

Autopsy Based Pattern of Asphyxial Deaths in Forensic: A Retrospective Study

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ABSTRACT

Background: A substantial portion of autopsies involve fatalities resulting from violent incidents, and one significant contributor to such fatalities is violent asphyxiation. **Objective:** To determine the pattern of the asphyxial deaths among the forensic autopsies. **Study Design:** Cross sectional study. **Settings:** Department of Forensic Mohtrama Benazir Bhutto Shaheed Medical College, Mirpur Azad Jammu Kashmir. **Duration:** June 2020 to December 2022. **Methods:** A total of 77 autopsies were classified as asphyxial cases. This data was extracted from forensic autopsy reports and was gathered using a predefined data collection sheet, with consent obtained from the close relatives of dead body. Collected was analyzed through SPSS version 21. **Results:** Among total autopsies asphyxial deaths were identified in 77(10.26%). There were 17 cases (22.07%) in the 1-12 years category, 16 cases (20.77%) in the 13-18 years category, 37 cases (48.05%) in the ≥ 19 and < 60 years category, and 8 cases (10.38%) in the ≥ 60 years category. In urban areas, there were 41 cases (53.24%), and in rural areas, there were 36 cases (46.75%) of asphyxial deaths. Among males, drowning accounted for 88.37% of cases, hanging 46.15%, strangulation 66.66%, suffocation 42.85%, and throttling 60.0%. Among females, drowning was 11.62%, hanging 53.84%, strangulation 33.33%, suffocation 57.14%, and throttling 40.0%. **Conclusion:** Males and young adults having in age range of 19 to 49 years are at a greater risk of becoming victims of fatal asphyxial incidents. Drowning emerged as the predominant asphyxiation mechanism in forensic autopsies, with hanging also accounting for a significant portion of asphyxial fatalities.

Keywords: Asphyxia, Drowning, hanging, Forensic, Strangulation.

INTRODUCTION

Death is an inescapable reality, yet individuals of both genders persistently endeavor to resist its inevitability. Individuals may seek methods to circumvent the inherent progression of life that ultimately culminates in death, encompassing factors such as aging and sickness.^{1,2} Additionally, they may also aim to evade unnatural means of death, including mechanical asphyxiation methods such as hanging, strangulation, drowning, and suffocation. The forensic evaluation of deaths caused by hypoxia continues to present a significant problem, as it requires the

establishment of compelling evidence to demonstrate the presence of crucial exposure to a hypoxic insult.^{3,4}

Asphyxial death may manifest as having a homicidal, suicidal, or accidental nature and can be attributed to 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 other alterations in breathable air.⁵ Limited literature is known on focused analyses of asphyxial deaths in Pakistan, despite the existence of medicolegal findings on

numerous other causes of unnatural deaths such as firearm injuries.^{6,7}

During the autopsy, common pathological observations consist of cyanosis, venous congestion, petechial hemorrhages, pulmonary edema, tissue edema, and fluidity of blood. The brain is considered to be the organ that exhibits the highest degree of sensitivity towards hypoxia.^{8,9} Asphyxia fatalities occur when hypoxia induces impairment of the respiratory center located in the brainstem, resulting in respiratory arrest accompanied by bradycardia or asystole.¹⁰

This research on the autopsy-based pattern of asphyxial deaths in forensic science has significant importance. It aims to provide a comprehensive understanding of prevalent asphyxial patterns, enhancing diagnostic accuracy in forensic investigations. Additionally, this study seeks to identify emerging trends in asphyxial deaths, improving victim safety through informed risk assessment. Furthermore, it fills gaps in existing literature, serving as a valuable reference for future research in forensic science and potentially leading to more effective prevention and intervention strategies

METHODS

After approval from the hospital's ethical review board (ERB), this cross-sectional study was conducted at Department of Forensic Mohtrama Benazir Bhutto Shaheed Medical College, Mirpur Azad Jammu Kashmir from June 2020 to December 2022 and will include in-patients as well as out-patients.

This study looks at cases of asphyxial fatalities that occurred from June 2020 to December 2022. During the specified time frame, a comprehensive examination of medicolegal autopsies was performed. A comprehensive analysis was conducted, wherein a rigorous examination was carried out by reviewing historical records, police documents, and postmortem findings, among other relevant sources of information. This study incorporated autopsy reports of a medicolegal type that were relevant to cases of asphyxia. Conversely, autopsies that were non-medicolegal in nature and medicolegal autopsies involving unnatural deaths unrelated to asphyxia were not included in the study. Asphyxial fatalities were commonly classified into various categories, including drowning, hanging, strangulation, suffocation, and throttling. The characteristics that were examined in this study included the reason, mode, and type of violent asphyxial death, as well as the age and gender of the victims.

SPSS version 22 (IBM Corp, Armonk, NY, USA) was used for analysis of data that was entered into a personal computer. Means and standard deviations were determined along with frequency distributions.

Comparisons between groups were made using Chi-square.

RESULTS

There were 750 autopsies performed from June 2020 to December 2022. Among them, asphyxial deaths were identified in 77(10.26%) of the total sample. table 1.

Table 1: Total number of autopsies performed (June 2020 to December 2022)

Autopsies	Asphyxial Deaths	Percentage (%)
750	77	10.26%

There were 17 cases (22.07%) in the 1-12 years category, 16 cases (20.77%) in the 13-18 years category, 37 cases (48.05%) in the ≥ 19 and < 60 years category, and 8 cases (10.38%) in the ≥ 60 years category. The p-value for age groups was 0.736, indicating no significant difference. In urban areas, there were 41 cases (53.24%), and in rural areas, there were 36 cases (46.75%) of asphyxial deaths. The p-value for residence was 0.321, suggesting no significant difference between urban and rural areas in terms of asphyxial deaths given in table 2.

Table 2: Frequencies of asphyxial deaths in autopsies with different characteristics

Variables	Category	Male (n)	Female (n)	Total (n)	P-value
Age (years)	1-12	13 23.21%	3 14.28%	17 22.07%	0.736*
	13-18	11 19.64%	5 23.80%	16 20.77%	
	≥ 19 & < 60	26 46.42%	11 52.38%	37 48.05%	
	≥ 60	6 10.71%	2 9.52%	8 10.38%	
	Total	56 72.78	21 27.27	77 100.0%	
Residence	Urban	30 53.57%	11 52.38%	41 53.24%	0.321**
	Rural	26 46.42%	10 47.61%	36 46.75%	

Among males, drowning accounted for 88.37% of cases, hanging 46.15%, strangulation 66.66%, suffocation 42.85%, and throttling 60.0%. Among females, drowning was 11.62%, hanging 53.84%, strangulation 33.33%, suffocation 57.14%, and throttling 40.0%. The p-value for gender was < 0.001 , indicating a significant difference in asphyxia patterns between males and females. In the 1-12 age groups, drowning was 27.90%, hanging 7.69%, strangulation 22.22%, suffocation 14.28%, and throttling 20.0%. In the 13-18 age groups, drowning was 11.62%, hanging 23.07%, strangulation 33.33%, suffocation 57.14%, and throttling 20.0%. In the ≥ 19 & < 60 age group, drowning was 51.16%, hanging 61.53%, strangulation

11.11%, suffocation 28.57%, and throttling 40.0%. In the ≥ 60 age group, drowning was 11.62%, hanging 15.38%, and there were no cases of strangulation, suffocation, or throttling. The p-value for age was 0.231, indicating no significant difference. In urban areas, drowning was 51.16%, hanging 69.23%, strangulation 55.55%,

suffocation 28.57%, and throttling 60.0%. In rural areas, drowning was 47.22%, hanging 30.76%, strangulation 44.44%, suffocation 77.77%, and throttling 80.0%. The p-value for residence was 0.054, suggesting a borderline significant difference in asphyxia patterns between urban and rural areas as presented in table 3.

Table 3: Pattern of asphyxia across different variables like gender, age and residence

Variables	Category	Drowning (n=43)	Hanging (n=13)	Strangulation (n=9)	Suffocation (n=7)	Throttling (n=5)	P-Value
Gender	Male	38 (88.37)	6 (46.15)	6 (66.66)	3 (42.85)	3 (60.0)	<0.001
	Female	5 (11.62)	7 (53.84)	3 (33.33%)	4 (57.14)	2 (40.0)	
Age	1-12	12 (27.90)	1 (7.69)	2 (22.22)	1 (14.28)	1 (20.0)	0.231
	13-18	5 (11.62)	3 (23.07)	3 (33.33)	4 (57.14)	1 (20.0)	
	≥19 & <60	22 (51.16)	10 (61.53)	1 (11.11)	2 (28.57)	2 (40.0)	
	≥ 60	5 (11.62)	2 (15.38)	0 (0.00)	1 (14.28)	0 (0.00)	
Residence	Urban	22 (51.16)	9 (69.23)	5 (55.55)	2 (28.57)	3 (60.0)	0.054
	Rural	17 (47.22)	4 (30.76)	4 (44.44)	7 (77.77)	4 (80.0)	

DISCUSSION

The examination of the deceased individual's body after death is a crucial component in ascertaining the underlying factors contributing to their demise. The process of autopsy involves the systematic examination of the organs, cavities, and overall external surface of the body in order to determine the underlying cause of death.¹¹ The practice of conducting a medicolegal autopsy, also referred to as post-mortem analysis, involves the identification of the deceased individual and the determination of the cause of death, particularly in cases when criminal activities are suspected.¹²

Many of the medicolegal autopsies we perform are on victims who died of asphyxiation. Almost (10.26%) of all deaths in this study were the result of asphyxiation, or 77 out of 750 medicolegal autopsies. In agreement with this, a four-year research in India by Singh et al. (2003), found that 5.26 percent of autopsied deaths were the result of violent asphyxia out of a total of 2110.¹³ A research from Gujarat (India) by Ankur et al. (2013), found that 5.63 percent of all autopsies had a death by asphyxiation.¹⁴ Tirmizi et al. (2012) reported that of the 2,090 medico-legal deaths in Karachi for whom an autopsy was performed, 148 were attributed to violent asphyxia, for a rate of 7.08 percent.¹⁵ However, it contradicts a study conducted by Azmak et al. (2006) in Turkey over the course of 21 years, which found an incidence of 15.7%. One possible explanation is that the longer research periods and/or additional regions accounted for the differences.¹⁶

In our research, the majority of victims fell within the age range of 19 to less than 60, making up 48.05% of all autopsies, followed by those aged 13 to 18, constituting 20.77%. This age distribution was more prevalent among males, possibly because the age bracket of 21 to 40 is

typically the most active phase in life, a trend consistent with previous studies. Our study also revealed a significant gender difference, with 56(72.78%) males and 21(27.27%) females among the victims, resulting in a male-to-female ratio of 2.1:1. This observation may be linked to the traditional role of males as primary breadwinners and the associated family responsibilities. When males are unable to meet these obligations, they may experience heightened suicidal tendencies, making them more susceptible to suicidal impulses for even minor reasons. This shift in the gender distribution of asphyxial deaths reflects a changing trend. Similar findings are observed by Guntheti et al. (2021), the majority of victims were in the younger age brackets, primarily within the 21-30 years group, comprising 62 individuals (49.81%), and the 31-40 years group, which accounted for 46 cases (31.08%), with males being the more affected gender. Likewise, a notable gender disparity was evident, with 86 males (58.10%) and 62 females (41.89%) among the victims.¹⁷

Our study showed among males, drowning (88.37%), hanging (46.15%), strangulation (66.66%), suffocation (42.85%), and throttling (60.0%) were prevalent. Our results are in accordance with Akhtar et al. (2022) who reported that among the modalities of asphyxiation identified in medicolegal autopsies, 61.91 percent were caused by hanging, 33.33 percent by drowning, and 4.76 percent by strangulation.¹⁸ Among 320 asphyxia-related medicolegal autopsies, hanging was found to be the predominant cause of death (78.12 percent) after the victim had been drowned and strangled, they were hung study conducted by Gupta et al. (2016).¹⁹ However, a four-year prospective study conducted by Khalil et al. (2014) of asphyxiation deaths in Peshawar, Pakistan indicated that strangling was the leading method.²⁰ Asphyxiation by drowning was shown to be the top cause

of death among children and adolescents in a retrospective study conducted in Hamburg, Germany. Similarly, reports indicate that in India, drowning is the second leading cause of mortality, right behind car accidents. These results imply that regional differences exist in the patterns of asphyxial death modes.²¹

There is a critical need for a thorough and well-structured investigation to pinpoint the root causes of asphyxial deaths due to suicidal behaviors. Additionally, the development of an effective awareness program is essential for prevention. These measures collectively have the potential to instigate positive, long-term change in addressing this issue.

CONCLUSION

Males and young adults having in age range of 19 to 49 years are at a greater risk of becoming victims of fatal asphyxial incidents. Drowning emerged as the predominant asphyxiation mechanism in forensic autopsies, with hanging also accounting for a significant portion of asphyxial fatalities.

LIMITATIONS

Study was conducted on a small sample size. This program should focus on educating the population, harnessing the power of media responsibly, inspiring the younger generation to embrace new opportunities, and fostering strong family support systems.

SUGGESTIONS / RECOMMENDATIONS

We should express our appreciation for future research efforts in this area.

CONFLICT OF INTEREST / DISCLOSURE

None.

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