

Original article

VIOLENT ASPHYXIAL DEATH DUE TO HANGING: A PROSPECTIVE STUDY

Dr. SH Bhosle, Dr. AK Batra, Dr. SV Kuchewar

Authors:

Dr. Santosh H. Bhosle. MBBS, MD, Assistant Professor, Department of Forensic Medicine, Dr. S.C. Govt. Medical College, Nanded. (Maharashtra).

Dr. Anil K. Batra. MBBS, MD, LLB, Professor & Head, Department of Forensic Medicine, Govt. Medical College, Akola. (Maharashtra).

Dr. Sharad V. Kuchewar. MBBS, MD, Assistant Professor, Department of Forensic Medicine, Shri V. N. Govt. Medical College, Yavatmal. (Maharashtra).

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Address for correspondence:

Dr. Santosh Harishchandra Bhosle
Assistant Professor, Department of Forensic Medicine,
Dr. S.C. Govt. Medical College, Nanded. Pin-431601
e-mail: santoshbhosle09@gmail.com

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Abstract:

Hanging is one of the common methods of committing suicide and it is considered suicidal unless contrary is proved. In the present study total 84 cases of asphyxial death due to hanging were studied during October 2008 to June 2010 in Department of Forensic Medicine and Toxicology, at Shri Vasantrao Naik Government Medical College, Yavatmal (Maharashtra).

In our study, almost all cases (98.81%) of hanging were suicidal in nature. There was male preponderance (78.57%) and age group 21-40 years (61.90 %) was the most vulnerable for committing suicide by hanging. Most of victims of suicidal hanging were farmers (30.12%) and laborers (24.10%). The most common place of committing hanging was home (69.88%) and most common ligature material used for suicidal hanging was the nylon rope (53.01%). Complete ligature mark was found in significant number of cases of hanging with running noose and throat skeleton fracture were more common with complete hanging and with increasing age.

Key words: Hanging, farmer suicide, nylon rope, throat skeleton fracture.

Introduction:

The term 'asphyxia' literally means lack of oxygen, though etymologically, asphyxia means 'absence of pulsations'¹. The usual relevance of asphyxial death in Forensic context is violent asphyxia. In violent asphyxial deaths, exchange of air between atmosphere and lung beds is prevented by some violent mechanical means. Usual causes of violent asphyxial deaths are hanging or strangulation, choking and drowning.

Hanging is a form of ligature strangulation in which the force applied to the neck is derived from a gravitational drag of the weight of the body or part of the body¹. Apart from now rare 'lynching', hanging is almost always suicidal or accidental, the former being by far most common. Occasional cases of homicidal hanging have been reported. Examples have also occurred of people killed in some other way and later suspended to simulate hanging². Hence death due to hanging is one of the most complex and controversial areas of asphyxial deaths. To ascertain cause and manner of death in cases of hanging, meticulous examination of ligature mark, neck structure findings and other autopsy findings are much helpful². Also visit to the scene of crime is very much helpful to ascertain circumstances and manner of hanging.

Yavatmal is one of those districts of Maharashtra in which majority of population are engaged in agricultural work. Farmer suicides are very common in this region and hanging being one of the common methods used by farmers to commit suicide. The present study was carried out to know demographic features, characteristics of ligature mark, its relationship with the knot & injuries to neck structures in deaths due to hanging and to emphasize importance of meticulous examination of neck in such cases.

Material & Methods:

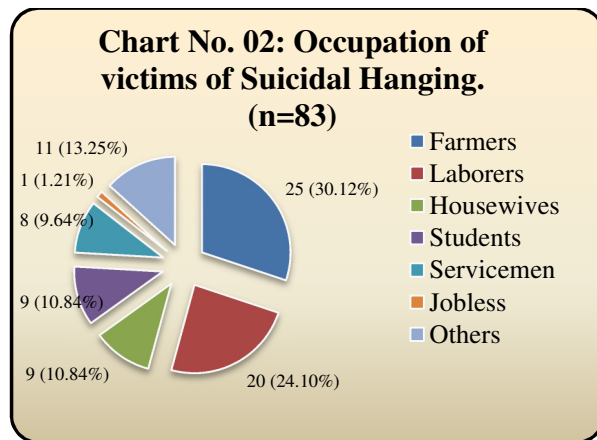
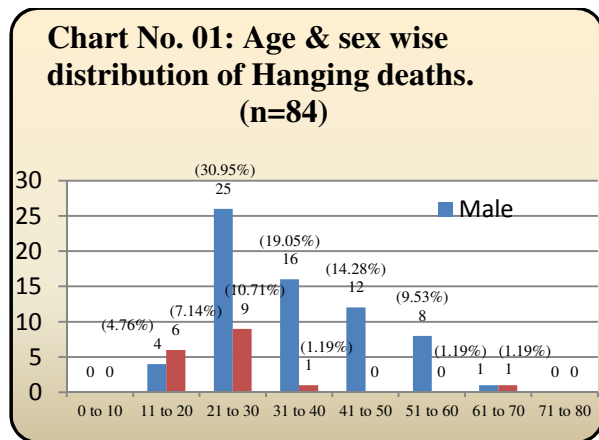
The present study was conducted in Department of Forensic Medicine and Toxicology, at Shri Vasantrao Naik Government Medical College, Yavatmal (Maharashtra). Total 84 cases of

asphyxial death due to hanging were studied during October 2008 to June 2010. The details about the victims regarding the age, sex, circumstances of death, type of ligature material, manner and supposed cause of death were obtained from police reports and relatives of deceased.

The meticulous examination of ligature material, whenever available, was carried out in this study. A thorough and complete autopsy was carried out in each case with special reference to injuries to neck structures. The data of 84 cases of death due to hanging were recorded, compiled and analyzed statistically.

Results:

During study period, 84 cases of death due to hanging were observed. Out of 84 cases, most of the cases were suicidal in nature (98.81%). Only one case of homicidal hanging was observed during study period and victim was female. Accidental hanging was not observed during study period.



Majority of deaths due to hanging were males (78.57%) with male: female ratio 1:0.27. The highest number of cases of death due to hanging were in the age group of 21-30 years (41.67%) followed by age group 31-40 years (20.24%)(Chart 01). The analysis of the occupations of victims who died due to suicidal hanging revealed that, hanging was more common in farmers (30.12%) and laborers (24.10%) followed by housewives (10.84%), students (10.84%), and servicemen (09.64 %) (Chart 02).

Table No. 01: Place of suicidal hanging. (n=83)

Place of occurrence	Total (%)
Home	58 (69.88)
Farm	11 (13.25)
Public Places	04 (04.82)
Forest	06 (07.23)
Other Places	04 (04.82)
Total	83 (100)

The most common place of committing suicide by hanging was home (69.88%) followed by farm (13.25%) and forest (07.23%) (Table 01).

The ligature material most commonly used to commit suicide by hanging was nylon rope (53.01%) followed by long handkerchief (06.03%) and Chunni (06.03 %). Jute rope, cotton rope and sari were used as ligature material in 03.61% cases each while the ligature material could not be ascertained in 16 (19.28%) cases (Table 02).

Table No. 02: Ligature material used for Suicidal hanging. (n=83)

Ligature material	Number	%
Nylon rope	44	53.01
Long handkerchief	05	06.03
Chunni	05	06.03
Jute rope	03	03.61
Cotton material	03	03.61
Sari	03	03.61
Coconut rope	01	01.19
Shawl	01	01.21
Towel	01	01.21
Electric wire	01	01.21
Not Ascertained	16	19.28
Total	83	100

Table No. 03: Relation of type of ligature mark with type of knot. (n=84)

Ligature knot	Ligature mark		Total
	Complete	Incomplete	
Fixed	12 (40.00%)	18 (60.00%)	30 (100%)
Running	15 (51.72%)	14 (48.22%)	29 (100%)
Not known	05 (20.00%)	20 (80.00%)	25 (100%)

The fixed noose was observed in 30 (35.71%) cases; out of which 12 (40%) cases showed complete ligature mark and 18 (60%) cases showed incomplete ligature mark around neck. The running noose was seen in 29 (34.52%) cases; of which ligature mark completely encircling around neck was observed in 15 (51.72%) cases (Table 03).

Table No. 04: Particulars of ligature mark in hanging. (n=84)

Particulars of Ligature mark		Number	%
Type	Complete	32	38.10
	Incomplete	52	61.90
Level	Above level of thyroid	70	83.33
	At level of thyroid	13	15.47
	Below level of thyroid	01	01.19
Direction	Oblique	83	98.81
	Horizontal	01	01.19
Depth	Deep	65	77.38
	Shallow	19	22.62

In 52 (61.90%) cases, the ligature mark was incomplete and in 32 (38.10%) cases, ligature mark was completely encircling neck. The ligature mark was observed above the level of thyroid cartilage in 70 (83.33%) cases, at the level of thyroid cartilage in 13 (15.47%) cases and below thyroid cartilage in 01 (01.19%) case. In 83 (98.81%) cases, the ligature mark was passing obliquely upward and ligature mark was horizontal in only 01 (01.19%) case. Ligature mark was grooved in 65 (77.38%) cases and shallow in 19 (22.38%) cases (Table 04).

Table No. 05: Throat skeleton fracture in relation to type of suspension. (n=84)

Throat skeleton fracture	Type of suspension		
	Complete (%)	Partial (%)	Not known (%)
Fracture of Hyoid bone	07 (08.33)	03 (03.57)	03 (03.57)
Fracture of Thyroid cartilage	01 (01.19)	01 (01.19)	00 (00)
Fracture of hyoid & Thyroid	00 (00)	00 (00)	00 (00)
No fracture	26 (30.95)	28 (33.33)	15 (17.85)
Total	34 (100)	32 (100)	18 (100)

In 34 (40.47%) cases complete suspension of body was noted and 32 (38.09%) cases there was partial suspension. The throat skeleton fracture was observed in 07 (20.58%) cases of complete suspension and 03 (9.37%) cases of partial suspension (Table 05).

Out of 22 cases above 40 years of age, throat skeleton fracture was observed in 08 (36.37%) cases while out of 62 cases below 40 years of age 07 (11.29%) cases showed throat skeleton fracture.

Discussion:

Hanging is one of the common methods of committing suicide and it is considered suicidal unless contrary is proved. In our study, 83 (98.81 %) cases of hanging were suicidal and 01 (01.19%) case of homicidal hanging was observed. Similar findings were reported by Naik et al³ (98.44%), Batra et al⁴ (100%), Azmak D⁵ (100%), Simonsen J⁶ (96.25%), Davidson et al⁷ (95.5%), Bowen DA⁸ (93.53%), Cooke et al⁹ (93.21%), and Elfawal et al¹⁰ (96.7%). Single homicidal hanging noted in our study was of dyadic death where newly married female was hanged by her husband and later he committed suicide by hanging. Similar type of homicidal hanging in dyadic death was reported by Lew EO¹¹.

In this study, majority of hanging deaths was contributed by males (78.57%). Similar finding with male preponderance was observed by Elfawal et al¹⁰ (80.32%), Nikolic et al¹² (76%), Paparo et al¹³ (75.62%), Dixit et al¹⁴ (75%), Bowen DA⁸ (82.98%), Batra et al⁴ (83.76%), Luke et al¹⁵ (83.60%), Morild I¹⁶ (73%), Sharma et al¹⁷ (66.66%), Singh et al¹⁸ (66.55%), Simonsen J⁶ (60%), Azmak D⁵ (83.9%), Uzun et al¹⁹ and Sharma et al²⁰. This does not mean that males commit suicide more than females. It only signifies that, men prefer to commit suicide by hanging than women who prefer to commit suicide by other means like burning, drowning and poisoning⁴. Naik et al³ reported female preponderance (62.2%) which is in contrast with our study.

The study showed that 21-40 years (61.90%) was the most vulnerable age period for committing suicide by hanging. High incidence of hanging in middle age group and minimal incidence in extremes of age was also reported by many researchers^{4,5,10,14-19,21} with varying percentage. The age group of 21-40 years is the most active phase in life wherein exposure to anxiety, stress, strain and various adverse circumstances occur. Economic Problems, unemployment, failure in love, alcohol addiction, and emotional instability were the alleged reasons for committing suicide in this age group. Hanging more common in higher age group than our study was reported by Bowen DA⁸ and Simonsen J⁶.

In our study, analysis of the occupations of victim who committed suicidal hanging revealed that farmers (30.12%) and laborers (24.10%) constitute major group. The study of Elfawal et al¹⁰ reported that the most of the victims of suicidal hanging were from low socio-economic class namely laborers and domestic workers. The present study was carried out in district of Vidarbha region of Maharashtra where farmers commit suicide by various means due to failure of crops, poverty, bankruptcy, alcohol addiction, and stress & strain.

In present study the most common place of hanging was home in 69.88%. Similar observations were reported by Cooke et al⁹ (71%), Uzun et al¹⁹ (83.33%), Elfawal et al¹⁰ (95.08%) and Bowen DA⁸. Usually person prefers any secluded place which suit for his/her purpose. The victim being very well aware of the home and its surroundings, it suits his or her needs for hanging. The second most commonly preferred secluded place for committing suicide observed in our study was farm and other places were forest, public ground, garden, school, shop and Hindu cemetery.

Nylon rope was the most common ligature material (53.01%) used for hanging in our study. Similar finding was also reported by Sheikh et al²² (53.02%). Dixit et al¹⁴, Uzun et al¹⁹ & Cooke et al⁹ reported rope as most common ligature material. Elfawal et al¹⁰ reported that popular plastic clothesline (rope) (85.41%) was most common ligature material used for hanging. Nylon rope was the commonest ligature material used for hanging in our study was probably because most of the victims of hanging were farmers, farm workers or most of them belong to agricultural family background. Nylon rope is easily available due to common use for various purposes by farmers & for domestic uses and also, as it is cheap, the incidence of its use in suicidal hanging was more. Sharma et al¹⁷ reported that common ligature material was Chunni (30.90%) which is in contrast with our finding. The ligature material used by the victim for hanging may be anything available at that moment, which includes any household article or belongings of the victim. This view is further strengthened by the findings in our study which showed that other ligature material used for hanging were long handkerchief, chunni, sari, shawl, towel, jute rope, cotton rope, coconut rope and electric wire.

The complete ligature mark around neck was observed in 51.17% of running noose cases and 40% of fixed noose cases. The ligature mark completely encircling the neck is usually found with running type of noose because the noose moves towards the neck due to weight of body and thus completely constricting the neck; giving complete ligature mark.²³ However in present study, complete ligature mark around neck was observed significantly even in cases with fixed noose (40%). This could be due to the nylon rope being very smooth & slippery in nature, and during hanging the knot usually slips towards the neck giving complete ligature mark.

In the present study ligature mark was completely encircling the neck in 32 (38.10%) cases and was incomplete in 52 cases (61.90%). The ligature mark was commonly observed above the level of thyroid cartilage in hanging (83.33%). The similar findings were reported by Sharma et al²⁰ (84.62%) and Mukherjee JB²³ (80%). Lower incidence ligature mark above level of thyroid cartilage was reported by Elfawal et al¹⁰ (65.57%) and Dixit et al¹⁴ (77%). Ligature mark below the level of thyroid cartilage in significant percent was reported by Davidson et al⁷ (6.66%), Elfawal et al¹⁰ (24.59%) and Dixit et al¹⁴ (23%). The high reporting may be because that, they had not differentiated mark at the level of thyroid cartilage or below it; but clubbed both as below the level of thyroid cartilage. In our study we observed obliquely placed ligature mark in 83 (98.81%) cases. Similar finding was reported by Sharma et al¹⁷ (97.8%). Horizontal ligature mark situated below the level of thyroid cartilage was observed in only one case (01.19%) with partial hanging in almost lying down position where only head, neck and upper chest was not touching ground. In the present case, the victim had consumed alcohol prior to committing suicide. Deep, grooved mark was observed in 65 (77.38%) cases. In our study as most common ligature material used for hanging was nylon rope, grooved ligature mark was observed more commonly.

The present study showed fractures of hyoid bone in 13 (15.47%) cases, which is similar to finding of Dixit et al¹⁴ (14.38%) and Morild I¹⁶ (16.00%). The fracture of hyoid bone noted by different authors^{5,6,15,22} varies with different percent. The fractures of thyroid cartilage were noted in 02 (2.38%) cases in present study correlating with Feigin G²⁴ (06.40%) but it does not correlate with Morild I¹⁶ (12.50%), Luke et al¹⁵ (13.11%) and Dixit et al¹⁴ (15.60%). Paparo et al¹³ noted throat skeleton fracture in 20% cases and Feigin G²⁴ in 9% cases. Elfawal et al¹⁰, Bowen DA⁸, Naik et al³ did not find any fracture of hyoid bone or thyroid cartilage in their study. The age composition of study group, type of ligature material used and type of hanging

probably plays the role in sustaining the neck structure injuries and these things differ from one study to other. Thus, it is expected to vary from one study to another.

In 23.5% cases of complete hanging and 12.5% of partial hanging cases the throat skeleton was fractured in our study. Luke et al¹⁵ (25.8%) and Morild I¹⁶ (26.89%) reported similar finding of more common fracture of throat skeleton with complete hanging. Higher percentage of throat skeleton fracture with complete suspension of body (56.66%) than partial suspension (38%) was noted by Simonsen J⁶. The higher percentage of fracture in completely suspended bodies resulted from rapid and forceful constriction of the neck, the ligature supporting the entire body weight and the more force acting on the throat skeleton.

The frequency of throat skeleton fracture in hanging was more with increasing age of the victim. Similar finding were reported by Luke et al¹⁵, Davidson et al⁷, Morild I¹⁶ and Nikolic et al¹². All these authors described that with advancing age the bones and cartilages of the neck get calcified, become rigid and brittle, thus more liable to fracture.

Conclusion:

Hanging being viewed as giving swift painless death and with easily available ligature material & ligature points in secluded place without arousing much suspicion, this mode is increasingly adopted to commit suicide. Peak incidence of mortality due to hanging is in young age groups (21-40 years). The present study throws some light on the emerging trends that nylon rope is increasingly used for committing suicidal hanging. More incidence of throat skeleton fracture is observed with complete hanging & with increasing age.

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