



## Original Research Article

## Autopsy based retrospective study of hanging cases in Kolhapur district Maharashtra

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## ABSTRACT

A retrospective study was conducted from 1st January 2018 to 31st December 2019 in RCSM Government Medical College and CPR Hospital, Kolhapur, Maharashtra, India. A total of 3430 autopsies were carried out of which 443 (12.91%) cases were death due to hanging. The study revealed that, the natures of hanging in all the cases were suicide. Male constitute 76.67% and female (23.32%). In regards to age, 54.17% of the cases felt within 20 to 40 years. The most common reason for the hanging was family disputes (34.98%). Occupational status of victims, it was observed that (41.10%) were labour. The choice of ligature material was nylon rope (42.25%) followed by saree (19.82%), cotton dupatta (8.74%), bedsheets (11.37%) respectively.

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### 1. Introduction

Violent asphyxial deaths are one of the most important cause for unnatural deaths occurring nowadays. Hanging is the form of violent mechanical asphyxial death which is caused by constriction of the neck, as a result of suspension of the body, where the constriction force is the weight of the body.<sup>1</sup> to cause hanging, full suspension of the body is not always required. According to Anton J. L. van Hoof, hanging was the most common suicide method in primitive and pre-industrial societies.<sup>2</sup> The World Health Organization (WHO) estimates that of the nearly 900,000 people who die from suicide globally every year, 170,000 are from India.<sup>3</sup> However, India's National Crime Records Bureau (NCRB) – which report official suicide rates based on police reports – estimated only 135,000 suicides in 2011.<sup>4,5</sup> Hanging is invariably suicidal. Accidental and homicidal hangings are rare.<sup>6</sup>

### 2. Materials and Methods

A 2 years retrospective analysis of death due to hanging was conducted in the Department of Forensic Medicine & Toxicology of RCSM GMC & CPR Hospital Kolhapur which covers almost entire district for medico-legal post mortems and unnatural deaths during the period of January 2018 to December 2019. Post-mortem reports, police inquest report and panchanama report was analysed. The aim of the present study was to analyse the various profiles of death due to hanging and to compare the findings with previously published literature.

### 3. Observations

To A total of 3430 dead bodies were brought for post-mortem examination at the mortuary of CPR Hospital Kolhapur, during the 2 year period ranging from January 2018 to December 2019 out of which total 343 cases (10.00%) were of deaths due to hanging. The maximum numbers of hanging 82 [31.17%] cases were observed between age group of 21-30 years in males and 29 [36.25%] cases were observed in same age group of females. In age below 10 years not any single case was reported and in

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old age above 61 years total 22 [6.41%] cases were found. The most vulnerable age group for hanging was observed as 11-40 years in which 246 [71.72%] cases was reported. This particular age group is most active period in one's life. Frustration due to various reasons such as financial problems, the burden of livelihood, unemployment, and poverty contributed to their death.

Table 1 shows that of the total 343 cases, males constituted for 263 (76.67%) cases and females accounted for 80 (23.32%) cases. The 21-30 years age group, constituted 111 (32.36%) cases, accounting for the maximum number of cases, followed by 31-40 years group 84 (24.48%) cases and the 41-50 years group 51 (14.86%) cases. Table 4 shows the occupational status of the victims. With regard to occupation, most of the victims were labour 141 (41.10%) cases followed by housewives 49 (14.28%) in number, students 34 (9.91%), farmers were 27 (7.87%) service personals 14 (4.08%), drivers 22 (6.41%) and farmers 6 (1.39%). According to the Table 2 shows the type of ligature material used by the victims. Nylon rope was the commonest type of ligature material used for hanging in 147 (42.25%) of the cases, followed by saree 68 (19.82%) cases, cotton dupatta 30 (8.74%) cases, cotton rope 18 (5.24%) cases, bed sheet 39 (11.37%) cases, cable wire 27 (7.87%) cases, electric wire 14 (4.08%) cases. Nylon rope as a ligature material for hanging was preferred by male, but saree, cotton dupatta were preferred by female victims.

Typical hanging was observed only in 43 [12.53%] cases in which position of knot was found behind the neck in occiput region, while atypical hanging in which position knot present either on right or left side of neck was reported in 132 (38.48%) & 115 (33.52) cases respectively. In 53 [15.45%] cases position of knot was not found appreciable. [Table 3] It was found that the most common reason of hanging among these cases were family disputes (marital unhappiness) with 120(34.98%) cases followed by financial problems 84 (24.48%) cases, personal affairs 62(18.07%) cases, mental illness 52 (15.16%), harassment 14 (4.08%) and reason could not be determined in 11 (3.20%) cases. In autopsy findings, Imprint of ligature material in the form of single mark was found in 296 (86.29%) cases while multiple marks of ligature material were noted in 47 (13.70%) cases. In most 321 (93.58%) cases of hanging ligature mark was noted above the thyroid cartilage while in 15(4.37%) & 7(2.04%) cases it was found at the level of thyroid & below thyroid cartilage respectively. As shown in table no. 6, bluish discoloration of nails/ lips/earlobes was the most common finding observed in 277 (80.75%) cases, subconjunctival haemorrhage was found in 184(53.64%) cases, protrusion of tongue was noted in 229 (66.76%) cases. Dribbling of saliva from angle of the mouth down the chin was noted in 225 (65.59%) cases. The Post mortem lividity was noted on back in 228 (66.47%) cases and over hand in 55 (16.03%) cases while over legs in 60 (17.49%)

cases each, which is depends on time period of suspension. Seminal ejaculation was found in 91 (26.53%) cases while discharge of urine & passing off of faecal matter was found in 95 (27.69%) cases.

Internal examination revealed congestion of larynx and trachea in 268 (78.13%) cases and petechial haemorrhages in 28 (8.16%) cases. The tissue under ligature mark was glistening white in 298 (86.88%) cases. The haemorrhages in neck muscles particularly in sternocleidomastoid were present in 63 (18.36) cases while platysma tear was found in 6 (1.74%) cases. In 3 (0.87%) cases there was fracture dislocation of cervical vertebra. Tear in intima of carotid artery was found in 53 (15.45%) cases. Hyoid bone fracture was found in 332 (96.79%) cases of hanging while fracture of thyroid cartilage was seen in 5 (1.45%) cases. In our study, majority of victims were below 40 years, and the frequency of fracture of hyoid bone was found increased with age as it got ossified. [Table 7]

#### 4. Discussion

The present retrospective study was carried out in the Department of Forensic Medicine & Toxicology, R.C.S.M. Government Medical College & C.P.R. Hospital, Kolhapur (Maharashtra) during the period from 1<sup>st</sup> January 2018 to 31<sup>st</sup> December 2019. It has been compared with other similar studies carried out in different parts of the country to bring out the similarities and differences.

In the present study, the total number of hanging cases conducted were 343 [100.00%], almost similar cases was observed by Manoj K Baishya et al,<sup>7</sup> less number of cases was observed by N. Vijaykumari,<sup>8</sup> Patel A P et al.<sup>9</sup> observed 332 cases of hanging in their study period. In another study conducted by Kumar and Verma<sup>10</sup> in Lucknow (India) a total of 4405 cases were autopsies in a five year period of which only 10% cases were due to hanging. In this study, cases in age group between 21-30 years accounted for the maximum number, with 33.10% of all cases. Similar observation, regarding to, age in hanging cases were observed by Udhayabanu R et al.<sup>11</sup> (32.25%), Patel AP et al. (32.98%) and Vijayakumari N et al<sup>8</sup> (38.5%) respectively. The reason can be related to failures in overcoming stress and demands of life such as unemployment, financial problems, causing mental distress, depression, and feeling of worthlessness resulting in taking such measures to end life. The study showed male preponderance with males accounting for 263 (76.67%) of all the cases. Similar observation with regards to sex in hanging were recorded by Udhayabanu R et al.<sup>11</sup> (70.32%), Momin SG et al.<sup>12</sup> reported 66.6% were male cases with male: female ratio of 1.5:1. The study showed male preponderance with males accounting for 332 (77.39%) of all the cases. Similar observation with regards to sex in hanging were recorded by Udhayabanu R et al<sup>11</sup> (70.32%), Momin SG et al.<sup>12</sup> reported 66.6% were male cases with

**Table 1:** Age & sex wise distribution

Age group	Male		Female		Total	
	No	Percentage	No	Percentage	No	Percentage
0-10 yrs	0	0%	0	0%	0	0%
11-20 yrs	27	10.26	18	22.50	45	13.11
21-30 yrs	82	31.17	29	36.25	111	32.36
31-40 yrs	65	24.71	19	23.75	84	24.48
41-50 yrs	40	15.20	11	13.75	51	14.86
51-60 yrs	28	10.64	2	2.50	30	8.74
61 & above	21	7.98	1	1.25	22	6.41
Total	263	100	80	100	343	100

**Table 2:** Ligature material used

Ligature Material	Male		Female		Total	
	NO	Percentage	No	Percentage	No	Percentage
Nylon rope	142	53.99	5	6.25	147	42.25
Cotton Dupatta	9	3.42	21	26.25	30	8.74
Cotton rope	15	5.70	3	3.75	18	5.24
Saree	21	7.98	47	58.75	68	19.82
Bed Sheet	35	13.30	4	5.00	39	11.37
Electric wire	14	5.32	0	0	14	4.08
Cable wire	27	10.26	0	0	27	7.87
Total	263	100	80	100	343	100

**Table 3:** Position of knot

Occiput	Percentage	Right side of neck	Percentage	Left side of neck	Percentage	Not appreciable	Percentage
43	12.53	132	38.48	115	33.52	53	15.45

**Table 4:** Occupational status of victim

Ligature Material	Male		Female		Total	
	NO	Percentage	No	Percentage	No	Percentage
Labour	135	51.33	6	7.50	141	41.10
Farmer	27	10.26	0	0	27	7.87
Service	11	4.18	3	3.75	14	4.08
Student	21	7.98	13	16.25	34	9.91
Housewife	0	0	49	61.25	49	14.28
Driver	22	8.36	0	0	22	6.41
Unemployed	47	17.87	9	11.25	56	16.32
Total	263	100	80	100	343	100

**Table 5:** Reasons for hanging

Reason	Male		Female		Total	
	NO	Percentage	No	Percentage	No	Percentage
Family disputes	78	29.65	42	52.50	120	34.98
Financial problems	69	26.23	15	18.75	84	24.48
Harassment	9	3.42	5	6.25	14	4.08
Mental Illness	43	16.34	9	11.25	52	15.16
Personal affairs	56	21.29	6	7.50	62	18.07
Unknown reason	8	3.04	3	3.75	11	3.20
Total	263	100	80	100	343	100

**Table 6:** Post-mortem findings on external examination

S. No.	External Findings	No. of victims	Percentage	
1	Imprint of ligature material	Single mark	296	86.29
		Multiple marks	47	13.70
2	Location	Above thyroid	321	93.58
		At thyroid	15	4.37
		Below thyroid	7	2.04
3	Face	Pale	25	7.28
		Congested	318	92.71
4	Tongue	Protruded & bitten	229	66.76
		Inside the mouth	114	33.23
5	Cyanosis of nails, fingers, lips, ear lobes	277	80.75	
6	Postmortem Lividity	Hand	55	16.03
		Back	228	66.47
		Legs	60	17.49
7	Dribbling of saliva	225	65.59	
8	Sub-conjunctival haemorrhage	184	53.64	
9	Discharge of semen	91	26.53	
10	Discharge of urine & feces	95	27.69	
11	Struggle marks	5	1.45	

**Table 7:** Post-mortem findings on internal examination

S. No.	Internal examination	No. of victims	Percentage	
1	Larynx & Trachea	Normal	47	13.70
		Congested	268	78.13
		Petechial haemorrhage	28	8.16
5	Tissue under ligature mark	Glistening white	298	86.88
		Normal	45	13.11
6	Neck muscles	Platysma tear	6	1.74
		Hemorrhages in SCM muscle	63	18.36
7	Hyoid fracture	Present	332	96.79
		Absent	11	3.20
8	Thyroid Fracture	Present	5	1.45
		Absent	338	98.54
9	Tear in intima of carotid	53	15.45	
10	Fracture dislocation of cervical vertebra	3	0.87	

male: female ratio of 1.5:1.

In the present study the commonest choice of ligature material used was nylon rope 147 (42.25%) of cases and least preferred choice was the electric wire 14 (4.08%). These findings were contrary to the observations made by Udhayabanu R et al.<sup>11</sup> and Vijayakumari N et al.<sup>8</sup> Dupatta was the most commonly used ligature in the studies done by Sharma BR et al.,<sup>13</sup> Patel AP et al.,<sup>9</sup> Ahmad et al.<sup>14</sup> The wide nature of variations in the choice of ligature material depends on the dressing fashion of the population and occupation & different factors like sex of the victim, culture, geographic location and place of act.

In present study position of the knot in a majority of cases was found present in right and left side of neck 38.48% and 33.52% respectively [atypical hanging]. Similar findings were observed by Manoj K Baishya et al.<sup>7</sup> and differ from Mishra P.K. et al.<sup>15</sup> With regard to occupation, most of the victims were labour 141 (41.10%) cases followed by

house wives 49 (14.28%) cases, unemployed 56 (16.32%) in number, students were 34 (9.91%) 1 service personals 14 (4.08%), drivers 22 (6.41%) and farmers 27 (7.87%). These findings are consistent with the study done by Udhayabanu R et al,<sup>11</sup> and Samanta AK et al.<sup>16</sup>

In the present study it was found that the most common reason of hanging among these cases were family disputes (marital unhappiness) with 120 (34.98%) cases followed by financial problems 84 (24.48%) cases, personal affairs 62 (18.07%) cases, mental illness 52 (15.16%), and reason could not be determined in 11 (3.20%) cases. Similar findings were reported by Dinesh Rao<sup>17</sup> that the major motivating factors for hanging were domestic/family related issues comprising 82 cases (31.06%) and Udhayabanu R et al<sup>11</sup> 81 cases (52.25%). Saisudheer T et al<sup>18</sup> observed that 18% of cases were due to family related issues.

On external examination it was seen that the ligature mark was situated at and above the level of thyroid cartilage

while in 15 (4.37%) & 7 (2.04%) cases ligature mark was situated at the level of thyroid cartilage & below thyroid cartilage respectively. Congestion of face because of venous occlusion was noticed in 318 cases (92.71%). Dribbling of saliva from the angle of mouth opposite to the knot, the surest sign of ante-mortem hanging was noticed in 225 cases (65.59%). In 60 cases (17.49%) the distribution of post-mortem lividity was typical of hanging means in legs, feet while in 55 (16.03%) cases it was found on hands and forearms suggestive that lividity was fixed because the body was suspended for more than 4 to 6 hours. In 228 cases (66.47%) the lividity was noticed on back side only when body was released from the point of suspension within a few minutes after death. Discharge of semen was seen in 91 cases (26.53%) whereas discharge of urine/faeces was noticed in 95 (27.69%) cases. La facie sympathetic and defence wounds were noticed in none of the cases under the study.

On internal examination larynx & trachea was congested in 268 (78.13%) cases while white-glistening subcutaneous tissue under ligature mark was seen in 298 (86.88%) cases and haemorrhages in sternocleidomastoid muscles were detected in 63 (18.36%) cases. Hyoid bone fracture was noted in 332 (96.79%) cases & thyroid cartilage fracture was not found in 338 (98.54%) cases while tear in intima of carotid artery was found in 53 (15.45%) cases.

## 5. Conclusion

Suicide by hanging is a major public health issue of the world especially in developing countries. Physical illness, mental disorder, quarrel with spouse, poverty, are major causative factors which are directly or indirectly responsible for committing suicides. To overcome this problem, prior information and knowledge about suicidal behaviour of persons, risk factors associated with it and early diagnosis of psychiatric disorders is required at familial and societal level. In addition, grooming of children at home to build a healthy child and make them mentally strong to face the harsh realities of life. Investigating agencies, media persons, social workers, health personnel, psychiatrics, non-governmental organisations (NGOs), political leaders, Governments and even the common man should play their role in identifying the underlying factors in the society to prevent the precious loss of life to family as well as society.

## 6. Source of Funding

None.

## 7. Conflict of Interest

None

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