

Deaths due to Suffocation: A Comprehensive Study

B. Lakshmi Prasanna*, **Bharath Kumar Reddy****, **D. Sridhar*****, **Nishat Ahmed Sheikh******

Abstract

Background: Suffocation is a general term that encompasses several forms of asphyxia either from lack of gas in the breathable environment, or from obstruction of the external airways (smothering) or the internal airways (choking), or from a pressure on the chest or abdomen or a body position restricting respiratory movement (traumatic and positional asphyxia, respectively). *Study Design:* It's a cross sectional prospective study. *Place of Study:* Mortuary of Osmania general hospital, Hyderabad. *Duration of Study:* 2-year study period 2013-2015. *Material and Method:* out of 9812 autopsies conducted at mortuary of Osmania General Hospital, during two year period 46 cases of suffocations were identified and autopsy was done. *Observation and Discussion:* The most common cause of suffocation is smothering comprising about 39% of the study sample. i.e. 18 cases followed by traumatic and/or positional asphyxia (26%). The least common cause in the study sample is autoerotic asphyxia. Most of the accidental suffocation deaths are associated with alcohol intoxication comprising almost 56.25% of cases, whereas majority of victims of homicidal suffocation deaths are non-alcoholic. Choking as a cause of sudden death has been recognized and well documented since the time of Hippocrates [11] and it is mostly accidental. The chances of choking are higher if the subject is under the influence of alcohol (cafe coronary) as supported by Hangen RK. *Conclusion:* The percentage of suffocation deaths in relation to the total Post Mortem Examination is miniscule i.e. 0.5%, but still it is one of the most important cause of death in terms of its complex mechanism. Suffocation deaths cannot be attributed to a single entity but to a spectrum of smothering, choking, traumatic/positional asphyxia, entrapment/environmental types of deaths. Further studies on different populations are required, particularly to obtain evidence-based data to support our common body of knowledge and assess the discrepancies with the textbook literature.

Keywords: Asphyxia; Suffocation; Alcohol Intoxication.

Introduction

Suffocation is a type of asphyxial death upon which authors in different textbooks differ in definition and classification. Suffocation is a general term used to indicate death from deprivation of oxygen, either from

lack of gas in the breathable environment or from obstruction of the external air passages [1,2].

Suffocation simply stated is deprivation of oxygen in breathable environment. It apparently looks simple, but is one of the most complex causes of death. It perplexes and is a challenge even to forensic medicine expert to come to an accurate diagnosis. Not only is the diagnosis of suffocation deaths very difficult, owing to very minimal findings but also the nature of death in these cases is very complicated and tricky [2,3].

Suffocation deaths can pose considerable difficulties for the Forensic expert to distinguish between accident, suicide and homicide because in many situations, it leaves no specific findings supporting the diagnosis of manner, which mostly relies on the circumstantial evidence or sometimes

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on eyewitness. A clear-cut history is the key to understand suffocation deaths. This will not only help in easing a conclusion at autopsy but also throws a light on preventing them [4].

Suffocation is a general term that encompasses several forms of asphyxia either from lack of gas in the breathable environment, or from obstruction of the external airways (smothering) or the internal airways (choking), or from a pressure on the chest or abdomen or a body position restricting respiratory movement (traumatic and positional asphyxia, respectively) [1,2]. Suffocation from lack of oxygen in the breathable environment can be encountered by re breathing in an air-tight or relatively airtight enclosure (entrapment suffocation), by low atmospheric oxygen in unusual environments (environmental suffocation) or, more commonly, by physical displacement of oxygen by other gases or by chemical changes such as combustion [1,2].

Death from accidental suffocation was considered as any unintentional death reported to Eurostat with an underlying cause of death coded W75 to W84 (Table 1) in the 10th revision of ICD (ICD-10).

Mostly the studies of suffocation deaths were limited to a specific type in the form of case reports, case series and included specific studies such as lethal crush D traumatic asphyxia, suffocation in motor vehicle collisions, fatal entrapments in grain storage bins, café coronary deaths and suffocation by plastic bags. The objective of this paper is to make an analysis of etiology of suffocation deaths, to assess the circumstances leading to suffocation death and to study the mechanism of asphyxia in different types of suffocation deaths. In the present study, the postmortem findings are explained in three categories i.e. external findings, internal findings and petechial hemorrhages.

Materials & Methods

The forensic medicine department of the Osmania general hospital covers over 50,00,000 population of Hyderabad city. It's a cross sectional prospective study. All cases with suffocation as cause of death and of age more than one year, during the study period of two years were analyzed. For each case, the type of suffocation, manner of death, gender, age etc., were studied. During the 2-year study period 2013-2015, a total of 46 suffocation deaths were autopsied in our forensic medicine department. Total 9812 autopsies were conducted in that duration out of those 46 cases was due to suffocation.

All the cases for study were meticulously examined externally and internally at autopsy. Data were collected from relatives, accompanying persons, eyewitnesses, investigating officer and inquest reports. The chemical analysis for alcohol and toxicological reports were incorporated. Scene of Offences were visited. Suffocation associated with other types of major fatal injuries were excluded along with infants as in infant death, it is considered as SIDS rather than death due to any form of suffocation and it is quite impossible for autopsy surgeons to differentiate the two entities and stamp it as an absolute case of suffocation death.

Statistical Analysis

The collected data were analyzed using SPSS version 18 (SPSS Inc., Chicago)

Exclusion Criterion

Deaths due to respiratory tract involvement but not suffocation, below one year infants, inadequate information, and obscure findings from autopsy were excluded from the study.

Observations and Discussion

Analysis of study sample based on data collected suggested that majority of the study sample comprises of male sex of about 67% (31 cases). Males form majority of study sample irrespective of the type of suffocation. Strong male predominance was also observed (M: F=1.47:1), consistent with the study from Canada and India [6,8]. In Turkey, male preponderance was reported in deaths due to asphyxia [9]. The cause may be due to industrial exposure, alcoholism and outdoor activity being more in males. Overall, a strong male predominance was observed, with two-thirds of the victims being men. Males form majority of study sample irrespective of the type of suffocation.

The major age group of deaths due to suffocation is 4th decade of life involving about 1/3 rd of cases, while the least common age group being more than 60 years of age. The minimum age seen in the study sample is 6years and the upper age is 65.

In our study majority of the cases were from lower socioeconomic status and it includes male predominance.

The most common cause of suffocation is smothering comprising about 39% of the study

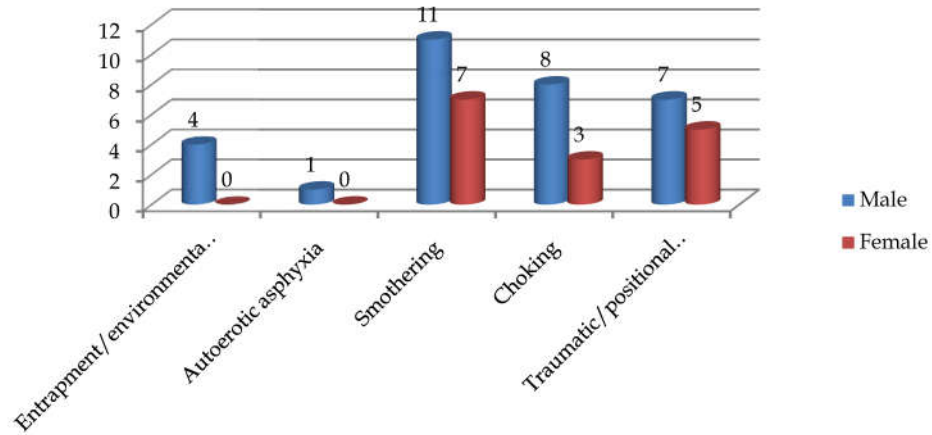


Fig. 1: Distribution of study sample based on type of suffocation and sex

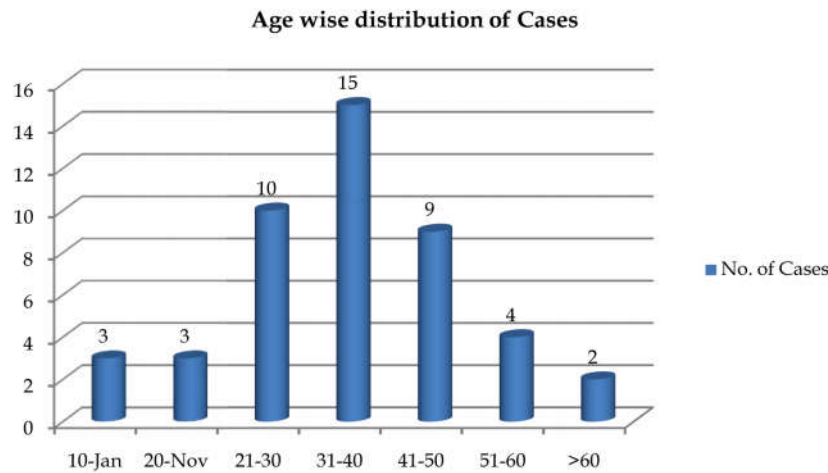


Fig. 2: Age wise distribution of study sample

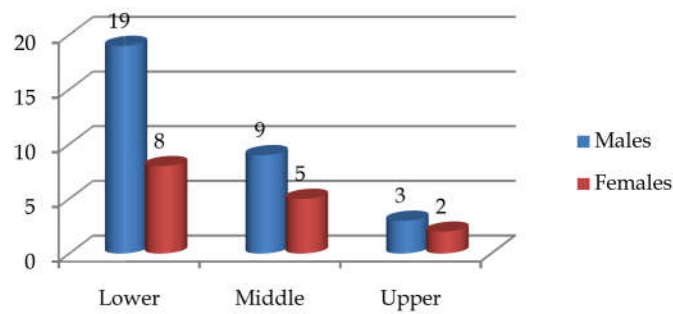


Fig. 3: Distribution of study sample based on socioeconomic status and gender

sample. i.e. 18 cases followed by traumatic and/or positional asphyxia (26%). The least common cause in the study sample is autoerotic asphyxia. Smothering is more often encountered in a homicidal context (66%). This is in contrast to western scenario where smothering is more commonly suicidal (with plastic bag tied around face and neck). All traumatic, environmental, positional asphyxial deaths and majority of choking and two smothering deaths were

accidental in nature, similar to the study from Canada [6,7].

Taken as a whole, manner of death in suffocation is generally ruled as accidental (70%). In fact, all entrapment/environmental suffocations and traumatic/positional asphyxia deaths were accidental, so is the case with majority of choking deaths (91%). Smothering, in contrast, is more often encountered in a homicidal context (66%). Most of

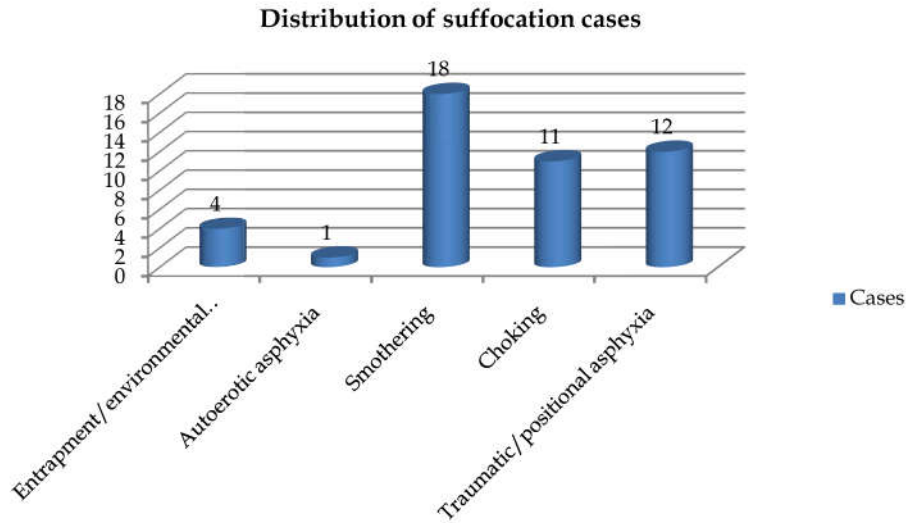


Fig. 4: Distribution of suffocation cases in study sample

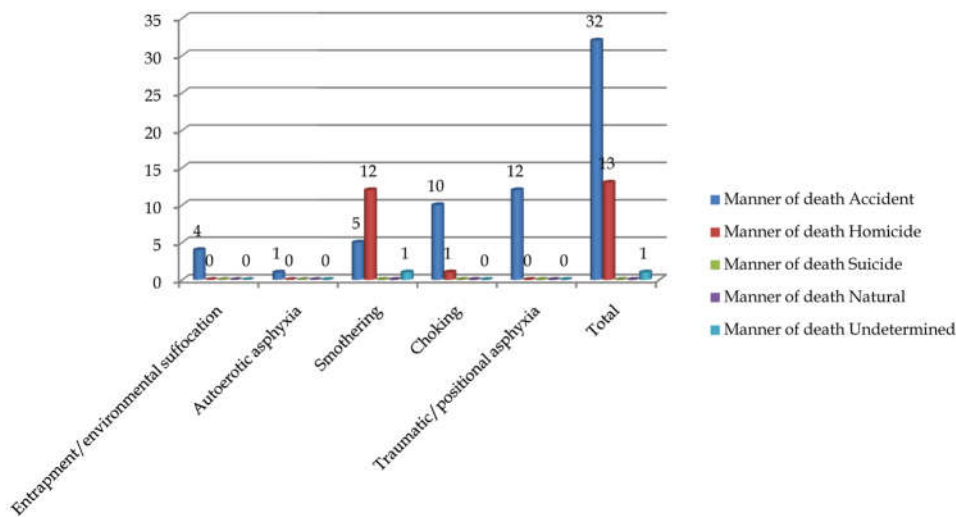


Fig. 5: Distribution of study sample based on type of suffocation and manner of death

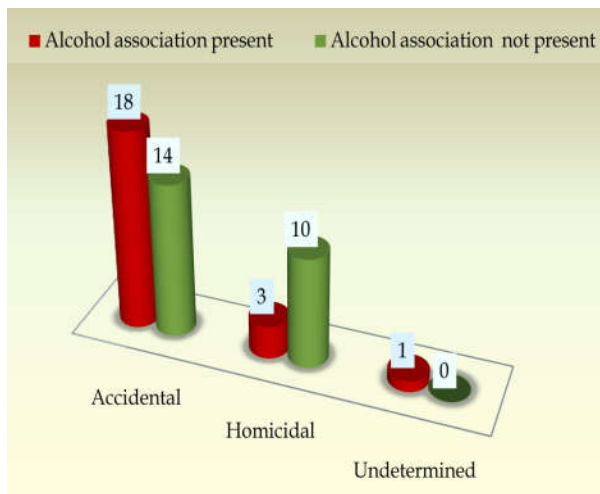


Fig. 6: Alcohol association in relation to Manner of death

the smothering was homicidal (83.33%) in nature but in contrast, Boghossian E et al, observed smothering in a suicidal context (58.62%). Choking as a cause of sudden death has been recognized and well documented since the time of Hippocrates [11] and it is mostly accidental.

Alcohol association is found in choking type of suffocation whereas in other types of suffocation association of alcohol is not significant. Most of the accidental suffocation deaths are associated with alcohol intoxication comprising almost 56.25% of cases, whereas majority of victims of homicidal suffocation deaths are non-alcoholic.

Most of the accidental suffocation deaths are due to traumatic asphyxia grossly related to alcohol intoxication comprising about 37% of total

accidental deaths whereas almost 93% of homicidal suffocation due to smothering are non-alcoholic.

Analysis of study sample indicates that alcohol association is found in choking type of suffocation. Choking as a cause of sudden death has been recognized and well documented since the time of Hippocrates and it is mostly accidental [10,11]. The chances of choking are higher if the subject is under the influence of alcohol (cafe coronary) as supported by Hangen RK [9].

Among the External findings, the most common finding is cyanosis. Among the Internal findings, the most common finding is congestion of internal organs. Petechial hemorrhages are found in external and internal organs. The most common site for Petechial hemorrhages is eyes, followed by brain. The various types of "Suffocation deaths" include Smothering, Choking, entrapment or environmental suffocation, traumatic or positional asphyxia and autoerotic asphyxia.

Over a 9-year period, 30 cases of positional (or postural) asphyxia were identified in the Dade and Broward County (Florida) Medical Examiner Offices⁴. The victims had an average age of 50.6 years with no significant sex or racial differences as compared with the general medical examiner population. Chronic alcoholism or acute alcohol intoxication was a significant risk factor in 75% of cases and these had an average postmortem ethanol concentration of 0.24 g%. The present study also considered the influence of alcohol in the cases that were died due to accidental and homicidal background. The present study also showed that Alcohol association is present in most of the males whereas in females alcohol association is not present in majority of sample. In the present study only one case of Auto erotic asphyxia/sexual asphyxia was found which are significant [3]. In rest of the cases there is no such particular history is found.

Limitations of the Study

The study was done with a small sample and generalization of result cannot be done. The source of data collection was a Government general hospital where the cases of that particular area were referred for autopsy and hence specification of geographical area cannot be done for comparison.

Conclusion

Medico legal autopsies not only give the cause and manner of death but also give important statistical

data related to legal incidents in the cities and regions where the autopsies are conducted. It is difficult task for forensic experts and scientific community to find out the exact cause of increasing number of unnatural violent asphyxial death.

The percentage of suffocation deaths in relation to the total Post Mortem Examination is miniscule i.e. 0.5%, but still it is one of the most important cause of death in terms of its complex mechanism. Suffocation deaths cannot be attributed to a single entity but to a spectrum of smothering, choking, traumatic/positional asphyxia, entrapment/ environmental types of deaths. Our research study proved that alcohol has played a key role as circumstantial evidence on suffocation deaths; alcohol played a significant role in mainly in deaths due to choking. The person in an inebriated state; be it victim or offender loses control of one's self-consciousness and conscience and may commit a heinous crime or end his valuable life.

The police should be trained to recognize social problems which may lead to violence at home. Strict enforcement of law against sale of alcohol has to be done and awareness about the hazards of alcohol is to be conveyed to the public. Promote gender and social equality through the social and educational policies. Nonviolent methods of arbitration to resolve the conflicts at all levels possible, should be promoted. To prevent industrial deaths, continuous observation on machineries and other protective measures are required. Further studies on different populations are required, particularly to obtain evidence-based data to support our common body of knowledge and assess the discrepancies with the textbook literature.

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Conflict of Interest

The author declares no conflict of interest in the present study

Author Disclosures

Authors have no conflict of interest. This study was a part of departmental research activities of Forensic Medicine at Kamineni Academy of Medical

Sciences and Research Center, Hyderabad.

Ethical Consideration

Clearance from the Institutional Ethical committee was obtained in advance.

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