

# Mortality Associated with Neck Compression Deaths –An Autopsy Based Study

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## ABSTRACT:

**Objective:** To determine the frequency of deaths due to compression of neck autopsied in three major mortuaries of Karachi and to evaluate the association of cause of neck compression deaths with the age and gender.

**Materials and Methods:** This autopsy- based descriptive cross-sectional study was conducted from 1<sup>st</sup> March 2008 to 28<sup>th</sup> February 2009 in the mortuaries at Civil Hospital, Jinnah Postgraduate Medical Center and Abbasi Shaheed Hospital Karachi. The study included 90 cases of deaths due to hanging and strangulation, brought to mortuaries of public sector hospitals of Karachi. Details of findings from autopsy reports and police papers were entered in a performa under the heading of cause, causative agent, manner, age and gender.

**Results:** 90 out of 2090 unnatural deaths were due to hanging and strangulation. Hanging was the most frequent cause among the deaths due to neck compression. Male to female ratio was 1.7:1. Male dominated in hanging and ligature strangulation while female dominated in manual strangulation. Age group ranging from 15 to 35years was chiefly involved. 100 % suicidal and homicidal manner of death was seen in hanging and strangulation respectively. Cause of neck compression death was significantly associated with gender (P value <0.036) but not with the age (P value <0.732).

**Conclusion:** Hanging is the most frequent neck compression death involving males of young age group. Hanging and strangulation are still used to commit suicide and homicide respectively. Such deaths indicate frustrated and stressful condition of young population necessitating comprehensive program of counseling for healthy environment.

**Keywords:** Neck compression, Hanging, Strangulation, Manner, Suicide, Homicide.

## INTRODUCTION:

Violence in the society has increased the rate of unnatural deaths and contributed a major part of medico legal autopsies. Violent asphyxial deaths make a significant part of un-natural deaths and are common in occurrence. Asphyxia is defined in simple words as interference with the process of respiration or impairment in the supply of oxygen to the inspired air. In forensic field it is restricted to those forms of oxygen lack (anoxia) resulting from mechanical interference with the process of respiration.<sup>1</sup> Generally in medico legal work asphyxial

deaths are associated with some form of mechanical obstruction and classified into hanging, strangulation, suffocation and drowning depending upon the level of obstruction from the nose and mouth to the alveolar membrane.<sup>2</sup> Among the violent asphyxial deaths, those resulting from compression of neck are due to sudden pressure over the sensitive neck structures. Two most commonly encountered causes of death due to neck compression are hanging and strangulation. Hanging in the adults is mostly suicidal although it may occur accidentally in children and persons practicing masochistic exercises. Homicidal hanging is difficult unless the victim is intoxicated or unconscious. Toxicological analysis of the victim of homicidal hanging is mandatory because this is not an easy way of homicide. Accused try to make the victim power less before applying noose. Hanging and drowning are generally considered suicidal manner of death while strangulation particularly manual is homicidal. Traumatic asphyxia and other asphyxial deaths resulting from suffocation are accidental.<sup>3</sup> Deaths due to ligature or hand induced compression of neck which include hanging and strangulation are now considered as one of the preferred method either to take away the life of self or other.<sup>4</sup> Hanging is a form of asphyxia resulting from the suspension of the body by a ligature compressing the neck externally, the constricting force being the weight of the body.<sup>5</sup> Globally hanging is considered among the most common methods of suicide, accounting for about more than 50% of all suicide in Saudi Arabia and Hungary and 31.5% of suicide in India.<sup>6,7</sup> Hanging accounts for about 2000 deaths annually in England and Wales and considered the most common method of suicide.<sup>8</sup> Studies from Canada has also reported hanging as the second most common method of suicide following suffocation.<sup>9</sup> In strangulation compression of the neck is effected by

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a force other than the body's own weight, such as ligature, hands when it is known as throttling, elbow (mugging) and bamboos (bansdola). Apart from the accidental strangulation seen in cases where the law enforcers use choke hold to control criminals, in wrestling and choking games, strangulation is always considered homicidal and will be treated as such by medical examiners and police, in the absence of clear evidence to the contrary. Choking games to achieve euphoric state amongst the youth have been reported in United States of America during 1995 – 2007.<sup>10</sup>

The ligature mark on neck of the body is the only available vital piece of evidence in the absence of actual ligature but on many occasions it creates an element of doubt especially when one has to differentiate ligature mark of homicidal hanging from that seen in strangulation.

Violent asphyxial deaths by the use of ligature or hand to compress the sensitive and delicate structures of neck have increased and contributed significantly to unnatural deaths. Hanging has been reported as the leading cause of suicide in a study from Faisalabad and Karachi on suicidal deaths.<sup>11-12</sup> Present study is therefore aimed to determine, the frequency, manner and associated factors of neck compression deaths autopsied in three major mortuaries of Karachi along with age and gender vulnerability.

#### MATERIALS AND METHODS:

Jinnah post graduate medical center, Civil hospital and Abbasi Shaheed hospitals being the busiest and authorized public sector centers to conduct autopsies on bodies of un-natural deaths, were selected for the present descriptive cross-sectional study on 90 cases of death as a result of neck compression. A total of 2090 cases of un-natural deaths were brought for autopsy during the study period of one year from 1<sup>st</sup> March 2008 to 28<sup>th</sup> February 2009, out of which details were collected for those resulting from the fatal compression of neck. All findings from autopsy reports and police papers were recorded in a purpose built performa under the headings of cause, causative agent, manner, age and gender. Manner of death was concluded from the police papers who investigated the deaths according to the legal provision under section 174 of Criminal Procedure Code. All cases of death that resulted from fatal compression of neck, whose medico legal autopsy was performed at mortuaries of Civil Hospital, Jinnah Postgraduate Medical Center and Abbasi Shaheed Hospital Karachi, were included in the study. Medico legal deaths in Karachi in which the cause of death was other than hanging and strangulation, or the dead bodies submitted for the partial/ external examination or dead bodies handed over to the relatives without proper and complete autopsy were excluded from the study. Microsoft Excel spread sheet and SPSS version 15 were utilized to analyze the data. The frequencies and percentages

were calculated for all categorical variables.

#### RESULTS:

Out of the total 2090 autopsies conducted during the study period, 54 cases were hanging and 36 were due to strangulation making incidence rate of hanging and strangulation 2.58 and 1.72 respectively (Table 1).

Table: 1  
Incidence of violent asphyxial death and death due to hanging and strangulation

Total No. of Autopsies	Neck Compression Deaths (90)	
	Deaths due to hanging	Deaths due to strangulation
2090	54 (2.58 %)	36 (1.72 %)

Hanging (60%) is the most frequent cause among 90 cases of neck compression deaths. Out of the 90 cases of death due to neck compression 57 (63.33%) were male while 33(36.37%) were female making male to female ratio 1.7:1. Male out-numbered female in hanging and ligature strangulation while female out-numbered male in manual strangulation.(Table 2a).

Table: 2a  
Frequency of deaths due to hanging and strangulation in relation to gender

S.No.	Cause Of Death	Male	Female	Total
1	Hanging	39	15	54 (60 %)
2	Ligature Strangulation	14	10	24 (26.67%)
3	Manual Strangulation	04	08	12 (13.33%)
		57 (63.33%)	33 (36.67%)	90 (100%)

The age group ranging from 15 to 35 years was most commonly involved in deaths due to hanging and strangulation. Hanging and strangulation were less common below 15 year and after 55 year (Table 2b)

Table: 2b  
Frequency of deaths due to hanging and strangulation in relation to age

Age	Hanging	Strangulation	Total
< 1 year	-	-	-
1 - <15 Year	02	-	02 (2.2%)
15 - <25 year	20	16	36 (40%)
25 - < 35 year	16	08	24 (26.67%)
35 - < 45 year	08	06	14 (15.56%)
45 - < 55 Year	05	03	08 (8.9%)
55 year	03	03	06 (6.67%)
Total	54 (60%)	36 (40%)	90 (100%)

All hanging cases (100 %) were suicidal while all ligature and manual strangulation cases (100 %) were homicidal. Hanging was the leading cause of deaths due to compression of neck (Table 3)

Table: 3

Frequency of asphyxial death in relation to Manner of death

S. No	Cause of Death	Manner of Death			Total
		A	H	S	
1	Hanging	-	-	54	54
2	Ligature Strangulation	-	24	-	24
3	Manual Strangulation	-	12	-	12
				36	54
				90 (100%)	

A=Accidental, H= Homicidal, S= Suicidal

Cause of neck compression deaths was significantly associated with gender (P value <0.036) but no such association is found with two groups of age of the victim when divided into above and below 25 year of age (P value <0.732). Hanging is significantly common in male. (Table 4)

Table: 4

Relationship of cause of neck compression deaths

Relationship of cause of neck compression deaths with gender			
	Hanging	Strangulation	P-value
Male	39	18	0.036
Female	15	18	
	54	36	
Relationship of cause of neck compression deaths with age			
	Hanging	Strangulation	P-value
≤25 years	22	16	0.732
>25 years	32	20	
	54	36	

## DISCUSSION:

Our study shows 90 cases of death resulting from the compression of neck among 2090 unnatural deaths giving 4.30% incidence of neck compression deaths. The similar trend has also been reported in a study conducted at Lahore, Pakistan showing 3.05% incidence of neck compression deaths.<sup>13</sup>

In the present study mostly deaths (54 cases; 60%) were related to hanging followed by ligature strangulation (24 cases; 26.66%) and manual strangulation (12 cases; 13.33%). Hanging has also been reported by most of the authors as the most frequent type of violent asphyxial death.<sup>14,15</sup> The type of the violent asphyxial death occurring most frequently depend upon the area and environment. A report from India has shown drowning as the most frequent type of violent asphyxial death because of the bhakra canal in the near vicinity of the studied area.<sup>16</sup>

The male – female ratio of all deaths resulting from compression of neck in our study is 1.7:1. Patel has also reported male – female ratio 1.69:1 of total violent asphyxial deaths.<sup>14</sup> In the present study male to female ratio is 2.6:1 for hanging, 1.4:1 for ligature strangulation and 1:2 for manual strangulation. Studies from other parts of Pakistan have reported male to female ratio

2.25:1 and 2.7:1 for hanging, while 2.05:1 and 1.4:1 for ligature strangulation which is comparable to our present study.<sup>17,18</sup> Author from India has reported higher incidence of ligature strangulation and throttling in female compared to male.<sup>19</sup> Our study has also reported higher incidence of throttling in females. This is due to the fact that females are weak, offer less resistance particularly when female is a child. It is easier for the assailant to throttle when his physical size and strength exceeds that of the victim. Several studies from India<sup>7,20,21</sup> has shown higher number of hanging deaths in the age group ranging from 21-30 years followed by 31-40 years which is similar to our study reporting higher involvement of victims of age group ranging from 15 to less than 25 year followed by 25 to less than 35 year. This is the period of life when a person is exposed to various stresses and anxiety in adverse circumstances.

Our study has reported suicidal manner of death in all hanging cases and homicidal manner of death in all strangulation cases. It is generally considered and described in most of forensic medicine textbooks that hanging is suicidal and strangulation is homicidal in nature until the contrary is proved otherwise. Patel has demonstrated 80.41% suicidal manner of death in hanging and 100% homicidal manner of death in strangulation.<sup>14</sup> Retrospective study from Turkey has reported not even a single case of homicidal hanging.<sup>15</sup> Higher incidence of strangulation for homicidal purposes in females has been reported in a five year retrospective study of India.<sup>22</sup> Studies have reported that hanging is the most common violent asphyxial death which based on opinion were suicide in manner while all strangulation deaths were homicide in nature.<sup>23,24,25</sup> Our study of neck compression deaths has also shown a significant association of cause of neck compression deaths with gender but not with the age when two groups of victims that is above and below 25 years were compared. Many of the studies have shown male predominance in hanging cases and female dominance in strangulation cases.<sup>17,18,19</sup> Most of the studies have reported that young age group ranging from 15-35 years is mainly involved in asphyxial death that is why the victims of neck compression deaths are evenly distributed around 25 year and showing no significance of age with the cause. Not a single study has shown such significance even on extensive search.

It is required that a medical examiner should perform a meticulous post mortem examination and interpret the manner of death in the light of thorough death scene investigation along with the past history of the deceased in all cases of hanging and strangulation. Doctors generally do not visit the crime scene in our set up and there by miss relevant photographs and trace evidences. We have limitation that not all unnatural deaths were reported and even the reported autopsies are avoided due to religion, political and racial influences. Family honor is also a big hurdle in performing autopsies of unnatural death.

## CONCLUSION:

Hanging is the leading cause of death resulting from

the neck compression. Male of age group ranging from 15 to 35 years are the major victims of neck compression death except manual strangulation where females are the major victims. Hanging to commit suicide and strangulation as a mean of homicide continues to be the preferred manner of deaths. Such a picture indicates frustrated environment for the youngsters in our society and demands attention from those who handle and investigate these cases to rectify familial and financial disputes in order to reduce the frequency of violent asphyxial deaths.

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