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Violent Asphyxial Deaths: An Autopsy Based Study.

Hrishikesh B Deshpande^{1*}, Hemant V Godbole², Maroti D Dake³, and Sunil B Madewad⁴.

¹Assistant Professor, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.

²Professor and Head, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.

³Associate Professor, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.

⁴Assistant Professor, Department of Forensic Medicine and Toxicology, Dr Shankarrao Chavan Government Medical College, Nanded, Maharashtra, India.

ABSTRACT

This autopsy-based study aimed to investigate the demographic patterns of violent asphyxial deaths, analyzing age, gender, methods, manners, and contributing factors. The study analyzed 154 cases of violent asphyxial deaths autopsied from January 2016 to June 2017. The incidence of violent asphyxia was 9.10% of all cases studied, with a predominance of males (71.42%). Hanging was the most common method of asphyxiation (59.09%), followed by drowning (33.76%). Suicidal deaths were the most common manner (69.48%), followed by accidental (16.88%) and homicidal (7.79%) deaths. The age group most affected was 21-30 years (30.51%). Contributing factors to these deaths were explored, with personal reasons, financial issues, social/family/domestic problems, and extramarital/love affairs identified. The study revealed that housewives (17.53%) and students (16.88%) constituted a significant portion of victims. Most victims of hanging chose to commit the act at home (91.20%), while drowning victims were commonly found in rivers (69.23%). The study sheds light on critical factors contributing to violent asphyxial deaths, including stress, financial burdens, and domestic issues. The findings emphasize the need for comprehensive efforts by authorities to address these issues, particularly unemployment and farmer suicide. The study underscores the importance of promoting psychological well-being, especially among young males, to mitigate the rising incidence of asphyxial deaths. Effective preventive measures and support systems are crucial to curb this concerning trend.

Keywords: Asphyxial Deaths, demographic patterns, contributing factors

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**Corresponding author*

INTRODUCTION

Due to numerous socio-economic reasons like poverty, increase strains & stress in day today life, we frequently come across cases of suicides, homicides and accidents which are common manner of unnatural death. In most of these cases interference with the process of respiration by some violent mechanical force leading to asphyxia is commonly reported mode of death. It is commonly known as violent asphyxia [1]. Every cell of the body for sustenance of life requires oxygen in adequate supply for purpose of utilization. The term “asphyxia” is applied to those circumstances in which mechanical interference either impedes access of air to the lungs or interferes with the cerebral blood supply [2]. However; the term has been translated from the original Greek, implying “pulselessness or absence of pulsation”.

Adelson defined asphyxia as the physiologic and chemical state in a living organism in which acute lack of oxygen available for cell metabolism is associated with inability to eliminate excess of carbon dioxide [3].

Generally, the term “anoxia” implies ‘absence of oxygen’ [4]. But Bacroft [5] using this term divided the condition into three groups: (1) anoxic anoxia – meaning prevention of oxygen from reaching the lungs (2) anaemic anoxia – meaning inability of blood to carry sufficient oxygen to the tissues due to low haemoglobin content (3) stagnant anoxia – meaning lack of oxygenated blood transport to the tissues due to impaired circulation. Later on, Peters and Van Slyke in 1931 added a fourth group to it called (4) histotoxic anoxia wherein, though freely available in the blood stream, oxygen cannot be utilized by the tissues.

In Forensic Medicine, the word asphyxia implies anoxic anoxia, which results from mechanical interference with respiration and such deaths due to mechanical interference of respiration are also termed as violent asphyxia deaths [6-9]. This study is an attempt to study demographic pattern including age and gender of violent asphyxial deaths.

MATERIAL AND METHODS

The present study was conducted on violent asphyxial deaths autopsied during the period from 1st January 2016 to 30th June 2017 at Department of Forensic Medicine. It is an autopsy based descriptive cross-sectional study. A total 154 autopsy cases of violent asphyxial deaths were studied during the study period.

Inclusion criteria

The criterion applied for the selection of cases was that the asphyxia should have occurred by mechanical interference with respiration.

Exclusion criteria

- Cases of birth asphyxia in neonates
- Cases showing signs of decomposition masking findings of asphyxia

The study has been undertaken with due approval from the Institutional Ethics Committee. The present study was conducted in accordance with protocol and to comply with all requirements of ICMR guidelines (2006).¹⁰ All the cases of violent asphyxial deaths were examined as per standard medico-legal autopsy procedure and data was gathered on the basis of information from:

- Inquest papers
- Detail history from near relatives of deceased
- Autopsy findings

RESULTS

A total of 1691 medico-legal autopsies were conducted during the study period, out of which 154 (9.10 %) cases were fulfilling the inclusion and exclusion criteria i.e of violent asphyxia deaths. In this

study maximum number of cases were of hanging (91 cases, 59.09%), followed by drowning (52 cases, 33.76%). Other cases consist of ligature strangulation (7 cases, 4.54%), throttling (3 cases, 1.94%) and smothering (1 case, 0.64%). (Ref. pie chart 1 & 2)

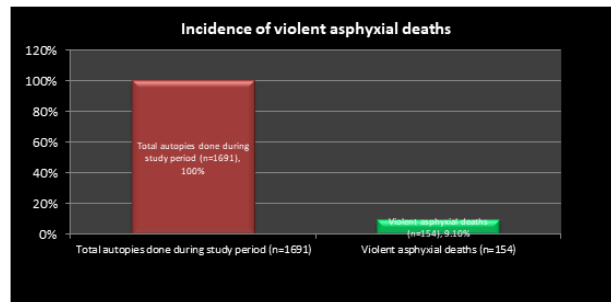


Chart 1

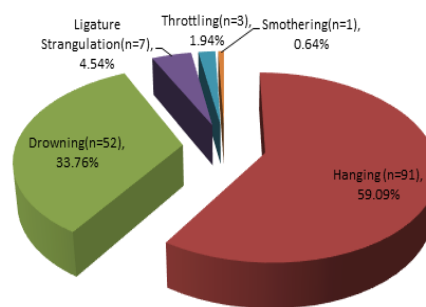


Chart 2

Chart 1 & 2: Incidence of violent asphyxial deaths and percentage distribution of different methods of violent asphyxial deaths

During study period no cases of choking, gagging and traumatic asphyxia were observed. After analyzing the manner of all asphyxial deaths it was observed that suicidal deaths accounted a major bulk comprising 107 cases (69.48%) followed by accidental deaths (26 cases, 16.88%), homicidal deaths (12 cases, 7.79%) and in 9 cases (5.84%) manner of death could not be ascertained.

It was also observed that among 91 cases of hanging, except in only 1 case (1.09%) of accidental hanging all other 90 cases (98.90%) were of suicidal manner. Among 52 cases of drowning, accidental drowning accounted for 44.23% (23 cases), suicidal drowning 32.69% (17 cases) and homicidal drowning 5.76% (3 cases). Manner could not be ascertained in 9 cases (17.30%). Among 7 cases of ligature strangulation, homicidal manner accounted for 71.42% (5 cases) and accidental ligature strangulation accounted for 28.57% (2 cases) whereas all the cases of throttling (3 cases, 100%) and smothering (1 case, 100%) were homicidal in manner. (See chart 3 and table 1)

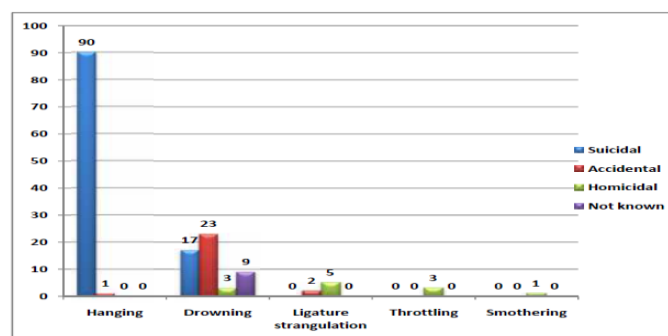


Chart 3: Method and Manner of asphyxial deaths

Table 1: Method and Manner of asphyxial deaths

Method	Manner			
	Suicidal	Accidental	Homicidal	Not known
Hanging (n=91)	90 (98.90%)	1 (1.09%)	0	0
Drowning(n=52)	17 (32.69%)	23 (44.23%)	3 (5.76%)	9 (17.30%)
Ligature Strangulation(n=7)	0	2 (28.57%)	5 (71.42%)	0
Throttling(n=3)	0	0	3 (100%)	0
Smothering(n=1)	0	0	1 (100%)	0

The age wise distribution of various asphyxial deaths. It was observed that among 154 cases of asphyxial deaths, maximum number of cases 47 (30.51%) were observed in the age group of 21-30 years followed by 31-40 years (36 cases, 23.37%), 41-50 years (23 cases, 14.93%) and 11-20 years (22 cases, 14.28%). In 0-10 years, age group, 7 cases (4.54%) were observed. 8 cases (5.19%) and 5 cases (3.24%) were observed in 51-60 years and 61-70 years age group respectively. 6 cases (3.89%) were observed in > 71-year age group.

The Socio demographic profile in asphyxial deaths also analysed in this study. Among the 154 cases studied, maximum cases were from urban area comprising 57.79% (89 cases) and 53 were from rural area comprising 34.41 %. In 12 cases (7.79%) data regarding residence was not available. Among the 154 cases studied, 98 cases were married comprising 63.63 % and 47 were single comprising 30.51 %. In 9 cases (5.84%) marital status was not available. In the present study, majority of victims died due to asphyxia were housewives and students (27 cases, 17.53% housewives and 26 cases, 16.88% students) followed by labourer, service, farmers and business which account for 14.28%, 13.63%,7.79% and 5.84% cases respectively. In 10 cases (6.49%) victims were unemployed and in 22 cases (14.28%) where victim’s occupation could not be ascertained. (See table below)

Table 2: Socio demographic profile in asphyxial deaths (n-154)

Characters		No. of cases (%)
Address	Urban	89(57.79%)
	Rural	53(34.41%)
	not known	12(7.79%)
Marital Status	Married	98(63.63%)
	single	47(30.51%)
	Not Known	9(5.84%)
Occupation	Service	21(13.63%)
	Labour	22(14.28%)
	Housewife	27(17.53%)
	Student	26(16.88%)
	Driver	5(3.24%)
	Unemployed	10(6.49%)
	Business	9(5.84%)
	Farmer	12(7.79%)
	Not known	22(14.28%)

Table 3: Place of incidence in asphyxial deaths

Place	Types				
	Hanging (n-91) No. (%)	Drowning (n-52) No. (%)	Ligature Strangulation (n-7) No. (%)	Throttling (n-3) No. (%)	Smothering (n-1) No. (%)
Home	83 (91.20)	0	2 (28.57)	0	0
Farm	7 (7.69)	0	5 (71.42)	0	0
Road side	1 (1.09)	0	0	1 (33.33)	0
River	0	36 (69.23)	0	1(33.33)	1(100)
Well	0	8 (15.38)	0	1(33.33)	0
Lake	0	3 (5.76)	0	0	0
Drainage / Tank	0	5 (9.61)	0	0	0

Our study shows the places of incidence in relation with methods of asphyxiation. Out of 91 cases of hanging it was observed that most of the victims (83 cases, 91.20%) chose home for hanging over the other places like farm (7 cases, 7.69%) and road side (1 case, 1.09%). From above table it is clear that most of the victims chose closed place rather than open places for hanging. It was also reported that among 52 cases of drowning maximum victims (36 cases, 69.23%) were found in river followed by well (8 cases, 15.38%), drainage / tank (5 cases, 9.61%) and lake (3 cases, 5.76%). While among 7 cases of ligature strangulation, in 5 cases (71.42%) victims were found in farm and in 2 cases (28.57%) victims were found in home. Among 3 cases of throttling 1 each victim (33.33%) was found along road side, in river and in well while the only victim of smothering was found in river (1 case, 100%). (See table 3)

Table 4: Showing study summary and comparison with different studies

Violent Asphyxial deaths	This study	Chaudhary BL et al [1] (2019)	Patel AP et al [9] (2013)	T. K. Singh et al [10] (2018)	Azmak D et al [11] (2006)	Tirmizi SZ et al [12] (2012)
Incidence of Asphyxial deaths	154 (9.1%)	167 (6.02%)	388 (5.63%)	391 (12.1%)	134 (15.7%)	148 (7.08%)
MALE	71.42%	74.25%	62.88%	57.80%	79.80%	75.68%
Female	28.58%	25.74%	37.12%	42.20%	20.20%	24.32%
Cause of death						
Hanging	91 (59.09%)	129(77.24%)	320(82.48%)	254 (64.9%)	56(41.8%)	54 (36.48%)
Drowning	52(33.76%)	16(9.58%)	56(14.43%)	97 (24.8%)	41(30.5%)	48 (32.43%)
Ligature Strangulation	7 (4.54%)	10(5.98%)	12(03.09%)	18 (4.6%)	4(2.98%)	36(24.32%)
Other	4 (2.59%)	12(7.18%)	0	22(5.7%)	33(24.62%)	10(6.75%)
Manner of death						
Suicidal	107(69.48%)	NA	336(86.60%)	278(71%)	NA	54(36.48%)
Homicidal	12(7.79%)	NA	12(3.09%)	31(8%)	NA	38(25.67%)
Accidental	26(16.88%)	NA	40(10.31%)	82(21%)	NA	56(37.83%)
Not known	9(5.84%)	NA	0	0	NA	0
Reason for Death/Contributing factors						
Personal	31(20.12%)	NA	136(34.51%)	136 (34.8%)	NA	NA
Borrowings/Finacial	27(17.53%)	NA	32 (8.25%)	23 (5.9%)	NA	NA
Revenge	0	NA	04 (1.03%)	6 (1.5%)	NA	NA
Social/family/domestic problems	22(14.28%)	NA	88 (22.68%)	54 (13.8%)	NA	NA
Extramarital /love affairs	3(1.94%)	NA	08 (2.06%)	7 (1.8%)	NA	NA
Accidental	26(16.88%)	NA	40 (10.31%)	82 (21%)	NA	NA
Not known	30(19.48%)	NA	80 (20.62%)	83 (21.2%)	NA	NA
Other important factors						
Farmer suicide	6(3.86%)	NA	NA	NA	NA	NA
Unemployment	8(5.9%)	NA	NA	NA	NA	NA

DISCUSSION

Violence in any form is intolerable and unacceptable. But the incidents of violence in both the forms; killing self or someone else are recorded since the existence of human being for one or the other reason. Asphyxial deaths constitute an important proportion of medico legal deaths and unfortunately will continue to do so due to stressful and competitive lifestyles. There is social, psychological, economic and legal impact of such violent asphyxia deaths. According to the WHO, decreasing deaths due to mechanical asphyxia requires scientific approach for providing careful analysis and interpretation of good data and setting up targets and plans.

In violent asphyxial deaths the process of respiration i.e. exchanges of air between the atmosphere and lung beds is prevented by some violent mechanical means. To the Forensic pathologist, the word asphyxia means anoxic anoxia and implies some compromising of the air passages which may come about in variety of ways. This study has been attempted to generate data about the socio-demographic background of the victims and to analyze these data to get information about the various correlates and their impact on the incidence of various types of asphyxial deaths.

The present study has been carried out in the Department of Forensic Medicine of this Medical College, from 1st January 2016 to 30th June 2017.

In present study, the incidence rate of violent asphyxia was 9.10% of all the cases, while it was reported lower by different studies carried out by various authors as 5.63% (by Patel AP et al) , 5.9 % (by Zanjad NP et al) & 6.02% (by Azmak D et al) [9, 11, 13]. Other similar studies conducted by Tarun Kumar Singh et al & DK Vadgama et al were reported higher incidence rate of violent asphyxia 12.1% & 22.2% respectively [10, 14]. Our study shows 71.42% male involvement, more or less similar to the study of Turkey in which male constituted 79.8% of all cases, such male predominance (75.68% males) was also observed in one study of Pakistan carried out by Tirmizi SZ et al [11, 12].

In this study most commonly affected age group was 21- 30 years with 47 cases (30.51%) followed by 31-40-year age group (23.27%). Thus, incidence of asphyxial deaths was found to be less in very young age but it increases from adolescence to late middle age and again it drastically falls in old age. Our findings in this regard were consistent with findings reported by Hussaini SN et al (male - 75.09% and 21-30-years age group -30.65%), Bakkannavar SM et al (male - 63%- and 21-30-years age group - 31.11%), Bhagora LR et al (male - 72.79% and 21-30 years age group - 34.56%) and Dakhankar S et al (male - 61.13% and 21-30 years age group- 28.50%) [15-18]. These studies cited the reason that young adult male group is most active group of population and also the earning group in families; this makes them more vulnerable to stress and strain of life and also exposes them to the risk of accidents, suicides and sometimes homicide also.

In this study hanging (91 cases, 59.09%) was the most common method of asphyxiation followed by drowning (52 cases, 33.76%) these finding were concurrence with findings reported by Gurudut et al (hanging - 61.16% and drowning - 28.15%), Chaurasia N et al (hanging - 52.21% and drowning - 45.02%) [19, 20]. Findings in our study was in contrast to the study conducted by Singh A et al. They found drowning as the commonest method of asphyxiation (59.4%) followed by hanging (24.3%). This can be explained on the basis of different region of the study and proximity of Bhakhra canal where the study was conducted [21]. In our study it was also observed that commonest manner of asphyxiation was suicide (69.48%) followed by accidental (16.88%) and homicidal (7.79%). Study conducted by Gupta VP et al ²²(suicidal - 83.75%, accidental - 15.31% and homicidal - 0.93%) & different studies carried out by various authors in their studies reported the similar observation. (Ref table 4) As in present study, maximum cases are of hanging which are mostly suicidal thereby explaining predominance of suicidal manner. As per our study most of the victims of asphyxial deaths belonged to urban area (57.79%) while 34.41% victims belonged to rural area. These findings are somewhat similar with the Gargi et al findings (Urban - 41.89% and Rural - 27.03%) & differ from the findings reported by Singh A et al (Urban - 48.4% and Rural - 51.6%) [21, 23].

It was also observed that most of the victims of asphyxial deaths were married (63.63%) which was supported by observations reported by Gupta VP et al (55.62%) and Singh B et al (65.75%) in their studies [22, 24]. This higher incidence among married victims can be explained by early marriages in the

Indian community, familial responsibilities, social customs, limited source of income, frustrations, dowry, family quarrels, maladjustment in marriage life, infidelity, unemployment etc.

In the present study, it was observed that housewives (17.53%) and students (16.88%) constituted relatively higher number of cases followed by labourer, service, farmers and business which account for 14.28%, 13.63%, 7.79% and 5.84% cases respectively which is similar with the findings of Gupta VP et al, in their study they observed that students constituted the highest number of cases, 72 (22.5%) followed by the daily labourers 58 (18.12%), service holders and businessman [22].

When Place of incidence in asphyxial deaths was analysed in our study (ref. table no 3) it was observed that most of the victims (83 cases, 91.20%) chose home for hanging which was in agreement with the studies done by Meera Th et al (73.81%), Bhosle SH et al (69.88%) [25, 26]. Usually, persons prefer any closed space for suicide and home is the place which suits his / her needs for hanging. In present study majority of the victims drowned in river (69.23%) followed by well (15.38%), drainage / tank (9.61%) and lake (5.76%). Findings in this regard were similar from study done by Nayak GH et al [27] (river/lake- 65.21%, well-17.39%) while differ from Patel AP et al [9] (river-28.56%, pond-21.43%, well-7.15%) and Gupta VP et al [22] (river-29.68%).

Higher percentage of victims drowned in river in present study can be explained by the fact that our area is located near the banks of one of the major rivers of Maharashtra and one small river. Most of the victims of ligature strangulation were found in farm (71.42%), 1 each victim (33.33%) of throttling was found along road side, in river and well and the only victim (100%) of smothering was found in river. This shows that assailant prefers lonely place for homicide and also tries to hide the crime by throwing the victims in places like river, well etc. where early detection of body and crime becomes difficult.

Different predisposing factors of violent asphyxial deaths were studied in detail in our study (see table 4) It was observed that personal reasons like stress, chronic illness common factor followed by financial social /family /domestic problems, Similar Predisposing factors were analysed in different studies (see table 4) Some important contributing factors were analysed in our study like unemployment and farmer suicide we found that 5.9% asphyxial deaths cases unemployment was probable culprit and 3.86% cases were of farmer suicide.

CONCLUSION

This autopsy-based study provided important statistical inputs also impart need to look after some important contributory factor of violent asphyxia deaths like unemployment, farmer suicide More vulnerability among Males belonging to younger age group 21-40 raises concern about early exposure different predisposing factors affecting psychological health by producing undue stress and burden in males. Majority of asphyxial deaths were suicidal followed by accidental and homicidal. Suicidal deaths as a result of hanging and accidental deaths as a result of drowning seem to be the major contributing causes of asphyxial deaths. Increase in number of suicide cases should serve as an eye opener for different organizations working for socio economic justice.

Our study concludes that considering contributing factors of asphyxia deaths effective, organised efforts from the concerned government authorities is need of hour to prevent rising asphyxial deaths in area. Also, priority to psychological health like general health in younger age group should be given.

REFERENCES

- [1] Chaudhary BL, Vidua RK. Asphyxial deaths: A study from Delhi, India. *Journal of Indian Academy of Forensic Medicine* 2019;41(4):241-2.
- [2] Polson CJ, Gee DJ. *The Essential of Forensic Medicine*. Pergamon Press; 1985: 35.
- [3] Adelson L. *The Pathology of homicide*. Springfield: Charles C Thomas; 1974: 555-557.
- [4] Vij K. *Textbook of forensic medicine and toxicology*. 6th ed New Delhi: Reed Elsevier Pvt Ltd; 2014: 106-136
- [5] Bacroft J. Physiological effects of insufficient oxygen supply. *Nature* 1920:106-127.
- [6] Reddy KSN. *The essentials of Forensic Medicine & Toxicology*, 33rd edition, 2014:338-376.
- [7] Tiwari P, Sharma D, Meena SK, Tiwari H. Analysis of suicidal asphyxial deaths in Kota, the coaching city of India. *Journal of Indian Academy of Forensic Medicine* 2019;41(4):243-4.

- [8] Kumar Khalkho S, Kumar Pathak M. Death Due To Traumatic Asphyxia in Varanasi Region, India. *International Journal of Medical Toxicology and Forensic Medicine* 2019;9(2):51-6.
- [9] Patel AP, Bhoot RR, Patel DJ, Patel KA. Study of violent asphyxial death. *International Journal of Medical Toxicology And Forensic Medicine* 2013;3(2 (Spring)):48-57.
- [10] Singh T K, Agarwal A, Gupta R, Sharma V. A study of demographic variables of violent asphyxial deaths in Agra region. *Indian J Forensic Community Med* 2018;5(4):223-226.
- [11] Azmak, Derya MD Asphyxial Deaths, *The American Journal of Forensic Medicine and Pathology* 2006;27(2):134-144.
- [12] Tirmizi SZ, Mirza FH, Paryar HA. Medicolegal investigation of violent asphyxial deaths - an autopsy based study. *J Dow Uni Health Sci* 2012; 6(3):86-90.
- [13] Zanjad NP, Bhosle SH, Dake MD, Godbole HV. Study of Violent Asphyxial Deaths: a 10-Year Retrospective Study. *Medico-Legal Update*. 2015 Jan 1;15(1).
- [14] DK Vadgama, PJ Manvar, PR Varu, RD Vaghela, RK Mashru Study of violent asphyxial deaths in Rajkot Region *Indian Journal of Forensic and Community Medicine* 2016;3(4):254-256.
- [15] Hussaini SN, Kulkarni CS, Mukherjee AA, Singh B, Batra AK. Medicolegal Evaluation of Asphyxial Deaths in Akola District of Vidharbha Region. *Indian Journal of Forensic Medicine and Pathology* 2014; 7(1): 15-18.
- [16] Bakkannavar SM, Kumar PG, Nayak VC, Rajendiran G, Chhikara S, Sharma S. Victimo - epidemiological profile of violent asphyxial deaths in Manipal, Karnataka. *Indian Journal of Forensic and Community Medicine* 2015; 2(1):29-34.
- [17] Bhagora LR, Parmar AP, Patel TC, Bhagora RV. Recent trends of Asphyxial Death in Bhavnagar Region. *Int J Res Med* 2015; 4(1); 109- 112
- [18] Dakhankar S, Maled V. Pattern of asphyxial deaths in Kolhapur district of Maharashtra. *Med Pulse - International Medical Journal* 2016; 3(12): 1093-1096.
- [19] Gurudut KS, Ajaykumar S, Gouda HS, Analysis of Fatal Cases of Mechanical Asphyxia at Belgaum, Karnataka *Journal of Forensic Medicine & Toxicology* 2011; 28:51-53.
- [20] Chaurasia N, Pandey SK, Mishra A. An Epidemiological Study of Violent Asphyxial Death in Varanasi Region (India) a Killing Tool. *J Forensic Res* 2012; 3: 174.
- [21] Singh A, Gorea RK, Dalal JS, Thind AS, Walia D. A study of demographic variables of violent asphyxial deaths. *JPAFMAT* 2003; 3: 22-25.
- [22] Gupta VP, Mahanta P. A Study of Asphyxial Death Cases in Medico- Legal Autopsy *IJHRMLP* 2016; 2(2): 86-89.
- [23] Gargi J, Gorea RK, Chanana A, Mann G. Violent Asphyxial Deaths- A six years study. *Journal of Indian Academy of Forensic Med* 1992:171-176.
- [24] Singh B, Ghosh M, Sangal A, Srivastava AK. Post-Mortem Medico legal Study of Violent Asphyxial Deaths - An Autopsy Based Study. *Int Arch BioMed Clin Res* 2017; 3(2):104-107.
- [25] Th. Meera, M. Bapin Kumar Singh. Pattern of Neck Findings in Suicidal Hanging - A Study in Manipur. *J Indian Acad Forensic Med* 2011; 33(4): 352-354.
- [26] Bhosle SH, Batra AK, Kuchewar SV. Violent asphyxial death due to hanging: A prospective study. *Journal of Forensic Medicine, Science and Law* 2014; 23(1).
- [27] Nayak GH, Karlawad M. A Medico legal Examination of Drowning Deaths - A Retrospective Study. *International Journal of Science and Research* 2017; 6(1): 811-814.