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Original research article

A Post-mortem study of deaths due to hanging reported to RIMS, Adilabad

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Abstract
Introduction: The overall death by hanging has increased recently. A detailed post-mortem examination of deaths due to hanging plays an important role in determining the manner of death especially if there is a doubt whether the cause is suicidal, accidental, or homicide. We in the current study tried to determine the various predisposing factors and different methods adopted for hanging.
Methods: This retrospective study was conducted in the Department of Forensic Medicine and Toxicology, Rajiv Gandhi Institute of Medical Sciences, [RIMS] Adilabad A total of n=75 cases were identified and included in the study. Data from the autopsy reports along with police investigation reports along with History obtained from relatives were analyzed.
Results: The present study included n=75 cases out it n=57(76%) were males and n=18(24%) were females. The most common type of ligature material used was a rope in 56% of cases followed by saree in 16% and dupatta in 12% cases. The color of ligature marks was dark brown in 52% of cases marks were red in appearance in 21.33% of cases. Pale color ligature marks were found in 14.67% of cases. Fracture of hyoid bone was found in 42.67% of cases. Fracture of thyroid cartilage was found in 9.33% of cases.
Conclusion: Married males are more likely to commit suicide by hanging. Socio-economically weaker sections and lower literacy rates in tribal/rural areas are more likely to commit suicide by hanging due to financial problems/loans/debts etc. Chronic physical pain and psychiatric problems are also likely to drive victims to commit suicide by hanging.
Keywords: Hanging, Post-mortem study, Rural Adilabad, Suicide

Introduction
Among the various methods for suicide in human beings hanging is most commonly adopted as the materials required are easily available and the success rate is high. Hanging is a special form of compression of the neck which is different from manual or ligature strangulation. In hanging the pressure on the soft tissues of the neck is due to the bodyweight exerting a pulling force at the hanging noose. The constricting force of the noose leads to asphyxia and causes compression and narrowing of the laryngeal airway and tracheal lumen and ultimately complete blockage of the airway which leads to deaths. [1] All the cases of hanging are subjected to autopsy to clarify the manner of death. [2] A study in 2010 revealed that the motivation of people who made near-fatal attempts of suicide was interviewed and it was found that most of these people considered hanging as painless, quick, simple, and clean method however those who opted for different methods did have opposing views. [3] It was estimated that globally 8,00,000 people killed themselves in the year 2000 making it the 13th leading cause of death. [4] In countries such as Germany and Japan hanging was found to be the leading method of suicide. In USA and India hanging was the second leading cause of

death following intoxication. [5] Suicide is the third leading cause of death in the age group 15 – 44 years. On average about 1 person for every 40 seconds commits suicide. [6] In fact, in numerous countries, suicide numbers are higher than road traffic accidents. The common method adopted for self-suspension is attaching the suspending material which may be rope, string, chunni, or other material to a high point such as ceiling fan, beam, or hook and the lower end is formed into a fixed loop or noose which is placed around the neck. The victim stands on a stool/chair/table then jumps or kicks the support to get suspended. The nature of neck marks depends on the type of noose. [7] Scientific evidence shows that noose made of soft material such as saree or scarf will leave only minimal marks which sometimes may be difficult to interpret. [7] The noose of rope or cord will leave a deep furrow which may be accompanied by abrasions. If the suspension is typical an inverted "V" shape with a gap below the knot is seen at the back. This appearance is used to distinguish the hanging from strangulation. However, in cases of hanging with low suspension, the marks tend to be horizontal rather than diagonal which may simulate ligature strangulation. [8] The Forensic pathologist may sometimes in a dilemma when atypical findings are present along with typical ligature marks. A proper assessment is therefore required to arrive at a scientific conclusion. We in the current study tried to analyze the demographic profile of victims of hanging along with the details of hanging such as complete or partial hanging, ligature material, ligature marks, post-mortem changes in neck structures, etc in autopsies of hanging reporting to RIMS, Adilabad.

Material and Methods

This retrospective study was conducted in the Department of Forensic Medicine and Toxicology, Rajiv Gandhi Institute of Medical Sciences, [RIMS] Adilabad, Telangana State, India. Institutional Ethical committee permission was obtained for the study. All the hanging cases reported to Hospital for post-mortem examination from the year 2017 to 2020 were included in the study.

Exclusion criteria

1. Decomposed bodies with unclear post-mortem findings.
2. Exhumation bodies.
3. Strangulation victims
4. Cause of death other than hanging

A total of n=75 cases were identified and included in the study. Data from the autopsy reports along with police investigation reports along with History obtained from relatives were analyzed. The details of age groups, gender, Marital status, occupation, reasons for suicide, literacy status, socio-economic status, type of ligature material used, place of incident, time of death, previous psychiatric history, previous history of suicide attempts, Post-mortem staining of lower limbs and back, salivary stains, the position of knot, ligature marks, effusion of blood in the deep tissues of the neck, fractures of the hyoid bone, and fracture of thyroid cartilage were analyzed from forensic science lab report. All the available data was uploaded on an MS Excel spreadsheet and analyzed by SPSS version 19 in windows format for descriptive statistics.

Results

The present study included n=75 cases out it n=57(76%) were males and n=18(24%) were females. The mean age of men was 35.5 years and the mean age of females was 29.5 years. The youngest male 18 years old and the oldest male was 72 years. Similarly, the youngest female was 16 years and the oldest case was 70 years old. The most vulnerable age group was

21 – 30 years with 25.33% cases followed by 31 – 40 years with 22.66% cases details given in table 1.

Table 1: Distribution of cases age-wise and sex-wise included in the study

Age group	*Male*	*Female*	*Total*	*percentage*
11 – 20	03	03	06	08.00
21 – 30	11	08	19	25.33
31 – 40	13	04	17	22.66
41 – 50	12	02	14	18.66
51 – 60	10	00	10	13.33
61 – 70	07	01	08	10.66
> 70	01	00	01	01.33
Total	57	18	75	100.0

Based on the religion of the victims in males out of n=57 cases, n=55(96.49%) were Hindu n=1(1.75%) were Muslim and Christian. In females out of n=18 cases, n=16(88.88%) were Hindu and n=2(12%) were Muslims, and no Christian women were found. Out of the males, n=47(82.45%) were married and n=10(17.55%) were unmarried. In females, n=13(72.22%) were married and n=5(27.78%) were single. Based on the locality out of n=75 cases, n=18(24%) were urban and n=57(76%) were rural areas. The distribution of population based on the educational status is depicted in table 2.

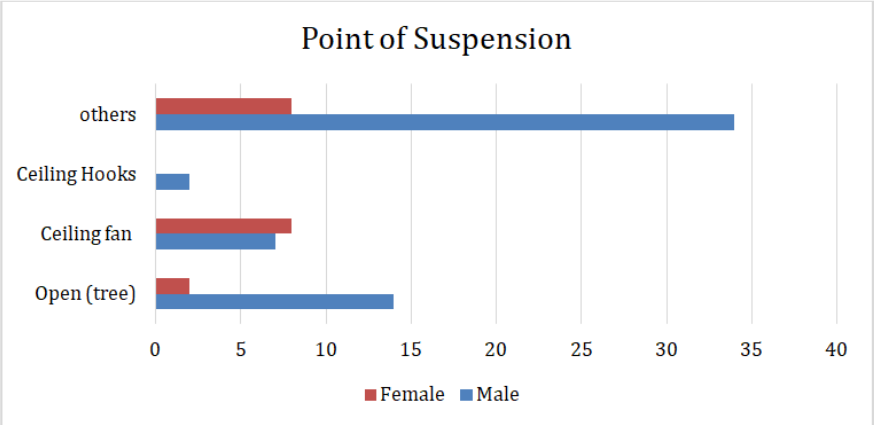
Table 2: Distribution of cases based on the educational status.

Educational status	*Male*	*Female*	*Total*	*percentage*
Illiterate	11	01	12	16
Primary	27	06	33	44
Secondary	17	10	27	36
Graduate	02	01	03	04
Post-Graduate	00	00	00	00
Total	57	18	75	100

Adilabad being a predominantly tribal area the socio-economic status of the victims revealed 81.33% were belonging to lower socioeconomic status and 18.66% were belonging to middle socioeconomic status there were no cases of upper socioeconomic status in this study. The timing of the incidents revealed 26.66% incidents reported in Mid-day and evening respectively and 24% cases reported at night 18% cases were in the morning and 4% in the early morning. The most common type of ligature material used was a rope in 56% of cases followed by saree in 16% and dupatta in 12% of cases and other materials used have been shown in table 3.

Table 3: Distribution of cases according to the ligature material used

Ligature Material	*Male*	*Female*	*Total*	*Percentage*
Rope	37	5	42	56.00
Dupatta	1	8	9	12.00
Saree	7	5	12	16.00
Bedsheet	1	0	1	1.33
Electrical wire	1	0	1	1.33
Lungi	5	0	5	6.66
Towel	4	0	4	5.33
Cable wire	1	0	1	1.33
Total	57	18	75	100



Graph 1: Distribution of cases according to point of suspension

In 56% of the cases, the point of suspension were ceiling rods, wooden logs which were included in other categories the other common methods for suspension were open trees, ceiling fans depicted in graph 1. In all the cases there was no suicide note found. In n=1 male and n=2 female cases, there was a history of previous suicidal attempts found. In the rest of the cases, no previous history of suicidal attempts was found. The most common motive for suicide by the victims was financial problems in 44% of cases followed by chronic physical pain 21.33% and psychiatric problems in 16% cases. The other causes have been shown in table 4.

Table 4: Distribution of cases according to the motive for hanging

Motive	*Male*	*Female*	*Total*	*Percentage*
Financial problems	26	7	33	44.00
Marital disharmony	7	2	09	12.00
Psychiatric problems	8	4	12	16.00
Exam failure	0	0	00	00.00
Dowry harassment	0	1	01	1.33
Chronic physical pain	12	4	16	21.33
Unemployment	3	0	03	4.00
Love failure	1	0	01	1.33
Total	57	18	75	100

In n=53 males and n=15 females the hanging was complete and in n=4 males and n=4 females there was partial hanging found. In n=30 males there was the presence of fecal discharge and in n=16 males, there was seminal discharge and both fecal and seminal discharge were found in n=12 males. In n=12 females, there was fecal discharge present. Post-mortem staining of lower limbs was examined. The staining of lower limbs with petechiae was found in n=32 males and without petechiae was in n=12 males and staining of the back was found in n=13 male cases. In females in n=13 cases lower limbs were stained with petechiae and in n=3 cases were without petechiae and staining at the back was in n=2 cases. The presence of salivary stains on the right side was found in n=26 males and n=11 females and salivary stains on the left side were found in n=23 males and n=3 females. The position of the knot was on the right side in n=21 males and n=9 females and left side in n=24 males and n=6 females and center occipital region were in n=12 males and n=3 females. The level of ligature marks above the thyroid cartilage in n=38 cases out of which n=29 were males and n=9 were females. The level overriding the thyroid cartilage was found in n=30

cases out of which n=22 were males and n=8 were females and below the thyroid cartilage was found in n=7 cases out of which n=6 were males and n=1 was the female case. The color of ligature marks was dark brown in n=39 cases out of which n=32 were males and n=7 were females. The ligature marks were red in appearance in n=16 cases out of which n=11 were males and n=5 were females. Pale color ligature marks were found in n=11 cases out of which n=8 were males and n=3 were females. Yellow-brown color marks were found in n=9 cases out of which n=6, were male and n=3 were females. Effusion of blood in deep tissues of the neck was found to be present in n=57 cases out of which n=44 were males and n=13 were females. Fracture of hyoid bone was found in n=32 cases out of which n=28 were males and n=4 were females. Fracture of thyroid cartilage was found in n=7 cases out of which n=5 were males and n=2 were females.

Discussion

During the study period of 4 years, there were n=75 cases of suicide by hanging brought for post-mortem examination to our Institute. Out of n=74 cases n=57(76%) were males and n=18(24%) were females. The male to female ratio was near to about 3:1 Sharma BR et al., [7] found the male to female ratio in hanging 2:1. The most vulnerable age group was 21 – 30 years with n=19 (33.33%) cases followed by 31 – 40 years with n=17(22.66%) cases. M Ahmad et al., [9] found similar observations in their study in Bangladesh. KV Nagaraju et al., [1] in a similar study in MGM Warangal found age group of 21 to 40 years, accounted for was 60% of deaths. Amandeep Singh et al., [10] in their study found age group 21-25 years (29.62%) and 16-20 years (29.62%) followed by 26-30 years (18.51%). In this study, the rates of suicides were highest in the Hindu population (94.66%) followed by Muslims (4%) and Christians (1.34%) similar observations were made by Khajuria B et al., [11] in their study in a tertiary care hospital in Kashmir. The number of males who were married was n=47 and females were n=13 a total of 80% of both sexes who committed suicide were married. Mohanty S, et al., [12] found that married males are more prone to hang themselves as compared to females. Adilabad being a predominantly tribal area hence most of the cases 76% were from rural areas. Educational status is an important factor in unnatural deaths like hangings. In the current study, we found 16% illiterates, 44% had primary education and 36% were educated up to secondary levels. People with lesser educations levels are generally with low socioeconomic status and they are less likely to be efficient in coping with stress. Lower neurodevelopmental vulnerabilities increase the risk of psychiatric disorders. [13] the assessment of ligature material revealed 56% of cases used ropes and 16% used saree 12% used dupatta some other materials like lungi, electrical wire, cables were used (Table 3). Sharma BR, et al., [7] in their study found chunni was the most used ligature material, 17 (31%) cases; followed by nylon rope, 10 (18%) cases, and bedsheet, etc., 09 (16%) cases. The most common motive which led to suicide by the victims was financial problems in 44% of cases followed by chronic physical pain 21.33% and psychiatric problems in 16% of cases. National Crimes Record Bureau (NCRB) India in the year 2019 data shows most common motive for suicide included 34% family problems, 7% marriage related issues, 7% psychiatric illness, 6% prolong illness/ drug/ alcohol abuse, and 5% love affair. [14] In this study, we found a total of n=68(90.67%) cases with complete hanging and n=7(9.33%) partial hanging. Uzun I, et al; [15] in their study found 47.83% of cases with complete hanging and 52.16% of cases with partial hanging. M Ahmad et al., [16] 6 and T. Saisudheer et al., [17] in their study found complete hanging outnumbered partial hanging cases agreeing with the results of the present study. The level of ligature marks was above thyroid cartilage in 50.66% of cases. The marks overriding the thyroid cartilage were found in 40% of cases and rest of the cases 9.33% of the marks were found below the thyroid cartilage similar observations have been found by various studies in this field. [17-19] Red-colored ligature marks were seen in 21.33%

of cases, pale color ligature marks in 14.67% cases, yellow brown color marks in 12% of cases. B Chowdhury et al., [20] found dark brown color ligature marks in 34.09%) cases, yellowish-brown in 75(28.41%) cases, red color in 53(20.08%) cases and pale in 46(17.42%) cases. The color of ligature marks depends on the duration of the suspension and the complexion of the victim. Neck dissection found effusion of blood in deep tissues in 76% of cases and fracture of the hyoid bone in 42.67% cases, and fracture of the thyroid cartilage in 9.33% cases. B Chowdhury et al., [20] found Hemorrhage in strap muscles in 24.24% of cases and fracture of the hyoid bone in 1.89%, and fracture of the thyroid cartilage in 2.27% of cases. Nantana C et al., [21] found fracture of hyoid bone as well as thyroid cartilage in 25% of cases.

Conclusion

The study found the highest number of hanging deaths in 21 – 30 years in which the majority of victims were males. Married males are more likely to commit suicide by hanging. Socio-economically weaker sections and lower literacy rates in tribal/rural areas are more likely to commit suicide by hanging due to financial problems/loans/debts etc. Chronic physical pain and psychiatric problems are also likely to drive victims to commit suicide by hanging. Most of the victims choose ropes for hanging and in the majority of cases, the hanging was found to be complete. Therefore, Govt of Telangana is now taking proactive steps in reducing the economic burden to farmers by application of Raithu Bandhu schemes which provide financial assistance to distressed farmers. Better availability of psychiatric rehabilitation centers will also help in reducing the number of suicidal deaths due to hanging.

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