

Outline and Medico-legal Drift of Asphyxial Deaths

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Cases of asphyxial death are frequently come across and the numbers are remarkable now-a-days. The study was aimed to estimate the frequency and to determine the socio-demographic pattern of the victims of asphyxial death. It was a cross-sectional variety of descriptive study and carried out in the Department of Forensic Medicine, Dhaka Medical College, Bangladesh from 1st January 2018 to 31st December 2019. A predesigned proforma was made first, and then various data were assembled, tabulated and analyzed there. In the midst of 2199 medicolegal autopsies, there were 224 cases of asphyxial death. Male victims (62.05%) were mostly found and the most affected age group was 30-39 years (35.26%). Victims were predominantly married (53.57%) and were mainly from urban areas (38.39%). The Muslims (76.78%) were the major victims followed by the Hindus (17.41%), Christians (2.67%) and the Buddhists (1.78%). Maximum victims were unemployed (31.69%) followed by students, day laborers & cultivators. Hangings (54.01%) were mostly encountered followed by drowning (23.21%) and throttling (7.14%). Majority of the cases were suicidal (58.48%) followed by homicidal (24.55%) and accidental (16.96%). The main provoking factors in suicidal cases were unemployment (22.13%) followed by failure in examination (20.61%) and domestic violence (12.97%). Hangings were proven to be suicidal. In cases of drowning manner of death could not be given and throttling were homicidal by autopsy.

[Mymensingh Med J 2024 Oct; 33 (4): 1097-1106]

Key words: Asphyxial death, Medicolegal autopsy, Hanging, Drowning, Throttling, Suicide, Homicide

Introduction

Suboxia or Anoxia or Anoxaemia - all these words are synonymous linguistically¹. Even so the term 'Asphyxia' is well trusted from forensic point of view². The word 'asphyxia' is reported to have been arisen in the early 18th century³. Actually this word is derived from the Greek word 'Asphuxia' - in which 'a' stands for 'absence' and 'sphuxis' denotes 'pulse'⁴. Thus, it is meant by pulselessness⁵. But from forensic point of view, it means interference with oxygenation⁶. Definition of asphyxia was stated by Adelson as a state in the living organism where there is terrible deficiency of oxygen available for cell metabolism along with failure of the body to remove excess of carbon dioxide⁷. However, the term mechanical asphyxia is applied to the conditions where there is mechanical trespassing either- a) retards access of air into the lungs, or b) decreases blood supply to the head-neck region or c) leads to sudden cardiac arrest from hyperstimulation of the carotid sinus-vagal reflex mechanism⁸. Mechanical asphyxia is broadly classified as hanging, strangulation, drowning and suffocation. While, the strangulation is again sub-classified as the ligature strangulation, manual strangulation (throttling), mugging, garroting and bansdola; yet again, suffocation is sub-divided into smothering, choking, gagging, overlying,

burking and traumatic asphyxia⁹. Asphyxial death occurs by failure of the cells to gain oxygen. This oxygen deprivation is of two types namely hypoxia (partial deprivation) and anoxia (complete deprivation)¹⁰. Principal signs of asphyxia comprise of cyanosis, petechial haemorrhage, visceral congestion and fluidity of blood¹¹. Death is supposed to take place owing to asphyxia when respiration ends first and eventually promotes the failure of other two important systems of the body namely cardiovascular and nervous systems¹². Thus, asphyxia is regarded as one of the modes of death¹³. Asphyxial death gives rise to unnatural manners namely suicide, homicide and accident¹⁴.

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Hanging, ligature strangulation; throttling, drowning, smothering and traumatic asphyxia is often come across by forensic pathologists during autopsy. In the midst of these, cases of hanging are mostly encountered and considered to be the mostly chosen means to commit suicide¹⁵. By definition hanging is a separate type of mechanical asphyxia where force of constriction is being the weight of the whole or part of the body¹⁶. Hanging accounts for about 2000 deaths each year, reported in England and Wales, accordingly regarded as the most common method to commit suicide^{17,18}. In consonance with Australian Bureau of Statistics, the mostly chosen way of committing suicide in 2006 was hanging (57.8%) followed by poisoning (9.8%) and firearm injury (8.0%)¹⁹. A report from the United States of America stated that among 92.3% cases of suicidal death hanging was on top of the list^{20,21}. Hanging was considered to be the second most common suicidal method as stated in a report published from Canada²². In strangulation the constriction force is other than the weight of the body²³. The force of constriction may be exerted by different ways like a ligature (ligature strangulation), palm of the hands (throttling), bamboos (bansdola), elbow/knee (mugging) and between sticks (garroting)²⁴. From forensic point of view, strangulation is invariably considered as a means of murder²⁵. Suicidal strangulation is extremely rare²⁶. It may be accidental when members of law enforcing authority use choke holds for controlling the suspects²⁷. Strangulation accounts for 2.5% of all traumatic deaths around the world²⁸. Drowning is a form of violent asphyxia in which atmospheric air is prevented from entering the respiratory passages due to submersion into water or any other fluid media²⁹. Fresh and salt water drowning are two main varieties of drowning depending on the water where the victim is actually submersed. Other types of drowning include dry drowning, near drowning, immersion syndrome etc³⁰. Bangladesh is a riverine country, and this land is adorned with abundant number of lakes, ponds, wells and a large seashore. In 2010, World Health Organization conducted a study on global burden of disease which stated that global mortality due to drowning was approximated to be 7.0% of all

deaths. They evaluated that the yearly global incidence of death due to drowning to be 4,00,000³¹. Another study conducted by W.H.O. in 2017, which stated drowning to be the 3rd leading cause of unintended injury deaths around the world counting up to 360,000 deaths per year³². Another form of violent asphyxia is traumatic asphyxia or crush asphyxia which is caused due to mechanical fixation of the chest wall by external pressure, therefore causing limitation in chest movements during respiration³³. Traumatic asphyxia is mostly considered to be accidental³⁴. Smothering is another variety of violent asphyxia in which entry of air into the lungs is prevented by mechanical closure of air passages which means the nose and the mouth by hands, clothes or any other materials³⁵. If a soft cloth or a pillow is used for this purpose, autopsy findings may often be missed. Proper crime scene investigation and a meticulous autopsy examination can figure out this problem and thus may prevent any benefit of doubt and help the court in the administration of justice³⁶. Comprehensive studies on asphyxial death are seldom found to be conducted in a country like Bangladesh which might cover all varieties of violent asphyxia. Therefore, this study aimed to approximate the frequency of asphyxial deaths at Dhaka Medical College Mortuary from forensic point of view. The study was conducted with a view to evaluate the magnitude of asphyxial deaths in contrast to other causes of unnatural death. Aim of the study was to determine the socio-demographic pattern of the victims of asphyxial death and ascertain the medicolegal aspects in death due to asphyxia.

Methods

This cross-sectional variety of descriptive study was conducted for a period of 2 years from 1st January 2018 to 31st December 2019 at the Department of Forensic Medicine of Dhaka Medical College, Bangladesh. This study revealed a total of 224 cases of asphyxial death in the judgmental sampling in middle of 2199 medicolegal autopsies performed during that study period. A predesigned proforma was made and findings were noted down in different tables.

Original Contribution

Epidemiological figures including age, gender, religion, marital status, professional status, dwelling place and family history- all were accumulated from police inquest report. Subsequently, these variables were assembled and analyzed carefully to complete the study.

Results

Table I shows that in 2018 there were 1068 medicolegal autopsies amongst which 98 cases (9.17%) were of asphyxial death and in 2019 there were 126 cases (11.14%) of asphyxial death of the total 1131 autopsies. In total 224 cases of asphyxial death were encountered at Dhaka Medical College Mortuary out of the total 2199 medicolegal autopsies conducted during the study period of 2 years.

Table I: Yearly reported cases of asphyxial death

Year	Total number of autopsy conducted (N)	Frequency of cases of asphyxial death (n)	Percentage (%)
2018	1068	098	09.17
2019	1131	126	11.14
Total	2199	224	10.18

Table II shows males (139 cases 62.05%) outnumbered the females (85 cases 37.94%) of the total 224 cases of asphyxial death. There were no cases of transgender in the study.

Table II: Gender-wise frequency of cases of asphyxial death (n=224)

Gender	Frequency (n)	Percentage (%)
Male	139	62.05
Female	85	37.94
Transgender	00	00.00
Total	224	100.0

Table III shows that major victims were from the age group 30-39 years (in 79 cases 35.26%) followed by 20-29 years (42 cases 18.75%), 40-49 years (39 cases 17.41%), 10-19 years (31 cases 13.83%), 50-59 years (24 cases/10.71%), >60 years (7 cases 3.12%) and 0-9 years in 2 cases comprising 0.89% of the total.

Table III: Age-wise frequency of cases of asphyxial death (n=224)

Age in years	Number of cases of violent asphyxial death (n)	Percentage (%)
0-9	02	00.89
10-19	31	13.83
20-29	42	18.75
30-39	79	35.26
40-49	39	17.41
50-59	24	10.71
>60	07	03.12
Total	224	100.0

Table IV exhibits among 139 male victims there were 73(52.51%) married, 64(46.04%) unmarried and 2(1.43%) unknown. On the other hand, there were 47(55.29%) married, 37(43.52%) unmarried and 1(1.17%) unknown victims of the total 85 female victims. In total there were 120(53.57%) married, 101(45.08%) unmarried and 3(1.33%) unknown victims of the total 224 cases of asphyxial death.

Table IV: Frequency of cases of asphyxial death according to marital status (n=224)

Marital status	Male		Female		Total	
	n	%	n	%	n	%
Married	73	52.51	47	55.29	120	53.57
Unmarried	64	46.04	37	43.52	101	45.08
Unknown	02	01.43	01	01.17	003	01.33
Total	139	100.0	85	100.0	224	100.0

Figure 1 shows that there were 86 victims (38.39%) from urban, 69(30.80%) from the rural, 66(29.46%) from the suburban areas (areas in between the urban and rural) and in 3(1.33%) unknown cases dwelling places could not be known.

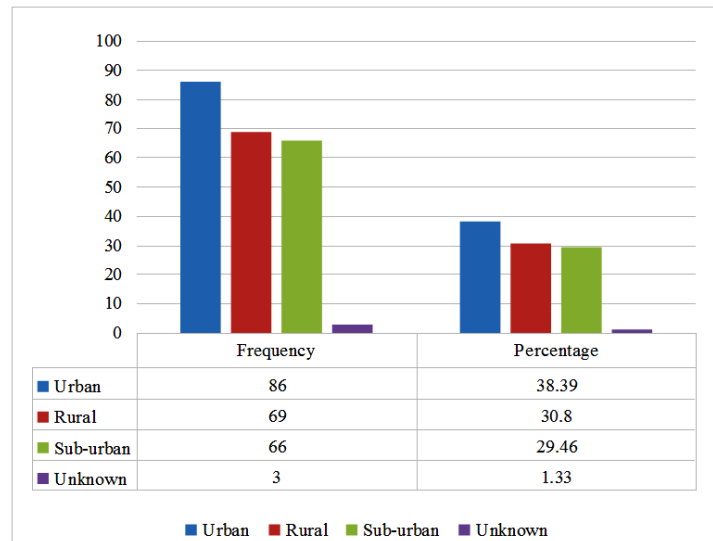


Figure 1: Frequency of cases based on dwelling places (n=224)

Figure 2 indicates that the predominance of the Muslim victims (172 cases 76.78%) followed by the Hindus (39 cases 17.41%), the Christians (6 cases 2.67%), the Buddhists (4 cases 1.78%) and 3 unknown victims whose religion could not be determined.

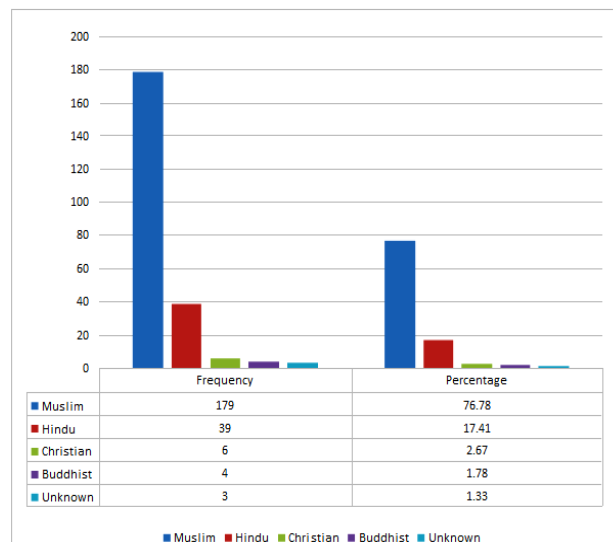


Figure 2: Frequency of cases on the basis of religion (n=224)

Original Contribution

Table V shows that unemployed victim (71 cases 31.69%) tops the list followed by 38 students (16.96%), 29 day laborers (12.94%), 22 cultivators (9.82%), 20 housewives (8.92%), 19 businessmen (8.48%), 16 service holders (7.14%), 6 retired persons (2.67%). In 3 victims occupational status could not be known.

Table V: Distribution of cases based on occupation (n=224)

Occupation	Frequency (n)	Percentage (%)
Unemployed	71	31.69
Students	38	16.96
Day Laborer	29	12.94
Cultivators	22	09.82
Housewives	20	08.92
Businessmen	19	08.48
Service Holders	16	07.14
Retired Persons	06	02.67
Unknown	03	01.33
Total	224	100.0

Table VI shows that maximum cases (121 cases 54.01%) were of hanging followed by 52 cases of drowning (23.21%), 16 cases of throttling (7.14%), 13 cases of traumatic asphyxia (5.80%), 12 cases of ligature strangulation (5.35%), 10 cases of smothering comprising 4.46% of the total 224 cases of asphyxial death.

Table VI: Frequency of cases of asphyxia based on the type of violent asphyxial death (n=224)

Type of death	Frequency (n)	Percentage (%)
Hanging	121	54.01
Drowning	52	23.21
Throttling	16	07.14
Traumatic Asphyxia	13	05.80
Ligature Strangulation	12	05.35
Smothering	10	04.46
Total	224	100.0

Figure 3 depicts that suicidal cases (131 cases 58.48%) were on top of the list followed by 55 homicidal cases (24.55%) and 38 accidental cases accounting for 16.96% of the total. In cases of drowning, manner of death could not be ascertained by autopsy.

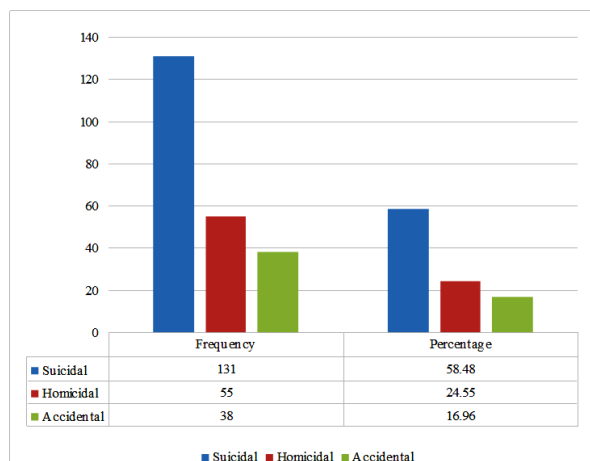


Figure 3: Manner of death in asphyxia cases (n=224)

Table VII shows that among 131 cases of suicide unemployment (29 cases 22.13%) was on top followed by failure in the examination (27 cases 20.61%), family quarrel (17 cases 12.97%), failure in love (15 cases 11.45%), failure in business [(14 cases 10(68.0%)], poverty (12 cases 9.16%), mental depression (10 cases 7.63%) and loss of job in 7 cases accounting for 5.34% of the total.

Table VII: Provoking factors in total suicidal cases of asphyxia

Provoking Factors	Frequency	Percentage (%)
Unemployment	29	22.13
Failure in Examination	27	20.61
Family Quarrel	17	12.97
Failure in love	15	11.45
Failure in business	14	10.68
Poverty	12	9.16
Mental depression	10	7.63
Loss of job	7	5.34
Total	131	100

Discussion

In 2018 and 2019 there were 1068 and 1131 medicolegal autopsies performed respectively, in the midst of which there were 98(9.17%) and 126(11.14%) cases of asphyxial death respectively which undoubtedly signifies a yearly steady rise in the frequency of asphyxial cases. In this study, there were 224 cases of asphyxial death comprising 10.18% of the total 2199 medicolegal autopsies done at Dhaka Medical College Mortuary. Almost similar findings were seen by Prakash GV et al.³⁷ (11.54%), Ajaykumar S et al.³⁸ (10.5%), Murty OP et al.³⁹ (10.0%) and Tirmizi SZ et al.⁴⁰ (7.08%). Higher incidences of asphyxial death were observed in the studies done by Reddy SP et al.⁴¹ (19.7%) and Azmac D et al.⁴² (15.7%). While lower incidences were observed in the studies done by Sharma et al.⁴³ (5.0%), Amandeep et al.⁴⁴ (5.26%), Patel A et al.⁴⁵ (5.63%) and Mariam A et al.⁴⁶ (5.9%). Gender variation of the cases of asphyxial death. This study reveals male (139 cases 62.05%) predominance over the females (85 cases 37.94%). Almost similar pictures were observed in other studies conducted by Vadgama DK et al.⁴⁷ (males- 64.0% and females- 36.0%), Ahmed et al.⁴⁸ (males- 61.9% and females- 38.1%), Chaurasia N et al.⁴⁹ (males- 60.89% and females- 39.11%) and Akber EB et al.⁵⁰ (males- 54.07% and females- 45.92%). Higher level of male percentage was observed in another study conducted in Turkey where there were 79.8%

male victims and 20.2% female victims⁵¹. Similar pictures were also observed in other studies^{52,53,54}. On the other hand, Murthy VK et al.⁵⁵ revealed almost the same frequency observed in males (26 cases 48.2%) and females (28 cases 51.8%). The maximum victims were from the age group 30-39 years (in 79 cases 35.26%) followed by 20-29 years (42 cases 18.75%), 40-49 years (39 cases 17.41%), 10-19 years (31 cases 13.83%), 50-60 years (24 cases 10.71%), >60 years (7 cases 3.12%) and 0-9 years in 2 cases accounting for 0.89% of the total. Other studies such as Ghadge et al.⁵⁶ and Arora S et al.⁵⁷ showed almost the similar findings. There were 73(52.51%) married, 64(46.04%) unmarried and 2(1.43%) unknown victims in the midst of 139 male victims. While, there were 47(55.29%) married, 37(43.52%) unmarried and 1(1.17%) unknown among the total 85 female victims. In this study, there were in total 120(53.57%) married, 101(45.08%) unmarried and 3(1.33%) unknown victims for both genders among the total 224 cases of asphyxial death. Waghmare PB et al.⁵⁸ showed 68.33% married and 25.0% unmarried victims. Depicts that majority of the victims were from urban areas (86 victims 38.39%) followed by 69(30.80%) from the rural, 66(29.46%) from the sub-urban areas and 3(1.33%) unknown victims. Almost similar findings were observed in other studies such as Chauhan S et al.⁵⁹ (urban- 70.2%, suburban- 19.85% and rural- 9.89%) and Rawat V et al.⁶⁰ (urban- 72.28% and rural- 27.72%).

Studies showing contradictory observations include Singh A et al.⁶¹ (rural- 51.6% and urban-48.4%) and Santosh CS et al.⁶² (rural- 51.14% and urban- 44.86%). Most of the victims were the Muslim (172 cases 76.78%) followed by the Hindu (39 cases 17.41%), the Christians (6 cases 2.67%), the Buddhist (4 cases 1.78%) and 3 unknown victims whose religion could not be revealed. Similar study revealed completely dissimilar pictures such as Mohanty S et al.⁶³ which showed 93.5% Hindu victims. The occupation of the victims were 71(31.69%) unemployed and top of the list followed by 38(16.96%) students, 29(12.94%) day laborers, 22(9.82%) cultivators, 20(8.92%) housewives, 19(8.48%) businessmen, 16(7.14%) service holders, 6(2.67%) retired persons and 3 unknown victims whose occupational status could not be ascertained. Similarly Majumdar BC et al.⁶⁴ revealed 25.8% students, 21.3% farmers and 11.3% service holders. Most of the cases were of hanging (121 cases 54.01%) followed by 52 cases of drowning (23.21%), 16 cases of throttling (7.14%), 13 cases of traumatic asphyxia (5.80%), 12 cases of ligature strangulation (5.35%) and 10 cases of smothering (4.46%) among 224 cases of asphyxial death. Singh B et al.⁶⁵ revealed 60.27% hanging followed by drowning (19.63%) and ligature strangulation (14.61%). Gurudut et al.⁶⁶ and Khalil et al.⁶⁷ also revealed the same picture. Tmka J et al.⁶⁸ contradicted with these findings. Exhibits 131 cases (58.48%) of suicide followed by 55 homicides (24.55%) and 38 cases of accident comprising 16.96% of the total in relation to manner of death. Copeland AR et al.⁶⁹ and Auer A et al.⁷⁰ showed almost the similar pictures. Shows unemployment (in 29 cases 22.13%) was the prime provoking factor in the midst of 131 suicidal cases. Other factors include failure in examination in 27 cases (20.61%), family quarrel in 17 cases (12.97%), failure in love in 15 cases (11.45%), failure in business in 14 cases (10.68%), poverty in 12 cases (9.16%), mental depression in 10 cases (7.63%) and loss of job in 7 cases comprising 5.34% of the total. Udhaya B et al.⁷¹ revealed marital disharmony with spouse in 52.25% cases and mental depression in 23.87% cases were the main provoking factors to commit suicide. Rai RK et al.⁷² showed that 40.0% cases of suicide were due to marital disharmony, extramarital relationship and bothersome love experience. Srivastava AK et al.⁷³ revealed family

discord, unemployment and poverty - all were equally connected in 23.33% cases. Chronic painful diseases and mental unsoundness were found to have connection with suicide in 13.33% cases.

Conclusion

Cases of asphyxial death are mystifying and it is almost always very much challenging on the part of a forensic pathologist to determine the manner and mode of death even in the advancement of forensic science now-a-days. Major analytical data regarding the legal events of a specific territory are usually delivered through medicolegal autopsy and it is never an easy task. Violent asphyxia accounts for significant number of deaths annually (approximately 10.0%) around the globe. This study concluded that, hanging and drowning were chiefly come across in the midst of all cases of asphyxial death. Hanging was a proven means to commit suicide mostly affecting the people of young aged group. Scarcity of jobs, poverty, family discords, mental depression, failure in business, love and examination were the main reasons behind committing suicides. Family discussion, sharing facts with friends, family members and colleagues, prayer and meditation on the regular basis could be the effective ways to get rid of mental stresses of life. Moreover, emotionally unstable people with suicidal tendency need consultations from psychiatrists and clinical psychologists to prevent suicides. Job scarcity and poverty are bigger problems and thus difficult to solve overnight in a country like Bangladesh. Cases of drowning were mostly accidental. Unawareness and heavy rushes in the boats and launches during major festivals are identified causes of accidental drowning. Beside these, Bangladesh is known to be the land of natural calamities like flood, cyclone, tidal bore etc. due to the effect of global warming are also responsible for accidental drowning each year. Mass media has due responsibilities to raise awareness among common people. And of course, the water transport authority also has a significant role to monitor the overloaded and careless passenger carriage particularly during festivals with a view to minimize the events of accidental drowning in the future. Strangulation is a common method of murder after stab injury and firearm injury in Bangladesh like other countries of the world.

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