

# A Study of Asphyxial Deaths

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## Abstract

An increasing death rate as a result of violence constitutes a large group in medicolegal autopsies. Specially, deaths due to asphyxia are one of the most important causes in violence deaths.

During the 5-year period from January 2013 to October 2018, there were 134 asphyxial deaths autopsied by the Department of Forensic Medicine, ACSR Government Medical College, Nellore. Asphyxial deaths comprise 15.7% of all forensic autopsies; 20.8% of the cases are aged between 30 and 39 years, and the average age was 41.9 years. Males constitute 79.8% of all the cases.

The most frequent method of asphyxiation death is hanging (56 cases, 61.8%), followed by drowning (32.6%) and More violent methods, such as ligature or manual strangulations, constitute 3.1% and 2.5% of all asphyxial deaths, respectively. Although it was varying according to the methods of asphyxiation, suicide was found to be the manner of death in the majority of the cases.

**Keywords:** *method of asphyxiation, manner of death, cause of death, autopsy*

Asphyxial death is a common incident in forensic practice, and determination of the manner of death is very important. The manners of death can be accidental, suicidal, homicidal, or natural due to main methods of asphyxia. In such deaths, autopsy plays a major role to solve the case; the scene investigation and collection of samples are also of importance.<sup>1</sup>

Asphyxial deaths are divided into different methods, such as strangulations (hanging, manual, ligature), suffocations (environmental, smothering, choking, mechanical, suf-focating gases), chemical asphyxia (carbon monoxide CO, hydrogen cyanide, hydrogen sulfide), and drownings.<sup>1</sup> Additionally, in some cases, the victim dies as a result of the combination of different mechanisms of asphyxia. A case study from Romania<sup>2</sup> indicates that a victim was killed by 3 different mechanisms of asphyxia: smothering with the hand, manual strangulation<sup>3</sup> with the other hand, and traumatic asphyxia by thoracic compression with the knees.

Autoerotic asphyxial deaths, positional asphyxial deaths, and neck holds are some other reported unusual forms of asphyxial deaths in forensic practice.

## Materials and Method

This study is based on a retrospective investigation of asphyxial deaths that were autopsied by the Department of Forensic Medicine, ACSR Government Medical College, Nellore. In the period between January 2013 and January 2018, 4250 autopsies were performed all are of medicolegal autopsies.

## Results

### General Findings

During the period of 5 years, between January 2013 and January 2018, 4250 autopsies were performed; 852 (70.6%) of those 1206 cases were forensic cases. For the study group, 134 (15.7%) cases of asphyxial deaths were separated from all forensic autopsy records.

In this group, there were 107 males (79.8%) and 27 females (20.2%). The ratio of male to female was found to be 3.9:1.

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The ages of the cases in this study include children from day 6 after birth to adults aged 97 years. The mean age of the cases is 41.9 years. The age group of 30 –39 years accounts for 20.8% of the cases, followed by those 20 –29 years (19.4%) and 40 – 49 years (14.1%); 53.2% of the cases constitute the age group of 20 – 49 years .

Table 1 shows the detailed distribution of the cases according to the methods of asphyxiation, the manners of deaths, and gender. In the study period between 2013 and 2018.

**Methods of Asphyxiation in Detail Hanging Deaths**

In this study, the most common method of asphyxiation was hanging<sup>2</sup> (56 cases, 41.8%); 83.9% of those cases were male. The age ranged from 14 to 97 years, with a mean of 41.6 years. Most of the cases were in the age group of 25–30 years.. According to STA, Alcohol was detected in 5 cases (8.9%), plasma con-centration being between 29 mg/dL and 93 mg/dL. There was

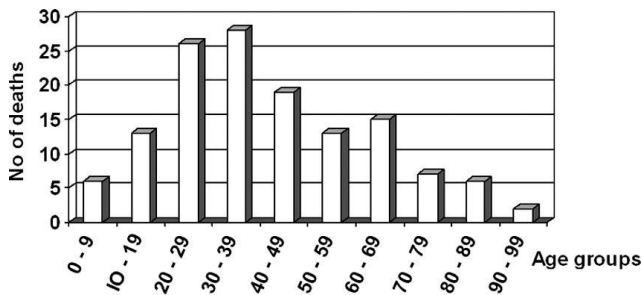


FIGURE 1. Age distribution of asphyxia-related deaths.

No evidence of violence occurring before the cases hanged themselves. Only 2 cases had small bruises. Seventy-six percent of the cases hanged themselves indoors, mostly at home.

In the records, a ligature mark on the neck was well described for all cases, and the knot of the loops was found to be tightly placed under the chin in 85.7% (n 48) of the cases. In 37 of 56 cases (66%), the suspension point was occipitally, 14 of 56 cases were laterally (right, left), and 5 of 56 cases were frontally localized. In these series, 26 of 56 victims (46.4%) had hyoid bone fractures, 10 of 56 victims (17.8%) had thyroid cartilage fractures, and 7 of 56 cases

(12.5%) had both hyoid bone and thyroid cartilage fractures. Gross bleeding in the neck muscles and other soft tissues was seen in 51.7% of the cases (n 29). Fifty-

four victims were found to be suspended freely, and the remaining 2 were incompletely suspended. All of the cases accepted suicide, according to the knowledge of the scene investigation files and autopsies.

**Drowning Deaths**

The second largest method of asphyxiation was drowning (41 cases, 30.5%); 90.2% of the cases were male. The age ranged from 6 to 94 years, with a mean of 42.7 years. Most of the deaths occurred in the summer months. STA was performed on only 8 cases, and Alcohol<sup>4</sup> was detected in 2 cases, plasma concentration being 196 mg/dL and 242 mg/dL.

Of 41 cases, 30 cases (73.1%) were found in the river, 5 cases (12.1%) in the sea, 3 cases (7.3%) in a well, 2 cases in a dam, and 1 case in a small ditch.

The distributions according to the manner of death show that accidents accounted for 78.1% (n 32) of all cases, suicides such as jumping from a bridge to the river accounted for 17.1% (n 7), and homicidal cases accounted for 4.8%. Of the 32 accidental drowning cases, Autopsy and prosecution findings indicate that the perpetrators applied severe blunt force to the decedents, who then inhaled water in one case from a river and from the sea in another. In these 2 cases, the death was attributed to the combined effects of drowning and severe blunt-force injuries.

**Ligature Strangulation Deaths**

In this category, there were 4 cases (3.1%), 3 of which were females. The age ranged from 1.5 to 58 years. Fifty percent of the cases were homicide, and 1 of the female case had vaginal sexual assault<sup>6</sup>. Intravaginal swab samples were positive for the presence of spermatozoa by microscopic examination, and there were acute injuries involving hymenal tears and bruises.

**Manual Strangulation Deaths**

During a 21-year period, there were only 3 manual strangulation deaths, 2 of which were females. One male case had severe body trauma that was antemortem. The manner of death was homicide in all cases. Table 6 shows the descriptions of manual strangulation deaths in detail.

**Choking and Aspiration Deaths**

There were 4 cases (2.5%) in this category. The age ranged from 5 days after birth to the age of 36 years.

Three of them were male. One case, known as an epilepsy patient, died of aspiration of gastric contents during an epilepsy attack. The other case, a baby 5 days old, died of aspiration of milk while suckling. The manner of death is accident in all cases. Table 4 shows the descriptions of choking deaths in detail and aspirated materials.

### **Discussion**

Asphyxial deaths are caused by the failure of cells to receive and/or use oxygen. Brain is most sensitive to oxygen deprivation, and it is the organ mostly affected in all types of asphyxial deaths. However, cardiac function usually continues for several minutes after respiratory arrest.

Autopsy plays an important role for the investigation, and the collection of samples is of value in the reconstruction of the cases.

In Table 1, the methods of asphyxiation and the manners of death are shown in detail. In this region, hanging is the most common method of asphyxiation (41.8%), followed by drowning (30.5%), CO poisoning (8.2%), and compressive asphyxia (5.3%). The other rare methods are environmental suffocation<sup>5</sup>(forced depletion of oxygen), choking and aspiration of gastric contents, ligature and manual strangulations, and smothering, which constitute 2.3%–3.8% of asphyxial deaths.

The distribution according to manners of death showed that suicides accounted for 47% of asphyxial deaths and accidents 44%, while homicides were 9% of all cases.

### **Conclusion**

Asphyxial deaths constitute 15.7% of all forensic autopsies in the total autopsies. It has been the fourth or

fifth leading cause of death, changing over the years. Asphyxial death rates in forensic autopsy series from other cities in Nellore were between 6.7% and 14.7%.

Most deaths are hangings are suicidal, being 100% of cases in this study. There is only 1 case defined as an adolescent suicide at the age of 14 years, who hanged himself at home.

Accidental hangings are uncommon and constitute nearly 5% of all hangings. Deaths due to accidental hanging. Around 5% cases are strangulation and remaining are 0 to 1% prevalent.

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**Conflict of Interest -** Nil

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