0%	8.8% - 18.6%
51-60 Years	5	2.5%	0.9% - 6.1%
61-70 Years	1	0.5%	0.0% - 3.2%
71 and above	2	1.0%	0.2% - 3.9%

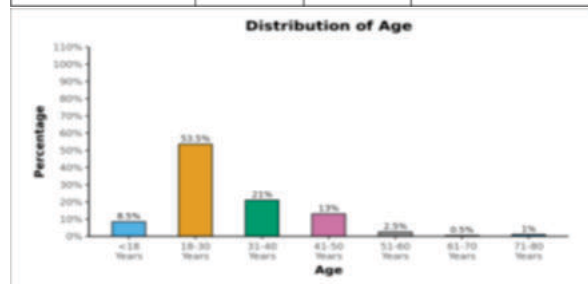
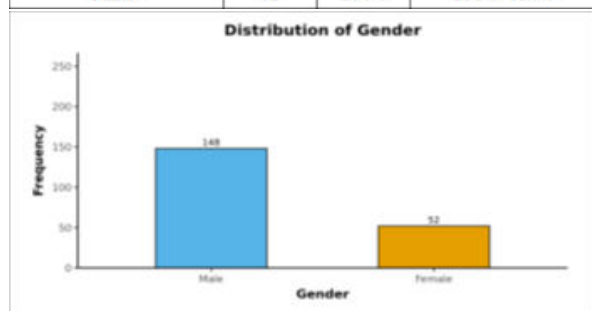


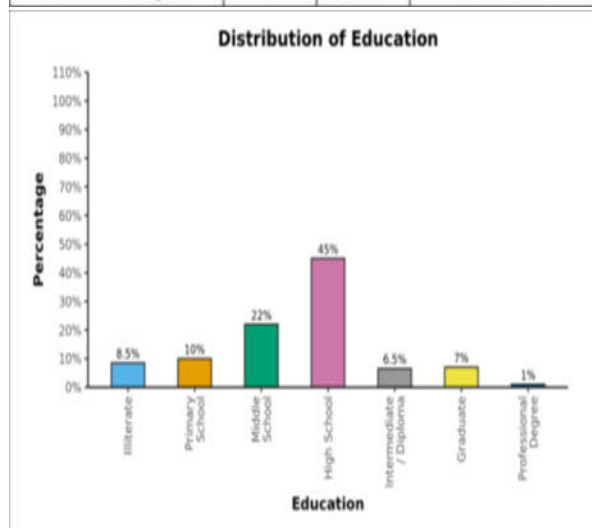
Figure1. Distribution of Age

Table 2. Distribution Of The Participants In Terms Of Gender

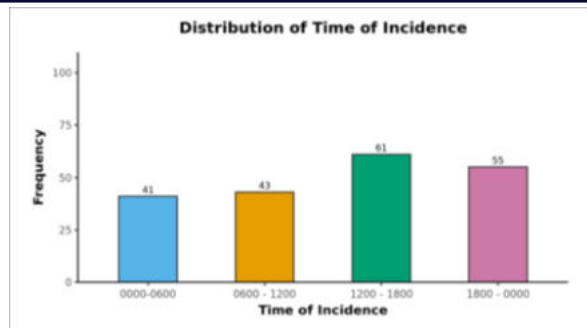
Gender	Frequency	Percentage	95% CI
Male	148	74.0%	67.2% - 79.8%
Female	52	26.0%	20.2% - 32.8%

**Figure 2.** Distribution of Gender**Figure3.** Distribution of Marital Status**Table 3. Distribution Of The Participants In Terms Of Education**

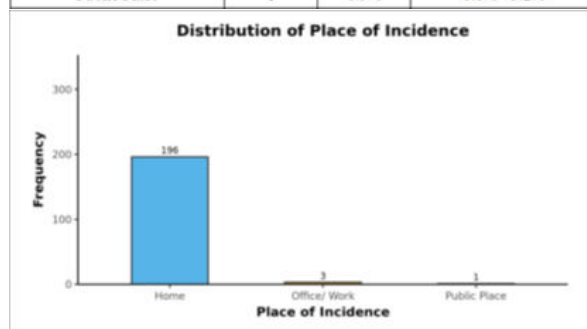
Education	Frequency	Percentage	95% CI
Illiterate	17	8.5%	5.2% - 13.5%
Primary School	20	10.0%	6.4% - 15.2%
Middle School	44	22.0%	16.6% - 28.5%
High School	90	45.0%	38.0% - 52.2%
Intermediate / Diploma	13	6.5%	3.7% - 11.1%
Graduate	14	7.0%	4.0% - 11.7%
Professional Degree	2	1.0%	0.2% - 3.9%

**Figure4.** Distribution of Education**Table4. Distribution Of The Participants In Terms Of Time Of Incidence**

Time of Incidence	Frequency	Percentage	95% CI
0000-0600	41	20.5%	15.3% - 26.9%
0600 - 1200	43	21.5%	16.1% - 28.0%
1200 - 1800	61	30.5%	24.3% - 37.5%
1800 - 0000	55	27.5%	21.6% - 34.3%

**Figure5.** Distribution of Incidence**Table 5. Distribution Of The Participants In Terms Of Place Of Incidence**

Place of Incidence	Frequency	Percentage	95% CI
Home	196	98.0%	94.6% - 99.4%
Office/ Work	3	1.5%	0.4% - 4.7%
Public Place	1	0.5%	0.0% - 3.2%

**Figure 6.** Distribution of Incidence**Table 6. Distribution Of The Participants In Terms Of Appearance Of Face**

Appearance of Face	Frequency	Percentage	95% CI
Pale	25	12.6%	8.4% - 18.2%
Congested	98	49.9%	42.1% - 56.4%
Normal	76	38.8%	31.5% - 45.4%

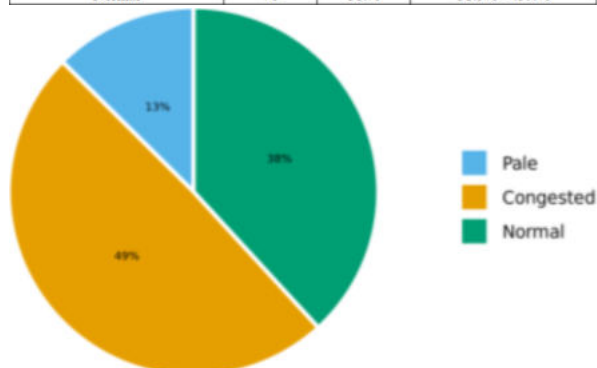
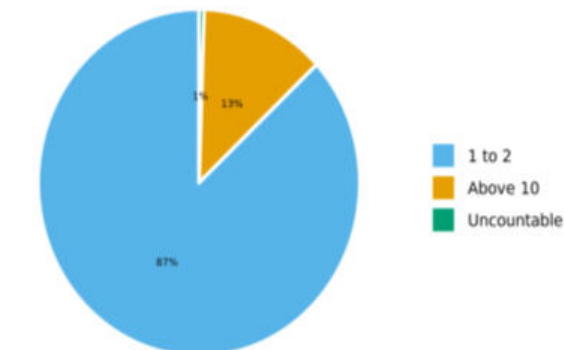
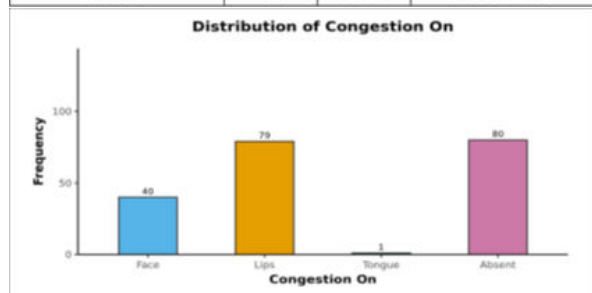
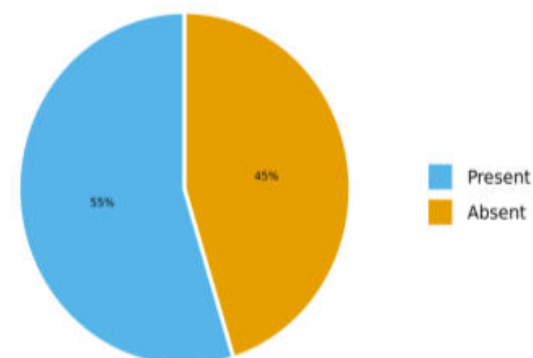
**Figure 7.** Distribution of Appearance of Face**Figure 8.** Distribution of Density of Petechiae

Table 7. Distribution Of The Participants In Terms Of Density Of Petechiae

Density of Petechiae	Frequency	Percentage	95% CI
1 to 2	173	86.9%	81.3% - 91.1%
Above 10	25	12.6%	8.4% - 18.2%
Uncountable	1	0.5%	0.0% - 3.2%

Table 8. Distribution Of The Participants In Terms Of Congestion

Congestion On	Frequency	Percentage	95% CI
Face	40	20.0%	14.8% - 26.4%
Lips	79	39.5%	32.7% - 46.7%
Tongue	1	0.5%	0.0% - 3.2%
Absent	80	40.0%	33.2% - 47.2%

**Figure 9. Distribution of Congestion****Figure 10. Distribution of Dribbling of Saliva Either Over Body Or Clothes****Figure 11. Presence Of Petechiae In Conjunctiva And Sclera Of The Eye.****Figure 12. Congested Face, Petechiae On Circumoral Skin, Frank Bleeding From Nose.****Figure 13. Cyanosis Of Fingernails**

Out of the total 200 individuals suicide note was present with 12 individuals, appearance of Face was pale in 25 individuals or 12.5 percent. Appearance of Face was congested in 98 individuals or 49 percent and it was normal Appearance of Face in 76 individuals or 38 % of total (Table 6 & Figure 7). Total of 90 individuals had Petechiae on Forehead, 41 individuals had Petechiae on Skin Behind, 23 individuals had Petechiae on Skin Circumoral Skin, 86.9% had minor Density of 1-2 Petechiae. It was above 10 petechiae in 12.6% of the participants or 25 in number and only one individual or 0.5 % had dense petechiae of uncountable number (Table 7 & Figure 8). 79 individuals or 40 % had lips congested, and only 01 person or 0.5% had congested tongue. Rest all i.e. 80 individuals or 40 percent showed no such congestion (Table 8 & Figure 9,11). 30.5% had Petechiae on the Conjunctiva And Sclera of eye, 39.5% had Frank Bleeding From Nose & 0.5 % had frank bleeding from ears, 20% had congestion on face. (Figure 12) Frothing over nostrils was noted in 55 individuals, 41% had Tongue Caught between Teeth, only 02 individuals or 1.0% had Linear Scratches/ Fingernail Abrasions, 55% had Dribbling of Saliva Either Over Body Or Clothes, 98.5% in total had Post Mortem Staining Present on Back (Figure 10). None of them had Resuscitation Injury on Chest. 0.5% of the participants had Any Injury Noted on Abdomen And Back, 50% had cyanosed fingernails (figure 13), none of them had any Abrasion present on body & external bruises. Total of 8.0% had Hesitation Cuts/ Slashed Wrist Scar Marks, 1.0% had Post Mortem Injury/ Dragging Marks on Feet, 42.0% had Clenched fist & 99.5% had no Injury on Genital And Pelvis Region. Out of these 148 males, 97.3% of them had flaccid penis at time of examination, 48.6% had Seminal Fluid-Stained Genitals or Undergarments, 57.0% had Clothes and Perineum Stained with Feces, 69.0% had Petechiae And Or Ecchymosis Under Scalp, 75.0% had Edema of the Brain Present, 28.0% had Visceral Petechial Hemorrhages in Brain, 0.5% had Cervical Vertebrae Injury and Haemorrhages, 18.0% had Brain Stem Hemorrhage present, 100 % of them had Visceral Petechial Hemorrhage Interlobar Fissures 80.0%, 90.5% had Visceral Petechial Hemorrhage At Epicardium, 75.0% had Visceral Petechial Hemorrhage At Atrioventricular Groove, 0.5% or only 01 of the participants had Visceral Petechial Hemorrhages in Thymus & none had gastric contents in their respiratory tract.

DISCUSSION –

The study was intended to be conducted on all types of mechanical asphyxial deaths. However the results pertains to only hanging cases as the sample size of other types of mechanical asphyxial deaths were negligible / non-significant. In the study by Gururaj Biradar et al., (6) in 2020, the age wise distribution of deaths showed that maximum deaths were seen in the age group of 12-18 years while in our study majority of the case were in age range 18 and 30 years. Similar to our study in the study by Gururaj Biradar et al., (6) in 2020, majority of cases were male, sex distribution was 365 males and 242 were females. Mortality among males were slightly higher than females. Similar findings were observed in the study by Aisha A. Abouhashem et al., (7) in 2020. In the study by Gururaj Biradar et al., (6) in 2021, Regarding the marital status of the victims, almost 199(56%) of the victims of hanging were married.

Bhim Singh et al., (8) in 2017, observed that most of the cases of

hanging is in married individuals 98(44.74%) which is similar to this study (64.5%). S Starkuviene et al.,(9) in 2006, found that the methods of suicide differed according to educational level. Vahid Monsef Kasmaee et al., (10) in 2015, observed that hanging was significantly higher in men ($p < 0.001$), people with an education level of less than high school diploma ($p = 0.02$) and the unemployed ($p < 0.05$) patients. In the study by Gururaj Biradar et al.,(6) in 2021, chronic alcoholism in 40(11.23%) cases. Ambade 2015,(11) detected alcohol in sixteen cases (12.6%), all males, and the concentration was more than 85 mg % in all cases.

In the study by Brian K. Ahmedani et al., (12) in 2019, Healthcare use was more common across all healthcare settings for individuals who died by suicide. Gururaj Biradar et al.,(6) in 2021, In their study, the morning was the most preferred time for committing suicide accounting for 109(30.61%) cases, followed by 88(24.71%) cases in the night and 85(23.87%) cases in the evening. The incidence of petechiae in hanging deaths varies greatly from one study 48% in Samarasekera and Cooke,(13) and 69% in Luke.(14) By compiling all these previous studies, the incidence on 768 cases would be of 39%. This incidence is in keeping with the 46% found in the study by Renaud Cle'ment, in 2011. (15)

Tulapunt 2017,(16) Face congestion occurred in 23.8%. Congestion of internal organs occurred in 57.4% of cases, with similar percentages in men and women. (present study was 40%). Tulapunt 2017(16) Tongue protrusion was found in 45% of cases similar to this study. In the study by Ambade(11) 2015, the stain marks of dribbling of saliva either over the body or on clothes were noted in only 11.8% cases of hanging. Ravdeep Singh et al (17) observed dribbling of saliva in 39.58% of hanging cases while it was 50% in present study. As per the study by Ambade 2015,(11) The brain was edematous in 77.2% cases of hanging while in this study it was 25%.

CONCLUSION –

The study was conducted in GTB HOSPITAL & UCMS, consisting of 200 subjects, with the aim to study extra cervical features among fatal mechanical asphyxia. The term "asphyxia" is used to describe circumstances in which a number of mechanisms interfere with the passage of oxygen from the surrounding air to specific cells, tissues, and organs. In cases of suffocation involving pressure on the neck, a thorough forensic examination is crucial and it is equally crucial to include healthcare professionals and other professionals when assessing potentially hazardous commodities.

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