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ORIGINAL ARTICLE

Pattern of Asphyxial Deaths in Forensic Autopsies

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ABSTRACT

Aim: To observe the pattern of the asphyxial deaths among the medicolegal autopsies.
Study design: Prospective observational study
Place and duration of study: Medicolegal Section, Liaquat University Hospital, Hyderabad from 1st January 2015 to 31st December 2019.
Methodology: One hundred and forty seven autopsies were characterized as asphyxial. The data was obtained from forensic autopsy reports and was collected in a preformed data collection sheet after acquiring consent of close relatives.
Results: There were 107 males and 40 females. Most of the subjects belonged to age group of adults (≥19 to <60 years) followed by age group of teens (13-18 years). The medicolegal autopsy was performed for 58 and 49 deceased from urban and rural areas, respectively. The asphyxial deaths were characterized as drowning (57.82%), hanging (16.32%), strangulation (14.28%), suffocation (8.16%), and throttling (3.40%).
Conclusion: The drowning was the most common mechanism of asphyxia in medicolegal autopsies. The hanging also contributed substantial number in asphyxial deaths. Most types of asphyxia were higher in males of adult age than in females.
Key words: Forensic autopsy, Asphyxia, Drowning, hanging, Strangulation

INTRODUCTION

The post-mortem analysis of the body of the deceased plays an important role in determining the cause of death. Autopsy is a scientific method to observe the organs, cavities, and whole surface of the body to conclude the cause of death.[1] The post-mortem performed with the purpose of clinical investigation is termed as clinical autopsy and is considered an important tool for quality assessment in healthcare because of diagnosis of the disease that may have caused the death.[2] Whereas the post-mortem analysis having the aim to identify the deceased and cause of disease in association with suspicion of criminal offenses is known as medicolegal autopsy. Both autopsies are essential to provide the information that facilitates healthcare planning on population level and supports the law-enforcement procedures by acting as evidence.[1] the autopsy is also helpful to confirm accidental, suicidal, or homicidal element of unnatural deaths[3].

Asphyxia is characterized by deprivation of oxygen in cells encompassing all the conditions and consequences that result from insufficient or altered oxygen supply.[4] Asphyxial death can exhibit homicidal, suicidal, or accidental nature and could be attributed to positional asphyxia, drowning, mechanical causes such as constriction, aspiration of foreign bodies, or strangulation, mechanism of strangulation including hanging and ligature, and any other changes in breathable air[4,5]. Although, medicolegal observations of various other causes of unnatural deaths such as firearm injuries have been reported from Pakistan, focused analyses of asphyxial deaths are limitedly available in literature[6,7].

The current study aimed to describe pattern of asphyxial deaths among medicolegal autopsies. Hyderabad is the largest division of Pakistan having nine districts and it is the second largest city of Sindh province. The incidence of asphyxial deaths is presented as frequency distribution among different age groups, from different localities.

The findings of this study could be helpful for medicolegal specialists who play a crucial role to prevent such cases of death by examining the injury patterns and highlighting the potential sources of danger.

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MATERIALS AND METHODS

The study was a five-year observational and prospective study carried out by analyzing the forensic autopsy reports of medicolegal section at Liaquat University Hospital, Hyderabad from 1st January 2015 to 31st December 2019. The consent was obtained from the close relative of the deceased before obtaining data from autopsy report. The ages of the victims were grouped into children (1-12 years), teens (13-18 years), adults (≥19 - <60 years), and elderly (≥60 years). The autopsy reports of medicolegal nature pertaining to asphyxia were included in this study to determine the pattern whereas the non-medicolegal autopsies and medicolegal autopsies of unnatural deaths other than asphyxia were excluded. Asphyxial deaths were broadly categorized as drowning, hanging, strangulation, suffocation, and throttling. The data was entered and analyzed through SPSS-24.

RESULTS

There were 107 males and 40 females. The age of asphyxial victims ranged from three years to 80 years with mean age of 28.76 years. Both males and females represented higher frequency in age group of ≥19 <60 years (72.11%) followed by age range of one to twelve years (12.93%). The least frequency of asphyxia was observed in elderly (3.40%) whereas the teens presented third highest frequency (11.56%) of asphyxial deaths. Regarding locality, 58 males and 23 females belonged to urban areas while 49 males and 17 females were reported from rural areas of the region (Table 1).

A majority of asphyxial deaths were caused by drowning (57.82%) and was followed by hanging (16.32%). The strangulation and suffocation caused 14.28% and 8.16% asphyxial deaths, respectively. The least number of asphyxial deaths was associated to throttling (3.40%). The males outnumbered the females in drowning, strangulation, and suffocation whereas the number of hanging and suffocation was higher in females as compared to males (Table 2). A substantial number of mechanisms of asphyxial deaths was observed in age group of adults with reference to other age groups. The incidence of drowning was higher among children after age group of adults whereas the occurrence of suffocation was noted to be higher in teens than children. The frequency of hanging and strangulation was found to be similar in age groups of children and adults. Drowning was the only mechanism observed in elderly age group. All types of asphyxial deaths except suffocation were recorded to be higher among subjects from urban areas in comparison to rural

localities. Contrarily, the rural region represented higher incidence of suffocation than urban areas. Overall, the asphyxial deaths were higher among males of adult age group from urban locality

Table 1: Frequencies of asphyxial deaths in medicolegal autopsies with different characteristics

Characteristics	Male (n=107)		Female (n=40)		Total(n=147)		P value
	No.	%	No.	%	No.	%	
Age (years)							
Children (1 - 12)	15	14.02	4	10.00	19	12.93	0.842*
Teens (13 - 18)	13	12.15	4	10.00	17	11.56	
Adults (≥19 - <60)	75	70.09	31	77.50	106	72.11	
Elderly (≥60)	4	3.74	1	2.50	5	3.40	
Locality							
Urban	58	54.21	23	57.50	81	55.10	0.433**
Rural	49	45.79	17	42.50	66	44.90	

*Chi-Square **Fisher's Exact Test

Table 2: Pattern of asphyxia against various variables

Characteristic	Pattern of Asphyxial Deaths										P value
	Drowning (n=85)		Hanging (n=24)		Strangulation (n=21		Suffocation (n=12)		Throttling (n=5)		
	No.	%	No.	%	No.	%	No.	%	No.	%	
Gender											
Male	76	89.41	11	45.83	13	61.90	4	33.33	3	60.00	<0.001
Female	9	10.59	13	54.17	8	38.10	8	66.67	2	40.00	
Age (years)											
1 – 12	13	15.29	2	8.33	3	14.29	1	8.33	0	0.00	0.408
13 – 18	7	8.24	2	8.33	3	14.29	4	33.33	1	20.00	
≥ 19 - < 60	60	70.59	20	83.33	15	71.43	7	58.33	4	80.00	
≥ 60	5	5.88	0	0.00	0	0.00	0	0.00	0	0.00	
Locality											
Urban	45	52.94	17	70.83	12	57.14	3	25.00	4	80.00	0.083
Rural	40	47.06	7	29.17	9	42.86	9	75.00	1	20.00	

DISCUSSION

14.96% autopsy reports concluded asphyxia as cause of death. The finding is consistent with Gupta and Mahanta[8] who reported 15.8% cases of asphyxia from 2777 medicolegal autopsies. A study from Peshawar region of Pakistan found comparatively smaller number of asphyxial deaths (3.98%) out of 3,265 forensic autopsies[6]. The difference may probably be related to different socioeconomic and environmental conditions between the two regions.

Most of the asphyxial deaths in present study were found higher in males (Table 2). The gender distribution among victims of death by asphyxia is coherent to other similar studies from Brazil[9], Germany[7], India[3] and Pakistan[6,10]. It has been reported that males being the sole earners for the family are more exposed to accidents, violence, and stress. The males have also been found more inclined towards addiction and risk-taking behaviour[11]. The present study illustrates that highest number of asphyxial deaths occurred in age group of adults. Similar observations have been reported in a three-year retrospective study[11] and four-year prospective study of asphyxial deaths[6]. The adult age is most active phase of life and adults are involved in most activities of the life and therefore adults are more vulnerable to dangers[11].

The present study reveals that the drowning was the leading modality of death among victims of asphyxia regardless of gender, age group, and locality (Table 2). The hanging and strangulation were the second and third highest causes of asphyxial deaths, respectively. However, the suffocation was higher in females than in males and in deceased from rural locality than subjects from urban area whereas, the throttling was identified as least mechanism of asphyxial deaths. The present study found that nearly 90% of subjects who died due to drowning were males. These findings are consistent with global data by World Health Organization[12] and drowning fact sheet by Centers for Disease Control and Prevention[13].

A study that aimed to screen mechanical asphyxia found 61.91% hanging, 33.33% drowning, and 4.76% strangulation as modalities of asphyxia in medicolegal autopsies.[9] Another study with similar objective found hanging as leading cause of death (78.12%) among 320 asphyxial autopsies of medicolegal nature.[8] The hanging followed the drowning and strangulation. Contrarily, the strangulation was found to be the foremost modality in a four-year prospective analysis of asphyxial deaths in Peshawar, Pakistan.[6] A retrospective analysis of cases of asphyxia in children and adolescents in Hamburg, Germany, found drowning as the leading mechanism of asphyxia. Similarly, the drowning has been reported as second most common cause of death after road accidents in India[14]. These findings suggest that pattern of modalities of asphyxial deaths may vary between different regions of the world.

The drowning is considered as a serious public health concern throughout the world within all socioeconomic classes.[15] Although the association of asphyxial deaths with intentions of homicide and suicide have been reported.[3,11] the majority of water-related deaths are ascribed to accidental drowning.[15] Globally, drowning acquires third position among leading causes of deaths due to unintentional injury[12] and it is ranked as the tenth most frequent cause of injury-related deaths in United States[15].

CONCLUSION

The drowning was most common modality of asphyxial death. The other mechanisms were hanging, strangulation, suffocation, and throttling. The asphyxia was higher in adult males and in urban locality.

Conflict of interest: Nil

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