



AUTOPSY FINDINGS AND DURATION OF SURVIVAL IN SUICIDAL HANGING DEATHS IN DELHI- A RETROSPECTIVE STUDY

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ABSTRACT

Hanging is the most common method of committing suicide constituting 53.6% of total suicidal deaths in India, as the death is painless and almost no cost is involved. This retrospective study consists of all death due to suicidal hanging over 4 years, reported in the VMMC & Safdarjung Hospital from 2016 to 2019 intending to describe and characterize different hanging events with a focus on the autopsy findings and duration of survival of the victims. During the study period, a total of 305 hanging deaths were reported. The ligature mark was appreciable in all except 2 cases and in 88.52% of cases, the mark was incomplete. The knot was present over the back of the head in 65.02% of cases. In 79.02% of cases no external findings were present in the heart and lungs were the most common internal findings observed. Based on the results, the ligature mark can be considered as a sign to diagnose and differentiate between hanging and strangulation. Hanging as a mode of suicide is highly fatal as the majority die before reaching the hospital.

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INTRODUCTION

Each suicide prematurely ends the life of an individual and is not only a personal tragedy affecting the lives of families and friends but has a continuing ripple effect on a community as a whole. Every year, more than 1,00,000 people commit suicide in India.¹ Hanging is the most common method of committing suicide in India constituting 53.6% of total suicidal deaths, as the death is painless and almost no cost is involved.^{1,2} Although rare hanging can be homicidal and accidental as well.

Hanging is that form of asphyxia which is caused by suspension of the body by a ligature which encircles the neck, the constricting force being the weight of the body. It is classified as complete when the whole body is suspended without any part touching the ground and incomplete when suspension is partial, and some part of body touches the ground. When the ligature mark lies on the anterior region of the neck and the knot is on the back over occiput, hanging is typical and in atypical hanging knot is anywhere other than on the occiput.³

This present study was carried out in a retrospective manner consisting of all death due to suicidal hanging over a period of

4 years and reported in the Vardhaman Mahavir Medical College (VMMC) and Safdarjung Hospital from 2016 to 2019 with aim to describe and characterize different hanging events with focus on the autopsy findings and duration of survival of the victims.

MATERIAL METHODS

This retrospective study was conducted in the department of Forensic Medicine, Vardhaman Mahavir Medical College and Safdarjung Hospital, New Delhi in the year 2021.

Selection of Cases - Inclusion Criteria

- All the cases brought to the mortuary wing of Safdarjung Hospital for medicolegal autopsies with alleged history of suicidal hanging and later confirmed by police investigation and autopsy from January 2016 to December 2019.
- The cases without alleged history of hanging but later during autopsy came out to be a case of suicidal hanging from January 2016 to December 2019.

Source of Information

Autopsy reports.

Statistical Analysis

The presentation of the Categorical variables was done in the form of number and percentage (%). On the other hand, the

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quantitative data with normal distribution were presented as the means \pm SD and median with 25th and 75th percentiles (interquartile range). Kaplan Meier survival analysis curve was used to assess actuarial survival rate of patients who were brought alive in hospital. The data entry was done in the Microsoft EXCEL spreadsheet, and the final analysis was done with the use of statistical Package for Social Sciences (SPSS) software, IBM manufacturer, Chicago, USA, version 21.0.

RESULT

In the present study four years of retrospective data was analyzed, a total of 11,325 autopsies were conducted during this period, out of which 305 cases were of hanging and following findings were observed.

Ligature Mark: Out of 305 cases of hanging ligature mark was appreciable in 303 cases. It was complete in 33 cases (10.82%) and incomplete in 270 cases (88.52%). It was oblique and above thyroid cartilage in all 303 cases. Ligature mark was not appreciable in 2 cases (0.66%).

Position of knot: The knot was present in the front of neck in 1.32% of case (n= 4), below left mastoid region in 21.11% cases (n= 64), below right mastoid region in 11.88% cases (n=36), over back of neck in 65.02% cases (n=197). Position of knot cannot be commented upon in 2 cases.

Ligature Material used: In the present study data regarding ligature material used by the study subjects was available in 102 cases, out of which in 75 cases, cloth was used as ligature material and in 27 cases, rope or cable was used as ligature material by the victim.

External findings: In this study, in 47 cases tongue was found caught between teeth, facial congestion was observed in 18 victims while petechial haemorrhage in conjunctiva was noted in 4 cases. In rest 241 cases face was pale and none of the above external findings were observed.

Internal Findings: Petechial haemorrhage in heart was seen in 196 cases followed by petechial haemorrhage in lungs in 169 cases. Extravasation of blood in neck muscles was noted in 22 cases, while fracture of hyoid bone was observed in 4 cases. Figure 1.

Psychiatric history: Psychiatric history was present in only 2 cases out of 305 study subjects.

Toxicological screening: Data regarding toxicological screening was present in 79 cases of those in 61 cases toxicological reports were still awaiting, in 13 cases reports were clean and in remaining 5 cases toxicological screening showed ethyl alcohol in blood of victims. Figure 2.

Duration of survival: In 213 cases victims were declared brought dead in the emergency, while 92 cases had life when brought to the emergency after hanging. Mean duration of survival in days was 5.41 ± 8.33 and median was (25th-75th percentile) 3(1-6.25) with range of 0.08 to 64 days as shown in table 5. Out of those 92 cases 63.04% survived more than one day, 7.61% survived more than 15 days and 1.09% cases survived more than 30 days as shown in Table 1 and Fig 3.

DISCUSSION

One of the most lethal methods of suicide is hanging with fatal outcome in over 70% cases and comparatively painless.^{2,4,5,6} In a case of mechanical compression of neck, about 2 kg, 2.3 –

30.0kgs and 15kgs of pressure is enough to block and obstruct the jugular veins, cerebral arterial supply and trachea respectively.⁷ In the present study conducted on hanging victims we have studied the distribution of ligature mark, position of knot, type of ligature material used, psychiatric history, toxicological screening, duration of survival etc.

In the present study ligature mark was appreciable in 99.34% (n= 303) victims, comparable findings were observed by Sudheer and Nagaraja,⁸ Ballur,⁹ and Kumar *et al.*¹⁰ It was incomplete in 88.52% (n= 270) of victims and oblique and above thyroid cartilage in all 303 cases. Russo *et al.*¹¹ observed oblique mark in 96% of cases, Buchade *et al.*¹² Ballur and Sudheer and Nagaraja observed in their studies that ligature mark was above thyroid cartilage in 100%, 83% and 88% respectively comparable to this study. However, Russo *et al.*, Naik and Patil,¹³ and Kumar *et al* in their studies observed ligature mark was above thyroid cartilage in 62%, 62% and 69% respectively which is comparably less than this study. Thus, these features (oblique, incomplete and above thyroid cartilage) of ligature mark assert it as one of the main pathognomonic signs of hanging differentiating it from ligature strangulation where ligature mark runs horizontally and often below thyroid cartilage.¹¹

In the present study data regarding ligature material was available in 102 cases, out of which 73.5% of victims used soft ligature such as sari/chunni/lungi/bedsheet as ligature material, followed by rope/cable that was used in 26.4% of cases. Similar findings were observed in the studies of Buchade *et al* in Delhi, Saiyed and Modi¹³ in Ahmadabad, Meera and Singh¹⁴ in Manipur and Mohammed¹⁵ in Basrah, Iraq, where most common ligature material used was sari or chunni, followed by cable/rope. However, in the studies of Kumar *et al* and Russo *et al* rope was the most common used ligature material. Typical hanging with knot over back of neck was observed in about 65.02% of the cases in our study which is comparable to the findings of Russo *et al.* However, in the studies of Sharma *et al.*¹⁷ and Dean *et al.*¹⁸ knot was not seen over back of neck in majority of cases.¹⁸

In the present study external autopsy findings like facial congestion, subconjunctival haemorrhage and tongue caught between teeth were observed in 5.9%, 1.31% and 15.41% of cases only, while in majority of victims (79.02%) face was pale and findings like subconjunctival haemorrhage or tongue caught between teeth were not observed. However, in the study of Mohammed done in Basrah, Iraq facial congestion was seen in 27% of cases and subconjunctival haemorrhage was observed in 58% of cases. This can be due the reason that in the study of Mohammed only 48% of cases were complete hanging, although no sufficient data was available to comment upon the percentage of complete or partial hanging in the present study but majority of case were typical hanging in this study causing maximum occlusion of neck vessels.¹⁹ Internal autopsy findings were observed in more than half of victims like Petechial haemorrhage in heart and lungs were seen in 64.26% and 55.41% of cases respectively which is comparable to the study of Buchade *et al* and Mohammed. Haemorrhage in neck muscles was observed in 7.21% of cases which is comparably less than the study of Russo *et al* where they find haemorrhage in neck muscles in 50% of cases. Fracture of hyoid bone was observed only in 4 cases (0.98%) which is comparable with the study of Kumar *et al.*, Yadav *et al.*,²⁰ Sudheer and Nagaraja, Ballur, Jayaprakash and Sreekumari,²¹

Meera and Singh, Bachade *et al* and Mohammed who observed hyoid bone fracture in 5.2%, 1.6%, 4%, 4%, 2.7%, 3.6%, 0 and 0 cases, respectively.

In contrast studies by Russo *et al*, Ahmad and Hossain,² Charoonnate *et al.*,²² and Uzun *et al.*²³ have reported higher incidence of hyoid bone fracture. Fracture of thyroid cartilage and cervical vertebrae was not observed in any case similar to the study conducted by Kumar *et al* and Patel *et al.*²⁴ However, study conducted by Jayaprakash and Sreekumari and Russo *et al* reported thyroid cartilage fracture in 5.3% and 17% of cases, respectively. Russo *et al* also observed cervical fracture in 4% of cases in their study. Psychiatric history was present in only 2 cases (0.66%), no proper Indian data was found to draw comparisons however, studies done in abroad by Russo *et al.* and Mohammed have reported psychiatric history in 25% and 18% of cases. This might be due to the reason that in India psychiatric problems are considered as taboo and does not get reported. Majority of cases 69.83% in the present study were declared brought dead when brought to the emergency of a hospital which is comparable to the observations of other studies^{4,5,6,12} as discussed earlier.

CONCLUSION

During the study period of four from 2016 to 2019, a total of 305 hanging deaths were reported. The ligature mark was appreciable in all victims except two cases and majority of cases were typical hanging with pale face and external findings like facial congestion and subconjunctival haemorrhage and internal neck findings like haemorrhage in neck muscles and fracture of osteocartilaginous structures were observed in only a few cases. The characteristics of the ligature mark should be carefully examined. As based on the results, the ligature mark can be considered as a sign to diagnose and differentiate between hanging and strangulation. Hanging as a mode of suicide is highly fatal as majority die before reaching hospital.

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Table 1 Kaplan Meier survival analysis curve for overall survival curve of patients who were alive at admission

| | | Total N | 92 |
|----------------------------|--|-------------------------|--|
| N of Events | | | 92 |
| Censored | | N | 0 |
| | | Percent | 0.00% |
| OS at the end of 1 day | | | 63.04% |
| OS at the end of 15 days | | | 7.61% |
| OS at the end of 30 days | | | 1.09% |
| OS at the end of the study | | | 0.00% |
| Mean | | Estimate | 5.415 |
| | | Standard Error | 0.868 |
| | | 95% Confidence Interval | Lower Bound 3.713 Upper Bound 7.117 |
| Median | | Estimate | 3 |
| | | Standard Error | 0.651 |
| | | 95% Confidence Interval | Lower Bound 1.723 Upper Bound 4.277 |

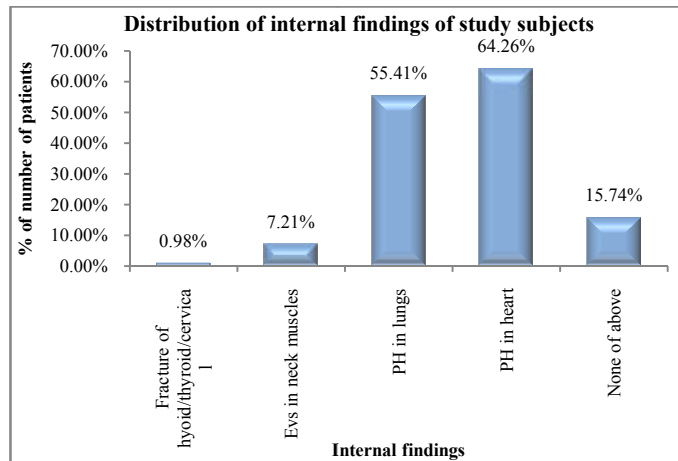


Fig 1 Distribution of internal findings of study subjects

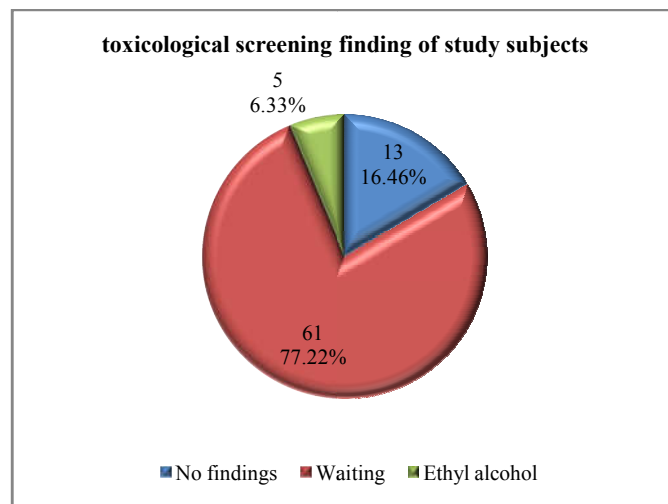


Fig 2 Toxicological screening finding of study subjects

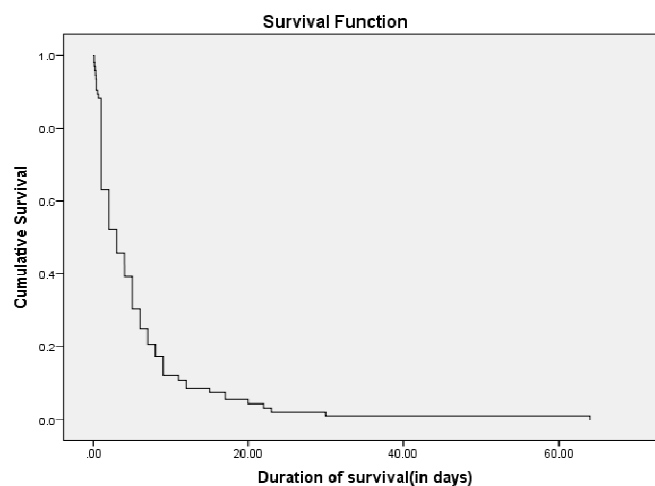


Fig 3 Kaplan Meier survival analysis curve for overall survival curve of patients who were alive at admission

References

1. National Crime Records Bureau[Internet]. New Delhi: Ministry of Home Affairs, Government of India. Accidental Death and Suicides in India; 2019[cited on 18th May 2021]. Available from: https://ncrb.gov.in/sites/default/files/Chapter-2-Suicides_2019.pdf

2. Ahmad M, Hossain MZ. Hanging as a method of suicide retrospective analysis of post-mortem cases. *J Armed Forces Med Coll* 2010;6:37-9.
3. Reddy KSN, Murty OP. The essentials of Forensic Medicine and Toxicology. 33rd ed. New Delhi. JAYPEE The Health Sciences Publishers. 2014.
4. Simounet C, Bourgeois M. Suicides and attempted suicides by hanging. *Ann Med Psychol* 1992; 150: 481–85.
5. Aufderheide TP, Aprahamian C, Mateer JR *et al*. Emergency airway management in hanging victims. *Ann Emerg Med* 1994; 24:879–884.
6. Luke JL, Reay DT, Eisele JW, Bonnell HJ. Correlation of circumstances with pathological findings in asphyxial deaths by hanging: a prospective study of 61 cases from Seattle, WA. *J Forensic Sci* 1985; 30: 1140–1147.
7. Iserson KV. Strangulation: a review of ligature, manual, and postural neck compression injuries. *Ann Emerg Med* 1984;13: 179–185.
8. Sudheer TS, Nagaraja TV. A study of ligature mark in cases of hanging deaths. *Int J Pharm Biomed Sci* 2012; 3:80-4.
9. Ballur MS. Analytical study of deaths due to hanging cases reported at Dr. B.R. Ambedkar medical college mortuary during 2010-2012 [Master's thesis]. Bangalore: Rajiv Gandhi University of Health Sciences, Karnataka; 2013.
10. Kumar N, Sahoo N, Panda BB, Hansda MK. Fractures of hyoid bone and thyroid cartilage: an autopsy study. *J Indian Acad Forensic Med* 2016; 38:393-6.
11. Russo MC, Verzeletti A, Mauro P, Ferrari FD. A Retrospective study regarding 260 cases. *Am J Forensic Med Pathol* 2016; 37: 141–145.
12. Buchade DD, Bharti R, Amarnath A, Mittal AK, Khanna SK. Analysis of Hanging Cases Brought to Mortuary of Lok Nayak Hospital, New Delhi: A 3-Year Retrospective Study. *MAMC J Med Sci* 2019; 5:69-72.
13. Naik SK, Patil DY. Fracture of hyoid bone in cases of asphyxia deaths resulting from constricting force round the neck. *J Indian Acad Forensic Med* 2005; 27:149-53.
14. Saiyed MZG, Modi KA. Retrospective study of post-mortem cases of 'hanging': a method of suicide. *J Med Sci* 2013; 2:48-50.
15. Mohammed AAQ. Hanging as a method of suicide: a retrospective study. *MJBU* 2017; 35(2):97-104.
16. Meera T, Singh MBK. Pattern of neck findings in suicidal hanging: a study in Manipur. *J Indian Acad Forensic Med* 2011; 33:352-4.
17. Sharma BR, Harish D, Sharma A, *et al*. Injuries to neck structures in deaths due to constriction of neck, with a special reference to hanging. *J Forensic Leg Med*. 2008;15(5):298–305.
18. Dean DE, Kohler LJ, Sterbenz GC, *et al*. Observed characteristics of suicidal hangings: an 11-year retrospective review. *J Forensic Sci*. 2012;57(5):1226–1230.
19. Karmakar R N. J.B Mukherjee's Forensic Medicine and Toxicology. 3rd ed. Kolkata. Academic Publishers 2007.
20. Yadav A, Kumath M, Tellewar S, Lohit Kumar R. Study of fracture of hyoid bone in hanging cases. *J Indian Acad Forensic Med* 2013; 35:239-41.
21. Jayaprakash S, Sreekumari K. Pattern of injuries to neck structures in hanging: a autopsy study. *Am J Forensic Med Pathol* 2012; 33:395-9.
22. Charoonnate N, Narongchai P, Vongvaivet S. Fractures of hyoid bone and thyroid cartilage in suicidal hanging. *J Med Assoc Thai* 2010; 93:1211-6.
23. Uzun I, Buyuk Y, Gulpinar K. Suicidal hanging: fatalities in Istanbul retrospective analysis of 761 autopsy cases. *J Forensic Leg Med* 2007; 14:406-9.
24. Patel AP, Bansal A, Shah JV, Shah KA. Study of hanging cases at Ahmadabad region. *J Indian Acad Forensic Med* 2012; 34:342-5.

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