

TRENDS OF ASPHYXIAL DEATHS AND ITS ASSOCIATION WITH VARIOUS DEMOGRAPHIC FACTORS REPORTED TO FORENSIC MEDICINE DEPARTMENT PESHAWAR; AN AUTOPSY-BASED RETROSPECTIVE STUDY

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ABSTRACT

Objectives: To find the frequency of reported asphyxial deaths to gender and pattern of injury reported. This study also intended to identify the causes and the association between age, area, and gender of the deceased with sexual assault-related asphyxial deaths.

Material and Methods: A retrospective chart review was conducted at the Department of Forensic Medicine and Toxicology Khyber Medical College Peshawar from 1st July 2018 to 30th June 2023 (5 years data). All the subjects who died due to asphyxia and were presented for autopsy at the department were included in the study. Cases with incomplete documentation and those referred from other districts were excluded from the study.

Results: Of the total 187 subjects, 66.8% (n=125) were males and 33.2% (n=62) were females with male to female ratio of 2:1. In the data, 57.2% (n=107) belonged to urban areas and 42.8% (n=80) were of rural areas. In total subjects, 88.8% (n=166) had immediate deaths, 6.4% (n=12) had delayed ones, and 4.8% (n=9) were undetermined. The most prevalent type of asphyxia was mechanical 113 (60.4%). The most common cause of asphyxia death was found to be hanging at 34.22%. However, of the 187 subjects, 5.3% (n=10) had intoxications, of which 1.6% (n=3) had tetrahydrocannabinol (THC), carbon monoxide (CO) and morphine poisoning each and 0.5% (n=1) had methamphetamine poisoning.

Conclusion: Our study concluded that asphyxial deaths were more prevalent in males in the middle-aged group. Asphyxial deaths were found more in urban areas than in rural areas. Mechanical asphyxia was the most common type of asphyxia while hanging was the most common pattern.

Key words: asphyxia, tetrahydrocannabinol, mechanical, traumatic, sexual, iatrogenic, and chemical asphyxia.

This article may be cited as: Nadeem F, Ahmad I, Ali Ahsan, Khan Ma, Wasif M, Afridi Hk. Trends Of Asphyxial Deaths And Its Association With Various Demographic Factors Reported To Forensic Medicine Department Peshawar; An Autopsy-Based Retrospective Study. J Med Sci 2024 April-June;32(2):160-164

INTRODUCTION

Asphyxia is a Greek word that means “absence of pulse” or “pulselessness.”¹ In actuality, it is a misnomer. Asphyxia is a disorder that prevents breathing from happening or results in low oxygen levels in inspired air,

depriving the organs and tissues of oxygen and ultimately leading to unconsciousness or death. When pressure is applied to the neck or chest, obstructing the airway, and there is difficulty breathing, these are the classic symptoms of asphyxia.² The number and variety of medicolegal deaths have skyrocketed in recent years along with the rise in crime. The investigation of medicolegal fatalities necessitates that medical professionals probe certain aspects such as the cause, method, and timing of death to address certain questions. This can only be accomplished by a thorough autopsy.³

Some examples of unnatural causes of death include firearms, assaults with sharp and blunt weapons, bomb blasts, violent compression of the neck by hand

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Date Received: 24-01-2024

Date Revised: 26-02-2024

Date Accepted: 15-04-2024

or ligature, poisoning, heat injuries, and traffic accidents. Suicidal, accidental, and homicidal deaths can occur due to violent asphyxia including smothering, choking, drowning, hanging, ligature, and manual strangling. One of the most common methods of suicide is hanging, which involves the body being suspended by a rope that compresses the neck externally, with the body's weight acting as a constriction.⁴ A rise in suicide by suffocation (52%) and poisoning 19% has been observed, where suicide by suffocation increased by 104% among those aged 45–59 years and rose steadily in all other age groups except those aged ≥ 70 years.⁵ One Canadian report says that hanging is the second most common suicidal method while suffocation remains the first cause.⁶

Oxygen shortage first affects nervous tissues, and even a slight oxygen shortage might cause these tissues' functioning to be disrupted resulting in abrupt unconsciousness. The heart may beat for several minutes after breathing stops in all types of asphyxia. Mechanical asphyxia, pathological asphyxia, toxic asphyxia, environmental asphyxia, traumatic asphyxia, postural/positional asphyxia, and iatrogenic asphyxia are among the several forms of asphyxia.

Deprivation of oxygen for five to ten minutes can cause irreversible damage to the central neurological and circulatory systems, which can lead to asphyxia fatalities. The three main symptoms of asphyxia are cyanosis, increased capillary permeability, and petechial hemorrhage, which appear when breathing is mechanically blocked for 15 to 30 seconds. Conjunctival and facial petechiae, although nonspecific findings are considered hallmarks of asphyxial deaths. Even though they are neither predictable findings in all asphyxial deaths nor rare in natural, non-asphyxial deaths, the belief prevails that petechiae are suggestive of asphyxia.⁷

Petechial hemorrhages are typically found in the skin of the head and face, particularly in the lax tissues of the eyelids, conjunctivae, and sclera.⁸ These are caused by blood leaking from tiny venules as a result of the venous system's increased pressure. Because they can emerge instantly in the face and eyes after a strong episode of coughing or sneezing, they are not indicative of suffocation.⁹

The victims' ages range from 10 to 80 years old, which is the extreme of any age range. The likelihood of events in both sexes is similar, and both are equally prone.¹⁰ For children ages 5 to 14, drowning ranks as the sixth most common cause of mortality worldwide. More than 90% of drowning deaths take place in nations with poor and moderate incomes.¹¹ Death due to drowning, one of the causes of asphyxia, is one of the most difficult causes of death to prove at postmortem, especially when the body is not examined in a fresh condition.

This study will add new data for the pattern of injuries in asphyxia deaths in Peshawar. Previously, no such study in this region has been conducted. The data would be helpful for Forensics, Public Health Experts, and Law Enforcement agencies to cover and cope with the evil of asphyxial deaths. The data further can be used to create awareness in the general public.

MATERIALS AND METHODS

A retrospective chart review was conducted at the Department of Forensic Medicine and Toxicology Khyber Medical College Peshawar from 1st July 2018 to 30th June 2023 (5 years data). All the subjects who died due to asphyxia and presented for autopsy at the department were included in the study. Cases with incomplete documentation and cases referred from other districts were excluded from the study.

Once the study had received institutional and ethical permission, the data for the study sample was gathered. The data was extracted using a pre-designed proforma. A section on demographics and closed-ended questions about autopsy cases presented at the Department of Forensic Medicine was included in the pre-designed proforma. v.20 of SPSS was utilized for analysis. Frequency and percentage analyses were used to describe categorical variables. Chi-square was employed to investigate correlations between different demographic characteristics and asphyxia-related mortality. A P value of less than 0.05 was considered significant.

RESULTS

Of the total 187 subjects, 66.8% (n=125) were males and 33.2% (n=62) were females with a male-to-female ratio of 2:1. The mean age of the subjects was 29.0+/- 14.1 years. Table 1 shows the ages in groups.

In the data, 57.2% (n=107) were related to urban areas and 42.8% (n=80) were of rural areas. In total subjects, 88.8% (n=166) had immediate deaths, 6.4% (n=12) had delayed ones, and 4.8% (n=9) were undetermined. The type of asphyxia encountered is described in Table 2, whereas Table 3 illustrates the causes of asphyxia.

However, of the 187 subjects, 5.3% (n=10) had intoxications, of which 1.6% (n=3) had THC, CO, and morphine poisoning each and 0.5% (n=1) had methamphetamine poisoning. Moreover, 1.6% (n=3) of subjects were having sexual assaults. The gender is compared with sexual assault in cases of asphyxia which shows a p-value of 0.035 which is statistically significant, whereas area compared with sexual assault shows a p-value of 0.61 which is statistically insignificant.

DISCUSSION

Asphyxial deaths result from the deprivation of ox-

Table No 1: Ages in groups with their frequencies

Age in groups	Frequency (n=187)	Percentage (%)
0-15 years	21	11.2
16-30 years	104	55.6
31-45 years	43	23.0
46-60 years	11	5.9
more than 60 years	8	4.3

Table No 2: Different types of asphyxia

Types	Frequency (n=187)	Percentage (%)
Mechanical	113	60.4
Traumatic	60	32.1
Chemical	7	3.7
Pathological	5	2.7
Iatrogenic	1	.5
Perinatal	1	.5

Table No 3: Different types of asphyxia

Causes	Percentages
Hanging	34.22%
Strangulation	13.9%
Drowning	6.95%
Suffocation	0.53%
Smothering	1.6%
CO poisoning	3.7%
Infections	2.1%
Traumatic	32.6%
Throttling	2.1%
Choking	0.53%

Table No 4: Association of asphyxia death with sexual assault and residence

Variables	Sexual Assault		p-value
	Negative	Positive	
Gender			
Male	125 (66.8%)	0 (0%)	0.035
Female	59 (31.5%)	3 (1.6%)	
Area			
Urban	105 (56.2%)	2 (1.1%)	0.61

xygen to cells, particularly affecting the brain, which serves as the central regulator of the body's physiological processes. These deaths are typically confirmed through autopsy-based studies, providing valuable insights into the patterns and demographics of such fatalities. Notably, a consistent male-to-female ratio of 2:1 is observed across various regions, including Brazil¹², Germany¹³, and South Asian countries like Pakistan⁽¹⁴⁾ and India.¹⁵

The higher frequency of asphyxial deaths among males can be attributed to societal roles, where males often serve as the primary breadwinners of their families. This societal pressure places them at a heightened risk of experiencing violence and stress, potentially contributing to the prevalence of asphyxial deaths among this demographic. Moreover, the age range most affected by such deaths typically falls between 16 to 45 years, aligning with findings from previous studies^(6,17). This period of life is often characterized by significant stressors, responsibilities, and challenges, which may predispose individuals to fatal outcomes related to asphyxia.

The dominance of asphyxial deaths within this age range suggests that individuals in their prime working and reproductive years may be particularly vulnerable to such incidents. The accumulation of stressors and challenges during this stage of life could potentially exacerbate the risk of fatal outcomes related to asphyxia.

Hanging was the most common cause of death in the study, preceding road traffic accidents, strangulation, and drowning, respectively, comprehensible to a study in Pakistan^{4,16}, but contrary to a study where drowning was the leading cause¹⁸.

Mechanical asphyxia is the topmost cause, after that traumatic one either due to road accidents or falls. This is one of the worldwide causes of suicide by asphyxia in third-world countries. To settle that suicide by hanging is the easiest method whatever material is found in the vicinity. On the other hand, traumatic asphyxia mostly due to an RTA is because of a lack of traffic sense, rash driving, and inapplicable traffic rules.

The strangulation in the study, another type of mechanical asphyxia, is homicidal, and much prevailing in this part of the world. Strangulation cases were also found higher in honor-killing victims in a four-year study done by the Human Rights Commission¹⁹. Random cases of asphyxia due to pathological lung infection, suffocation due to congested inhabiting areas, or carbon monoxide poisoning because of burning or indoor gas appliances are the utmost causes. Smothering another type of homicidal manner by asphyxia²⁰ in which the nose or mouth is occluded with hands or materials like plastic bags or pillows existed in the study.

In the study, sexual assault was statistically significant with a p-value less than 0.05. Sexual assault prevailed in cases with homicidal asphyxia mainly by strangulation as in other studies^{21,22} and drowning in one of the cases. Of the data, some intoxications were encountered in the serum that were of the recreational drugs or medicinal ones. Moreover, CO monoxide was present in the blood of the subjects who died due to gas appliances in closed encounters or burning of buildings, mostly in the winter compared with other studies^{23,24}. Those having lung

infections died of pathological asphyxia and were having morphine poisoning because of the additional use of anti-tussive or homemade remedies containing opium. The recreational drugs like methamphetamines and THC met in the serology were due to use in social stress or gathering in bad company where its use might lead to violent activities, one of the effects as in studies^{25,26}. The different patterns along with aspects like sexual assault and intoxication are discussed to imply the consequences shortly for the betterment of the community.

The study's limitations include reliance on recorded data, which may introduce information bias due to incomplete or inaccurate documentation. Additionally, the absence of personal interviews limits the depth of understanding of individual cases and may overlook important contextual factors contributing to asphyxial deaths. These limitations highlight the importance of future research efforts that incorporate qualitative inquiry to complement quantitative analysis. Efforts to integrate qualitative methods into future research endeavors can enrich our understanding of the complex interplay of factors influencing asphyxial deaths, ultimately informing more effective prevention and intervention strategies.

CONCLUSION

Our study concluded that asphyxial deaths were found more prevalent in males of the middle age group. Asphyxia deaths were found more in urban areas than in rural areas. Mechanical asphyxia was the most common type of asphyxia. Hanging was the most common pattern of asphyxia death. Moreover, 10 individuals were intoxicated with poisons and 3 individuals had a sexual assault. Gender was compared with sexual assault and was found to be highly significant.

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Authors Contribution:

Following authors have made substantial contributions to the manuscript as under

Authors	Conceived & designed the analysis	Collected the data	Contributed data or analysis tools	Performed the analysis	Wrote the paper	Other contribution
Nadeem F	✓	✓	✓	✗	✓	✗
Ahmad I	✓	✓	✗	✗	✓	✗
Ali Ahsan	✗	✓	✗	✗	✗	✓
Khan MA	✓	✗	✓	✓	✗	✗
Wasif M	✓	✓	✗	✓	✗	✗
Afridi HK	✗	✓	✗	✓	✓	✗

Authors agree to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Ethical Approval:

This Manuscript was approved by the Ethical Review Board of Khyber Medical College, Peshawar. Vide No. 767/DME/KMC.

Dated: 30 11 2023



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