Original Report

# A Post-Mortem Study on Deaths Due To Mechanical Asphyxia among Autopsies Conducted At Mortuary, Rims Raichur

Abhinandana R[1], Sharanabasavappa S Karaddi[2], Sujit N Jadhav[1]

**Abstract**

Mechanical asphyxial death includes deaths occurring as a result of constriction around neck, blockage of respiratory tract, pressure around chest or inability of respiration due to odd position of body. The present work is a retrospective study of autopsies conducted between year June 2015 to December 2016, with an attempt to know the pattern of asphyxial deaths such as hanging, strangulation, smothering, drowning, throttling etc. at RIMS, Raichur Karnataka. Total 684 autopsy conducted over 18 months period, out of which 47 (6.9%) were mechanical asphyxial deaths.

***Keywords*:** Retrospective, Mechanical Asphyxia, socio-demographic factors



**Introduction:**

With the increase in incidence of crime, the count, variety and issues related to medico-legal deaths has increased tremendously in the recent years. Investigation of medico-legal deaths, as a part of medical issues, requires certain queries to be answered by medical man like manner, cause, and time since death which is only possible when a meticulous autopsy is performed.[1]

As to existing terminology, the word asphyxia enjoys wide usage, especially in the courts - but in everyday speech, the phrase 'an asphyxial death' usually implies one due to mechanical blockage of the air passages. Violent deaths resulting chiefly from asphyxia includes death due to hanging, strangulation, and throttling, smothering, drowning, chocking, gagging, traumatic asphyxia. Violentasphyxial deaths have contributed considerably to unnatural homicidal, suicidal and accidental deaths. [2]

[1]Postgraduate, [2] Associate Professor, Department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur – 584102
Correspondence: Dr. Abhinandana R
Email- sianfmt@outlook.com
Contact- 9611718384

The term asphyxia may be defined as a state in which the body lacks oxygen, because of some mechanical interference with the process of breathing. [3]Bernard Knight text book say that, anything that interferes with oxygen transfer can be called as asphyxia, though other terms such as Hypoxia or Anoxia are more accurate, and should be preferred. [4]In asphyxia there is prevention of exchange of air between the atmosphere and the lungs alveoli and there is lack of oxygen supply to the tissues. Asphyxia may be mechanical, toxic, traumatic or pathological. In mechanical asphyxia the scenario may be constriction around or pressure over the neck, closure of the external respiratory orifices, and occlusion of the respiratory passages from inside or restriction of the respiratory movements caused due to compression over the chest. [5]

The hanging and drowning are commonly seen in suicidal cases, while strangulation including throttling is usually homicidal. In addition, accidental compression or trauma to chest that prevents respiratory movement, which is known as traumatic asphyxia or crush injury, is also one of the causes for violent asphyxial death. [6,7] It has been found

that the number of asphyxia deaths has been increasing continually in our country and asphyxial deaths are more common in middle age group and in those who are lagging behind socio-economically. [8]

In this retrospective study, we are describing the proportion and pattern of asphyxial deaths in our region and related socio-demographic factors. This study would help us to compare the statistics of asphyxial deaths in our region with other cities/study and to discuss the factors which would have influenced the outcome.

**Objective:**

In this study our objective is to find out the prevalence and pattern of asphyxia deaths among autopsies conducted in RIMS Raichur Karnataka, with other relevant socio-demographic factors leading to asphyxia deaths. The study provides epidemiological analysis of autopsy record on asphyxial deaths and different methods used to carry it out.

**Material and Methods:**

This is a retrospective descriptive study, based on analysis of the autopsy record of cases reported to the department of Forensic Medicine and Toxicology, Raichur Institute of Medical Sciences, Raichur, Karnataka form June 2015 to December 2016.

For the study, detailed information about asphyxial death was extracted from the 146 (i) & (ii) forms, inquest reports and post-mortem examination report. The details were entered in performa along with data related to socio-demographic profile and other matters pertaining to asphyxial deaths and were tabulated. Ethical clearance was taken from Institutional Ethic committee prior to the conduct of the study.

**Results & Discussion:**

In our study period (June 2015 to December 2016), a total of 684 cases were subjected to autopsy. Among them 47 cases were related to asphyxial deaths which accounts for 6.9% of all cases autopsied. (Table No. 1) The percentage of asphyxial deaths may vary from place to place depending on various socio-economical and geological factors. In our study asphyxial deaths accounts for 6.9% of all bodies autopsied. Study conducted by Reddy SP et.al. in and around Tumkur region, the asphyxial deaths accounted for 19.14 %,[9] where as it accounts for 5.26% in a study conducted by Singh A et.al in Government medical college Patiala. [10] In the same way in a study conducted by Ajay kumar S et.al in Chitradurga district of Karnataka the asphyxial deaths accounted for 10.50 % of all the bodies autopsied. [11] Whereas study conducted by Tirmizi SZA et.al at Mortuaries at Civil, Jinnah Postgraduate Medical Center and Abbasi-Shaheed Hospital Karachi it was found that prevalence of asphyxial deaths were 7.08%.[12]

**Table No.1: Total number of autopsies done (June 2015 to December 2016)**

| Autopsies done | Number of asphyxial deaths | Percentage |
|---|---|---|
| 684 cases | 47 | 6.9 % |

**Table No.2 Total number of autopsies done (January 2014 to May 2015)**

| Autopsies done | Number of asphyxial deaths | Percentage |
|---|---|---|
| 575 | 35 | 6.1% |

Among asphyxial deaths, the majority of the deceased belong to male sex, with male: female ratio of 2.1: 1. The findings are in line with findings of study conducted by Reddy SP et.al. [9] and Sharma BR et.al.[13] Kulshrestha P et.al in their study states that men have a higher risk of suicide than women. [14]

Ours being a male dominated society and more exposure to competitive and stressful society, asphyxial deaths were commonly seen in males. (Table No.3) Most common age group affected was between 21-30 years.

Since this age group was more active socially, physically, economically and

emotionally, it's quite natural to have more number of asphyxial deaths among these age groups. (Table No.4)

**Table No.3 Total number of asphyxial deaths**

| Asphyxial deaths | Male | Female |
|---|---|---|
| 47 cases | 32 cases (68.08 %) | 15 cases (31.92 %) |

**Table No.4 Age wise distribution of cases**

| Age (Years) | Males | | Females | | Total | |
|---|---|---|---|---|---|---|
| | NO. | % | NO. | % | NO. | % |
| 0-10 | 01 | 3.12 | 00 | 00 | 01 | 2.12 |
| 11-20 | 04 | 12.5 | 03 | 20 | 07 | 14.89 |
| 21-30 | 16 | 50 | 06 | 40 | 22 | 46.80 |
| 31-40 | 07 | 21.87 | 03 | 20 | 10 | 21.27 |
| 41-50 | 03 | 9.37 | 02 | 13.33 | 05 | 10.63 |
| 51-60 | 01 | 3.12 | 01 | 6.66 | 02 | 4.25 |
| 61+ | 00 | 00 | 00 | 00 | 00 | 00 |
| **Total** | **32** | **68.08** | **15** | **31.91** | **47** | **100** |

Out of 47 cases 57.44% deceased were employed and 43.66 % were unemployed. Even though the number of asphyxial deaths were more in employed people, the percentage of asphyxial deaths in unemployed people were also high, which indicates that both employed and unemployed population were exposed to different kind of stress in their daily life. The employed population may be exposed to work place stress like work overload, competition, adjustment problems with working environment etc. In the same manner the unemployed population exposed to pressure of being unemployed and related financial problems. Certain percentages of unemployed population were also involved in antisocial elements. (Table No.5)

**Table No.5 Cases based on employment**

| Total no. of asphyxial deaths | Employed | Unemployed |
|---|---|---|
| 47 | 27 (57.44 %) | 20 (43.66 %) |

Out of 47 cases of asphyxial deaths 65.95 % were married. We observed that married person (65.95 %) more often become victim compared to unmarried (31.91%). The reason could be that the amount of stress and the responsibility carried by the married people in their day to day life is more than the unmarried people, which makes them more vulnerable.

Out of 15 asphyxial deaths in females, 12 (80%) were married, compared to 19 deaths (59.37%) out of 32 asphyxial deaths in married males, the more incidence of asphyxial deaths in females indicates that the married females were more commonly the victims of domestic violence. (Table No.6)

**Table No.6 showing marital status**

| Marital Status | Male | | Female | | Total | |
|---|---|---|---|---|---|---|
| | No. | % | No. | % | No. | % |
| Married | 19 | 59.4 | 12 | 80 | 31 | 65.9 |
| Un Married | 13 | 40.6 | 02 | 13 | 15 | 31.9 |
| Widow | -- | --- | 01 | 6.7 | 01 | 2.12 |
| Total | 32 | 68.1 | 15 | 31.9 | 47 | 100 |

In our study, hanging (46.80%) was the commonest type of asphyxial death followed by drowning (44.68%), which is consistent with the studies by various authors, [4,9,10,15,16,17] hanging was the commonest method used to commit suicide[19] which is found to be more prevalent among males; this was quite similar to the study done by Sharma et al. [13] In India hanging is among the top 5 methods of choice for committing suicide. [20]

Hanging is always considered suicidal except accidental hanging in sexual perverts, homicidal in lynching and justifiable judicial hanging. In England and Wales hanging accounts for about 2000 deaths each year and considered the most common method of suicide. [21] In United States of America 92.3% of all suicides were caused by firearms, hanging and poisoning. [22] A report from Canada has also indicated hanging as the second most common method of suicide after suffocation. [23]

In our study second most common type of asphyxial deaths were drowning (44.68%) which could be due to the presence of water

reserves in the region like canals, ponds, lakes and rivers. According to WHO report 2007, Both China and India have particularly high drowning mortality rates and together contribute 43% of all drowning deaths worldwide. Most of the deaths caused due to drowning (nearly 97%) occur in developing countries like India, drowning is a common method of committing suicide, more particularly in localities nearby the sea, river, dam or canal.

Studies by United Nation's World Health organization have shown that throughout the region of South Asia, about 90,000 people drown every year. Most of the South Asian countries have higher drowning death rates than the world average. [24] (Table No.7)

**Table No.7 showing type of asphyxia**

| Type of Asphyxia | Total | Percentage |
|---|---|---|
| Hanging | 22 | 46.80% |
| Strangulation | 01 | 2.12% |
| Throttling | 02 | 4.25% |
| Drowning | 21 | 44.68% |
| Traumatic Asphyxia | 01 | 2.12% |
| Choking | 00 | 00% |
| Total | 47 | 100% |

In our study, out of 47 cases of asphyxial deaths 31 cases (65.95%) accounted for suicidal asphyxial deaths followed by 13 cases (27.65%) of accidental asphyxial deaths and 3 cases (6.38%) of homicidal asphyxial deaths.

In suicidal asphyxial deaths, males predominate both in hanging (68.18%) and drowning (55.55%) as these are not as commonly opted method of suicide by females as compared to poison intake and burning. [14]

In our study, all types of asphyxial deaths were common in males except homicidal asphyxial deaths i.e strangulation and throttling which were more common in females. In our study period,1 case of strangulation and 2 cases of throttling were documented and all are seen in females indicating that in case of dowry related tortures, family problems, infertility and infidelity matters the victim will be most of the times females.

Interestingly all accidental asphyxial deaths were seen in males. Out of 13 cases, 12 cases accounted for accidental drowning cases which involves children and young adults going for swimming to river who either don't know swimming or don't know it properly. (Table No.8)

**Table No.8 Showing manner of death**

| Manner of Death | Type of Asphyxia | No of Cases | Male | Female |
|---|---|---|---|---|
| Suicide | Hanging | 22 | 15 | 7 |
| | Drowning | 9 | 5 | 4 |
| Homicide | Strangulation | 1 | 0 | 1 |
| | Throttling | 2 | 0 | 2 |
| Accident | Choking | 1 | 1 | 0 |
| | Drowning | 12 | 12 | 0 |
| Total | | 47 | 32 | 15 |

As per as timing of occurrence of these asphyxial deaths were concerned the maximum deaths were occurred between 8 AM to 1 PM (32%) followed by >1 PM to 5 PM (29%) that means 61% of all the asphyxial deaths were occurred in the day time. When you go through the table carefully it involves 12 cases of hanging, 1 case of throttling, 18 cases of drowning and 1 case of choking. It is clear that during working hours when nobody was there in home and victim was all alone, person/assailant prefer these time for their activities to be done. Similarly children and young adults prefer these timings to go for swimming and accidently drowned them. (Table No.9)

The most common reason for asphyxial deaths in our study was accidental occurrence of the event. It includes most of the cases of drowning which were accidental in nature and all cases were seen in males.

Second most common reason was quarrel between family members, spouse, lover and neighbors. It took equal numbers of lives in male and females.

Third most common reason being suffering from long standing diseases like kidney failure, backache, cancers and pain abdomen

(inflammatory bowel diseases). It also took same numbers of lives in male and females.
An extramarital affair was reason for 3 deaths in males, in which 2 died due to hanging and another one by suicidal drowning. One female was killed by throttling.
Dowry related problems and debt was the reason for death in 3 cases each. All dowries related problems caused death in females by hanging and debt took 3 lives in male by hanging.
In 2 cases, the female was victim of sexual assault followed by death due to strangulation. (Table No.10)

**Table No.10 Showing reason for the incident**

| Reason | Male | Female | Total |
|---|---|---|---|
| Dowry | 00 | 03 | 03 (6.7%) |
| Extra Marital Affair | 03 | 01 | 04(8.5%) |
| Disease | 05 | 05 | 10 (21.2%) |
| Quarrel | 06 | 06 | 12 (25.4%) |
| Sexual Assault | 00 | 02 | 02 (4.2%) |
| **Accidental** | **13** | **00** | **13(27.4%)** |
| Debit | 03 | 00 | 03(6.7%) |

When it comes to occupation, daily wage workers (36.1%) were the most suffered population followed by farmers (25.5%), housewives (10.6%) and students (10.6%). Table No.11

**Conclusion:**
Even though number of asphyxial deaths compared to RTA, burns, poisoning and railways related deaths were less in our region, but their percentage was increasing year by year. Poverty, lack of jobs for youths, family problems, defamation and alcoholism related problems are the main reason for suicidal deaths. Due to repeated physical and mental torture, they go beyond threshold level of self-constrain and commit suicide by easily available methods like hanging and drowning which are types of asphyxial deaths.
Males and young age group population between 15–30 years are more vulnerable victims of violent asphyxial deaths. Asphyxial deaths like hanging and drowning, somehow indicates frustration and carelessness on the part of population which are preventable and needs to be rectified on urgent basis.
More over suicide by asphyxial deaths should serve as an eye opener for the civilised society to organise and be a part of continuous awareness programmes to bring socio economic justice in the country.A well designed and comprehensive study to identify the causative factors and highly motive awareness program is needed to prevent suicidal behaviors in turns asphyxial deaths. Appropriate education of the people, proper use of the media, motivating the young generation for new challenges and family support will bring a positive change in a long term.

**References**

1. Joseph HD. Medico-legal death investigation. Forensic pathology; principlesand practice. 2nd ed. Oxford: Elsevier Academic Press. 2005; p. 1-64.
2. Reddy KSN. Mechanical asphyxia. The essentials of Forensic Medicine & Toxicology. 33rd ed. 2016; p.338.
3. Mant KA. Mechanical asphyxia. Taylor's Principal and Practice of Medical Jurisprudence. 13th ed. Churchill Livingstone. 1984; p.282.
4. Saukko P, Knight B. Suffocation and asphyxia. Knight's Forensic Pathology. 4thed. New York: CRC Press. 2016; p 353.
5. Nandy A. Violent asphyxial deaths. Principles of forensic medicine including toxicology. 3rd ed. Kolkata: New central book agency. 2015; p 517.
6. Parikh CK. Violent asphyxial deaths. Parikh text book of medical jurisprudence forensic medicine and toxicology. 7thed. New Delhi: CBS publishers. 2002; p.3.33-3.40.

7. Franklin CA. Deaths from asphyxia. Modi's text book of Medical Jurisprudence and Toxicology. 24th ed. Noida: lexis Nexis. 2012; p.445.
8. Dhoble VS, Dhoble SS, Kukde HG. Socio-Demographic profile of Asphyxial deaths in Female: 2 yr study. IJSR feb 2006 5 (2).
9. Reddy PS, Rajendra KR, Rudramurthy. Asphyxial Deaths at District Hospital, Tumkur- A Retrospective Study. J Indian Acad Forensic Med. April-June 2012; 34(2).
10. Singh A, Gorea RK, Dalal JS, Thind AS, Walia D. A study of demographic variables of violent asphyxial death. JPAFMAT 2003; Vol(3).
11. AjayKumar S, Chandan V, Rudresh YC, Govindaraju HC, Gouda S. Study of Violent Asphyxial Deaths in Chitradurga district of Karnataka. International Journal of Biomedical And Advance Research.
12. Tirmizi SZ, Mirza FH, Paryar HA. Medicolegal investigation of violent asphyxial deaths – an autopsy based study. J Dow Uni Health Sci 2012; 6(3):86-90.
13. Sharma BR, Harish D, Singh VP and Singh P. Ligature mark on neck: How informative?.JIAFM, 2005;27(1):10-15.
14. Kulshrestha P, Sharma RK and Dogra TD: The study of sociological and demographical variables of unnatural deaths among young women within seven years of marriage, Journal of Punjab Academy of Forensic Medicine & Toxicology, 2002; 2:7-17.
15. Gurudatt KS, Kumar SA, Gouda HS. Analysis of fatal cases of mechanical asphyxia at Belgaum, Karnataka 2011; 28(2): 51-53.
16. Patel AP, Bhoot RR, Patel DJ. Study of Violent Asphyxial Death. Int J Med Toxicol Forensic Med 2013; 3 (2): 48-57.
17. Gargi J, Gorea RK, Chanana A, Mann G. Violent asphyxial deaths- A six years study. Journal of Indian Academy of Forensic Medicine 1992; 171-6.
18. Momonchand A, Devi TM, Fimate L. Violent asphyxial deaths in Imphal. Journal of Forensic Medicine & Toxicology 1998; 15 (1): 60-4.
19. Starkuviene S, Kalediene R, Petrauskiene J. Epidemic of Suicide by hanging in Lithuania: does socio demographic status matter ? Pub Health 2006; 120(8): 769-775.
20. Bhatia M S, Agarwal N K, Millo T, Murthy O P. Suicide, suicide note, and psychological autopsy. International Journal of Medical Toxicology and Legal Medicine. (1999); 16:38 -39.
21. Bennewith O, Gunnell D, Kapur N, Turnbull P, Simkin S, Sutton L et al, Suicide by hanging: multicentre studybased on coroner's records in England. The Brit J Psychiatry. 2005; 186:260-1.
22. U.S. Suicide Statistics (2001). Suicide. Org. Suicide Prevention, Awareness and Support. [cited 2010 Mar 11]. Available from- http://www.suicide.org/suicidestatistics.html
23. Hanging- New World encyclopedia. [Online] 2009 [cited 2009 Nov 11] Available from- http://www.newworldencyclopedia.org/entry/hanging
24. The need for Drowning Prevention Programs in South Asia. [Online] 2010 [cited 2010 Feb 10] available fromhttp://www.swiminia.org/need.html

**Table No.9 Showing cases as per time interval**

| | Time Interval | | | | | |
|---|---|---|---|---|---|---|
| | 8 am – 1 pm | >1 pm – 5 pm | >5 pm – 8 pm | >8 pm – 12 am | >12 am – 4 am | >4 am – 8 am |
| Hanging | 07 | 05 | 03 | 06 | 00 | 01 |
| Strangulation | 00 | 00 | 00 | 01 | 00 | 00 |
| Throttling | 00 | 01 | 01 | 00 | 00 | 00 |
| Drowning | 11 | 07 | 01 | 01 | 00 | 01 |
| Traumatic Asphyxia | 00 | 00 | 00 | 00 | 00 | 00 |
| Choking | 00 | 01 | 00 | 00 | 00 | 00 |
| Total | 18 (32%) | 14 (29%) | 05 (10%) | 08 (17%) | 00 (0%) | 02 (4%) |

**Table No.11 Showing employment of the victim**

| Type Of Job | Accidental | Suicidal | Homicidal | Total |
|---|---|---|---|---|
| Farmer | 02 | 10 | 00 | 12 (25.5%) |
| Self Employed | 01 | 03 | 0 | 04 (8.5%) |
| Daily Wage Workers | 06 | 09 | 02 | 17 (36.1%) |
| House Wife | 00 | 04 | 01 | 05 (10.6%) |
| Student | 03 | 02 | 00 | 05 (10.6%) |
| Professional | 01 | 00 | 00 | 01 (2.1%) |
| Unemployed | 00 | 03 | 0 | 03 (6.3%) |
| Total | 13 | 31 | 03 | 47 (100%) |