

The Position of Knot at Occipital Region in Suicidal Hanging Deaths amongst Asphyxial Medico-Legal Autopsies in Lahore

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ABSTRACT

Objective: To find out the position of knot in all asphyxial deaths, where the interference was at the level of neck, was the main objective. This study was conducted to find out the position, particularly in suicidal hanging cases.

Study Design: Descriptive / Observational Study

Place and Duration of Study: This study was conducted at the Forensic Medicine Department, King Edward Medical University, Lahore from 2006 to 2008.

Materials and Methods: a total of 2979 medico-legal autopsies were conducted in the Department of Forensic Medicine & Toxicology, King Edward Medical University. Out of these 220 cases were asphyxial deaths. Autopsy reports of these asphyxial deaths, their police documents and hospital charts were scrutinized.

Results: 220 cases out of total 2979 autopsies were of asphyxial deaths, which was 7.39%. In these 104 cases were those of hanging being the commonest cause. And they were 42.27% of total asphyxial deaths. Cases of ligature strangulation were 64, which was 29.09% of total asphyxial cases. And 52 cases were that of manual throttling and it was 23.64%. In 104 cases of hanging, the suicidal manner of death was seen in 68 which was 68.50%. And in ratio males were quite distinct in predominance, which was Male/Female ratio 02.78:1.0. The age group between 20-30 years showed higher incidence in males as compared to females which were more in number in 10-20 years. Not a single case of hanging was seen in below 10 years of age. On the other hand, the strangulation was common in ages between 20-40 years. The males of age group of 20's and 30's showed higher incidence than females in hanging, which was in 30's to 40's. The females were higher in number in ligature strangulations in twenties to forties years of age than males. While males were higher in number in thirties in throttling and females in forties. The manner of death was homicidal in 52.27% deaths. In 30.90% the manner was suicidal, and in 11.82% the manner was undetermined. The method adopted to achieve neck compression was ligature strangulation and throttling in homicidal cases in 57.27% deaths, in 30.97% was hanging in suicidal manner of death. In hanging the knot was found at occipital region in 62.50% deaths and it was found on the side of the neck in 23.08% deaths. In contrast to hanging in ligature strangulation in 78.13% cases the knot was found on front of the neck and in 21.87% it was on the side of the neck.

Conclusion: For committing suicide the hanging was the most common method used in our country. And for homicidal killing the ligature strangulation and manual throttling were the methods used for asphyxial deaths. In hanging the knot was typically placed at occipital region in 65 deaths and on either side of the neck in 24 deaths. And not a single case had the knot on front in suicidal hanging. In contrast to it, in ligature strangulation the knot was seen on front in 50 cases and in 14 cases it was on either side of neck. Not even a single case it was placed at the back of the neck.

Key Words: Suicidal Hanging, Position of Knot, Occipital Region, Asphyxial Deaths.

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INTRODUCTION

Neck is an important structure as it connects head and body. So it conducts many structures to achieve this connection and function.

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There are the main blood vessels carrying blood to and from brain and other vital structures. Similarly the nerves coming from brain and going to brain are also conducted through neck. The main wind pipe to the lungs (Trachea) and food pipe (Esophagus) are also other important structures being conducted through neck. Hence neck is an important vulnerable structure, especially in mechanical asphyxial deaths. Ligature strangulation and manual throttling are the most common means used to cause mechanical asphyxia. In typical hanging only the weight of the body is the constricting force¹. A direct blow on neck, arm lock of

this region, falls on neck and accidental entrapment in ropes, all these can cause mechanical asphyxia².

Whatever means are used, the cause of death in asphyxial death will depend upon the manner and amount of force applied and the type of structure involved. Blockage of jugular veins can be achieved with only 2 kilo grams of weight; and back flow of blood to heart will occur, causing cyanosis, congestion and petechiae in the area above constriction. With the occlusion of carotids arteries the cerebral ischemia will occur, only with 3.5 kilo grams of weight. Sudden cardiac arrest will occur with the excitation of baroreceptors in carotid bodies with a blow in that area.

In manual throttling especially the air passages are blocked just by pushing the larynx back, it will push the base of tongue posteriorly against the posterior pharyngeal wall. Higher weight, as much as 15 kilo grams will cause occlusion of trachea being a rigid structure. In manual throttling and ligature compression will cause fractures of hyoid bone & thyroid cartilages, as direct force is being applied on the larynx.^{2,3,4,5,6}

So with the achievement of mechanical asphyxia, whatever means is used, the physiological and pathological changes will appear. There will be reduction in the oxygen concentration, rise in carbon dioxide and pH will become acidic. With this reduction in oxygen level will cause endothelial damage resulting in increased permeability and dilatation of capillaries. They are manifested as non-pathological findings of asphyxia, as cyanosis, congestion, tardeu spots and edema of lungs. With endothelial damage, fibrinolysin will be released causing fluidity of blood.

MATERIALS AND METHODS

Data Source: The main source was the post-mortem reports, available police papers and hospital documents. All types of cases were studied, but the cases of asphyxial deaths were of major concentration. In these cases all the parameters were analyzed as, the age of the deceased, it's sex, methods used for compression of the neck, material of string, it's level from thyroid cartilage, numbers of whorls, hyoid bone fracture and placement of knot.

Selection's Criteria.

Inclusion Criteria: Only the cases in which the cause of death was hanging and strangulation were selected to be included in this study.

Exclusion Criteria: Other cases in which the cause of death was other than hanging or strangulation were not included.

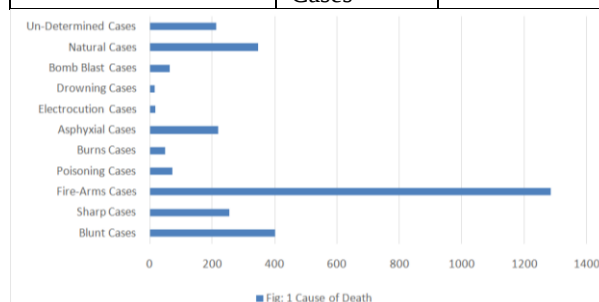
RESULTS

As this study includes the scrutiny of 2979 cases of all types of medico-legal deaths, in which the autopsies were conducted at the autopsy center of the Department of Forensic Medicine, King Edward Medical

University, Lahore. Out of all cases, 220 (7.38%) cases were those of asphyxial deaths. (Table: 1) & (Fig: 1)

Table No.1: Cause of Death

	Total cases	Percentage of Cases
Blunt Cases	403.0 Cases	13.52%
Sharp Cases	256.0 Cases	8.5%
Fire-arms Cases	1285. Cases	43.13%
Poisoning Cases	74.0 Cases	2.48%
Burns Cases	50.0 Cases	1.68%
Asphyxia Cases	220.0 cases	7.38%
Electrocution Cases	19.0 Cases	0.64%
Drowning Cases	17.0 cases	0.57%
Bomb Blast Cases	65.0 Cases	2.18%
Natural Cases	347.0 Cases	11.65%
Un-Determined Cases	213.0 Cases	7.15%
Total Cases	2979.0 Cases	100.00



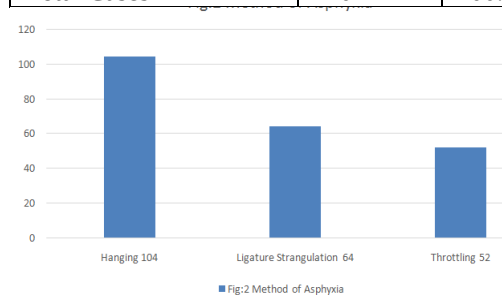
■ Fig:1 Cause of Death

Figure No.1: Causes of death

Method of Asphyxia: In 220 cases of asphyxial deaths, which were selected for study, mainly three types of means of neck compression were found. Which were hanging, ligature strangulation and throttling. 104 cases were of hanging (47.27%), 64 cases were of ligature strangulation (29.09%) and 52 cases were of throttling (23.64%). (Table: 2) (Fig: 2)

Table No.2: Method of Asphyxia in 220 Asphyxial Deaths

Types of Asphyxial Deaths	Number	Percentage
Cases of Hanging	104	47.27%
Cases of Ligature Strangulation	64	29.09%
Cases of Throttling	52	23.64%
Total Cases	220	100.00



■ Fig:2 Method of Asphyxia

Figure No.2: Method of Asphyxia

Distribution of Gender and Age: Out of 220 cases of asphyxial deaths, 144 were males which were 65.45% and 76 cases were of females 34.55%. Fig: 3)

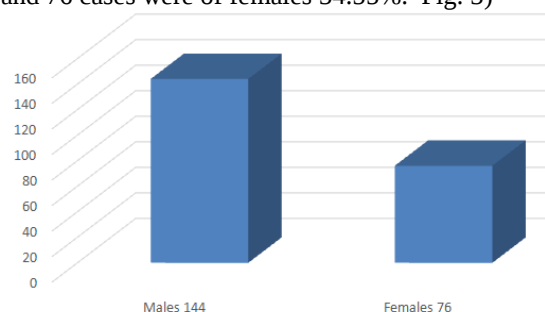


Figure No.3: Gender distribution

Between ages group of 21-30 years most of the cases of asphyxial deaths were found, and they were 79 cases (35.91% of all asphyxial deaths). Then the next higher age group was between the ages of 31-40 years, they were 57 in number (25.91% of all asphyxial deaths). (Table: 3)

Table No.3: Gender & Age Variation

	Males	Females	Total No. of Cases	%age
< 1 Years	-	-	-	-
1-10 Years	2.0	3.0	5.0	2.27%
11-20 Years	23.0	15.0	38.0	17.27%
21-30 Years	59.0	20.0	79.0	35.91%
31-40 Years	36.0	21.0	57.0	25.91%
41-50 Years	9.0	6.0	15.0	6.82%
51-60 Years	10.0	7.0	17.0	7.73%
>60 Years	5.0	4.0	9.0	4.09%
Total	144.0	76.0	220.0	100.0

Table No. 4: Manner of Death

Years Of Age	Cases	Homicidal Manner Male:Female Ratio 2.15:1.0			Suicidal Manner Male:Female Ratio 2.77:1.0			Manner Un-Determined Male : Female Ratio 1.6:1.0		
		M	F	Total	M	F	Total	M	F	Total
<1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1.0-10.0	5.0	5.0	3.0	5.0	0.0	0.0	0.0	0.0	0.0	0.0
11.0-20.0	38.0	8.0	6.0	14.0	5.0	9.0	14.0	7.0	3.0	10.0
21.0-30.0	79.0	36.0	11.0	47.0	20.0	6.0	26.0	4.0	2.0	6.0
31.0-40.0	57.0	20.0	14.0	34.0	16.0	2.0	18.0	3.0	2.0	5.0
41.0-50.0	15.0	8.0	2.0	10.0	4.0	1.0	5.0	0.0	0.0	0.0
51.0-60.0	17.0	6.0	3.0	9.0	5.0	0.0	5.0	0.0	3.0	3.0
>60.0	9.0	6.0	1.0	7.0	0.0	0.0	0.0	2.0	0.0	2.0
Total Cases	220.0	86.0	40.0	126.0	50.0	18.0	68.0	16.0	10.0	26.0
				57.27%			30.91%			11.82%

Table No. 5: Knot Position in Hanging & Strangulation

Type of Asphyxial Death	Hanging Cases	Position of Knot	No. of Cases	Percentage
		Front of Neck	0.0	0.0
		Occiput Region of Neck	65.0	62.50%
		Lateral (right or left)	24.0	23.08%
	Ligature Strangulation Cases	Front of Neck	50.0	78.13%
		Occiput Region of Neck	0.0	0.0
		Lateral (right or Left)	14.0	21.87%

	(65.45%)	(34.55%)		
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Manner of Death: In our study, the homicidal manner of death was seen in 126 cases, which was 57.27%. The suicidal manner was seen in 68 cases, that was 30.90%. And in 26 cases (11.82%), the manner remained un-determined. Not a single cases of accidental manner came out during this study period.

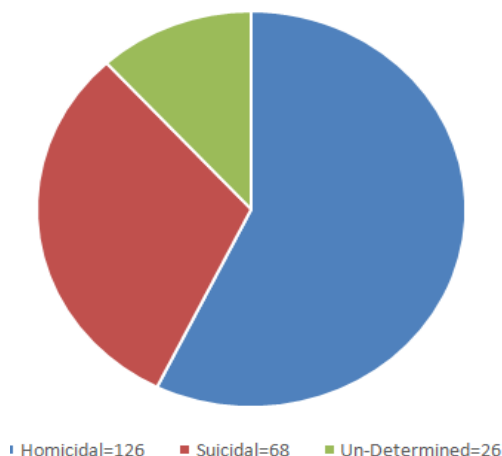


Figure No.4: Manner of death

In homicidal deaths, the male to female ratio was 02.15:1.0. In suicidal it was 02.77:1.0, and was 01.6:1.0 in un-determined cases. (Table: 4)

Knot Position in Hanging & Strangulation: The cases of hanging were 87 in total out of 220 cases of asphyxial deaths. Out of these, in 65 cases the knot was placed in occipital region, and in 24 cases it was laterally placed either on left or right. No case was seen where the knot was placed on front. Whereas in ligature strangulation, in 50 cases the knot was placed on front, and in 14 cases it was lateral in position. None was reported in which was at occipital region. (Table: 5) & (Fig: 5)

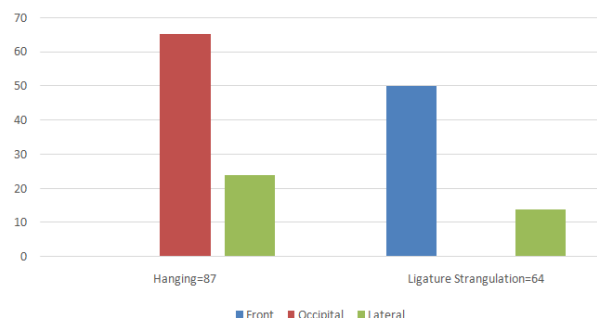


Figure No.5: Knot Position in Hanging & Strangulation

DISCUSSION

Incidence: In 2979 medico-legal autopsies, 220 deaths were because of interference to the process of respiration at all levels, showing an incidence of 0.7.39% out of all deaths. And in all asphyxial deaths the incidence of interference at the level of neck is 89.43%. Which is much higher than those of the 01.6%⁷ (Rehman), 01.75%⁸ (Malik SA), and 01.88%⁹ (Bashir MZ). In study carried out by Srivastava AK it was as, 02.94%¹⁰ of asphyxial deaths out of all deaths, and those where the interference was at the level of neck were 24.53% of all asphyxial deaths. In the study of Hussain SM the asphyxial deaths were 05%¹¹ out of all deaths, and where the interference was at the level of neck were 82% in all types of asphyxial deaths. And in all medico-legal deaths the incidence of asphyxial deaths were 01.17%¹² in the study of Verma SK and were 12.4%¹³ asphyxial deaths out of all causes in study of Vermici S. Where the study of Edirne in Turkey the incidence of asphyxial deaths was 05.5% out of all deaths, which is higher than that of our study.

Type of Interference at Neck: The number of cases of hanging were 104 (47.27%), which is highest in number. Those of the ligature strangulations were 64 (20.09%). And 52 (23.64%) cases were of manual throttling. These incidences are comparable with the study of Rehman IU⁷ showing 80.70% (Hanging & Strangulations) and 19.30% (Manual Throttling), and of Malik SA⁸ showing 61.17% (Hanging), 21.19% (Strangulation) & 18.0% (Throttling), of Bashir MZ⁹ 57.0% (Hanging), 21.0% (Strangulation) & 18.0% (Throttling), In Srivastava¹⁰ ligature strangulations were (19.23%) & throttling were (46.15%), in Hussain SM¹¹

69.0% cases were of hanging, in Demirci S¹³ 12.40% cases were of ligature strangulation, in Azmak D¹⁴ 41.80% were of hanging, 2.90% of ligature strangulation & 2.30% cases were of manual throttling, and in Sharma BR¹⁵ 85.0% cases were of hanging & strangulation and 6.0% of throttling.

Sex and Age: The maximum number of cases of asphyxia, where the interference was at the level of neck were between the ages of 21-30 years. This incidence is similar as seen in the studies already carried out on this cause of death. As it was seen in the study of Hussain SM¹¹ showing 57.0% of asphyxial deaths, in the study of Verma SK¹² the predominant age group involved was between 21-30 years, and in Azmak D¹⁴ the average age was seen as 41.90 years. The study of Bawon DA¹⁶, 5th decade of life showed highest incidence is hanging. Whereas the study carried out in USA by Guarner & Hanzlick¹⁷ noticed the average age of 31.0 years, the highest number.

Ratio of Male versus Females: Our study shows the ratio of male to female as, 02.25:1.0 in hanging, in strangulation it is 02.05:1.0, and for manual throttling it is recorded as 01.26:1.0. In all the three types of neck constrictions, the number of male cases are showing higher incidence.

Out of all asphyxial deaths, in the cases of hanging 69.23% were males, as compared to females which were 30.76%. This incidence is closer to the study of Azmak¹⁴, in which 83.90% were males. In the study of Bashir MZ⁹ et al., the number of male asphyxial deaths were 73.03% and females were 26.92%, having a ratio of male/female as 02.70:1.0. The study of Bashir MZ⁹ had shown 58.90% males and 41.02% females in neck compression by strangulation & throttling. Male/Female ratio by Azmak D¹⁴ was pointed out as 1.0:3.0 in ligature strangulation and 1.0:2.0 in manual throttling. Amongst all asphyxial deaths Srivastava AK¹⁰ had shown 30.77% cases of males and 69.23% cases of females, showing greater incidence in female cases than male cases.

Manner of Death: In our study amongst all asphyxial deaths 65.38% cases were of hanging, showing a higher incidence than the studies carried out by Bashir MZ⁹ 45.05% and is lower than that of Demirci S¹³ 85.0%.

Our study showed the manner as suicidal in 30.90% of cases, which is lower than study of Bashir MZ⁹ 45.45% & that of Azmak D¹⁴ showing 47.0%. The study of Demirci S¹³ showed 15.0%, which is quite lower than our study.

Our study showed 65.38% cases of hanging, which were all suicidal, and it is lower than that of Bashir MZ⁹ showing as 86.53%. Our study showed 09.62% cases of homicidal asphyxial deaths which are also higher than Bashir MZ⁹ showing 03.84%. No case of accidental hanging was seen in our study. However 5.0% of accidental deaths of auto-erotic asphyxia were seen by Bowen DA¹⁶.

Position of Knot: The position of knot was seen at occiput in 65 cases, which was 62.50% of all asphyxial deaths. And this incidence is similar to that of the study carried out by Azmak D¹² showing as 66.0% at occipital region in cases of hanging. Whereas his study showed that in 88.70% cases of ligature strangulation, it was in chin.

In our study in 24 cases of hanging, the knot was placed lateral side either on left or right, which came out to be 23.08%.

In 50 cases of ligature strangulation, the knot was on front, having an incidence of 78.13%. In 14 cases the knot was on lateral side, either on left or right and it was in 21.87% of cases. And the results of our study are close to those shown by Bawon DA.¹⁶ & Sharma BR¹⁵

CONCLUSION

Amongst all un-natural deaths, mechanical asphyxial deaths like hanging & strangulation is the most common method used. In these hanging remains the preferable choice in suicidal manner of dying. Males are higher in number and the highest incidence is seen in 3rd decade of life. Knot was typically placed at the occiput in most of the cases of suicidal hanging. Whereas it was observed to be placed on front in cases of homicidal ligature strangulation.

Author's Contribution:

Concept & Design of Study: Salman Pervaiz Rana
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 Data Analysis: Sadaf Nadir
 Revisiting Critically: Azhar Masud Bhatti
 Final Approval of version: Mohsana Urooj Rana

Conflict of Interest: The study has no conflict of interest to declare by any author.

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