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Original Article

Overview of Violent Asphyxial Deaths in Medico Legal Autopsies Conducted at Kokrajhar Medical College Hospital, Kokrajhar

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ABSTRACT

Background: Asphyxial deaths constitute a significant percentage of medico-legal autopsies in India and are a major contributor to unnatural mortality.
Aim: To analyze the epidemiological and medico-legal aspects of violent asphyxial deaths conducted at Kokrajhar Medical College Hospital from March 2024 to September 2025.
Methods: A descriptive cross-sectional study of 115 violent asphyxial deaths out of 714 medico-legal autopsies was conducted. Data on age, sex, cause, manner of death, occupation, socioeconomic status, and other variables were analyzed according to Vancouver referencing standards.
Results: Asphyxial deaths accounted for 16.1% of total autopsies. Hanging was the most common cause (74.78%), followed by drowning (24.35%) and strangulation (0.87%). Most victims were males (63.48%), aged 11–30 years (52.17%), and belonged to rural areas (71.3%). Suicidal manner was predominant (77.39%), followed by accidental (21.74%) and homicidal (0.87%).
Conclusion: Hanging remains the leading method of suicide, while drowning contributes significantly to accidental deaths. Preventive strategies focusing on mental health, socioeconomic development, and public awareness are essential to reduce the burden of asphyxial deaths.

Keywords*: Asphyxial deaths, Medicolegal autopsies, strangulation, hanging, drowning.*

INTRODUCTION

Asphyxial deaths represent a significant proportion of medico-legal autopsies globally, particularly in developing countries where socio-economic stressors, mental health issues, and limited preventive infrastructure contribute to their prevalence[1–4]. *Asphyxia* refers to impairment of oxygen exchange at the pulmonary or cellular level resulting from mechanical, toxicological, or environmental causes[3,4]. *Violent asphyxia* encompasses deaths due to hanging, drowning, strangulation, smothering, traumatic asphyxia, and choking[3,4]. Among these, hanging is consistently reported as the leading method of suicide in both urban and rural populations, owing to its ease of access, high lethality, and minimal requirement of preparation [6,9,14,15].

India reports a substantial burden of suicides and accidental deaths due to asphyxia, with variations observed across regions based on cultural practices, occupational patterns, and accessibility to healthcare[5,7,8,12–14,18]. Previous studies have shown that young adults constitute a vulnerable group, particularly those facing socio-economic challenges, academic pressure, or interpersonal stress [9,13,14,18,19]. However, regional studies are essential to understand area-specific trends, medico-legal challenges, and to develop targeted preventive strategies.

The Kokrajhar district of Assam is a socio-culturally diverse region. Postmortem examination at the newly established Kokrajhar Medical College and Hospital has been started since March, 2024 and hence epidemiological data on violent asphyxial deaths occurring at this region is limited. Undertaking this research will help in understanding the pattern of

such deaths and can assist forensic experts, law enforcement agencies, and policymakers in designing preventive measures and improving medico-legal protocols .

AIM OF THE STUDY

To analyze the epidemiological profile, manner of death and medico-legal characteristics of violent asphyxial deaths autopsied at Kokrajhar Medical College Hospital from March 2024 to September 2025.

MATERIALS AND METHODS

This study was a descriptive cross-sectional analysis conducted in the Department of Forensic Medicine at Kokrajhar Medical College and Hospital, Kokrajhar, Assam. The study period extended from 15 March 2024 to 30 September 2025. Ethical clearance for the study was obtained from the Institutional Ethics Review Board (ERB) prior to commencement.

The study included 115 cases of violent asphyxial deaths out of a total of 714 medico-legal autopsies performed during the study period. Cases were selected based on findings at autopsy, circumstantial evidence, and police inquest reports confirming death due to mechanical interference with respiration.

Inclusion Criteria

- Cases in which death was directly attributable to mechanical asphyxia, such as hanging, drowning, strangulation, smothering, or other violent means.

Exclusion Criteria

- Cases where death occurred due to natural causes, poisoning, burns, firearm injuries, or other non-asphyxial mechanisms.
- Decomposed bodies where cause of death could not be reliably determined.

A structured proforma was used to collect relevant information, including demographic profile (age, sex, religion, marital status, occupation, education), place and manner of death (suicidal, homicidal, accidental), type of asphyxial method, and seasonal trends. Information was obtained from police documents such as inquest reports and dead body challans, as well as interviews with relatives, witnesses, and investigating officers.

All autopsies were conducted following standard protocols as per the guidelines of the Ministry of Health and Family Welfare, Government of India. Detailed external and internal examinations were performed to identify classical signs of asphyxia such as ligature marks, petechial hemorrhages, cyanosis, congestion of organs, and fracture of neck structures where applicable. The collected data were compiled and analyzed using descriptive statistical methods. Results were expressed as frequencies and percentages and presented in tabular form for clarity. No inferential statistical tests were performed, as the primary objective was descriptive epidemiological assessment.

RESULTS

Incidence of violent asphyxial death in our study was 16.1%. The total number of autopsies conducted during the study period was 714, out of which 115 were violent asphyxial deaths. Hanging was the most common method of the asphyxia, comprising 74.78% of all asphyxial deaths. Drowning (24.35%) was second most common cause followed by strangulation (0.87%) as shown in Tables 1-2. In the present study, 71(61.74%) cases belonged to Hindu community and 44 (38.26%) cases were from Muslim community. A total of 82 (71.3%) incidence occurred in rural areas and 28.7% deaths occurred in urban areas. A maximum of 31.3% victims were students, followed by farmers i.e., 28 (24.35%). Eleven (9.56%) cases were service holders, 8 victims were retired persons and twelve (10.43%) victims were daily wage laborers. The educational qualification of majority of the cases in the current study were under class tenth i.e., 34 (29.56%), followed by 29 (25.22%) cases who were illiterate. A total of 19 (16.52%) cases studied up to primary school level, 18 (15.65%) up to high school and 12 (10.43%) up to higher secondary level. Three (2.6%) cases did their graduation or further studies. In the present study, 71 (61.74%) cases were married and 44 (38.26%) victims were unmarried. About 48.69% cases belonged to middle socioeconomic class followed by 42 (36.52%) victims belonging to lower economic status. Most of the deaths occurred in summer season i.e., 71 (61.74%), followed by autumn 27 (23.48%) and spring 17 (14.78%).

TABLE 1- GENDER-WISE DISTRIBUTION OF VARIOUS METHODS OF ASPHYXIAL DEATHS

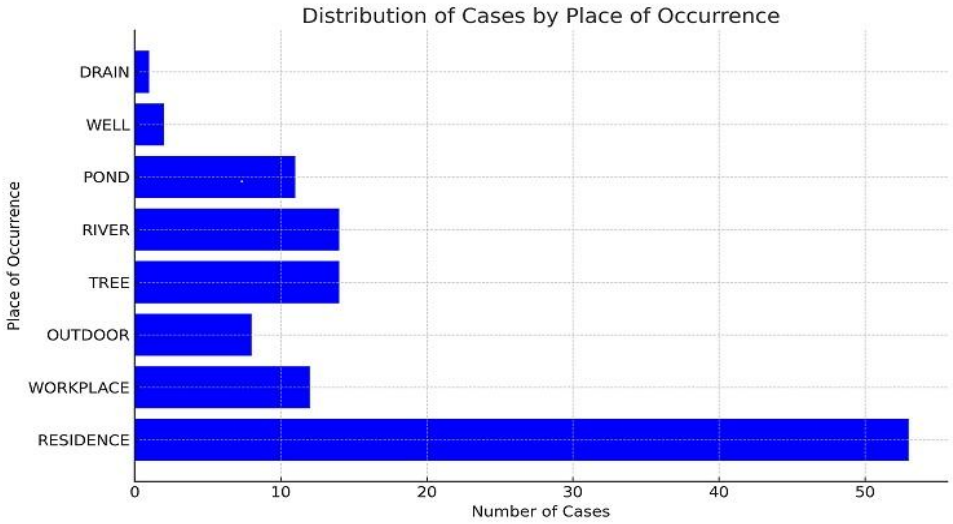
Methods	Male Nos	%	Female Nos	%	Total Nos	%
Hanging	52	45.21	34	29.56	86	74.78
Drowning	20	17.40	08	6.96	28	24.35
Strangulation	01	0.87	0	0	01	0.87
Total	73	63.48	42	36.52	115	100

TABLE 2- MANNER OF ASPHYXIAL DEATHS

Cause Of Death	Suicidal Nos.	%	Homicidal Nos.	%	Accidental Nos.	%	Total Nos.	%
Hanging	86	74.78	00	00	00	00	86	74.78
Drowning	03	2.61	00	00	25	21.74	28	24.35
Strangulation	00	00	01	0.87	00	00	01	0.87
Total	89	77.39	01	0.87	25	21.74	115	100

TABLE 3- AGE AND GENDER-WISE DISTRIBUTION OF CASES

Age (in Yrs)	Male Nos.	%	Female Nos.	%	Total Nos.	%
0-10	5	4.35	3	2.61	8	6.96
11-20	16	13.91	10	8.69	26	22.60
21-30	21	18.26	13	11.30	34	29.56
31-40	9	7.83	7	6.09	16	13.92
41-50	10	8.69	4	3.48	14	12.17
51-60	5	4.35	2	1.74	7	6.09
61-70	4	3.48	0	0	4	3.48
71-80	3	2.61	3	2.61	6	5.22
Total	73	63.48	42	36.52	115	100



DISCUSSION

In the present study, the incidence of violent asphyxial deaths was found to be 16.1%. This rate closely resembles the findings of Reddy et al.[5], Salacin [17], Ghadge et al. [18], and Azmak [6], but contrasts with the studies by Singh A. [7] and Chaurasia et al. [8], who reported a lower incidence. Differences in geographical location, culture, and ethnicity likely account for these variations. Hanging was the most common cause of asphyxial death, comprising 74.78% of all cases, followed by drowning (24.35%) and strangulation (0.87%). Similar findings were reported by Singh et al [19], Azmak [6] and Chaurasia et al [8].

In this study, 63.48% of victims were male and 36.52% were female, consistent with the findings of Bhim Singh et al. [9], Ghadge et al. [18], and Salacin [17]. A majority (52.17%) of victims were between 11 and 30 years of age, indicating a predominance of asphyxial deaths among young individuals. This agrees with the observations of Ghadge et al. [18], Copeland [10], Auer [11], Majumder [12], Lalwani et al. [13], Chaurasia et al. [8], and Patel et al. [14]. In contrast, Bhim Singh et al. [9] reported a peak incidence in the 11–20-year age group (33.1%). These age groups represent the most active and stressful phases of life, often associated with anxiety, financial pressures, unemployment, emotional instability, and failure in love—all potential triggers for suicidal behavior.

Of the total cases, 77.39% were suicidal, 21.74% accidental, and 0.87% homicidal. Hanging (74.78%) was the predominant method of suicide, likely due to its painless nature, accessibility of materials, and high lethality. Among accidental deaths, drowning accounted for 21.74%. The single strangulation case was homicidal. These results are consistent with Davidson and Marshall [15], Majumder [12], Lalwani et al. [13], Kanchan et al. [16], Chaurasia et al. [8], Patel et al. [14], and Mohammed et al. [20], though Azmak [6] reported higher strangulation rates (30.5%) compared to drowning, with

hanging remaining predominant (41.8%). Conversely, Amandeep Singh et al. [7] found drowning (59.4%) to be more common than hanging (24.3%) and strangulation (9.9%). The high rate of suicides in our study likely reflects socioeconomic stressors, including limited access to basic needs, education, and employment opportunities.

Regarding occupation, 31.3% of victims were students, followed by farmers (24.35%), service holders (9.56%), retired persons (6.96%), and daily wage laborers (10.43%), consistent with Majumder's[12] findings. Most victims had an education level below class 10 (29.56%) or were illiterate (25.22%). A smaller proportion had primary (16.52%), high school (15.65%), or higher secondary (10.43%) education, and only 2.6% were graduates. This contrasts with Pathak's study [21], which found the highest incidence among victims educated up to high school level. Low education levels correlate with unemployment and economic distress, both of which are major contributors to suicidal behavior. Among students, failures in exams, academic competition, and failed relationships were frequent factors.

Marital status analysis showed 61.74% of victims were married and 38.26% unmarried. Socioeconomic assessment revealed that 48.69% belonged to the middle class and 36.52% to the lower class—findings consistent with Vijayakumari's[22] prospective study. The most common location of incident was the victim's residence (46%), followed by trees and rivers (12.17% each), workplace (10.43%), ponds (9.56%), open areas (6.96%), wells (1.74%), and drains (0.87%), again in agreement with Vijayakumari [22].

CONCLUSION

This study indicates that suicidal hanging and accidental drowning are the leading causes of violent asphyxial deaths. Both reflect elements of preventable frustration and negligence within society. Urgent, well-designed interventions are needed to identify risk factors and prevent suicidal behaviors. Enhancing socioeconomic conditions through education, healthcare, and employment reforms could alleviate the stressors contributing to these deaths.

Comprehensive drowning prevention strategies should include: engineering controls to eliminate hazards, legislation to enforce safety standards, education and community awareness, and research initiatives to assess the burden and guide interventions. These multifaceted approaches can significantly reduce the incidence of suicidal, homicidal, and accidental asphyxial deaths.

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