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Forensic Medicine

Hanging: The Commonest Cause of Suicide in All the Fatal Compressive Traumas to the Neck in Lahore

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ABSTRACT

Objective: This study was carried out to find out the commonest cause of death amongst all the asphyxial deaths in Lahore and to compare it with other studies previously carried out on this subject.

Study Design: Experimental study

Place and Duration of Study: This study was carried out at Forensic Medicine Department, KEMU, Lahore during the period from Jan. 2006 to Dec. 2008

Materials and Methods: Out of total 2979 medico-legal autopsies carried out at Forensic Medicine Department K.E.M.U. Lahore, 220 cases of fatal compression to the neck were selected. The autopsy reports, police documents and hospital records were studied.

Results: Out of total autopsies compressive trauma to the neck was in 220 cases (7.39%). Hanging was the commonest cause 42.27%, ligature strangulation 29.09% and manual throttling 23.64%. The manner of death out of 104 cases of hanging was 68.50% (68 cases) with predominance of males (Male/Female ratio 2.78:1). 3rd decade showed higher incidence in males than the females which were more in 2nd decade. No hanging was seen in the 1st decade. The strangulation was common in 2nd, 3rd and 4th decades of life. Males showed higher incidence than females in hanging in 3rd and 4th decade. Females showed higher incidence in 2nd, 3rd and 4th decades in ligature strangulations than males. In throttling males showed higher incidence in 3rd decade than females in 4th decade. The homicidal deaths were 57.27%, suicidal 30.90% and un-determined were 11.82%. Ligature strangulation and throttling were the methods used in homicidal manner (57.27%) while hanging was used for suicide (30.97%). In hanging the position of the knot was at occiput in 62.50% cases and 23.08% had lateral position. In ligature strangulation 78.13% showed the knot on the front and 21.87% lateral.

Conclusion: Hanging is a common method of suicide in our country while ligature strangulation and throttling are used in homicide. The autopsy findings above the thyroid cartilage are in favor of death due to hanging and throttling. Whereas their presence at or below the thyroid cartilage indicate ligature strangulation. Fracture of hyoid bone if present, is a strong evidence of death due strangulation.

Key Words: Asphyxia, Hanging, Ligature Strangulation, Throttling..

INTRODUCTION

Neck contains important linking structures, like major blood vessels, nerves, wind pipe and esophagus. So this region is most vulnerable in many injuries and these injuries also include mechanical compression to the neck. This will cause mechanical asphyxia and most common means used to do this is by ligature or manual compression. In hanging the body weight acts as a constricting force[1]. This compression can also be achieved by direct blow on neck, arms lock, accidental falls on to the neck and accidental entanglement in ropes[2].

The outcome of mechanical asphyxia will depend upon the effects of the structures involved, individually or in total. Also the means used to get the compression, the level of constriction and the amount of constricting force will define the ultimate outcome.

To occlude jugular veins only 2 kg of tension is enough, it will cause obstruction to return to the heart and will appear as cyanosis, congestion and petechiae. Carotids arteries needs 3.5 kg and will cause cerebral ischemia. Pressure on carotid bodies will cause stimulation of baro-receptors, will cause sudden cardiac arrest. The airway obstruction can be achieved with elevation of larynx and pushing the base of tongue against the posterior pharyngeal wall. Due to rigid structures of wind pipe it is difficult to occlude the airways, but 15 kg of tension can do that. Direct pressure on the larynx can also cause the fractures of hyoid and thyroid cartilages [2, 3, 4, 5, 6].

Whatever mean is used to achieve mechanical asphyxia, the reduction in O_2 level will result in tissue anoxia leading to endothelial damage, capillary dilatation, increased permeability and stasis of blood. This will appear as cyanosis, congestion, petechial haemorhage oedema and serous effusion. This reduction in circulating blood volume will set in a viscous cycle of more anoxia and so on.

MATERIALS AND METHODS

Data Source: The data was collected from the medico-legal autopsies conducted during 2006-2008 in the Department of Forensic Medicine & Toxicology K.E.M.U. Lahore. The autopsy reports, police papers and hospital notes were scrutinized. Al the parameters about asphyxial means were taken into consideration like, age, sex, means of constriction, level of application of force and fracture of hyoid bone.

Selection Criteria:

Inclusion Criteria: Cause of death is due to hanging by ligature and weight of the body being the constricting force.

Exclusion Criteria: All other deaths were excluded in which trauma to the neck was there, but the cause of death was other than hanging.

RESULTS

Out of total 2979 medico-legal autopsies carried out during the three years study period of 2006-2008 in the Department of Forensic Medicine & Toxicology, 220 (7.38%) cases were due to compression of neck. (Table No. 1)

Table No. 1 Causative Agent (2979 cases)

	Total	%age
Blunt Means	403	13.52
Sharp Means	256	8.5
Fire-arms	1285	43.13
Poisoning	74	2.48
Burns	50	1.68
All Asphyxial Deaths	220	7.38
Electrocution	19	0.64
Drowning	17	0.57
Bomb Blast	65	2.18
Natural	347	11.65
Un-Determined	213	7.15
Total	2979	100.00

Types of Neck Compression: Three types of neck compression means were seen commonly in our study, out of these 220 cases of asphyxial deaths, the cases of hanging were 104 (47.27%). (Table No. 2)

Table No.2 Types of Neck Compression (220 cases)

Types	No. of Cases	%age
Hanging	104	47.27
Ligature Strangulation	64	29.09
Throttling	52	23.64
Total	220	100.00

Age and Sex Distribution: The most common age group involved was between 21-30 years (35.91%) and next to it was between 31-40 years (25.91%).Next involved age group was between 11-20 years (17.27%). Total of 144 (65.45%) male cases were seen out of all 220 asphyxial deaths, and females were 76 (34.55%). (Table No. 3)

Table No. 3: Age and Sex Distribution in 220 cases

Years	Male	Female	Total	%age
< 1	-	-	-	-
1-10	2	3	5	2.27
11-20	23	15	38	17.27
21-30	59	20	79	35.91
31-40	36	21	57	25.91
41-50	9	6	15	6.82
51-60	10	7	17	7.73
>60	5	4	9	4.09
Total	144 (65.45%)	76 (34.55%)	220	100.00

Hanging showed a higher incidence in both sexes in 2nd decade of life as compared to strangulation & throttling, which was in 3rd % 4th decade respectively. (Table No. 4)

No case of hanging was seen below first decade of life. There was higher incidence in males than females (2.25:1) in hanging, than strangulation (2.05:1) and throttling (1.26:1) (Table No. 4).

Males showed highest incidence in hanging in 3rd decade and females in 2nd decade of life. In ligature strangulation males had highest incidence in 3rd decade and females in 4th decade. In throttling males showed the highest incidence in 3rd decade and females in 4th decade. (Table No. 4)

Table No. 4: Age and Sex Distribution of Various Types of Compressions of Neck (n=220)

Age (Years)	Total	Hanging(n=104) M/F Ratio 2.25:1		Ligature Strangulation(n=64) M/F Ratio 2.05:1		Throttling(n=52) M/F Ratio 1.26:1	
		Male	Female	Male	Female	Male	Female
<1	0	0	0	0	0	0	0
1-10	5	0	0	1	2	1	1
11-20	38	14	10	6	3	3	2
21-30	79	28	9	17	6	14	5
31-40	57	19	4	12	7	5	10
41-50	15	4	4	2	1	3	1
51-60	17	5	4	3	1	2	2
>60	9	2	1	2	1	1	2
Total	220	72	32	43	21	29	23

Table No. 5: Manner of Death in All Asphyxial Deaths (n=220)

Age (Years)	Total	Homicide M/F Ratio 2.15:1			Suicide M/F Ratio 2.77:1			Un-Determined M/F Ratio 1.6:1		
		M	F	Total	M	F	Total	M	F	Total
<1	0	0	0	0	0	0	0	0	0	0
1-10	5	2	3	5	0	0	0	0	0	0
11-20	38	8	6	14	5	9	14	7	3	10
21-30	79	36	11	47	20	06	26	4	2	6
31-40	57	20	14	34	16	02	18	3	2	5
41-50	15	8	2	10	4	01	5	0	0	0
51-60	17	6	3	9	5	0	5	0	3	3
>60	9	6	01	7	0	0	0	2	0	2
Total	220	86	40	126 (57.27%)	50	18	68 (30.91%)	16	10	26 (11.82%)

Manner of Death: Manner of death is either natural or un-natural. Un-natural in our study include homicide, suicide or un-determinable death in which the exact cause of death could not be ascertained due to natural or acquired limitations. No case of accidental asphyxial death was reported during the period of study.

The distribution according to manner of death showed that, incidence of homicide was 57.27% (126), suicidal 30.90% (68), while 11.82% (26) cases remained un-determined. Male to female ratio was 2.15:1 in homicidal deaths, 2.77:1 in suicidal and 1.6:1 in un-determined deaths. (Table No. 5)

Table No. 6: Manner of Death in Hanging (n=104)

Age (Years)	Total	Homicide N=10 (9.62%) M/F Ratio 1.5:1		Suicide N=68 (65.38%) M/F Ratio 2.78:1		Un-Determined N=26 (25.0%) M/F Ratio 1.6:1	
		M	F	M	F	M	F
<1	0	0	0	0	0	0	0
1-10	0	0	0	0	0	0	0
11-20	24	2	1	5	6	7	3
21-30	37	4	2	20	5	4	2
31-40	23	0	0	16	2	3	2
41-50	8	0	0	5	1	0	3
51-60	9	0	0	5	1	0	3
>60	3	0	1	0	0	2	0
Total	104	6	4	50	18	16	10

Manner of Death in Hanging: The manner of death in 104 hanging cases showed suicide incidence 68.50% (68 cases) with M/F ratio of 2.78:1. Males showed highest incidence in 3rd decade and females in 2nd decade. Homicidal hanging was 9.62% (10 cases). The highest incidence was seen in 3rd decade in both sexes. Male had higher incidence than females in all decades with M/F ratio of 1.5:1 The un-determined hanging was seen in 26 cases (25%). The highest incidence was seen both males and females in 2nd decade. M/F ratio was 1.6:1. (Table No. 6)

Position of Knot in Hanging: The knot was present on occipital position in 65 cases (62.50%) and it was on lateral right or left positions in 24 cases (23.08%). (Table No. 7)

Table No. 7: Position of knot in hanging

Position of knot	**Hanging**	**Front**	-	-
		Occiput	65	62.50%
		Lateral (right or left)	24	23.08%

DISCUSSION

Incidence of Death: Our study showed that, fatal compression to the neck caused 220 deaths out of 2979 medico-legal autopsies carried out at the Department of Forensic Medicine & Toxicology K.E.M.U. Lahore with an incidence of 7.39% and 89.43% of all asphyxial deaths. This incidence is much higher than reported by 1.6%[7], 1.75%[8], and 1.88%[9] of all asphyxial deaths. And it was 2.94%[10] of all deaths 24.53% of all asphyxial deaths, 5%[11] of all deaths and 82% of asphyxial deaths, and 1.17%[12] & 12.4%[13] of all and 5.5% of all deaths but lower than 15.7%[14] in Edirne Turkey.

Type of Neck Compression: The incidence of hanging is the highest 47.27% (n=104), next is ligature strangulation 20.09% (n=64) and throttling is 23.64% (n=52). These values are comparable with (hanging 57%, strangulation 21%, and throttling 18%) [9], (hanging 61.17%, ligature strangulation 21.19% and throttling 17.64%) [8], (hanging/ligature strangulation 80.7% and throttling 19.3%) [7], (hanging/ligature strangulation 85% and throttling 6%) [15], (ligature strangulation 12.4%) [13], (ligature strangulation 19.23%, throttling 46.15%) [10], (hanging 41.8%, ligature strangulation 2.9% and throttling 2.3%) [14], (hanging 69%) [11].

Age and Sex Distribution: The highest incidence of all neck compression deaths, hanging, ligature strangulation and throttling is seen in the 21-30 years of

age group. This is comparable with the previous studies also 57% [11], 3rd decade [12], average of 41.9 years [14]. Bowen[16] has shown highest incidence of hanging in 50-59 years of age. Guarner & Hanzlick[17] mentioned 31 years of age showing highest incidence in USA.

Male/Female Ratio: In our study male/female ratio in hanging is 2.25:1, ligature strangulation 2.05:1 and in throttling 1.26:1. So males have shown higher incidence in all the three asphyxial deaths.

In hanging males were 69.23%, which is higher than females having 30.76%. This is comparable with those of 83.9% males of Azmak[14], 2.7:1 (males 73.07% and females 26.92%) of Bashir MZ[9] et al.

In ligature strangulation and throttling Bashir MZ[9] has shown 58.9% males and 41.02% females. Azmak D[14] has quoted 1:3 for strangulation and 1:2 for throttling, and Srivastava AK[10] had shown 30.77% males and 69.23% females, giving higher incidence in females than males.

Manner of Death: The homicidal deaths in our study were which shows higher incidence than that of Bashir MZ[9] 45.05% but lower than that of Demirci S[13] 85%.

Suicidal 30.90% in our study is lower than Bashir MZ[9] 45.45% and Azmak D[14] 47%. It is higher than that of Demirci S[13] 15%.

In hanging the suicidal incidence in our study was 65.38%, which is lower than that of Bashir MZ[9] 86.53%. Homicidal showed 9.62% which is also higher than 3.84%[9]. But lower than that of Bowen DA[16], which is 95%.

There was no case of accidental hanging; however Bowen DA[16] reported 5% of auto-erotic accidental asphyxial deaths.

Position of Knot: In 65 cases (62.50%), the knot was present at occiput, which is comparable with the findings of Azmak D narrating 66% on occiput. In 24 cases (23.08%), it was on lateral side, either right or left.

CONCLUSION

It is one of the commonest causes of deaths in our country. Hanging is the most preferable method of suicidal asphyxial deaths. Suicide occurs mostly in younger age groups, and males showing higher incidence than females due to socio-economic responsibilities on them.

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