

NECK COMPRESSION ASPHYXIAL DEATHS BY LIGATURE – A DEMOGRAPHIC PROFILE OF WESTERN RAJASTHAN

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Abstract

The tripod of life comprises of three vital organs namely brain, heart and lungs. Serious pathological and morphological abnormalities of any part of the body prove fatal due to direct or indirect involvement of either or all of the organs of tripod of life. Essential structures of neck including nerves, blood vessels, and other have a direct or indirect control on the function of respiratory, circulatory and nervous system. The compression of the neck involving the important structures may prove fatal. One of the major modes of death is asphyxia and type of asphyxia most commonly encountered in medico legal practice is mechanical asphyxia. Among the means of producing mechanical asphyxia, constriction around the neck plays a major role.

Background: Hanging is one of the most common methods of suicide in India; other types of hangings are homicidal hanging, judicial hanging, and autoerotic hanging (camps et al, 1976)³. Hanging differs from strangulation in which the neck is constricted irrespective of any effect caused by the weight of the body. The various structures damaged in hanging and strangulation include the soft tissues like skin, subcutaneous tissue, fascia, muscles, blood vessels, lymph nodes and the bony and cartilage tissues like the hyoid bone and larynx (A. Keithmant, 1984)¹.

Various forms of strangulations are ligature strangulation, throttling, mugging, garroting, bansdola etc (Simpson and knight, 1988)¹³.

As till now very less studies has been carried out in western Rajasthan on demographic pattern of deaths due to compression of neck by ligature material. A study of asphyxial deaths by ligature material that is hanging and ligature strangulation in relation of sex, age, region and religion has been undertaken.

Keywords: Hanging, Strangulation, Ligature, Neck, Demographic, Medico-Legal.

The aims and objectives of study

1. To find out the incidence of hanging and ligature strangulation in Western Rajasthan, specially in Jodhpur region.
2. To study the socio demographic profile (various sociological factors viz. rural/urban, caste/religion, age/sex,) affecting in cases of asphyxial deaths by compression of neck by ligature.
3. To compare the pattern of demographic distribution, found in the present study with other similar studies by different workers.

Review of literature: Hanging is a form of death produced by suspension of the body by a ligature round the neck, constricting force being the weight of the body (or a part of the body weight). Hanging is best defined as the constriction of neck by a ligature

tightened by the weight of the body. Mostly reported cases of hanging have occurred in adults and in that group majority were suicidal (Bowen, 1982)².

Sharma et al¹⁵ studied 2668 medico-legal cases during 1997-2004 and observed that 91 cases (3.4%) deaths were due to hanging and four cases (0.15%) deaths were due to ligature strangulation. Another study carried out by Joshi Rajeet et al⁷ in which maximum number of cases of hanging were observed in the age group of 21- 30 years (12 out of 25 that is 48%) followed by age group of 31-40 (6 out of 25 that is 24%). In another study on violent asphyxia deaths in Imphal incidences were higher in males than in females Fimate L.⁵ Yadav, Anil et. al. (2009)¹⁸ studied 94 cases from 2007 to 2008, out of them 91 hanging, 3 ligature strangulation, 21-30 age

group were maximum in hanging followed by 11-20 age group and than 31-40 year. **Shalender Kumar et al (2019)¹⁴** in his study observed that maximum number of suicides by hanging seen in the age group of 20-29 years, 20% in males and 12% in females and highest among Hindu population 96% followed by Muslims 4% and males outnumbered the females in committing suicide by hanging.

Ligature strangulation is a violent form of death which results from constricting the neck by means of a ligature without suspension of body. In strangulation, the exchange of air between the atmosphere and the lung is prevented by way of constriction of the neck by means of ligature material without suspending the body of the victim where the force of constriction is applied from outside (exogenous in origin) and is not the weight of body or the head of the victim.

Incidences of strangulation in both sexes of various age groups are reported and are variable. **Nayak S.K. et al (2005)¹²** noted 7 cases of strangulation in which 2 were male and 5 were female and maximum number of cases belongs to 21-30 years of age group. **Joshi Rajeev et al (2007)⁷** observed that out of 18 cases of ligature strangulation in which 9 cases were male and 9 were female and majority of cases being to 21-30 years of age group. **Sheikh et al (2009)¹⁶** observed that in all 7 cases of strangulation victim were male.

Morild (1996)¹⁰ in his study in suicidal hanging cases found that average age of hanging cases was 38.7 years. In study conducted by **Tabata (1998)¹⁷** maximum number i.e. 33.3% cases were observed in 0-10 year age group while 6.7% cases were observed in 21-30 year age group. 60% of the cases were males and 40% were female. **Sheikh et al (1999)¹⁶** found that out of 2047 post-mortem examination, 66 cases were of hanging and ligature strangulation. Out of these 49 were male and 17 were female. Death due to hanging and strangulation were observed more commonly in age group of 21-30 years followed by 11-20 years and 31-40 years. Married cases were double than unmarried cases.

Material and method:

The present study has been conducted in the department of Forensic Medicine and Toxicology at Dr. S.N. Medical College and attached Hospitals (MGH and MDMH) Jodhpur during the period of 1 January to 31 December 2017. During this period a total number of 104 cases of hanging and ligature

strangulation were observed, which are brought for postmortem examination through various police stations of Jodhpur with alleged history of suicide by hanging and homicide by ligature strangulation. Highly decomposed and charred burnt bodies were not included in this study. A detailed history regarding socioeconomic status, marital status, habits, prevailing mental illness, suicidal note etc. were enquired from the police/ other persons i.e. relatives/public etc.

Inclusion criteria - 1. All cases brought with history of suicide by hanging and homicide with ligature strangulation.

2. Cases diagnosed as suicide by hanging and homicide by ligature strangulation after post mortem examination.

Exclusion Criteria - Unclaimed, unknown, highly decomposed and charred burnt bodies without relevant history.

Observation-

Table 1: Distribution of Cases

Hanging	Ligature Strangulation	Total
100 (96.15)	4 (3.85)	104 (100.00)

Table 2: Age and gender wise distribution of cases

Age Group in	Type of Neck Compression						Total
	Hanging			Ligature Strangulation			
	Male	Female	Total	Male	Female	Total	
11-20	9 (9.00)	6 (6.00)	15 (15.00)	1 (25.00)	—	1 (25.00)	16 (15.38)
21-30	30 (30.00)	14 (14.00)	44 (44.00)	—	2 (50.00)	2 (50.00)	46 (44.23)
31-40	22 (22.00)	6 (6.00)	28 (28.00)	1 (25.00)	—	1 (25.00)	29 (27.88)
41-50	7 (7.00)	2 (2.00)	9 (9.00)	—	—	—	9 (8.65)
51-60	2 (2.00)	1 (1.00)	3 (3.00)	—	—	—	3 (2.88)
>60	1 (1.00)	—	1 (1.00)	—	—	—	1 (0.96)
Total	76 (76.00)	24 (24.00)	100 (100.00)	2 (50.00)	2 (50.00)	4 (100.00)	104 (100.00)

Table -2, depicts that maximum number of cases were found in age group 21 to 30 years (46 cases, 44.23%) followed by 31 to 40 years (29 cases, 27.88%) and then age group 11 to 20 years (16 cases, 15.38%). Notably in this study lowest age group to commit hanging is 16 years male followed by 17 years male.

Table 3: Gender and religion wise distribution of cases

Type of Neck Compression	Hindu			Muslim			Total
	Male	Female	Total	Male	Female	Total	
Hanging	68 (68.00)	28 (28.00)	96 (96.00)	3 (3.00)	1 (1.00)	4 (4.00)	100 (96.15)
Ligature Strangulation	2 (50.00)	2 (50.00)	2 (100.00)	–	–	–	4 (3.84)
Total	70 (67.31)	30 (28.85)	100 (96.15)	3 (2.88)	1 (0.96)	4 (3.84)	104 (100.00)

Table - 3, depicts the gender and religion wise distribution of cases which clearly indicates that among the two religions predominantly Hindu male (68 cases, 65.38%) has ended their life by hanging followed by Hindu female (28 cases, 26.92%). Only four (4) cases of Muslim community have committed suicide by hanging.

71 cases, 68.27% male and 29 cases, 27.88% female has committed suicide by hanging therefore male has outnumbered the female in committing suicide by hanging so the male: female ratio is 2.45:1

The ligature strangulation was observed equally in females and males of Hindu community and no case was found in Muslim community.

Table 4: Habitat and gender wise distribution of cases

Habitat	Hanging			Ligature Strangulation			Total
	Male	Female	Total	Male	Female	Total	
Urban	63 (63.00)	22 (22.00)	85 (85.00)	–	–	–	85 (81.73)
Rural	8 (8.00)	7 (7.00)	15 (15.00)	2 (50.00)	2 (50.00)	4 (100.00)	19 (18.27)
Total	71 (71.00)	29 (29.00)	100 (100.00)	2 (50.00)	2 (50.00)	4 (100.00)	104 (100.00)

Table - 4, depicts that maximum number of cases of hanging were observed in urban males, (63 cases, 63%) and followed by urban female, (22 cases, 22%). Rural males, (8 cases, 8%) were about to same over rural females, (7 cases, 7%) in committed suicide by hanging.

Ligature strangulation were observed in 1 case of male of rural habitat (25%) and 2 cases of females of rural habitat (50%), died due to homicidal ligature strangulation and rural male (1 cases, 25%) sustained accidental ligature strangulation. Suicide is predominant in urban area as compared to rural area.

DISCUSSION:

In this present study the maximum number of cases

who committed suicide by hanging were found in 21-30 years (44.23%) age group followed by 31-40 years (27.88%). The lowest age group who has committed suicide by hanging is 16 years followed by 17 years.

The observation are consistent with the studies of Monochand et al (1998)⁹, Sheikh et al (1999)¹⁶, Joshi et al (2007)⁷ and Shalender Kumar et al (2019)¹⁴.

21-30 year age group involves maximum number of cases because it is the most active period of one's life, people become violent and arrogant in this age group. People are more vulnerable to the fast changing social trends and cultures, as they are mentally a bit immature with little experiences of life and there is great fluctuation of emotions in this age group, suffering from all type of stress and strain i.e. domestic, economic, unemployment, educational, marital conflicts, failure in love and examination etc. But in age group of 60 years and above committing suicide by hanging due to mental illness and drug addiction.

Among all the religions predominantly Hindu males 68 (65.38%) cases ended their life by hanging followed by Hindu female, 28 (26.92%) cases. Only four (4) persons of Muslim community committed suicide by hanging. So the male has outnumbered the female in committing suicide by hanging, male (71): female (29), Male: female = 2.45:1. The observation are consistent with the studies of Shalender Kumar et al (2019)¹⁴.

Total (71) males have committed suicide by hanging; out of them (68) were Hindus. Out of 29 females 28 committed suicide by hanging where Hindus. As four (4) cases were strangled by ligature. 2 males and 2 females were suffered from ligature strangulation. The reason for this can be attributed to the cause that they are unable to cope-up with the stress of the life, aggressiveness, and lack of patience, out burst of temper, for their emotional, psychological and hormonal changes in the pre and post pubertal age group. Male are more active than female in society and customs and hence they are vulnerable for more stress and strain. The female opt for other measures of suicide like poisoning, burning, etc. other than hanging.

The high incidence of hanging in male is more or less similar to the study of Sheikh et al (1999)¹⁶ who observed 71.2 % males and 28.8 female. Tabata et al (1998)¹⁷ has observed 60 % male and 40 female

cases, Gargi et al 1992, Momanchand et al (1998)⁹, Shalender Kumar et al (2019)¹⁴ has observed 60% male and 40% female and Jani et al (2002)⁶ also in accordance.

In our study the ligature strangulation cases were equally observed in Hindu males and Hindu females which is different to the various studies.

The demographic profiling of the area of the study indicate that it has mixed population, consisting of Hindu/ Muslim/ Sikh/ Christian community and reflects the national demographic religion wise distribution of population. The cases of hanging and ligature strangulation are strictly confined to Hindu/ Muslim population, Hindu - 100 (96.15%) cases / Muslim 4 (3.85%) cases. The higher incidence of cases in Hindus is explained by their population in our country, which is in line with the current population as per census 2011, which shows the Hindus are 68% to the total population of minorities including Muslims 32%. Due to less accessibility of housing facilities in the Muslim community so they do not have opportunity to kill oneself by hanging, and Hindu community has abundant housing (Home) facilities as compared to Muslim community so they can easily find a lonely place to commit suicide by hanging, therefore it is more common in Hindu community than the Muslim community.

The maximum numbers of cases of hanging were observed in urban males 63 (63%) cases followed by urban females 22 (22%) cases and rural males 8 (8%) cases were predominant over rural females 7 (7%) cases respectively. Ligature strangulation was observed in 1 case of male of rural habitat and 2 cases of females of rural habitat. One case of accidental ligature strangulation was observed in a rural male with history of catching of neck by a cotton rope while playing which is common in young age group and is in accordance with Dixit P.C. (2007)⁴, Nandy A (2010)¹¹, Modi (2015)⁸.

Suicide is predominant in urban as compared to rural areas. Now a day due to globalization and urbanization the people are migrating from other districts and other states which cause increase in population of the city, the urban people have lots of business failures and social problem. So these factors play a contributing role to commit suicide. The ligature strangulation cases are equal to males and females this indicates that there is equal violence against males and females in urban areas.

We did not come across any study where habitat wise distribution of such cases has been studied, hence not compared. Only Joshi et al's⁴⁴ observations are quite similar to our study.

Conclusions:

The study concluded with the following conclusions:

1. The commonest age group in both hanging and ligature strangulation was 21-30 years, 46 (44.23%) cases and followed by 31-40 years 29 (27.88%) cases respectively. Alternatively, maximum numbers of suicide by hanging were in the age group below 40 years (87%) and rest (13%) above the age of 40 years.
2. Hanging was common among males (71%) and equal in ligature strangulation among females (50%) and males (50%). In death due to hanging and ligature strangulation number of males was more as compared to female. Male: Female ratio (2.45: 1).
3. Higher incidence was observed in Hindus religion (96%) in hanging and (100%) in ligature strangulation.
4. Higher incidence was observed in urban area (85%) than rural area (15%) in death due to hanging.

Thus it was observed that the incidence, circumstances and post-mortem findings in cases of hanging and ligature strangulation were almost same which was observed by the other recognized authors in the field. The varied features in cases of asphyxial death (hanging and ligature strangulation) observed during a meticulous autopsy examination, lead to a forensic expert to draw conclusion in cause of death due to compression of neck.

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