Section: Forensic Medicine

Original Research Article

CROSS SECTIONAL STUDY OF MECHANICAL ASPHYXIAL DEATHS AUTOPSIED IN A MEDICAL COLLEGE

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Abstract

Background: There is less data on mechanical asphyxiation deaths studied by autopsy. The study was conducted to analyze the various demographic variables of the subjects who died due to Mechanical Asphyxia and had undergone postmortem examination. **Materials and Methods:** Autopsies conducted during January 1, 2016 to May 31, 2018 were studied for analysis. Out of 363 medico-legal deaths autopsied at the hospital, details were collected from those medico-legal deaths identified to be due to violent asphyxial deaths. **Result:** Out of 363 medico-legal autopsies, 32 cases were of death due to mechanical asphyxia, making incidence rate of 8.8%. Study comprised of 65.6% males & 34.4% females with maximum deaths in age group of 21-30 years. There was equal incidence of hanging and drowning i.e. 14 each and rest 4 cases were of strangulation. Sexual ratio in hanging and strangulation was 1:1 but in drowning there was a male preponderance with ratio of 6:1. **Conclusion:** Males and young adults especially in the age group of 21 to 30 years are more vulnerable to victims of violent mechanical asphyxial deaths.

INTRODUCTION

Mechanical asphyxia, characterized by the restriction of airflow due to external compression or obstruction, represents a significant subset of forensic pathology cases. These incidents encompass a broad spectrum of scenarios ranging from accidental suffocation to intentional strangulation, each presenting unique challenges in both diagnosis and investigation. Understanding the epidemiological patterns, demographic characteristics, and mechanisms underlying these deaths is crucial for forensic pathologists, law enforcement, and policymakers alike. Forms of mechanical asphyxia include pressure over the neck caused by Hanging or Strangulation, Drowning, Suffocation i.e. interference with respiration by means other than hanging, strangulation or drowning and includes Smothering i.e. closure of external respiratory orifices, Choking i.e. closure or obstruction of respiratory passages from inside, Breathing in confined spaces or vitiated atmosphere i.e. environment deficient in oxygen or filled with irrespirable gases or Traumatic asphyxia which result from arrest of respiratory movements

Violent asphyxia deaths have significant contribution to unnatural deaths such as suicides, homicides, and accidental deaths. Among various violent asphyxia deaths like hanging, strangulation, smothering, throttling, traumatic asphyxia, choking and drowning. Hanging is one of the leading manner of suicide in which there is suspension of the body by a ligature material compressing the neck externally, the constricting force being the weight of the body.[1] Hanging is always considered suicidal except accidental hanging in sexual perverts, homicidal hanging in lynching and justifiable judicial hanging.

Strangulation is another form of asphyxia death in which there is compression of neck structures by a constricting force other than the body's own weight. The force may be exerted by different means such as ligature, by use of hand, when it is known as throttling or manual strangulation, elbow or knee (mugging) and bamboos (bansdola).[2]

In drowning, a global phenomenon, the access of air to lungs is prevented by submersion of body in water or fluid medium. It may be fresh or sea water

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depending upon the water in which the person is drowned.[3]

Another form of asphyxial death is 'Traumatic asphyxia' or crush asphyxia which is associated with prevention of respiratory movements due to compression of or penetrating trauma to the chest. Traumatic asphyxia is mostly accidental in nature. It presents with cervico-facial cyanosis, subconjunctival hemorrhages, marked petechial hemorrhage over face, neck and upper part of chest due to compressive force to thoraco-abdominal regions.[4]

In this study, we present a comprehensive analysis of mechanical asphyxial deaths autopsied within the context of a medical college. By examining a diverse array of cases, we aim to elucidate the circumstances, contributing factors, and associated injuries commonly encountered in these fatalities. Through meticulous examination of postmortem findings, including forensic pathology reports and investigative data, we seek to provide insights into the prevalence, distribution, and potential preventive measures for mechanical asphyxial deaths. By shedding light on the epidemiology and forensic aspects of mechanical asphyxia, this study contributes to the broader understanding of forensic pathology and forensic science. Furthermore, the findings gleaned from this research hold implications for forensic practitioners, educators, and policymakers involved in the investigation and prevention of deaths resulting from mechanical asphyxial mechanisms. In this study we aimed to to study the incidences and causes of mechanical asphyxia deaths in the victims brought to the Forensic department for medico-legal autopsies and to study the demographic profile of victims of violent asphyxia deaths.

MATERIALS AND METHODS

It was a retrospective observational study. We conducted a post-mortem examination based descriptive cross-sectional study on 32 deaths due to violent asphyxia autopsied during the period from Jan 2016 till May 2018 at MMIMSR Mullana. A proforma was prepared and findings were recorded as given in subsequent tables.

Inclusion Criteria

The study included only those cases in which cause of death could be attributed to the direct effects of mechanical interference in the process of respiration leading to asphyxia and ultimately death.

Exclusion Criteria

All deaths other than due to violent asphyxia were excluded.

The study complied with the principles outlined in the Declaration of Helsinki and was approved by the Institutional Review Board. We recorded the clinical and demographic details of the study subjects. The recorded data were compiled and entered into a Microsoft Excel spreadsheet, then exported to SPSS Version 20.0 (SPSS Inc., Chicago, Illinois, USA) for analysis. Continuous variables were expressed as Mean±SD, while categorical variables were summarized as frequencies and percentages. The association of various parameters with mortality was assessed using the appropriate Chi-square test or Fisher's exact test. A P-value < 0.05 was considered statistically significant, and all P-values were two-tailed.

RESULTS

Total number of deaths examined were 32. Maximum number of asphyxial death were seen in the age group of 21-30 years in case of females and males however least incidence was seen in the age group of 51-60 years if age group of 0-10 years is excluded. However, ratio of incidence of male deaths compared to female deaths is 2.2:1. [Table 1]. There was equal incidence for death due to Hanging and drowning i.e. 14 cases each whereas only 4 cases of strangulation were autopsied during the study period. [Table 2] For age group with maximum incidence of deaths i.e. 21-30 years, hanging was the most common cause of death followed by drowning and then Strangulation. Maximum number of victims of Strangulation belonged to the age group of 60 years and above. [Table 3]. There was equal incidence of hanging in both the sexes i.e. 7 cases each and similar pattern for strangulation too i.e. 2 cases each. However, number of drowning deaths were maximum in males in ratio of 6:1 compared to females. [Table 4]

Table 1: Age –sex composition of the subjects.

Age group	Female	Percentage	Male	Percentage	Total	Percentage
0-10	0	0	0	0	0	0
10-20	3	30	4	18.8	7	21.8
21-30	4	40	7	31.8	11	34.3
31-40	1	10	1	4.5	2	6.25
41-50	0	0	6	27.2	6	18.75
51-60	0	0	1	4.5	1	3.12
>60	2	20	3	13.63	5	15.6
Total	10	100	22	100	32	100

Table 2: Frequency of different types of asphyxia deaths

Asphyxia deaths	No.	Percentage
Hanging	14	43.75
Drowning	14	43.75
Strangulation	04	12.5

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Total	32	100

Table 3: Age-Wise distribution of causes of asphyxia

Age group	Drowning	Percentage	Hanging	Percentage	Strangulation	Percentage
0-10	0	0	0	0	0	0
10-20	3	21.4	3	21.4	1	25
21-30	4	28.5	6	28.5	1	25
31-40	1	7.1	1	7.1	0	0
41-50	3	21.4	2	21.4	0	0
51-60	1	7.1	1	7.14	0	0
>60	2	14.2	1	14.28	2	50
Total	14	100	14	100	4	100

Table 4: Gender-wise Distribution of Asphyxial Deaths

Asphyxial Death	Male	Percentage	Female	Percentage
Hanging	7	33.3	7	63.6
Drowning	12	57.1	2	18.1
Strangulation	2	9.5	2	18.1
Total	21	100	11	100

DISCUSSION

The proportion of asphyxial deaths in our study period was found to be 15.31% which is similar to studies conducted by Salacin,[5] (15.7%) and Ghadge MR et al (12%).[6] A lower incidence was reported by Singh RK et al (8.04%),[7] Tirmizi et al (7.08%),[8] Bhim Singh et al (8.83%) and Amandeep Singh et al (5.26%).[9,10]

In our study the ratio of gender distribution was one female for every two male victims (65.6% male and 34.4% females) which is in agreement study conducted by Bhim Singh et al,[9] and Ghadge MR et al,[6] Salacin,[5] reported 79.8% male victims whereas Srinavasa Reddy et al,[11] reported 59.14% of male victims. Maximum victims were in the age group of 21-30 years (34.3%) which is similar to incidence reported by Ghadge MR et al,[6] (37.9%) and Ankur P et al,[12] (32.98%) whereas Bhim Singh et al,[9] reports maximum incidence in age group of 11-20 years (33.1%).

In our study, the manner of death comprised of equal incidences of hanging (43.75%) and drowning (43.75%) followed by Strangulation (12.5%). This is different from other studies where hanging was the most predominant mode of asphyxia followed by drowning and then strangulation.[6,9,12] whereas Azmak D,[13] reported more incidences of strangulation (30.5%) compared to drowning (5.2%) but hanging was the predominant cause of death (41.8%). Amandeep Singh et al,[10] reported higher incidence of drowning (59.4%) followed by hanging (24.3%) and strangulation (9.9%).

In our study the male: female ratio for drowning is 6:1 which is quite high compared to national average published in NRCB 2015,[14] (3.5:1) and that of Amandeep Singh et al,[10] (3:1). However, Ankur P et al,[12] and Ghadge MR et al,[6] reported the male to female ratio for drowning as 6:1 and 5:1 respectively which is similar to our study. We observe equal incidences of hanging and strangulation in both the sexes whereas almost all the studies,[6,9,10,12,15] report higher incidences of hanging in males. Gadge MR et al,[6] and Ankur P et al,[12] reports higher incidence of strangulation in females whereas Bhim Singh et al observed the opposite.[9]

CONCLUSION

We conclude that males and young adults especially in the age group of 21 to 30 years are more vulnerable to victims of violent mechanical asphyxial deaths.

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