

ORIGINAL RESEARCH

Socio-Demographic Profile of Victims of Hanging Cases: An Autopsy Based Cross-Sectional Study Done in Police Morgue of a Medical College of West Bengal

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ABSTRACT

Background: The word asphyxia is of Greek derivation and means “a stopping of the pulse”. Any death is asphyxial in nature. But forensic pathology understands asphyxia as the interference with the exchange of oxygen and carbon dioxide in the body. Hanging and strangulation constitute asphyxia by compressing vital structures within the neck. Hanging is one of the ten leading causes of death in the world accounting for more than a million deaths annually. In India, hanging is one of the common methods of committing suicide. 2021 NCRB report also depicts the alarming rate of increase of suicide in the country. Over the past 30 years specially during and after the COVID-era the incidence of suicide by hanging is on increase, especially among young adults. 2021 NCRB report also depicts the alarming rate of increase of suicide in the country.

Materials and Methods: A cross-sectional study was conducted following the complete enumeration method over the body of deceased died due to hanging and came for medico-legal autopsy in Burdwan police morgue of West Bengal with specific Inclusion and Exclusion criteria. Study done on total 129 (N= 129) bodies of hanging cases Detailed information regarding the deceased, circumstances of death, its different sociodemographic parameters hanging were collected from the inquest, investigating officer and relatives.

Results: Results showed that most of the victims of hanging were males. Highest incidence was in the age group of 21 to 30 years. Most of the victims were Hindus by faith.

Conclusion: In Covid and Post-Covid era number of hanging cases has been increased mostly due to familial and socio-economical constrains.

Keywords: Social, Demography, Hanging, Autopsy, West Bengal.

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INTRODUCTION

The word asphyxia is of Greek derivation and means “a stopping of the pulse”. Any death is asphyxial in nature. But forensic pathology understands asphyxia as the interference with the exchange of oxygen and carbon dioxide in the body. Hanging and strangulation constitute asphyxia by compressing vital structures within the neck. Hanging is one of the ten leading causes of death in the world accounting for more than a million deaths annually. In India, hanging is one of the common methods of committing suicide. Over the past 30 years specially during and after the COVID-era the incidence of suicide by hanging is on increase, especially among young adults. 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.

A study was conducted to register the fractures of bony structures of the neck based on the radiological and dissection methods in Norway. Out of 80 suicidal hanging cases 58(73%) were men and 22(27%) were women with the average age of 38.7 years. There were 41 complete suspensions while 39 incomplete. There were 28 typical and 52 atypical hangings. Fracture of hyoid was found in 16% and of the thyroid cartilage in 12.5% of the cases. No cricoid fractures were seen. In the age group below 50 fractures of the hyoid bones were found only in 2.5% and of the thyroid cartilages in 9 % of the cases. It had been mentioned that fractures in the hyoid bone and thyroid cartilages were very often seen without any reaction in the form of haemorrhage.^[1]

A study conducted on 307 cases of accidental and suicidal hanging by 12 pathologists to assess the neck organ fractures had come out with the fracture incidence of 9% approximately. Of the 307 cases, 275 were male and 42 were female. Fractures of the hyoid bone, thyroid cartilage and cervical vertebrae were found in 29 of these cases; 4 in females (9.5%) and 25 (9.1%) males. Of the fracture observed, 21 were of the thyroid cartilage, 10 were of the hyoid bone, and 3 were of the cervical spine. Of the thyroid cartilage fractures, 20 were of the greater horn, and one was of the lower quarter.^[2]

A study of 50 cases of deaths due to hanging in Orissa in 1998 revealed that, 28 were males and 22 were females. Typical and complete hanging was seen in 14 cases, atypical and incomplete hanging as seen in 36cases. Rope was used in 26 cases, linen in 16 cases, electric wire in 8 cases as the ligature materials. 38 victims showed intense asphyxial signs with 13 cases showing fracture of the hyoid bone or thyroid cartilage. It seems that typical hanging is especially linked to the fractures and the congestion of the face corresponds to incomplete hanging. Localization of the postmortem staining depends on the length of time body is suspended. The study concluded that the frequency of fracture increases with the increase of suspension time.^[3]

A 10 year retrospective study conducted in Manipal, South India, to describe the victimologic profile and find the gender differences in suicidal hanging. A total of 70 cases of suicidal hanging autopsied during the study period spanning from January 1997 to December 2006 were identified. Males were predominantly affected (male: female – 2:1). Maximum victims of suicidal hanging were Hindus in their 3rd decade of life. Mean age for males and females was found to be 40.62 years and 29.96 years respectively. Maximum mortalities were noted during summer months. Deaths due to hanging which were suicidal in manner constituted 4.5% (n = 70) of the total autopsied cases during the study period. 84.3% of the victims (n = 59) were Hindus, followed by 10% Christians (n = 7) and 1.4% Muslims (n = 1). In three cases religion of the deceased remained unknown.^[4]

Another work of Sharma et al.(2008) on 1746 medico-legal autopsies conducted in Chandigarh revealed that, 5% of deaths were due to asphyxia of which 82% were those of

constriction of neck. The 21-30 years age group contributed for the maximum number of cases (57%). Male: female ratio was 2:1. Hanging (69%) outnumbered other asphyxial deaths-- ligature and/or manual strangulation, smothering, etc. Injury to the sternocleidomastoid muscle (54%) was the commonest injury to the neck structures. The hyoid bone was fractured in 21% cases, while the thyroid cartilage was fractured in 17% cases. Complete hanging was noted in 68% of cases while the hanging was atypical in 88%. Fixed knot was found to have been used in 71%. A single loop round the neck was observed in 80% of the cases and it was above the level of thyroid in 58% cases. Most cases of the fracture of the laryngo-hyoid complex were in the 41-60 year age group, 72% and the fracture was on the same side as the knot in 52% cases.^[5]

A study was undertaken at Jamnagar in 2002 comprising of 23 cases of hanging deaths. 15 victims were male and 8 were female. The age range was from 11 years to 80 years and the commonest group was between 21-30 years. Most commonly used ligature material was cotton rope followed by saree and nylon rope. Fixed noose was found in 52.2% cases, sliding noose in 39.1% and without noose in 8.7% of cases. 39.2% of the cases were typical hanging and 60.8% were atypical hanging. 60.8% of cases were completely suspended, while 39.2% of the cases were partially suspended. The highest level of ligature was at the back of the neck in most of the cases. In 69.6% cases duration of suspension was less than 6 hours, in 17.4% it was between 6-12 hours and in 8.7% it was more than 12 hours. Duration of suspension was not known in 4.3% of the cases. In 39.1% of cases breadth of ligature mark was less than 1 cm, in 30.4% cases it was 1-2 cm and in 4.3% of cases it was 4- 5 cms. In 4 cases(17.4%) injury to the hyoid bone was observed and no other osteo-cartilaginous structure was found to be involved. In hanging ligature mark is commonly located in upper part resulting in compression on the hyoid bone to greater extent as compared to rest of osseocartilaginous structures. The incidence of injury to hyoid bone is increasing with increase in age up to 50 years and with typical and complete type of hanging. The incidence of injury to hyoid bone was higher in cases with highest level of ligature mark at the back of middle of neck. The incidence of fracture of hyoid bone is higher in cases not showing congestion of face. The incidence of fracture increases with increase in duration of suspension and is higher with narrow ligature mark.^[6]

An earlier work on 540 suicidal attempters at Davanagere, Karnataka, showed that, out of the 540 suicidal attempters, 61.3% were males and 38.7% were females, which gave a male-to-female ratio of 1.6:1. More number of males attempted suicide in 20- to 39-year age group. Hindus constituted about 94.6% of the total suicidal attempters and only few (5.4%) were Muslims. The reason may be due to the large Hindu population residing in that area. Approximately 27.4% of the subjects had not received any education. Almost half (52.2%) of suicidal attempters had education below or up to matriculation. The proportion of females with education up to college and above was more (23.4%) compared to males (18.4%). Most (83%) of the suicidal attempters were from the lower (classes IV and V) socio-economic groups. Majority of the suicidal attempters (55%) were from nuclear families, about 33.1% were from joint families and 11.7% of them were from three-generation families Majorities (62.4%) of the attempters were married, 33.9% were unmarried and 2.4% of them were widows or widowers. The proportion of married and unmarried male attempters was 60.4% and 38.1%, respectively and in females it was 65.6% and 27.3%, respectively. Most common cause was family problem (27.2%) followed by illness (27%). Family problem (27.5%) topped the list in males and illness (33%) in females.^[7]

In the present study, an attempt has been made to address the problem of increased rate of death due to hanging, especially during covid-era.

MATERIALS & METHODS

After getting the ethical clearance from the IEC of the Medical College, a descriptive, cross-sectional study was conducted following the complete enumeration method over the body of deceased died due to hanging and came for medico-legal autopsy in Burdwan police morgue of West Bengal with the following Inclusion and Exclusion criteria-

Inclusion Criteria

Asphyxial deaths **only** due to hanging.

Exclusion Criteria

Decomposed bodies.

Study done on total 129 (N= 129) bodies of hanging cases which were brought for autopsy examination in the Burdwan police morgue where socio-demographic profile of those deceased were studied. Detailed information regarding the deceased, circumstances of death, its different sociodemographic parameters hanging were collected from the inquest, investigating officer and relatives.

RESULTS

Sex wise distribution of hanging cases

Of the 129 cases of hanging autopsied 88 (68.20%) were male and 41 (31.80%) were female, with a male to female ratio of 2.15:1. This is shown in table number 1 & graph number 1. The mean age of the male victim was 38.19 ± 14.26 years and the mean age of the female victim was 27.41 ± 15.59 years as shown in table 2A & graph 2. Independent t-test (student t-test) showed that the mean age difference between male and female is statistically significant (t value- 3.881, degree of freedom-127, p value-0.00) as shown in table 2B.

Table 1: Distribution of study population according to sex (n=129)

| Sex | Frequency | Percentage |
|--------|-----------|------------|
| Male | 88 | 68.2% |
| Female | 41 | 31.8% |
| Total | 129 | 100% |

Table 2A: Mean age of both sexes in study population

Mean age of both sexes in study population

| Sex | Age | | |
|--------|-------|-----|----------------|
| | Mean | N | Std. Deviation |
| Male | 38.19 | 88 | 14.256 |
| Female | 27.41 | 41 | 15.587 |
| Total | 34.77 | 129 | 15.474 |

Table 2B: Independent t-test between Age and Sex of the study population

| | | Independent Samples Test | | | | | | | | |
|-----|-----------------------------|---|------|------------------------------|--------|-----------------|-----------------|-----------------------|---|--------|
| | | Levene's Test for Equality of Variances | | t-test for Equality of Means | | | | | | |
| | | F | Sig. | t | df | Sig. (2-tailed) | Mean Difference | Std. Error Difference | 95% Confidence Interval of the Difference | |
| Age | Equal variances assumed | .043 | .837 | 3.881 | 127 | .000 | 10.779 | 2.777 | 5.283 | 16.274 |
| | Equal variances not assumed | | | 3.756 | 72.213 | .000 | 10.779 | 2.870 | 5.058 | 16.499 |

Age wise distribution of hanging cases

Mean age of the cases is **34.77** years with a standard deviation of **15.47** years and the age range of the victim is **9 to 82** years. Majority of the cases, **38 (29.50%)** out of 129 falling into the age group of **21 to 30** years, followed by **31 to 40** years (**29**cases, **22.50%**), **11 to 20** years (**19** cases, **14.70%**), **41 to 50** years (**18** cases, **14%**) and **51 to 60** years (**15** cases, **11.60%**). **First, sixth, seventh and eighth** decade had **2(1.6%)**, **4(3.1%)**, **3(2.1%)** and **1(0.8%)** cases respectively shown in table 3, table 4.

Table 3: Age distribution of the study population

| | N | Range | Minimum | Maximum | Mean | Std. Deviation |
|----------|----------|--------------|----------------|----------------|-------------|-----------------------|
| Age(yrs) | 129 | 73 | 9 | 82 | 34.77 | 15.474 |

Table 4: Distribution of study population according to age-range (n=129)

| Age Range | Frequency | Percent(%) |
|------------------|------------------|-------------------|
| 0-10 yrs | 2 | 1.6 |
| 11-20 yrs | 19 | 14.7 |
| 21-30 yrs | 38 | 29.5 |
| 31-40 yrs | 29 | 22.5 |
| 41-50 yrs | 18 | 14.0 |
| 51-60 yrs | 15 | 11.6 |
| 61-70 yrs | 4 | 3.1 |
| 71-80 yrs | 3 | 2.3 |
| 81-90 yrs | 1 | 0.8 |
| Total | 129 | 100.0 |

Age and Sex wise distribution of hanging cases:

Majority of the male were from **4th** (**25** cases among **88** male victims) and **3rd** (**23** cases among **88** male victims) decade of age, where as majority of the female were from **3rd** (**15** cases out of **41** female victims) and **2nd** (**14** cases out of **41** female victims) decade of age as shown in table 5.

Table 5: Sex distribution of different age ranges

| | | SEX | | Total |
|------------------|-----------|-------------|---------------|--------------|
| | | Male | Female | |
| Age Range | 0-10 yrs | 0 | 2 | 2 |
| | 11-20 yrs | 5 | 14 | 19 |
| | 21-30 yrs | 23 | 15 | 38 |
| | 31-40 yrs | 25 | 4 | 29 |
| | 41-50 yrs | 18 | 0 | 18 |
| | 51-60 yrs | 11 | 4 | 15 |
| | 61-70 yrs | 3 | 1 | 4 |
| | 71-80 yrs | 2 | 1 | 3 |
| | 81-90 yrs | 1 | 0 | 1 |
| Total | | 88 | 41 | 129 |

Religion wise distribution of hanging cases

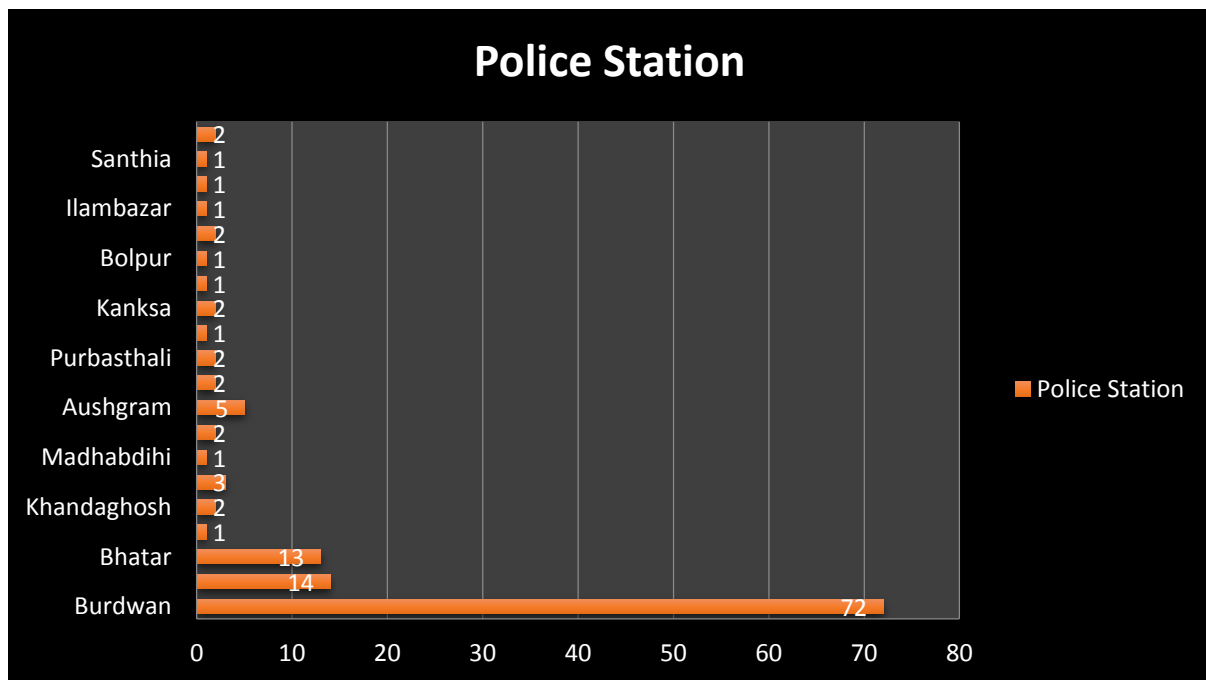
Of the 129 cases of hanging autopsied 106 (82.20%) were Hindu, 17(13.20%) were Muslim as shown in table 6. The mean age of the Hindu victim was 36.45 ± 16.01 years and the mean age of the Muslim victim was 25.28 ± 8.75 years as shown in table 7.

Table 6: Distribution of study population according to religion

| RELIGION | | |
|-----------|-----------|---------|
| | Frequency | Percent |
| Hindu | 106 | 82.2 |
| Muslim | 17 | 13.2 |
| Not known | 6 | 4.7 |
| Total | 129 | 100.0 |

Table 7: Religion wise mean ages

| Religion vs Age | | | |
|-----------------|-------|-----|----------------|
| RELIGION | Mean | N | Std. Deviation |
| Hindu | 36.45 | 106 | 16.010 |
| Muslim | 25.18 | 17 | 8.748 |
| Not Known | 32.17 | 6 | 10.998 |
| Total | 34.77 | 129 | 15.474 |



Graph 1: Radar diagram showing Distribution of cases according to police stations

DISCUSSION

I] Sex wise distribution of hanging cases

In the current study of the 129 cases of hanging autopsied 88 (68.20%) were male and 41 (31.80%) were female, with a male is to female ratio of 2.15:1 (Table 1). The mean age of the male victim was 38.19 years and the mean age of the female victim was 27.41 years (Table 2A and graph 2). Independent t-test(student t-test) showed that the mean age difference

between male and female is statistically significant (t value- 3.881, degree of freedom-127, p value-0.00) as shown in table 2B. The result of current study (regarding Male is to Female ratio) is almost concordant with the studies done by Kanchan & Menezes⁽⁴⁾, Sharma et al.^[5], Jani C.B. and Gupta B.D.^[6] where the number of male victims were almost double or more than double of the number of female victims. However, this study differs from earlier works Balabantaray J.K.^[3], Nikolic Nagendragouda & Rao^[7], where the sex ratio was almost 1.2:1. The result of current study (regarding Mean age of victim) is almost similar with the study done by Kanchan & Menezes^[4] where mean age of male victims (40.62 years) were more than that of female victims (29.96 years). Male : Female ratio in Burdwan district of West Bengal according to census 2011 is 945 Females to 1000 Males. So, matching with the trend of sex ratio, in current study of hanging cases Males have outnumbered Females by more than 2 times (Male is to Female ratio is 2.15:1). This difference in the sex ratio may be explained by the gender specific risk factors viz unemployment, economic difficulties, familial disputes, alcoholism, substance abuse, chronic diseased condition, psychiatric problems etc. As the male has to bear all the difficulties of a family so, they are more prone to self-harm. The mean age of Male victim (38.19 years) is also higher than that of Female victims (27.41 years). The probable cause may be alcoholism, economic difficulties, chronic diseased condition in male victims and early age of marriage, dowry demands, domestic violence in case of females.

II] Age wise distribution of hanging cases

In the current study of the 129 cases of hanging autopsied, mean age of the cases is 34.77 years with a standard deviation of 15.47 years and the age range of the victim is 9 to 82 years. Majority of the cases, 38 (29.50%) out of 129 falling into the age group of 21 to 30 years, followed by 31 to 40 years (29 cases, 22.50%), 11 to 20 years (19 cases, 14.70%), 41 to 50 years (18 cases, 14%) and 51 to 60 years (15 cases, 11.60%). First, sixth, seventh and eighth decade had 2(1.6%), 4(3.1%), 3(2.1%) and 1(0.8%) cases respectively shown in table 3, table 4 & graph number 3. The result of current study (regarding age range) is concordant with the study done by Jani C.B. and Gupta B.D.⁽⁶⁾, where the age range found 10 years to 87 years and discordant with the study of Sharma et al.⁽⁵⁾ where age range was smaller (15-60 years). However, result of age distribution in current study is in concordance with the earlier works Sharma et al.⁽⁵⁾, Jani C.B. and Gupta B.D.⁽⁶⁾ where most of the victims were from the 21-30 years age group. Most of the cases are from 2nd and 3rd decade of ages. The reason for this may be due to failure in love, inadequate performance in the academic institution, unemployment, familial disputes, dowry related problems, early marriage, domestic violence, substance abuse, depression due to various causes.

III] Age and Sex wise distribution of hanging cases

In the current study of the 129 cases of hanging autopsied, majority of the male were from 4th (25 cases among 88 male victims) and 3rd (23 cases among 88 male victims) decade of age, where as majority of the female were from 3rd (15 cases out of 41 female victims) and 2nd (14 cases out of 41 female victims) decade of age as shown in table 5 and graph 4. In a study done by Nagendragouda & Rao⁽⁷⁾, it was found that more number of male victims were from 20- to 39-year age group. The reason for this current result may be due to love failure, inadequate performance in the in the academic institution, unemployment, familial disputes, alcoholism, substance abuse which accounts for more male cases in the later decades.

IV] Religion wise distribution of hanging cases

In the current study of 129 cases of hanging, 106 (82.20%) were Hindu, 17(13.20%) were Muslim as shown in table 6 and graph 5. The mean age of the Hindu victim was 36.45 years and the mean age of the Muslim victim was 25.28 years as shown in table 7 & graph 6. In Burdwan district Muslim communities constitute for 19.78% of whole population according to census, 2011. Most of the victims are from Hindu communities which is consistent with the percentage of population statistics. The mean age of Hindu communities (36.45 years) is also higher than that of Muslim communities (25.28 years). The result of current study (regarding site of knot) is almost in concordance with the studies done by Kanchan & Menezes⁽⁴⁾, Nagendragouda & Rao⁽⁷⁾ where majority of the victims were of Hindu religion (84.3%-94.6%). The reason for above observation may be due to dowry related stress, unemployment, prolonged illness, failure in examinations, relationship and financial problems, alcoholism, substance abuse with population statistics of local area. The reason for the lower mean age among Muslim victims may be due to early marriages and early exposure to the reality of life arising from stresses stemming from social practices and perceptions.

V] Distribution of cases according to police stations

In the current study of 129 cases of hanging, most of the cases were under the jurisdiction of BURDWAN police station (72 cases, 55.81%), followed by MEMARI (14 cases, 10.85%) and BHATAR (13 cases, 10.07%) police station of BURDWAN district, where as very few cases were referred from BIRBHUM district as shown in table 8 and graph 7. Burdwan, one of the largest district of West Bengal, about 100 KM away from Kolkata, comprises of five sub-divisions- Burdwan (Sadar), Asansol, Durgapur, Katwa and Kalna covering the total area of 7035.86 Sq. KM. There are total 32 police stations in this district. As Burdwan police station covers a large area and most of the cases are referred to the Emergency Department of Burdwan Medical College and Hospital, so most of the cases are from Burdwan Police Station.

CONCLUSION

In Covid and Post-Covid era number of hanging cases has been increased mostly due to familial and socio-economical constrains.

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REFERENCES

1. Morild I. Fractures of neck structures in suicidal hangings. *Medical Science and Law*. 1996; 36(1):80-4
2. Feigin G. Frequency of neck organ fractures in hanging. *Am Forensic Med Pathol*.1999; 20(2): 128-30
3. Balabantaray J.K. Findings in Neck Structures in Asphyxiation due to Hanging. *Journal of the Indian Academy of Forensic Medicine*, 1998;20(4): 82-4.
4. Kanchan T, Menezes RG. Suicidal hanging in Manipal, South India Victim profile and gender differences. *J Forensic Leg Med*.2008 Nov;15(8):493-6.
5. Sharma BR, Harish D, Sharma A, Sharma S, Singh H. Injuries to neck structures in death due to constriction of neck, with a special reference to hanging. *J Forensic Leg Med*. 2008; 15: 298-305.

6. Jani C.B., Gupta B.D. An autopsy study of parameters influencing injury to osteocartilaginous structures of neck in hanging. *International Journal of Medical Toxicology & Legal Medicine*. 2002; 5(1): 4-7
7. Nagendra Gouda M, Rao SM. Factors Related to Attempted Suicide in Davanagere. *Indian J Community Med*. 2008 Jan;33(1): 15–8.