Original Article

Profile of Hanging Deaths in Lagos, Nigeria: A 9-Year Retrospective Autopsy Study

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Abstract

Introduction: Hanging is seen worldwide and is the most common method of suicide globally. Hanging in Western nations has been well documented. However, there appears to be a dearth of published data on hanging in Nigeria, Africa. The essence of this work is to look at the morphological characteristics and the epidemiological profile of victims who died from hanging. **Materials and Methods:** This was a 9-year retrospective autopsy study on hanging deaths from January 1, 2005, to December 31, 2013. The details of the injuries present were recorded in a predesigned format so as to minimize error. Such findings included age, sex, type of hanging, position of knot, number of turns of the ligature, and fracture of hyoid and thyroid cartilages. The findings noted were carefully compiled, tabulated, and analyzed using the Statistical Package for the Social Sciences version 20. **Results:** There were 22 cases of hanging during the study period representing 0.2% of the total autopsy cases. The mean age was 38 ± 12 years, ranging from 15 to 60 years. This was predominantly a male phenomenon, with males constituting 94.5%, whereas females accounted for only 4.5%. Hanging was most common in the fifth decade (27.3%). This was closely followed by the third and fourth decades. This study revealed that 95.5% had single loop. The knot was most common on the right representing 54.5% and least common at the occiput accounting for 13.6%. Hyoid bone fracture and thyroid cartilage fracture were seen in 22.7% each. **Conclusion:** This study has shown that the mean age of hanging was in the fourth decade in this environment, with an overwhelming male preponderance. Fixed single loop on the right side was the most common picture and a quarter had fracture of hyoid bone and thyroid cartilage. All the ligature marks were obliquely placed, and no fracture of cervical vertebrae was identified. A future study will be needed to determine what percentage of suicide is hanging in this part of the world.

Keywords: Hyoid, knots, loops, marks, thyroid cartilage

Introduction

Hanging is seen worldwide and is the most common method of suicide globally.[1-4] In the United States, hanging has become the second or third most frequent method of suicide attempts among adolescents and young adults.[5,6] According to the WHO, approximately one million people die from suicide, and 10–20 times more people attempt suicide worldwide every year.[7]

Hanging is a form of ligature strangulation in which the force affecting the neck region is resulting from the gravitational drag of the weight of the body or part of the body. The human neck is vulnerable to many types of life-threatening compression injuries such as hanging due to its relatively small diameter; lack of bony support; and close relation to the airway, spinal cord, and major vessels.[8] Hanging could be of two types, namely complete hanging in which the whole body is suspended from the ground and partial hanging where a part of the body touches the ground.[8]

The hanging or ligature mark almost never completely encircles the neck unless a slipknot was used. In most instances, the point of suspension is indicated by a gap in the skin mark, where the vertical pull of the rope leaves the tilted head to ascend to the knot and hence to the suspension point. This gap is usually seen at one or other side of the neck or at the center of the back of the neck. Apart from the appearances of the hanging mark, internal cervical findings such as petechiae or ecchymoses in the soft tissue, fracture of hyoid bone and/or thyroid cartilage,

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and bruising of neck muscles greatly contribute in making a diagnosis of hanging.[9-11]

Hanging in Western nations has been well documented,[5,6] but there appears to be a dearth of published data on hanging in Nigeria, Africa. We found three published articles relating to hanging in this country. The first was a study on the pattern of homicide in western part of Nigeria by Nwosu and Odesanmi;[12] Offiah *et al*.[13] in the Niger Delta region identified 22 cases of hanging in a study of suicide over a 10-year period; and lastly Seleye-Fubara *et al*.[14] identified only three cases of hanging in a 5-year study on violent deaths also in the Niger Delta region of Nigeria. Consequently, the essence of this work is to look at the morphological characteristics and the epidemiological profile of victims who died from hanging.

Materials and Methods

This was a 9-year retrospective autopsy study. It was carried out in the Department of Pathology and Forensic Medicine, Lagos State University Teaching Hospital, from January 1, 2005, to December 31, 2013. The materials for this study were bodies brought for autopsy to the department. All cases of hanging or suspected hanging were included in the study. Hanging cases that had been embalmed were excluded from the study.

A detailed history along with photographs was thoroughly studied before conducting the postmortem examination. Similarly, prior to dissection of the body, external examination of the whole body was carried out carefully. The ligature material including the knot where available was examined and photographed. Standard neck dissection was adopted throughout as outlined by Shapiro in Knight Forensic Pathology.[9] The details of the injuries present were recorded in a predesigned format so as to be as minimally error free as possible. Such findings included but not limited to age, sex, type of hanging, position of knot, number of turns of the ligature, contusion or bruising of neck tissues, and fracture of hyoid and thyroid cartilages. The findings noted were carefully compiled, tabulated, and analyzed using the IBM Statistical Package for the Social Sciences software version 20 (USA).

Results

There were 22 cases of hanging out of the 10,923 autopsies done during the study period. The mean age was 38 ± 12 years, ranging from 15 to 60 years. This was predominantly a male phenomenon, with males constituting 94.5% and females constituting only 4.5%. Hanging was most common in the fifth decade (27.3%). This was closely followed by the third and fourth decades, with equal frequencies representing 22.7% each [Table 1].

The study revealed that the ligature marks were obliquely placed in all the cases in contrast to ligature strangulation which is usually transverse. Similarly, not a single case had a fracture of the cervical vertebrae. In this study, 21 victims (95.5%) had single loop, while only one victim (4.5%) had double loop. The only one that had double loop made use of polyester fiber; in this case, the suspension was complete and typical. Furthermore, the loops were seen above the thyroid cartilage in 90.9% of cases and complete suspension was seen in 86.4%. The knot (all fixed) was most common on the right representing 54.5% and least common at the occiput accounting for 13.6% [Table 2].

In this study, hyoid bone fracture and thyroid cartilage fracture were seen in 22.7% each [Table 3]. Table 4 shows whether hanging was typical or atypical (based on the position of knot) in relation to the age groups. It showed absence of statistically significant

Table 1: The age distribution

Parameter	Frequency (%)
Sex	
Male	21 (95.5)
Female	1 (4.5)
Age category	
20 and below	2 (9.1)
21-30	5 (22.7)
31-40	5 (22.7)
41-50	6 (27.3)
51-60	4 (18.2)

Table 2: The distribution of the loops and frequency

Parameter	Frequency (%)
Number of loops	
1	21 (95.5)
2	1 (4.5)
Level of loops	
Above	20 (90.9)
Below	2 (9.1)
Position of knots	
Left	7 (31.8)
Right	12 (54.5)
Back	3 (13.6)
Type of suspension	
Complete	19 (86.4)
Partial	3 (13.6)
Type of hanging	
Typical	3 (13.6)
Atypical	19 (86.4)

Table 3: The frequency of fracture of hyoid and thyroid cartilage

Parameter	Frequency (%)
Fracture of thyroid	
Present	5 (22.7)
Absent	17 (77.3)
Fracture of hyoid	
Present	5 (22.7)
Absent	17 (77.3)

Figure 1: Typical hanging with a fixed knot

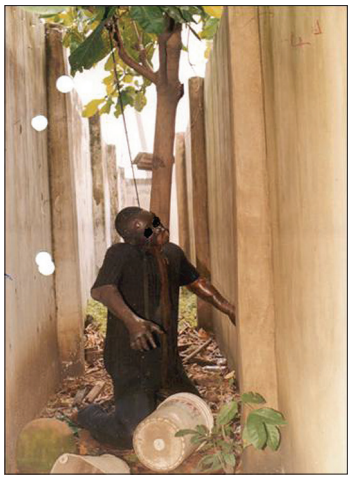

Figure 2: Atypical hanging with a fixed loop

Table 4: Type of hanging and the age distribution

Type of hanging	Age category (%)				
	≤20	21-30	31-40	41-50	51-60
Typical	1 (50.0)	1 (20.0)	-	1 (16.7)	-
Atypical	1 (50.0)	4 (80.0)	5 (100.0)	5 (83.3)	4 (100.0)
Total	2 (100.0)	5 (100.0)	5 (100.0)	6 (100.0)	4 (100.0)

P=0.642 not statistically significant

relationship ($P = 0.642$). Two cases were seen to have complete suspension and were not on the occipital region [Figures 1 and 2].

Discussion

Hanging is the most common method of suicide worldwide, as has been reported in many studies.[1-4,13,15-18] In this study, the age ranged from 15 to 60 years with a mean age of 38 ± 12 years, and males accounted for 94.5%. The preponderance of male in this study is compatible with most previous studies.[10,11,14,19] This observation in a wide variation between males and females could be attributed to the fact that males are more active in various activities and customs, and hence tend to be vulnerable to more stress and tension. Moreover, it has been established that men use more violent means of suicide which include hanging as against women who usually subscribe to drug overdose, burning, drowning, and poisoning.[20] Only few studies reported female predominance.[21,22] The reason for the sharp contrast is not known.

Most reported studies on the epidemiological pattern on hanging documented hanging to be most common between the ages of 21 and 30 years.[23-26] These findings are fairly in disagreement to the observation in our study which revealed 41–50 years as the most common decade. However, ours is fairly close to the work of Jayaprakash and Sreekumari in a study of pattern of injuries in India[19] who concluded that it was most common in the middle age.

In this study, all the loops were fixed, and single-loop pattern accounted for 95.5% of the cases. Similarly, in 90.9% of the cases, the loops were seen above the thyroid cartilage. These findings are similar to the observation of Sharma *et al*.[23] and Ali *et al*.[27]

In complete hanging, if the body is completely suspended with a fixed knot, the ligature mark will be completely oblique and continuous. This is in contrast to a slip knot which shows discontinuity.

In the same vein, the ligature marks were 100% oblique in the studies done by Momin *et al*.[28] and Naik.[29] These findings are compatible with our own observations which showed 100% oblique marks. It is also in agreement with a previous study in India that looked at ligature marks in strangulation and hanging.[30]

Furthermore, this study has shown that loops occur more on the right side (54.5%) than the left (31.8%). This might be due to the fact that most individuals are right handed. This observation is compatible with the works of Ahmad and Hossain[24] who documented it to be most common on the right (45.5%). The authors observed a contrary finding in the study done by Ali *et al*.[27] who concluded that the knot was more dominant on the left (60.8%).

Complete suspension and atypical hanging were seen in 86.4% in this study. Similar observations were made by Sharma *et al*.[23] in their study on injuries to the neck with special reference to hanging.

In this study, no single case of cervical fracture nor injury to the trachea was identified. This finding is similar to a previous report by Ahmad and Hossain.[24] It is generally not a common phenomenon for the cervical spine or larynx/trachea to be broken in suicidal hanging cases unless there is a long drop, which usually occurs when the victim selects a branch of a high tree as the point of suspension for hanging. These disruptive changes are commonly observed in judicial hanging.[31]

Our study revealed that hyoid bone fracture and thyroid cartilage fracture were seen in 22.2%. Previous studies observed a low incidence of hyoid bone fracture: Jayaprakash

and Sreekumari (2.7%), Meera *et al*. (3.5%), Chormunge *et al*. (7.14%), Sarangi (9.4%), and Shaikh *et al*. (11.4%).[19,32-35] These figures are quite lower than the findings in our study (22.2%) for each of hyoid and thyroid cartilage fractures. A relatively high figure of 64.5% was found in the study done by Tripude *et al*.[36] We opine that the relatively high figure in the Tripude's study could be a postmortem phenomenon. This is more often seen if care is not taken during the dissection of hyoid bone. In addition, hyoid bone fracture is commonly seen in the elderly in whom the bones are already ossified. This was not the case in this study as the mean age was the fourth decade. Furthermore, fracture of the cervical vertebrae is a function of the weight of the victim as well as the height of suspension. Tripude *et al*.[36] could have dealt with more obese individuals that fell from a significant height, although these details were not stated in their study.

Davison and Marshall[37] in 1968 had concluded that rope was the most common item used in Northern Ireland, and this is in tandem with our study as rope was the most item used except in three cases which comprise a shoelace, a cloth, and polyester fiber. Recent studies have now observed different uses of strong and easily available items/materials, and there appears to be no single dominant item[19,23,24,32] in various studies.

One of the major shortcomings was the inability to perform toxicological examination on samples of the victims. This would have assisted in identifying whether some of them were on drugs. The mental states of the victims were also not known. In addition, all the victims were brought in dead, and this could not provide us the opportunity to visit the scene of event; hence, we depended solely on photographs taken by the policemen. We could not also differentiate cases of suspected homicide from suicide by autopsy alone. We believe that the police investigators and the Coroner should be able to combine the autopsy findings with other investigation to conclude which of the case is homicide or suicide. Many of the cases are however lost to follow-up to confirm those that are concluded as suicide or homicide.

Conclusion

This study has shown that hanging deaths were seen in the fifth decade of life with an overwhelming male preponderance. Fixed single loop on the right side was the most common picture and approximately a quarter had a fracture of hyoid bone and thyroid cartilage. All the ligature marks were obliquely placed, and no fracture of cervical vertebrae was identified. A future study determining what percentage of suicide is hanging in this part of the world is advocated.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Kanchan T, Menezes RG. Suicidal hanging in Manipal, South India – Victim profile and gender differences. J Forensic Leg Med 2008;15:493-6.
2. Shetty CK. Suicide cases in Manipal, South India: An autopsy study. Int J Forensic Sci Pathol 2014;2:701.
3. Värnik A, Kõlves K, van der Feltz-Cornelis CM, Marusic A, Oskarsson H, Palmer A, *et al.* Suicide methods in Europe: A gender-specific analysis of countries participating in the "European Alliance against Depression". J Epidemiol Community Health 2008;62:545-51.
4. Wu KC, Chen YY, Yip PS. Suicide methods in Asia: Implications in suicide prevention. Int J Environ Res Public Health 2012;9:1135-58.
5. McHugh TP, Stout M. Near-hanging injury. Ann Emerg Med 1983;12:774-6.
6. United States Census Bureau. Statistical Abstract of the United States: 2004-2005. Washington, DC: US Census Bureau; 2005.
7. World Health Organization. Figures and Facts about Suicide. Geneva: World Health Organization; 1999. Available from: http://www.who.int/mental_health/prevention/suicide/suicideprevent/en/. [Last accessed on 2013 Oct 26].
8. Sharma BR, Harish D, Singh VP, Singh P. Ligature mark on neck: How informative? J Indian Acad Forensic Med 2005;27:10-15.
9. Saukko P, Knight B. Knight's Forensic Pathology. 2004 Edward Arnold (Publishers) Ltd London UK; 2004. p. 388.
10. Uzün I, Büyük Y, Gürpinar K. Suicidal hanging: Fatalities in Istanbul retrospective analysis of 761 autopsy cases. J Forensic Leg Med 2007;14:406-9.
11. 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;20:1118-21.
12. Nwosu SO, Odesanmi WO. Pattern of suicides in Ile-Ife, Nigeria. West Afr J Med 2001;20:259-62.
13. Offiah S, Obiorah CC. Pattern of suicide in Nigeria: The Niger Delta experience. J Med Investig Pract 2014;9:811.
14. Seleye-Fubara D, Nwosu SO. Violent deaths in Port-Harcourt, Nigeria 19951999. Niger J Surg Res 2003;5:124128.
15. Khalid N. Pattern of suicide causes and methods employed. J Comput Physicians Surg Pak 2001;11:759-61.
16. Kanchan T, Menon A, Menezes RG. Methods of choice in completed suicides: Gender differences and review of literature. J Forensic Sci 2009;54:938-42.
17. Khan MM, Hyder AA. Suicides in the developing world: Case study from Pakistan. Suicide Life Threat Behav 2006;36:76-81.
18. Gunnell D, Hawton K, Kapur N. Coroner's verdicts and suicide statistics in England and Wales. BMJ 2011;343:6030.
19. Jayaprakash S, Sreekumari K. Pattern of injuries to neck structures in hanging-an autopsy study. Am J Forensic Med Pathol 2012;33:395-9.
20. Batra AK, Dongre AP. A preliminary analysis of medico-legal autopsies performed over five years in a rural health district of Maharashtra state of India. J Forensic Med Toxicol 2003;20:41-6.
21. Naik SK, Patil DY. Fracture of hyoid bone in cases of asphyxial deaths resulting from constricting force round the neck. J Indian Acad Forensic Med 2005;27:149-53.
22. Saisudheer T, Nagaraja TV. A study of ligature mark in hanging deaths. Int J Pharm Biomed Sci 2012;3:80-4.
23. 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;15:298-305.
24. Ahmad M, Hossain MZ. Hanging as a method of suicide-retrospective analysis of postmortem cases. J Armed Forces Med Coll Bangladesh 2010;6:37-9.
25. Pal SK, Sharma A, Sehgal A, Kaushik N, Rana A. Hanging suicides

in Himachal Pradesh: An analysis of forensic cases. Int J Forensic Sci Pathol 2016;4:297-304.
26. Samanta AK, Nayak RS. Newer trends in hanging death. J Indian Acad Forensic Med 2012;34:37-9.
27. Ali E, Maksud M, Zubyra SJ, Hossain MS, Debnath PR. Suicide by hanging: A study of 334 cases. Bangladesh Med J 2014;43:90-3.
28. Momin SG, Mangal HM, Kyada HC, Vijapura MT, Bhuva SD. Pattern of ligature mark in cases of compressed neck in Rajkot Region: A prospective study. J Indian Acad Forensic Med 2012;34:40-3.
29. Naik SK. Obliquity vs. discontinuity of ligature mark in diagnosis of hanging – A comparative study. Anil Agarwal Internet J Forensic Med Toxicol 2006;7:2006.
30. Singh NK, Shubhend K, Mahto T, Chaudhary AK, Gawasker SP. Comparative study of ligature marks in cases of ligature marks and strangulation autopsied in RIMS, Ranchi. J Dent Med Sci 2018;17:1-5.
31. Shepherd R. Simpon's Forensic Medicine. 12th ed. London: Arnold Publishers; 2003. p. 98-101.
32. Meera T, Bipin K, Singh M. Pattern of neck findings in suicidal hanging. J Indian Acad Forensic Med 2011;33:350-2.
33. Chormunge P, Mahajan SV, Bhusari PA. Hanging vs. strangulation a comparative study. J Forensic Med Sci Law 2011;20:1-5.
34. Sarangi MP. Ligature mark/s – In forensic pathologist's perspective. J Forensic Med Toxicol 1998;1:99-102.
35. Shaikh MM, Chataliya HJ, Modi AD, Parmar AP, Kalele SD. A study of gross postmortem findings in cases of hanging and ligature strangulation. J Indian Acad Forensic Med 2013;35:63-5.
36. Tripude BH, Murkey PN, Pawar VG, Shende SA. Profile of hanging cases on autopsy at a tertiary care hospital in Central India. J Karnataka Med Leg Soc 2010;19:3-7.
37. Davison A, Marshall TK. Hanging in Northern Ireland – A survey. Med Sci Law 1986;26:23-8.