

# Autopsy Findings in Suicidal Hanging – A Cross-Sectional Study Based on the Documentation of the Department of Forensic Medicine & Toxicology in a Tertiary Level Institution in Dhaka, Bangladesh

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## ABSTRACT

A cross-sectional, descriptive study was carried out in the Department of Forensic Medicine & Toxicology of Shaheed Suhrawardy Medical College, Dhaka, Bangladesh, to determine the characteristics of the autopsy findings in suicidal hanging cases. A total of 157 cases with complete external and internal examination details were included in this study. Data was obtained from the inquest reports, chalan, and death certificates (for hospital deaths) between January and December of 2023. The mean age of victims was 29.9±7.8 years. Most of the victims belonged to the 21–30 years age-group (41.4%). A female predominance was observed (65%). Married (72%) were more affected than unmarried (28%). Most of them belonged to middle-class families (52.2%). Regarding occupation, most of them were students (39.5%), and homemakers (28.7%). The most commonly used ligature material was rope (44%), followed by dupatta (29%), sari (17%) and lungi (10%). Autopsy report revealed that the positions of the knots were found predominantly on the left side (58.6%), followed by the right side (29.3%) and the back of the neck (12.1%). Slip-type knots were more common (62%) compared to fixed knots (38%). Most of the ligature marks were located above the thyroid cartilage (89.8%). Grooving of the ligature mark was observed in 86%, while petechial hemorrhage was noted in 54.1% cases. Tongue bite was observed in 36.9% and subconjunctival hemorrhage was seen in 39.4% cases. Damage to the neck muscle fibers was identified in 78.3%, while damage to the cervical vertebrae were found in 15.9% cases. Regarding fractures, the thyroid cartilage was involved in 16% and the hyoid bone in 30% cases. Parchmentization was observed in 53.5% cases. The most common reported cause of suicidal hanging was familial disharmony (34%), followed by romantic/relationship distress (23%), academic pressure and examination failure (18%), financial crisis (17%), and depressive illness (8%). These findings play a decisive role in ascertaining the manner of death, especially if doubt exists over whether this was suicidal, accidental or homicide in nature and highlight the urgent need for targeted suicide prevention, including improved mental health care, public awareness, and support for at-risk individuals.

**Keywords:** Autopsy, hanging, ligature mark, ligature material, suicide.

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## INTRODUCTION

According to the World Health Organization (WHO), an estimated 727,000 people died by suicide globally in 2021. Suicide is a global phenomenon and occurs throughout the lifespan. Effective and evidence-based interventions can be implemented at population, sub-population and individual levels to prevent suicide and suicide attempts.<sup>1</sup> Hanging is defined as “death due to suspension of the body by a ligature around the neck, hanging leads to death primarily by asphyxia, venous congestion, or cerebral ischemia depending on the position of the knot, the force of suspension, and the body weight of the victim”.<sup>2</sup> The forensic examination of a hanging case involves a meticulous assessment of various factors and each of which provided crucial clues about the circumstances surrounding the death.<sup>3</sup> In our country, the ligature materials usually used are rope, shari, scarves (orna) etc. which can reveal details about the method chosen.<sup>4</sup> Moreover, the pattern of neck injuries can help distinguish self-infliction (suicidal or otherwise including accidental means such as auto-erotic asphyxiation) from homicidal causes of such deaths with greater certainty.<sup>4,5</sup> Fractures of the thyroid cartilage, particularly the superior horns, is the commonest fracture identified in hanging, the majority of which being sustained within the lower third toward the base. Conversely, cricoid fracture is very rare in hanging.<sup>4,6</sup> From a forensic standpoint, distinguishing between suicidal, homicidal, and accidental hanging requires careful evaluation of autopsy findings, ligature characteristics, scene investigation, and injury patterns.<sup>6</sup>

Autopsy plays a crucial role in confirming the cause and manner of death, assessing features like ligature marks, hyoid and laryngeal fractures, and the presence or absence of defensive injuries.<sup>4,7</sup> Several studies have examined the pattern of injuries in hanging cases to aid in medico-legal classification. In many cases, incomplete hanging, dribbling of saliva and oblique ligature marks are indicative of suicide.<sup>4,9</sup> However, occasional inconsistencies and overlapping features make comprehensive postmortem evaluation essential.<sup>4,9</sup>

By analyzing multiple forensic cases of suicidal hanging in Bangladesh, this study seeks to identify prevalent patterns and features. Such insights can strengthen forensic investigations, guide suicide prevention initiatives, and broaden our

understanding of the factors driving suicide in the country. Ultimately, a thorough comprehension of suicidal hangings may support the development of targeted interventions suited to the needs of the Bangladeshi population.

## METHODS

This cross-sectional, descriptive study was conducted in the Department of Forensic Medicine & Toxicology, Shaheed Suhrawardy Medical College, Dhaka, Bangladesh, from January to December of 2023. Relevant data was obtained from the autopsy reports, inquest papers, and police challans preserved in the corresponding department. The study population comprised individuals of all ages and genders whose deaths were confirmed as suicidal hangings through medico-legal investigations. Finally, a total of 157 autopsy-confirmed cases of suicidal hanging were included in this study based on our inclusion and exclusion criteria. Inclusion criteria included: i) autopsy confirmed cases of suicidal hanging and ii) deaths reported within the specified study period. Exclusion criteria were: i) suicides by other means except hanging and ii) victims having conflicting or insufficient information.

Variables included age, gender, marital status, socioeconomic status, occupation, ligature material, and autopsy findings (e.g., ligature marks, characteristics of injuries, fractures, petechiae etc.) and suspected causes behind suicide. A structured data extraction form was used to ensure consistency.

Data was analyzed using Microsoft Excel sheet in the computer. Descriptive statistics (e.g., frequency and percentage) were used to summarize categorical variables. Results were presented in tables and pie charts. No inferential statistical tests were applied, as the study was descriptive.

## RESULTS

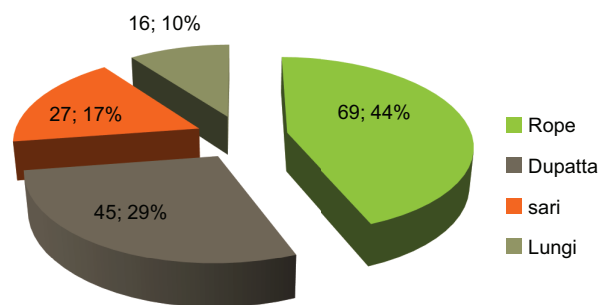
A total of 157 suicidal hanging cases were included in this study. The mean age of victims was  $29.9 \pm 7.8$  years. Most of the victims belonged to the 21–30 years age-group (41.4%). Females 102(65%) outnumbered males 55(35%). Married 113(72%) were more affected than unmarried 44(28%). Most belonged to middle-class families (52.2%), followed by lower and higher socio-economic status (32.5% and 15.3% respectively). Regarding occupation, most of them were students 62(39.5%), followed by homemakers 45(28.7%), business owners 25(15.9%), service holders 12(7.6%) and street vagrant 9(5.7%) (Table-I).

**Table-I: Sociodemographic characteristics of the victims (n=157)**

Variables Category	Frequency	Percentage
<b>Age group (years)</b>		
01-10	1	0.6
11-20	32	20.3
21-30	65	41.4
31-40	49	31.2
41-50	7	4.5
>50	3	2.0
Mean ± SD	29.9 ± 7.8 years	
<b>Gender</b>		
Male	55	35
Female	102	65
<b>Marital status</b>		
Married	113	72.0
Unmarried	44	28.0
<b>Socio-economic status</b>		
Lower class	51	32.5
Middle class	82	52.2
Higher class	24	15.3
<b>Occupation</b>		
Student	62	39.5
Homemaker	45	28.7
Business owner	25	15.9
Service holder	12	7.6
Street vagrant	9	5.7
Others	4	2.5

The most commonly used ligature material was rope, accounting for 69(44%) cases, followed by dupatta 45(29%), sari 27(17%), and lungi 16(10%) (Fig. 1). Autopsy report revealed that the positions of the knots were predominantly found on the left side (58.6%), followed by the right side (29.3%) and the back of the neck (12.1%). Slip-type knots were more common (62%) compared to fixed knots (38%). Most of the ligature marks were located above the thyroid cartilage as found in 141(89.8%) cases, while in 11(7%) cases over the thyroid cartilage and in 5(3.2%) cases below the thyroid cartilage. Grooving of the ligature mark was observed in 135 (86%) cases, while petechial hemorrhage was noted in 85(54.1%) cases. Tongue bite was observed in 58(36.9%) cases and

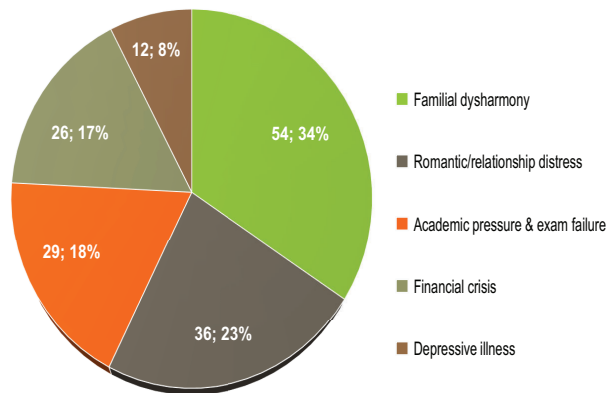
subconjunctival hemorrhage was seen in 62(39.4%) cases. Damage to the neck muscle fibers was identified in 123(78.3%) cases, while damage to the cervical vertebrae were found in 25(15.9%) cases. Regarding fractures, the thyroid cartilage was involved in 25(16%) cases, while the hyoid bone was fractured in 47(30%) cases. Parchmentization was observed in 84(53.5%) cases (Table-II). The most common reported cause of suicidal hanging was familial disharmony (34%), followed by romantic/relationship distress (23%), academic pressure and examination failure (18%), financial crisis (17%), and depressive illness (8%) (Fig. 2).



**Fig. 1: Type of ligature materials**

**Table-II: Autopsy findings of the victims (n=157)**

Autopsy Findings	Frequency	Percentage
<b>Ligature mark over the neck</b>		
Above the thyroid cartilage	141	89.8
Over thyroid cartilage	11	7.0
Below the thyroid cartilage	5	3.2
<b>Position of the knot</b>		
Left side	92	58.6
Right side	46	29.3
Back	19	12.1
<b>Grooving of ligature</b>		
Evidence of a slip knot	98	62.4
Petechial hemorrhage	85	54.1
Tongue bite	58	36.9
Subconjunctival hemorrhage	62	39.4
Damaged neck muscle fibers	123	78.3
Damaged cervical vertebrae	25	15.9
Parchmentization	84	53.5
<b>Fracture</b>		
Thyroid cartilage	25	16.0
Hyoid bone	47	30.0



**Fig. 2:** Suspected causes behind suicidal hanging (n=157)

## DISCUSSION

Suicides are horrific tragedies of premature end of the lives and have profound effects on the lives of families and communities.<sup>1</sup> Unnatural deaths like suicidal hanging pose a significant burden in the society, particularly in low-income countries like Bangladesh.<sup>10</sup> Our study was based on the autopsy findings of 157 victims who committed suicide by hanging in Dhaka city, Bangladesh. The cases were documented between January and December of 2023. The findings of the present study were analyzed and compared with those reported in previously published literature. In this study, the majority of hanging cases (41.4%) were observed in the 21–30 years age-group, which is more or less consistent with the findings of several previous studies done in Bangladesh.<sup>9,11–15</sup> This may be attributable to the fact that individuals in this age-group represent the most active phase of life, during which individuals are particularly susceptible to diverse psychosocial challenges that lead to suicidality. Our study also revealed a predominance of female victims in suicidal hanging cases, which is consistent with findings from studies conducted in our country.<sup>9,11,12</sup> In contrast, a male predominance was reported by several previous studies.<sup>13,14,16–18</sup> Equal gender distribution was also evident.<sup>15,19</sup>

This study also brings attention to the contextual factors in Bangladesh, including poverty, social discrimination, and limited mental health resources for this fatality. For example, in our study, hanging deaths were uncommon among the elite people. Conversely, the highest incidence was observed in the middle class group, who may struggle to accept reality, suggesting a predominantly psychological

origin for these deaths. These findings are consistent with results reported in other studies on suicidal hanging.<sup>15,16,19</sup> Students were the most victims, followed by homemakers in our study, which is in congruence with the previous studies. It assumed that students face academic pressure, often social isolation, and mental stress that may contribute such tragedies. In contrast, suicidal hanging was found predominant among service holders.<sup>11,15</sup>

Among ligature materials, ropes were used most (44%), followed by different types of clothing materials. Our findings are comparable with several previous findings.<sup>11,12,16,18,20,21</sup> In this study, the ligature mark was most commonly located above the thyroid cartilage (89.8%), regardless of whether the hanging was complete or partial. Similar findings were observed in other studies.<sup>11,13,14,19,20</sup> This may be explained by the frequent use of slip knots, where the final tightening of the ligature typically occurs once the noose settles at the upper part of the neck.<sup>14</sup> Analysis of ligature mark morphology revealed that 86% of cases exhibited grooving, which is more or less similar to the previous findings.<sup>11,19</sup> In contrast, another study reported that only 54% of cases had grooving.<sup>20</sup> Internal study of sternocleidomastoid (neck muscle) fibres revealed injury/damage in 78.3% cases – most likely due to compression or traction from the ligature, which is similar to previous studies.<sup>11,19</sup> On the contrary, some other evidence showed very low incidence of damaged sternocleidomastoid fibers in suicidal hanging.<sup>4,6,21</sup> Our study also revealed that the thyroid and hyoid bones were affected in 16% and 30% of the victims respectively, which is relatively high. Similar findings were reported by another study.<sup>11</sup> In contrast, several studies showed no or low incidence of such fractures.<sup>4,13,19,21</sup> This discrepancy is likely due to the fact that the majority of his victims were in the fourth and fifth decades of life, when ossification increases the likelihood of fracture, whereas in the present study most victims were between 21 and 30 years. Parchmentization, a typical feature of hanging, was observed in 53.5% in our series. However, previous studies reported much higher incidence.<sup>4,6,9,11</sup>

The leading suspected cause behind suicidal hanging was familial disharmony, followed by financial crisis other contributing factors, which is consistent with findings from studies conducted in several

countries.<sup>13,16,18,19</sup> Moreover, the relatively high proportion among married individuals (72%) suggests that marital discord is an important contributor to suicidal hanging, which is consistent with the research findings from both home and abroad.<sup>11,14,18,19</sup>

Although this cross-sectional, descriptive study provides valuable information, its single-center setting at a tertiary care hospital limits the applicability of the findings to the wider population of the country. However, the study has substantial sample size and detailed autopsy assessments offer a comprehensive perspective on suicidal hanging in Bangladesh.

### CONCLUSION

Our study provides an in-depth insight into suicidal hanging in Bangladesh, highlighting common patterns and associated risk factors. Promoting education, empathy, and reducing excessive stress on young people can play a crucial role in lowering youth suicide rates. By preventing self-harm among this economically active segment of the population, a developing country like Bangladesh can also enhance its economic growth and productivity. Future research should explore the long-term impact of suicidal hanging on families and communities, as well as assess the effectiveness of various preventive strategies. Social, legal and psychiatric interventions are required to prevent suicide.

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**Ethical Approval:** The study was approved by the Ethical Review Committee of Shaheed Suhrawardy Medical College, Dhaka, Bangladesh.

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### REFERENCES

1. World Health Organization (WHO). Suicide world wide in 2021: global health estimates. Geneva: WHO; 2025.
2. Reddy KSN, Murty OP. The Essentials of Forensic Medicine & Toxicology. 34th ed. New Delhi: Jaypee Borthers; 2017.
3. Ambade VN, Tumram N, Meshram S, Borkar J. Ligation material in hanging deaths: the neglected area in forensic examination. *Egypt J Forensic Sci.* 2015;5(3):109-13.
4. Datta M, Banik SK, Datta M, Rahman KGM, Ara M, Islam M. Distinguishing suicidal hanging from homicidal ligation strangulation – a diagnostic accuracy study of autopsy and scene findings. *Insight.* 2025;8(2):432-8.
5. Sharma BR, Harish D, Sharma A, Sharma S, Singh H. 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.
6. Suárez-Peñaranda JM, Alvarez T, Miguéns X, Rodríguez-Calvo MS, de Abajo BL, Cortesão M, et al. Characterization of lesions in hanging deaths. *J Forensic Sci.* 2008;53(3):720-3.
7. Saternus KS, Maxeiner H, Kernbach-Wighton G, Koebeke J. Traumatology of the superior thyroid horns in suicidal hanging – an injury analysis. *Leg Med (Tokyo).* 2013;15(3):134-9.
8. Moinuddin SK, Basha VC. Hanging deaths at tertiary care teaching hospital. *Indian J Forensic Med Toxicol.* 2021;15(2):1142-7.
9. Alam MS, Islam MS, Uddin NM, Hasan MR, Nurunnabi M. Suicidal hanging deaths in Sylhet: autopsy analysis of 208 cases. *Shaheed Syed Nazrul Islam Med Coll J.* 2021;6(2):171-6.
10. Sultan MT, Nurunnabi ASM, Jahan Z, Mozaffor M. Socio-demographic profile of unnatural deaths: an autopsy study at a tertiary hospital in Dhaka city. *Barind Med Coll J.* 2025;11(2):30-3.
11. Siddiqi MM, Jabin N, Bari FJ, Mazumder MAK, Ferdous J, Suraiya R. Autopsy findings in suicidal hanging cases. *J Armed Forces Med Coll Bangladesh.* 2024;20(2):33-6.
12. Hossain M, Rahman Z, Akhter S. Suicidal death autopsy analysis at Dhaka Medical College. *Bangladesh Med J.* 2011;40(1):18-21.
13. Datta M, Banik SK, Zoha RB, Syeed S, Rahman R, Keya AT, et al. Autopsy-based indicators of suicidal hanging – a study of ligation marks, salivary signs, and parchmentization. *Insight.* 2025;8(3):623-9.
14. Ali E, Maksud M, Zubayra S, Hossain MS, Debnath PR, Alam A, et al. Suicide by hanging: a study of 334 cases. *Bangladesh Med J.* 2014;43(2):90-3.

15. Ahmed T, Ferdous J, Sultana SF, Hossain DI, Dey S, Jeba TR. Analysis of autopsy finding in suicidal death. *Planet*. 2024;8(1):212-6.
16. Mahesar RA, Raza Ul Mustafa A, Latif M, Azeema N, Rao MA, et al. Suicidal hanging in Pakistan: an exploratory two-year content analysis study. *Int Rev Psychiatry*. 2024;36(4-5):480-6.
17. Abd-Elwahab Hassan D, Ghaleb SS, Kotb H, Agamy M, Kharoshah M. Suicidal hanging in Kuwait: retrospective analysis of cases from 2010 to 2012. *J Forensic Leg Med*. 2013;20(8):1118-21.
18. Taktak S, Kumral B, Unsal A, Ozdes T, Buyuk Y, Celik S. Suicidal hanging in Istanbul, Turkey: 1979–2012 autopsy results. *J Forensic Leg Med*. 2015;33:44-9.
19. Rao d. An autopsy study of death due to suicidal hanging - 264 cases. *Egypt J Forensic Sci*. 2016;6(3):248-54.
20. Ambade VN, Tumram N, Meshram S, Borkar J. Ligature material in hanging deaths: the neglected area in forensic examination. *Egypt J Forensic Sci*. 2015;5(3):109-13.
21. Jayaprakash S, Sreekumari K. Pattern of injuries to neck structures in hanging - an autopsy study. *Am J Forensic Med Pathol*. 2012;33(4):395-9.