ORIGINAL ARTICLE

The Analysis and Pattern of Sudden Deaths at a Teaching Hospital, Telangana

Guntheti BK,[1] Mohsin ZU.[2]

Professor,[1] Tutor.[2]
1-2. Department of Forensic Medicine, Mamata Medical College, Khammam.

Abstract :

Sudden natural death is defined as a healthy person's death within 24 hours after the onset of a terminal illness without any history of past illness. This study looks forward to assess the demographic profile, causes of sudden natural deaths, and the pattern involved in these cases. Materials and Methods: This prospective hospital-based study was conducted at an emergency department, Mamata General Hospital attached to Medical College, Khammam; Telangana, from January 2021 to December 2021. During this study period, 148 cases of sudden death victims were reported. Data of all sudden deaths 148 cases were collected, of which, 128 (86.48%) were male. Most of the victims were in the 4-5th decade, urban and lower socioeconomic groups, and laborers. Most of the cases occurred in the winter season. No ill health before death with alcohol abuse and smoking habits. The majority of onset of terminal signs and symptoms were reported at their home, during morning hours, and the most common symptom was unconscious, the cardiovascular system was involved in 45% of cases, the Pulmonary System in 28%, the Neurological System in 20% and the Gastrointestinal system 12%. Coronary artery disease was the single largest cause of death. This study shows a pattern of male manual workers of age between 31-40 who have encountered sudden death at their residence during the daytime during winter in the months of January, February, and March mostly found unconscious. This study revealed that a significant number of sudden deaths occurred in adults, particularly in the population above 30 years. Cardiac troubles contributed the maximum number, with atherosclerosis being the main culprit causing coronary artery disease.

Keywords : Sudden death; Pattern of death; Cause of death; Demographics profile.

Introduction :

According to World Health Organization sudden death is said to be the sudden or unexpected expiry of a person not known to have a history of any dangerous disease, injury, or poisoning within 24 hours after the onset of a terminal illness. Also defined as the instantaneous death of a person without any sign of disease.[1] A complete evaluation is essential in such deaths to ascertain the cause of death, especially in a young person, and to rule out foul play. An external examination by itself may not provide the required information to arrive at a proper conclusion about the cause of death.[2] The age of the deceased, authentic information as to past health status and the presence or absence of any witnesses at the time of death are all helpful in deciding the necessity for analysis.[3] The role of a Forensic expert is often vital in such deaths. Death of persons who were being clinically examined for a prolonged duration without adequate or satisfactory diagnosis or due to any illness of brief duration and the treating doctor has little opportunity to analyze factors responsible for the causation of death.[4]

The main objective of this study is to analyze the problem, determine the causes and inhabitant susceptibility, and determine the etiology in cases of sudden deaths.

Study Design: The present study is a prospective, hospital-based study carried out in the emergency department, Mamata general hospital attached to the medical college, Khammam, Telangana, India, from 1st Jan 2021 to Dec 31st 2021. The study has been approved by the institutional ethics committee of Mamata medical college.

Study Population: All the sudden death cases were admitted to the emergency department of Mamata medical college & hospital, a tertiary care center with Superspecialist services and a bed strength of 600 well-equipped with modern diagnostic and treatment facilities.

Inclusion Criteria: All the study cases were known to have died within 24 hours of the onset of signs and symptoms and presentation to casualty was considered.

Exclusion Criteria: Criteria for the selection of cases, involving trauma, drugs, poison, asphyxia, and decomposition cases were excluded. The exclusions mentioned above are external factors that do not justify sudden "natural" deaths.

Statical Data Analysis: Proforma was prepared, prospective data were collected from the patients, relatives, and hospital records, who received treatment before, and data were analyzed systematically. The objectives were to analyze the problem, describe the demographic profile and assess the causes of sudden deaths.

Results :

The study sample is 148 cases of sudden natural deaths presented

Corresponding Author
Bharath Kumar Guntheti
Email : bk62743@gmail.com
Mobile No. : 9908339507

to the emergency department during a one-year study period from 1st january 2021 to 31st December 2021.

The maximum number of sudden deaths 83 (56.08%) cases were seen in the age group of 41-50 years, followed by 53 (35.81%) cases in the age group of 31-40 yrs. The least affected age group was 11-20 years with 1 (0.67%) and no cases were reported in the age group of 0-10 years. Males constituted 128 (86.48%), while females were 20 (13.51%), and the male-to-female ratio was 6:4.

Among the study population, 88 (59.4s5%) were Hindu by religion, 34 (22.97%) were Muslim, and were 26 (17.56%) Christian. Most of the victims belonged to urban areas 96 (64.86%).

In two-thirds of the total, 118 (79.78%) sudden natural deaths

Table 1 - Age & gender distribution.

Age in yrs.	Male	Female	Total [%]
11-20	0	1	1 [0.67%]
21-30	1	1	2 [1.35%]
31-40	47 [31.75%]	5 [3.37%]	52 [35.13%]
41-50	73 [49.32%]	10 [6.75%]	83 [56.08%]
51-60	6	2	8 [5.40%]
>60	1	1	2 [1.35%]
Total	128	20	148

Table 2 - Religion wise.

Religion	No of cases	%
Hindu	94	63.51
Muslim	34	22.51
Christian	20	17.56
Total	148	

Table 3 - Domicile wise.

Domicile	No of cases	%
Rural	52	32.13
Urban	96	64.86
Total	148	

Table 4 - Marital status.

Marital Status	No of cases	%
Married	132	89.19
Unmarried	16	10.81
Total	148	

Table 5 - Socio-economic status.

Socio-economic Status	No of cases	%
Low	58	53.37
Middle	29	39.18
High	11	7.43
Total	148	

Table 6 - Time of death.

Time of Death	No. of cases	%
Day	106	71.62
Night	42	28.37
Total	148	

Table 7 - Place of death.

Place of Death	No. of cases	%
Home	71	47.97
Hospital	38	25.67
Workplace	19	12.83
Public place	20	13.51
Total	148	

have been seen in married persons. 79 (53.37%) victims belong to the lower socioeconomic class and 115 (77.70%) of the group were hard-working manual laborers, while there were 22 (14.86%) office workers as shown in chart 1.

A maximum number of 54 (36.8%) sudden death cases was noticed in winter, followed by monsoon 41 (35.13%) cases occurred between 6 a.m. to 1 p.m., while 40 (27.02%) cases occurred between noon to 6.00 depicted in chart 2. The standardized death rate was highest on Monday 26 (17.56%), followed by 25 (16.89%) Sunday. The highest number of deaths were reported at their residency at 71 (47.97%), followed by hospitals at 38 (25.67%).

In the present study majority of 86 (89.58.30%) victims were involved in daily routine work activities at the time of onset of symptoms as depicted in chart 3.

The onset of the most common signs and symptoms of the terminal illness was unconsciousness 56 (37.83%) followed by 50 (33.78%) chest pain, 22 (18.91%) breathlessness, and 14 (9.45%), and unknown signs 6 (4.05%) as depicted in chart 4.

58 (39.18%) victims were smokers, and 48 (32.43%) ethanol abusers were observed. There were no cases with complaints of any ill health.

Out of 148 cases, more than half of 82 (55.40%) presented a history of being brought dead to the hospital as depicted in chart 5. It was observed that a maximum number of deaths were related to the Cardiovascular system 58 (39.18%), followed by the Respiratory system 40 (27.26%) and the Central nervous system 28 (18.91%). The last cases were of Genito-urinary system 08 (18.91%). Maximum deaths were due to 45 (30.40%) coronary artery disease, followed by bronchopneumonia 22 (14.86%) cases shown in Table 1.

The cause of death was revealed or confirmed by microscopy in 58 (39.8%) cases. Microscopic examination revealed 29 (19.59%) cases of recent myocardial infarction followed by atherosclerosis 16 (10.81%) cases and myocarditis 6 (4.05%) cases where gross examination revealed nonspecific or negative

#### Table : 8 Actual cause of sudden natural death.

Systems involved	Disease/Cause	No of Cases	%
Cardiovascular Cases 58	Myocardial Infarction	29	19.59
	Atherosclerosis	16	10.81
	Myocarditis	6	4.05
	Restrictive Cardiomyopathy	4	6.08
	Disseminated Intravascular Coagulation	3	2.02
Respiratory Cases 40	Bronchopneumonia	22	14.86
	Pulmonary TB	8	3.37
	Ca Bronchus	4	2.70
	Pulmonary Oedema	6	4.05
	Acute Pancreatitis	5	3.75
GIT Cases 22	Liver Cirrhosis	7	4.72
	Intestinal Perforation	10	6.75
Neurological Cases 28	Stroke with ICH	28	18.91
	SAH	20	13.51
	SDH	08	5.40
Genito-Urinary System 08	Uterine hemorrhage	3	2.02
	Nephritis	5	3.37

findings.

Discussion :

In the present study, a maximum number of sudden deaths 136 (91.89%) cases were seen in individuals of age over 40 years with a peak incidence in the age group of 41-50 years with 83 (56.08%) cases, followed by 53 (35.81%) cases in the age group of 31-40 years, next 8 (5.40%) cases in the age group of 51-60 years, while 2 (1.35%) and no cases were reported in the age group 0-10 years. The high frequency seen in younger ages could be due to urbanization, westernization of Indian society, sedentary lifestyle, increased smoking habit, stressful lifestyle, lack of regular exercise, and lack of regular medical check-ups. Similar observations were made in studies conducted by other researchers.[5-7]

In the present study, male 128 (86.48%) victims predominate

CHART:4 Terminal Signs & Symptoms

CHART:5 PERIOD OF SURVIVAL
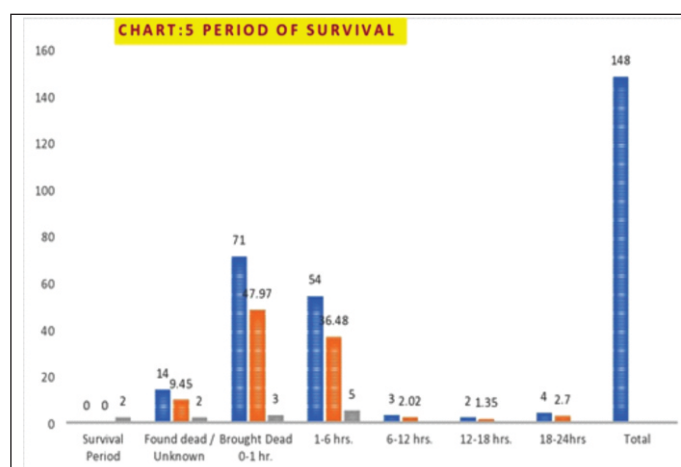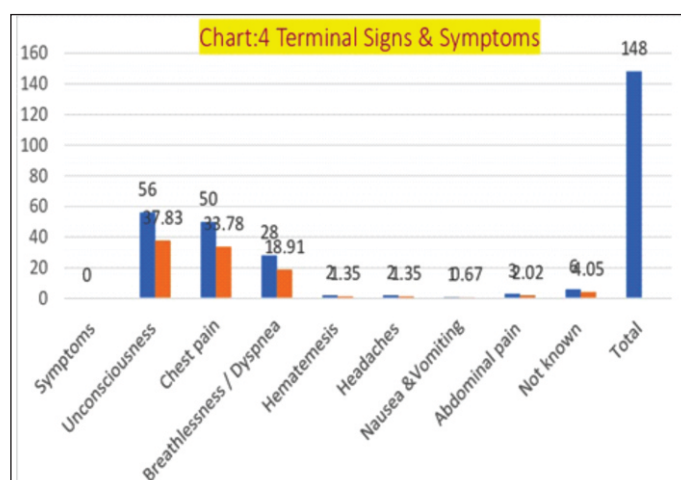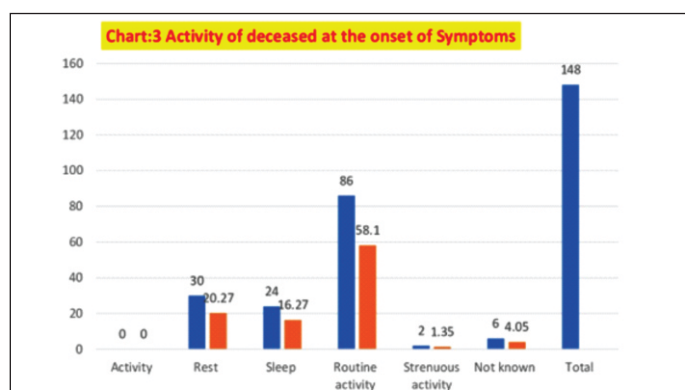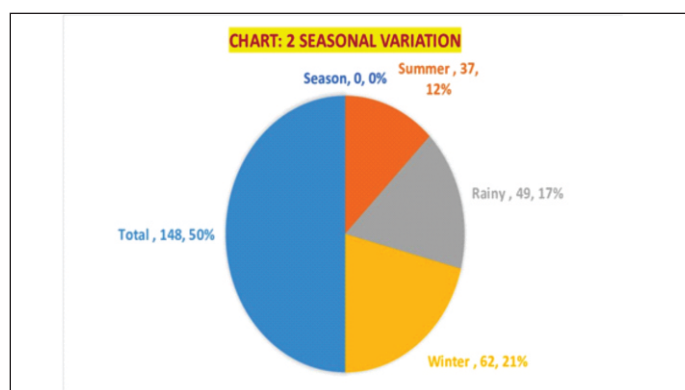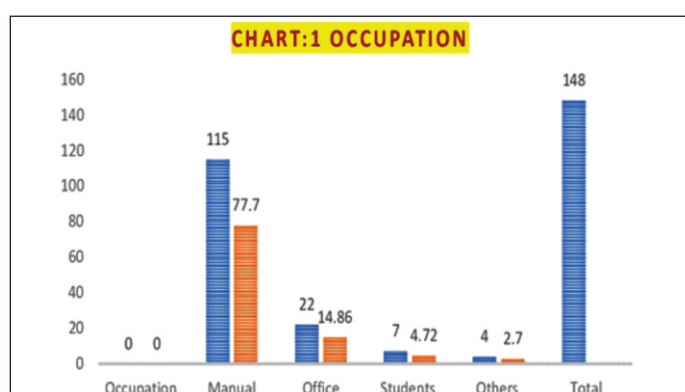
female 20 (13.51%) with a male-to-female ratio of 6:4. These are consistent with studies conducted by authors.[5-7] The possible explanation for male predominance is that male is more exposed to outdoor work so more physical and psychological stress is faced them likewise males are involved more in unhealthy addiction.

Most of the victims 88 (59.45%) were Hindu by religion, followed by 34 (22.97%) Muslims and 26 (17.56%) Christians. This type of similar findings was observed by the authors.[6-8] In the present study, victims 96 (64.86%) belonged to an urban area, whereas 52 (35.13%) were belonging to a rural. The urban area's predominance could be that the study population is urban habitation, and the hospital is in the heart of the city. Similar findings are seen by other researchers.[7-9]

The present study shows that most of the victims were married 118 (79.78%). The reason may be that married people are usually more cautious and worried about their financial and other social problems and lack regular medical checkups. This correlates with studies conducted by other researchers.[8-10]

The present study noted that the majority of the 79 (53.37%) victims belong to the lower socioeconomic class, followed by the middle class 58 (39.18%) and upper class 11 (7.43%). Lower and middle-class predominance due to lower

CHART:1 OCCUPATION

CHART: 2 SEASONAL VARIATION

Chart:3 Activity of deceased at the onset of Symptoms

socioeconomic status. Negligence of health and treatment defaulting may be the reason for higher incidence. These findings coincide with other studies.[9,10,12] Based on occupation, 115 (77.70%) of the group were manual workers while there were 22 (14.86%) office workers. The predominance in this group was by people doing moderate work in industries, mills, shops, and other sectors possibly due to lifestyles, poor living standards, neglect of alarming symptoms of illness, non-affording treatment, and mental stress, etc. while doing work may lead to imbalance. This coincides with studies conducted by other studies conferring to season, a maximum number of 54 (36.8%) sudden death cases was noticed in winter, followed by monsoon 41 (27.70%) and autumn 32 (21.62%) cases while 21 (14.86%) cases were observed in spring. These are consistent with studies conducted by other researchers.[13,14]

The peak measure of 48 (32.43%) cases was from January to March, followed by 40 (27.02%) by April to June and 38 (25.67%) from July to September, and 22 (14.86%). The last cases were seen in October and December. This is like other studies.[13,14] It was observed in sudden deaths as the standardized rate was highest on Monday 26 (17.56%) followed by 25 (16.89%) Sunday, and Saturday 23 (15.54%). The lowest number of 16 (10.81%) sudden deaths were reported on Tuesday. Similar observations were made by other researchers.[12-14]

Based on habits, a history of alcohol intake, smoking, and chewing tobacco was present in 58 (39.18%) victims, and 48 (32.43%), respectively. Personal habits, smoking, alcohol, and especially smoking are high-risk factors causing sudden deaths. These coincide with other studies.[13,14]

In the present study, the majority of 92 (2.16%) of the symptoms started when the patient was engaged in work/daily routine, followed by 30 (20.27%) cases during rest and 24 (16.27%) cases during sleep. Two of the cases had symptoms that started during strenuous activity. A stressful work atmosphere and schedules could be the reason for high incidences of sudden deaths while working. These are like other studies.[13,14]

Many victims noticed the duration of onset of symptoms was between 06.00 am to 12.00 noon in 52 (35.13%) cases, followed by 12.00 noon to 6.00 pm in 40 (27.02%) cases. Morning hours are more stressful on a daily schedule as they include transportation, fulfillment of duties, etc., which explains the higher frequency of sudden natural deaths. These are consistent with other researchers.[12,15,16]

The place of onset of terminal signs and symptoms observed at their home was 71 (47.97%), followed by hospital 38 (25.67%) followed by public 20 (13.51%), and at their workplace 19 (12.83%). These are coinciding with other studies.[13-16] The present study noticed that the survival period is less than 1 hour in most cases. Out of 148 cases, more than half of cases 82 (55.40%) presented with a history of being brought dead to the hospital dead on the way to the hospital, while 36 (24.32%) were found dead elsewhere. Only 20 (13.51%) cases died soon after arrival at the hospital and 10 (06.75%) cases died during the treatment. These findings were consistent with other studies.[16-18] The onset of the most common symptoms of the terminal illness

was unconsciousness 56 (37.83%) followed by 50 (33.78%) chest pain, 222 (18.91%) breathlessness, and 14 (9.45%), and unknown signs 6 (4.05%). The same findings were noted in other studies.[17,19,20] The primary reason for unconsciousness was the rapid progression of three modes of death i.e., syncope, coma, and asphyxia.

In the present study, the single most important system responsible for maximum deaths was the Cardiovascular system 58 (39.18%), followed by the Respiratory system 40 (27.26%), and the Central nervous system 28 (18.91%). Cardiac troubles are the commonest causes of sudden deaths in both genders, especially among the adult male population. These findings were consistent with other studies.[18-20] In our study hypertension and smoking were the most common high-risk factors for sudden deaths due to coronary artery disease.

Of the different types of cardiovascular causes, the maximum number of 16 cases occurred due to myocardial infarction 29 (19.59%), followed by atherosclerosis 16 (10.81%). Chronic coronary artery disease was the most reported cardiovascular ailment 45 (30.40%) with predominance in males. This trend is consistent and system-wise involvement coincides with previous studies.[20-22] This is due to a lack of regular health checkups, a sedentary lifestyle, and increased work stress in the male population and adults which predisposes them to coronary artery disease.

Among Gastrointestinal causes of sudden natural death, intestinal perforation with peritonitis 10 (6.75%) was the most common, followed by cirrhosis of the liver 7 (4.72%) and pancreatitis 5 (3.75%). Similar observations are made by some studies.[19-22] Among Genito-urinary system causes of sudden natural death nephritis, 5 (3.37%) was the most common followed by uterine hemorrhage 3 (2.02%). The present study coincides with other studies.[19,20,22]

The cause of death was revealed or confirmed by microscopy in 58 (39.18%) cases. Histopathological examination revealed 29 (19.59%) cases of recent myocardial infarction followed by atherosclerosis 16 (10.81%) cases and myocarditis 6% cases where gross examination revealed nonspecific or negative findings.[21-23]

Histopathological examination from the site showing gross pathological changes in the heart and cardiac findings observed either through gross examination or microscopically revealed coronary artery disease with associated thrombosis confirmed the gross diagnosis. It is seen that cardiovascular cause was the principal factor of death among sudden death and more common in males than females which is consistent with the studies conducted by authors.[18-23]

Conclusion :

This study shows a pattern of sudden natural deaths in male manual workers who encountered sudden death at their residence during the days of winter mostly found unconscious as the chief complaint.

Cardiac causes are the commonest cause of sudden deaths among the adult population due to coronary atheroma. Increased

frequency of sudden natural deaths among the younger age group, in urban populations might be due to sedentary lifestyles in urban areas and stressful situations among married individuals. This study expects to bring awareness to the community not just by explaining the lethality of unhealthy, stressful lifestyles but also explains the spontaneity of the terminal illness without any prior signs.

Declaration on conflict of Interest: Nil

Ethical Clearance: Has been obtained

References :

1. World Health Organization International Classification of Diseases and related health problems ICD-10 version 2010 [Accessed on January 2, 2021]. Available from: who.in/classifications https://icd.10int/browse/2010/en# R96.

2. Reddy KSN, Murthy OP. The Essentials of Forensic Medicine & Toxicology. New Delhi: Jaypee Brothers Medical Publishers (P) Ltd;.34th ed.2017.

3. K. Vij. Textbook of Forensic Medicine and Toxicology. New Delhi: Reed Elsevier Indian (P) Ltd;5th ed. 2011.

4. Kumar SA, Petkar M, Ghangale A, Arora P. Autopsy profile of natural sudden deaths and survival time. Int J. of Healthcare and Biomedical Research. 2015;3(4):126-134.

5. Zanjad NP, Nanadkar SD. Study of sudden unexpected deaths in medicolegal autopsies. Ind Acad For Med.2006;28 (1):27-30.

6. Dayananda R, Pradhan P, Kumar MP. The pattern of sudden natural deaths among autopsies conducted at Mysore Medical College. Ind Acad For Med.2018;4 (2):146-150.

7. Kumar V, Pei San K, Edwan A, Shah N. A study of sudden natural deaths in medicolegal autopsies in University Malaya Medical Centre, Laula Lampur. J Forensic Leg Med. 2007; 14(3):151-4.

8. Chaudhari VA, Mohite SC. Socio-demographic and clinical profile of sudden natural deaths in South Mumbai India. Int J Res Med Sci. 2016;4 (7):2947-2950.

9. Shashikant K, Pandey SK, Pathak, Kumar G. The pattern of sudden natural deaths in adults.2019; MLU 19 (2):89-93.

10. Guptha S, Panchal R, Sondarva D. An approach to sudden natural deaths in medicolegal autopsies at Karamsad, Gujarat. J Ind Acad Foren Med. 2011;33(1):30-32.

11. Mukhopadhyay S, Dutta SS, Kaushik G. A retrospective study of sudden death cases in medical college and hospital, Kolkata. J Dental Med Sci.2015;14 (1):9- 18.

12. Chaudhari VA, Mohite SC. Current trends in natural deaths. J Fore Med Sci and Law.2012;21(1):1-8.

13. Bhagora LR, Parmar AP, Patel TC. Analysis of sudden death cases brought for postmortem examination at Sir T. general hospital, Bhavnagar. J Ind Acad Foren Med. 2016;38(4):423-425.

14. Angam G, Maring SK, Singh KPK, Finite L. A study of pattern of sudden natural deaths: A JNIMS Experience. J Ind Acad Foren Med.2017;39(2):180- 183.

15. Naik GH, Biradar SSK, Sivakumar J, Kumar R. Pattern of natural deaths and the frequency of occurrence of diseases that cause them.2015; Int J health Sci Res.2015;5 (6):313-316.

16. Demographic profile of sudden natural deaths from among medico-legal postmortem examinations in vizag. Indian J Foren Med Toxicol. 2018;12 (1):63-68.

17. Chaudhari SH, Sane AMM, Zine KU, Ingale DI, Hiremath R. Study of sudden natural deaths in medico-legal autopsies with special reference to cardiac causes. Int J Curr Res Rev. 2013;5(2):37-42.

18. Bansal AK, Patel AP, Mittal P, Booth KR. The pattern of spot death cases brought to V.S. General Hospital, Ahmedabad: A retrospective study. J Ind Acad Foren Med. 2013;35(2):131- 133.

19. Rao DS, Yadhukul. Sudden and unexpected deaths-A four year autopsy review. J Punjab Acad Forensic Med Toxcol. 2008;8 (2):21-3.

20. Udayasnkar. Y. An autopsy study of sudden natural deaths in victoria hospital, bowring and lady curzon hospitals, Bengaluru. Indian J Foren Med Toxicol. 2012;6(2):214-219.

21. Jambure MP, Tindle RM, Zine KU, Tasgaokar GV, Ninal NS. Postmortem study of sudden and unexpected natural deaths in aurangabad region, Maharashtra. MLU 2013;13(1):45-49.

22. Chowdhary S, Mugadlimath A, Chowdhary M, Zine KU. Study of sudden natural deaths in medico-legal autopsies with medico-legal to cardiac causes. Int J Cur Res.2013; 05(3):37-42.

23. Rana NM, Pandey A. Profile study of sudden natural death cases in Vadodara region of central Gujarat. Indian J Foren Med Toxicol. 2020;14(3):469-474.