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Research Article
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# FATAL ASPHYXIA: IDENTIFYING PATTERNS AT THE MORTUARY OF SHEIKH ZAYED MEDICAL COLLEGE, RAHIM YAR KHAN

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## ABSTRACT

**Background**: A considerable proportion of autopsies pertain to fatalities stemming from violence ended up in asphyxia.

**Objective**: To identify the pattern of asphyxial deaths among medicolegal autopsies at Sheikh Zayed Medical college, Rahim Yar khan.

**Study Design:** Retrospective descriptive study.

**Place and Duration of Study:** Department of Forensic Medicine & Toxicology, Sheikh Zayed Medical College, Rahim Yar Khan from 1st January 2021 to 31st December 2023.

**Methodology:** Twenty-six autopsies were identified as asphyxial cases out of total 226 and cases of asphyxial deaths in both genders and of all age groups were selected from medicolegal autopsies, which had complete data of autopsy and police record.

**Results:** There were 4 cases (15.38%) in the 1-20 years category, 18 cases (69.23 %) in the 21 to 40 years category, and 4 cases (15.38%) in below 20 and above 60 year's category. In urban areas, there were 14 cases (53.8%), and12 cases (46.16%) were in rural. Hanging involves 14 (53.85%), drowning 6 (23.07%), strangulation accounted for 4 (16.6%) and suffocation 2 (7.69%). Among females, drowning was 7.69%, hanging 23.07%, strangulation 15.38% and suffocation was 7.69%.

**Conclusion**: Males and young adults having age range from 21 to 40 years are at a greater risk of becoming victims of fatal asphyxial incidents. Hanging emerged as the predominant mechanism of fatal asphyxia in medicolegal autopsies in this region, with drowning and strangulation both accounting for a significant portion of asphyxial fatalities.

**Keywords**: Asphyxia, Drowning, Hanging, Forensic, Strangulation

## INTRODUCTION

Death is attributed to asphyxia when the cessation of respiratory function initiates the subsequent failure of the body's other two vital systems. Asphyxia refers to mechanisms that cause a deficiency in tissue oxygen supply, essential for metabolic function. The four main physiological causes are reduced environmental oxygen, decreased blood oxygenation, impaired cardiovascular oxygen transport, and interference with cellular oxygen absorption [1].

Asphyxial deaths can be classified as homicidal, suicidal, or accidental, and may result from various causes such as positional asphyxia, drowning, mechanical factors like constriction or aspiration of foreign bodies, and different mechanisms of strangulation, including hanging, ligature, and may be due to other alterations in breathable air [2].

During the autopsy, the search for the cause of death plays an important role in forensic investigations [3]. The forensic evaluation of hypoxia-related deaths remains a significant challenge throughout the history of forensic medicine, as it necessitates the establishment of compelling evidence to demonstrate critical exposure to hypoxic conditions.

The classification of asphyxia and the definitions of its subtypes also lack uniformity, varying significantly across textbooks and research papers. Consequently, similar research designs can yield entirely different results depending on the definitions employed. Equally competent forensic pathologists may label closely comparable cases differently. It is suggested by Sauvageau and Boghossian in 2010 and now by majority that asphyxia be classified in a forensic context into four main categories: suffocation, strangulation, mechanical asphyxia, and drowning [4].

Suffocation includes smothering and choking as well as confined spaces, entrapment, and vitiated atmosphere. Strangulation is subdivided into hanging, ligature strangulation, manual strangulation, and other unspecified strangulation [5]. Various medical signs can be observed in deceased bodies to help determine the cause of death [6]. Cadaveric signs indicative of asphyxial deaths include the presence of abundant froth from the nostrils in drowning victims, fractured thyroid cartilage horns in cases of manual strangulation, and angled suspension marks in instances of suicidal hanging [7]. During the autopsy, frequently observed pathological features include cyanosis, venous congestion, petechial hemorrhages, pulmonary edema, tissue edema, and blood fluidity. The brain is regarded as the organ most acutely sensitive to hypoxia [8]. Throughout the years, the PTP was more commonly reported in cases of violent deaths by asphyxia, such as drowning [9].

The diagnosis of mechanical asphyxia remains one of the most difficult issues in forensic pathology. Asphyxia ultimately results in cardiac arrest and it relies on circumstantial details and on the pathologist experience, lacking objective evidence [10].

Despite the wealth of medicolegal findings on various causes of unnatural deaths, such as firearm injuries, the literature focusing on asphyxial deaths in Pakistan remains scant. This research on the autopsy-based patterns of asphyxial deaths in forensic medicine holds considerable significance. It endeavors to offer a thorough comprehension of prevalent asphyxial patterns, thereby enhancing diagnostic precision in forensic investigations. Moreover, this study aspires to identify emerging trends in asphyxial deaths in this region, thus augmenting victim safety through informed risk assessments. Additionally, it bridges gaps in existing literature, serving as an invaluable reference for future research in forensic science and potentially paving the way for more effective prevention and intervention strategies.

## PATIENTS AND METHODS

It was descriptive cross-sectional study, conducted in the Department of Forensic Medicine and Toxicology, Sheikh Zayed Medical College, Rahim Yar Khan, from 1st January 2021 to 31st December 2023 and Ethical Approval Letter No. 105/IRB/SZMC/SZH, Dated 14-12-2020. The purposive non-probability sampling technique was used for collection of data. Cases of asphyxial deaths in both male & female gender and of all age groups were selected from medicolegal autopsies conducted during the study period, which had complete data of autopsy and police record.

Exclusion criteria were all cases other than asphyxial deaths, cases diagnosed as natural deaths, hospital deaths, police encounter and custodial deaths along with extremely putrefied and exhumed bodies. After obtaining permission from the concerned authorities, the record of stipulated 03 years' autopsies was carefully examined and the cases labeled as violent asphyxial deaths on the basis of police papers; and autopsy reports were segregated and studied in detail. The variables observed were the residential background, gender and age of victim along with the type of asphyxia and manner of death. The observations were recorded in predesigned performa. The record of medicolegal autopsies conducted, during the study period was examined in detail. The information collected from police papers, hospital record and autopsy reports was entered on pre-designed performa and subsequently analyzed. The data was entered and analyzed through SPSS-26. Descriptive statistics and the Chi-square test were applied, with a significance level set at $P \leq 0.05$. Data normality was assessed using the Shapiro-Wilk test.

## RESULTS

The summarized demographic characteristics of the data and shows the P-value of Shapiro-Wilk test which is less than 0.05 $P \leq 0.05$ and shows that the data was not normally distributed so that non para-metric tests on this data can be applied.(Table 1)

**Table 1:** Demographic Profile and **Tests of Normality(n=226)**

| Characteristics | Values | Shapiro–Wilk Test |
|---|---|---|
| Number of Autopsies | 226, $P \leq 0.05$ | ---- |
| Sex | Male = 164<br>Female= 62 | 0.55 |
| Mean Age | $3.84 \pm 1.55$ | 0.93 |
| Manner of death | $1.42 \pm 1.24$ | 0.56 |

In the overall asphyxial deaths, females (n=14, 53%) outnumbered males (n=12, 46.1%) with a ratio of 1.3:1. Hanging was the most common method of asphyxia, accounting for 14 cases (53%), with a majority of male victims. Drowning was the second most common method, occurring in 6 cases (23%), also with a male predominance. Strangulation occurred in 4 cases (15.38%), involving only females and suffocation was the least frequent type, also in 4 cases (7.69%) exclusively involving females (Fig. 1).

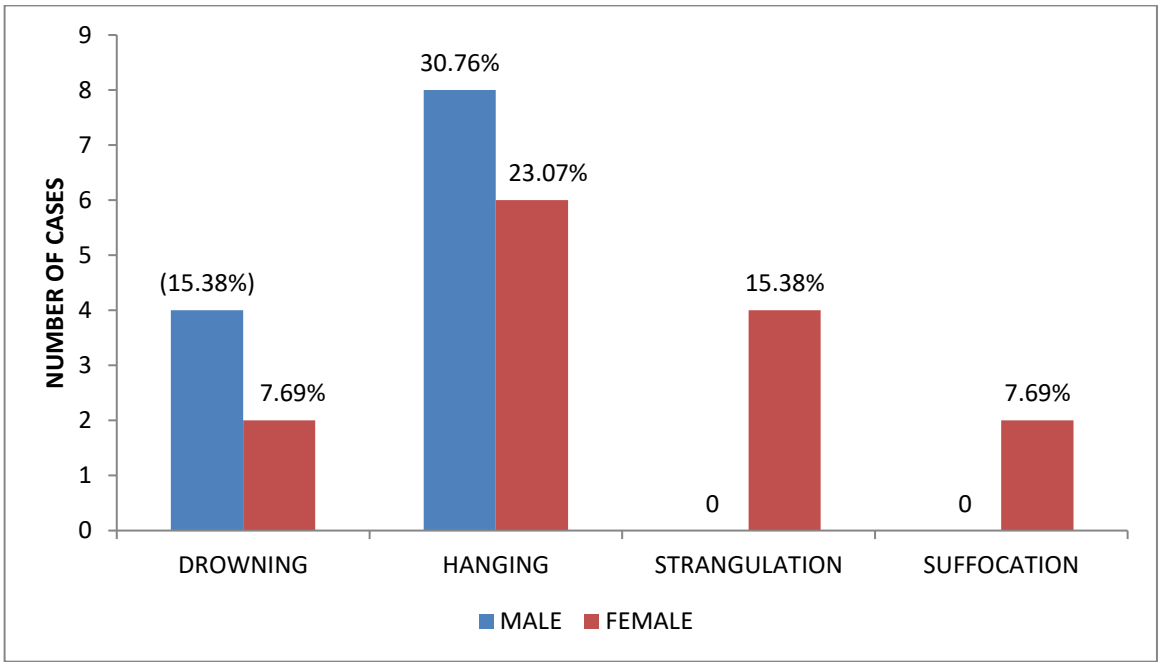


**Fig. 1: Gender distribution with types of asphyxial deaths (n=26)**

During this three-year study period, 26 out of the 226 medico-legal autopsies conducted (11.5%) were victims of violent asphyxia. The majority of the victims, 18 (69.23%), were between 21 and 40 years. This was followed by an equal number of cases in the 0-20year age group, with21 to40 year group, each having 04 cases (15.38%). Notably, there were no victims aged 61 years and above (Table 2).

**Table 2: Distribution of asphyxial deaths in different age groups (n=226)**

| Age (years) | Types of asphyxial deaths | | | | Asphyxial deaths | Total autopsies |
|---|---|---|---|---|---|---|
| | Drowning | Hanging | Strangulation | Suffocation | | |
| 0- 20 | 4 | - | - | - | 4 (15.38%) | 42 |
| 21- 40 | 2 | 10 | 4 | 2 | 18 (69.26%) | 112 |
| 41- 60 | - | 4 | - | - | 4 (15.38%) | 58 |
| 61& Above | - | - | - | - | -- | 14 |
| Total | 6 | 14 | 4 | 02 | 26 (100%) | 226 |

Table 3 is the distribution of asphyxial deaths across the type of residence of victim. The study shows more asphyxial deaths in urban region as compared to rural but overall ratio of asphyxial cases are more in rural area.

**Table 3: Distribution of pattern of asphyxia in relation with residence (n=226)**

| Residence | Types of asphixial deaths | | | | Asphyxial deaths | Total autopsies |
|---|---|---|---|---|---|---|
| | Drowning | Hanging | Strangulation | Suffocation | | |
| Rural | 2 | 10 | - | - | 12 (46.15%) | 42 |
| Urban | 4 | 4 | 4 | 2 | 14(53.85%) | 112 |
| Total | 6(23.07%) | 14(53.85%) | 4(16.6%) | 2(7.69%) | 26(100%) | 226 |

Figure 2 displaying the relationship between sex & manner of death in asphyxial deaths, where it depicts the overall comparable ratio of male involvement in unnatural asphyxial deaths as to female, it also shows noticeable high rates in the homicidal asphyxial death of female.

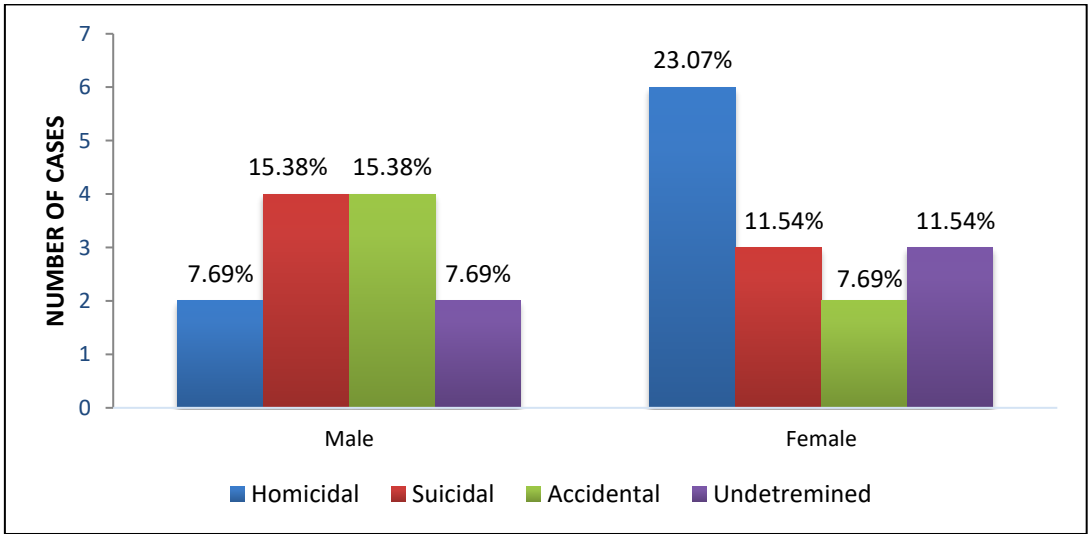


**Fig. 2: Gender distribution with manner in asphyxial deaths (n=26)**

## DISCUSSION

Asphyxia ranks among the foremost causes of violent fatalities globally, with the manner of demise varying widely from homicide to suicide or accidental occurrences. In this three-year study, a total of 26 autopsies were performed on deaths resulting from asphyxia, out of a total of 226 autopsies, constituting 11.5% of all medicolegal deaths. This proportion is comparable to a study conducted in Islamabad, where the rate was 10.61% [11] and a ten-year study in Faisalabad, where the rate was 7.66% [2]. These findings contrast with a four-year retrospective study in Peshawar, where the rate was notably lower at 3.98% [12]. Males were more affected than females, comprising 53.8% of all victims, which is similar to the 46.15% of females reported in the Islamabad study [11] and findings from Pune, India [13].

In our study predominance of violent asphyxial deaths was seen in urban areas similar to the recent study done at Peshawar [14]. The majority of the victims, 18 (69.23 %), were between 21 and 40 years which is comparable to studies conducted national and international levels [2,11,15].

Hanging, found as the method of choice for suicide, in our study, found to be more prevalent among males (30.76%) as compared to females (23.07%). This finding was similar to a study conducted at Lahore [16]. Hanging emerged as the predominant method of asphyxia in accordance with the other studies [14] but in contrast to some other studies where ligature strangulation is more common [11]. Drowning was the second most prevalent method, exhibiting a male predominance in this study similar to global findings in which drowning is the third leading cause of death by unintentional injury [17].

Strangulation was observed in this area, exclusively involving female victims; this can be due to the reason that females are weak and offer least resistance while suffocation, the least frequent type, was also, involving only females. Manual strangulation and smothering are the methods of homicide usually adopted by criminals who are physically strong as compared to their victims and this is furnished by our finding of female predominance in manual strangulation and smothering [18]. A comprehensive four-year study conducted by the Human Rights Commission revealed a significant prevalence of strangulation cases, accounting for 9% among honor killing victims [19] which is suggestive of the similar approach as our study conclude. Men with a history of depression exhibited a greater propensity for suicide by hanging. In contrast, women with depression were significantly less likely, by half, to resort to hanging compared to their non-depressed counterparts [20].

Study of this nature face certain limitations, as autopsies are not conducted on every case, and reporting deaths to the police is uncommon in many regions under study. The authors posit that the actual figures may be higher than reported, considering the prevailing mindset, educational levels, and social setup of the area. Law enforcement agencies should be informed of these statistics to aid in investigations and enhance surveillance in areas with higher incidences.

## CONCLUSION

Unnatural asphyxial deaths in the study exhibit a comparable overall ratio of male to female involvement, with a notable peak among young adults. These deaths are predominantly homicidal in females, while males are more frequently victims of suicides and accidents. Hanging emerges as the predominant mechanism of fatal asphyxia in medicolegal autopsies, with drowning and strangulation also constituting a significant portion. It is imperative that security agencies are apprised of these facts to enhance the efficacy of their investigations.

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