A Profile Study of Sudden Natural Death Cases in Vadodara Region of Central Gujarat

Neerav M. Rana[1], Anil R. Pandey[1]

[1]Assistant Professor, Dept. of Forensic Medicine & Toxicology, Government Medical College, Bhavnagar

Abstract

Sudden death is said to be sudden or unexpected when the victim not known to have been suffering from any dangerous disease, injury or poisoning is found dead or dies within 24 hours after the onset of terminal illness (WHO). Incidences of sudden natural deaths are increasing now a days and specifically in healthy young individuals can arise suspicion of foul play. Our study may help to provide epidemiological data regarding the sudden death that can be used to control disease outbreaks, identifying emerging causes or changes in disease pattern so that appropriate action can be taken to reduce the morbidity and mortality. The present study undertaken to find the socio-demographic profile (age, sex and religion etc.) of the deceased of sudden death. This prospective study had been conducted on autopsy cases brought to tertiary health center of Vadodara, Central Gujarat for the period of one year. During study period total 2240 autopsies were conducted, of which 224 cases (10%) were sudden deaths. Most of the cases were from the 41 - 50 years age group. Of the 224 cases, 149 were due to diseases of cardiovascular system and 63 due to diseases of respiratory system. We observed that sudden death cases were higher in young age group and cardiovascular system was most commonly involved.

Key words:-*Autopsy, Sudden Natural Death, Cardiovascular system*

Introduction

All forensic pathologists deal not only with criminal, suspicious, accidental and suicidal deaths, but with a wide range of deaths from natural causes. Many of these are sudden, unexpected, clinically unexplained or otherwise obscure even though there need be no unnatural element in their causation.(1) Death is said to be sudden in a person if death occurring in less than 24 hours from onset of symptoms, not otherwise explained, death known not to be violent or instantaneous for which no cause can be discovered.(2) Some authors limit sudden deaths as those occurring instantaneously or within one hour of onset of symptoms.(3) An apparently healthy individual of any age when dies suddenly and unexpectedly , without any pre indication or even in case of natural death under suspicious state, with no medical attention and possibility of any disease being responsible for it being considered remote, a suspicion of foul play, injury, poisoning may arise in the mind of officials responsible for the certification of death.(4) Determination of cause of death in natural deaths, particularly when the death occurred suddenly, unexpectedly, or in the young, is an important part of forensic autopsy practice, for reasons including the following:(5)

- Performance of a complete and through autopsy on apparent natural deaths can provide valuable information in the interest of public health by identifying public health risks and monitoring disease trends.

- Identification of disease processes and patterns provides epidemiological data that can be used to control disease outbreaks, identify changes in disease patterns, or to identify reportable diseases.

- The timely and accurate diagnosis of medically important diseases can have a significant impact on the relatives of the deceased by allowing them the opportunity to seek treatment for certain hereditary

Corresponding author
Dr.Anil R. Pandey
Assistant Professor, Dept. of Forensic Medicine & Toxicology, Government Medical College, Bhavnagar
Email- ankush6987@gmail.com

diseases in which the presenting symptom may in fact be sudden death.

Earlier studies have shown that cardiovascular disease was the most important cause of the sudden death. It was followed by respiratory disease, central nervous system disease and others. Several factors such as age, sex, occupation and marital status may also influence the sudden death which will be evaluated during this research.

Material and Method

This observational prospective study had been conducted in Department of Forensic Medicine and Toxicology, Medical College and S.S.G. Hospital, Vadodara during the period of 1 year from 1st March 2013 to 28th February 2014 which is tertiary health center of Central Gujarat. During this one year period 2240 autopsies were conducted and out of them 224 cases (10%) of sudden death were selected for present study in which relatives were ready to give informed written consent. Before starting the post mortem examination, a detailed history was taken from the relatives, investigating officer, inquest papers and from clinical papers. The information regarding the circumstances of death with special reference to any sign and symptoms suggestive of sudden death, family history, previous medical history, histopathology report and chemical analysis report in all cases were taken and data were filled in performa. All cases included in this study were examined meticulously during autopsy. Findings of this study were compared with the similar type of studies done by the Indian and foreign authors.

Inclusion criteria: All sudden natural death cases

Exclusion criteria: All cases where death occurred due to injury, poisoning.

All cases where the victim dies after 24 hours from the onset of symptoms

Decomposed and unidentified cases.

Results

Table: 1: Distribution of Sudden Death cases according to the Age and Sex

Age Group	Male (%)	Female (%)	Total (%)
1-10	2(0.89)	1(0.45)	3(1.34)
11-20	2(0.89)	3(1.34)	5(2.23)
21-30	14(6.24)	7(3.13)	21(9.37)
31-40	52(23.22)	4(1.79)	56(25.01)
41-50	56(24.99)	5(2.24)	61(27.23)
51-60	42(18.74)	4(1.79)	46(20.53)
Above 60	22(9.82)	10(4.47)	32(14.29)
Total	190(84.79)	34(15.21)	224(100)

Table 1 showing distribution of sudden death cases according to the Age and Sex in which majority of cases were seen in the age group 41-50 years (27.23%) and 31-40 years (25.01%). Males were affected more (84.79%) as compared to females (15.21%) making an M/F ratio of 5.57:1.

Table: 2: Distribution of Sudden Death cases according to their Marital status

Marital Status	No. of cases	Percentage
Unmarried	33	14.73
Married	173	77.23
Divorced	4	1.79
Widow /Widower	14	6.25
Total	224	100

Table 2 showing distribution of Sudden Death cases according to their Marital status in which majority of victims were married (77.23%) and 14.73% were unmarried.

Table: 3: Distribution of Sudden Death cases according to their Occupation

Occupation	No. of cases	Percentage
Not applicable (<18 years and student)	10	4.46
Office / Private Employee	39	17.41
Businessperson	20	8.93
Labourer	20	8.93
Worker in industries, mills, shops, farm and other sectors	45	20.09
Housewife	19	8.48
Unemployed	7	3.13
Government Employee	37	16.52
Retired person	27	12.05
Total	224	100

Table 3 showing distribution of Sudden Death cases according to their Occupation in which workers in industries, mills, shops, farms and other sectors constituted 20.09% and Office/Private Employee constituted 17.41% followed by Government Employee 16.52%.

Table: 4: Distribution of Sudden Death cases according to their Life Style

Life Style	No. of cases	Percentage
Sedentary	96	42.85
Moderate work	104	46.43
Heavy work	24	10.72
TOTAL	224	100

Table 4 showing distribution of Sudden Death cases according to their Life Style in which cases with sedentary and moderate work life style cases completely outnumbered cases with heavy work life style.

Table: 5: Distribution of Sudden Death cases according to Involvement of body system

System	No. of cases	Percentage
Cardiovascular	149	54.38
Respiratory	63	23
Gastrointestinal	25	9.12
Central nervous	17	6.20
Genitourinary	4	1.46
Not Known	16	5.84

Table 5 showing Distribution of Sudden Death cases according to involvement of body system in which majority of the sudden deaths were due to the diseases of Cardiovascular system (54.38%) followed by diseases of Respiratory system (23%).

Table: 6: Distribution of Sudden Death cases according to activity of deceased at the time of onset of symptoms

Activity	No. of cases	Percentage
Not known	10	4.47
Rest	84	37.5
Routine Activity	94	41.96
Strenuous Activity	8	3.57
Sleeping	17	7.59
Travelling	11	4.91
Total	224	100

Table 6 showing distribution of Sudden Death cases according to activity of deceased at the time of onset of symptoms in which 41.96% victims while doing routine day work and 37.50% were at rest.

Discussion

During the one year period of our study total 2240 medico-legal autopsy conducted and out of them incidence of sudden death was 224 (10%) cases. Almost similar incidence were noticed by Reddy[3], Nandy[6], Rao(8.67%) et al[7], Zanjad(8.92%) et al[8], Ambade (15.48%) et al[9]. In contrast higher incidence of sudden death was reported by most of the studies done by foreign author's e.g. Obiorah (55.6%) et al[10], in Escoffery and Shirley(51.3%) et al[11], Kuller(31.4%) et al[12], Azmak(28.9%) et al[13] , and Nordrum(27.8%) et al[14]. Higher incidence of sudden death outside India may be due to different type of case load, different geographical areas and different life styles of people.

Table no. 1 shows the distribution of cases according to their age and sex which shows that maximum number of the victims(27.2%) of the sudden death belonged to 41-50 years age group which was also observed by Kumar et al[15], Sarkioja et al[16] while Zanjad(26.78%) et al[8] and Ambade (20.75%) et al[9] found maximum cases in the age group 31-40 years.

Most of the studies done in India are showing that the maximum numbers of sudden death are happening in the middle aged people (31-50 years). It may be due to urbanization, westernization of Indian society, sedentary life style, increased smoking habit, stress and strain in life, lack of regular exercise and lack of regular medical check-up.

In our study majority of victims (84.79%) were male and 15.21% were female making male to female ratio of 5.57:1 which was also observed similarly by Zanjad et al[8], Kumar et al[15] and Rao et al[7] while study by Meina Singh et al[17] shows male to female ratio of 26.5:1. Thus from above studies, it was observed that males far predominate the females which is consistent with present study. During reproductive life women remarkably spared whose reason still unknown unless they have an underlying predisposition to atherosclerosis such as diabetes mellitus and hypertension. Also the habits of smoking and alcoholism are common in males and males are more prone for stressful conditions as compared to female.

It was observed that most of the victims (77.23%) were married as the occurrence of sudden deaths increase with aging. This coincides with study of and Gupta(63.49%) et al[18]) and Kumar(59.8%) et al[15] where majority of sudden deaths were seen in married. The reason may be married people are more cautious and worried about their financial and other social issues.

We found that most cases were from middle and lower socio-economic class constituting 90.18% which comprises labourers, workers in industries, mills, shops, farms and other sectors, drivers and so on. These groups basically have lower income compared to higher class. They might not get regular medical checkups for early detection or even treatment for their diseases. Risk factors for coronary artery disease such as lack of physical activity, smoking, hyperlipidemia, hypertension, obesity, and diabetes are more common among individuals with middle socio-economic status. Higher socio-economic class contributed least to the sudden deaths (9.82%) which comprises businessmen, managers and executives. They had better knowledge and were more aware of the health importance. Their economic status also allowed them to have a better nutrition and healthier lifestyle.

Table no. 3 shows that workers in industries, mills, shops, farms and other sectors constituted highest cases (20.09%) and labourers (8.9%). It coincides with study of Kumar (30.6%) et al [15] where majority of the patients were from the semiskilled–unskilled group. The preponderance in this group is possibly due to low socio-economic status, lower education, neglect of alarming symptoms of illness, unaffordable treatment and physical stress etc.

We observed that maximum deaths were related to diseases of cardiovascular system constituting 54.38% which was very well supported by other similar studies e.g. Di Maio and Di Maio (60.9%) et al[19], Puranik(56.4%) et al[20], Azmak(55%) et al[13], Anderson(53.4%) et al[21], 45-50% by Reddy[3] and 45% by Nandy[22]. Preponderance to cardiovascular system could be explained by changing social concepts and way of living, food habits- high concentration of fatty foods, physical and mental stress, lack of exercise with sedentary lifestyle, high salt intake, ice-cream, bakery items, urbanization, industrialization and progressive excessive indulgence of younger age groups in predisposing factors like smoking and alcoholism. In contrast to this study, very high cardiovascular disease

rates were reported by Lorin (72.7%) et al[23] and Sarkioja(83%) et al[16]. However, much lower rates of cardiovascular diseases were reported by Obiorah (23%) et al[10]. There was involvement of more than one system in some cases.

The second most common cause of sudden death was related to respiratory system diseases 23% which very well supported by Yadhukul(27.45%) et al[7] and Escoffery and Shirley(23%) et al[11]. Lung disease may be difficult to accept as a cause of sudden death in people who are not disabled by respiratory disease, but intermittent hypoxia may lead to ventricular arrhythmias in these patients. Pneumonia constituted 50.79% of all respiratory deaths in our study which was similar to in Nordrum (52.8%) et al[14] and in Obiorah (62.6%) et al[10]. The high rate of death due to pneumonia is attributable to a lack of education, lack of health care, exposure to the cold and inadequate nutrition. Sudden deaths due to pulmonary tuberculosis was 5.11% which were more when compared to Azmak (0.7%) et al[13] and Kumar(3.1%) et al[15]. Lower socioeconomic status, social stigma and treatment default may be the reason for higher incidence of pulmonary tuberculosis in our study.

The third commonest cause of sudden death was related to GI system(9.12%) which is consistent with Chaudhari(11.3%) et al[24]. Fatty liver (40%) was the commonest cause followed by Cirrhosis (36%). The fourth commonest cause of sudden death was related to central nervous system diseases (6.20%) which was almost similar to Chaudhari et al[24]. Intracerebral haemorrhage (52.94%) was the commonest cause followed by Subarachnoid haemorrhage (29.41%).

Conclusion

The present study illustrates a clear influence of age, sex, religion, occupation, marital status, socio-economic status and life style on the incidence of sudden death.

From this study we can conclude that diseases of the cardiovascular system are the major contributing factor for sudden deaths. The age distribution curve points out the fact that younger age group involvement appears to be slightly higher. Respiratory system diseases contributed the next major share of diseases. This can be attributed to poor hygiene, malnutrition and low socio-economic status.

This type of autopsy based information is vital in the planning of the health services, teaching and research programmes, particularly in a developing nation with a limited resources.

Conflict of Interest- None

Source of Funding – Self

Ethical Clearance - Approved by Institutional Ethical Committee

References

1. Saukko P, Knight B. Knight's Forensic Pathology Third ed. London: Arnold Publishers; 2004: 492-495.
2. International Statistical Classification of Diseases and Related Health Problems 10th Revision (ICD-10) Version for 2010. WHO; 2010.
3. Reddy KSN, Murthy OP. The Essentials of Forensic Medicine and Toxicology. 32 ed. Hyderabad: K. Shaguna Devi; 2013: 145.
4. Karmakar RN, editor. J. B. Mukherjee's Forensic Medicine and Toxicology. Fourth ed. Kolkata: Academic Publishers; 2011: 225-226.
5. Pathology of Sudden Natural Death [database on the Internet]. Medscape.[cited March 2013]. Available from: http:// emedicine.medscape.com/ article/1680282-overview.
6. Tsokos M, Turk EE. Esophageal variceal hemorrhage presenting as sudden death in outpatients. Arch Pathol Lab Med. 2002 Oct;126(10):1197-200.
7. Rao DS, Yadhukul. Sudden And Unexpected Natural Deaths - A Four-Year Autopsy Review. JPAFMAT. 2008;8(2):20-4.
8. Zanjad NP, Nanadkar SD. Study of Sudden Unexpected Deaths In Medico-Legal Autopsies. JIAFM. 2006;28(1):27-30.
9. Ambade VN. Study of natural deaths in Nagpur Region. J Medicolegal Association of Maharashtra. 2002;14(1-2):11-4.
10. Obiorah C, Amakiri C. Systemic Analysis of Sudden Natural Deaths at Braithwaite Memorial Specialist Hospital Port Harcourt, Nigeria. Nigerian Health Journal. 2012.
11. Escoffery CT, Shirley SE. Causes of sudden natural death in Jamaica: a medicolegal (coroner's) autopsy study from the University Hospital of the West Indies. Forensic Sci Int. 2002 Sep 26;129(2):116-

21.

12. Kuller L, Lilienfeld A, Fisher R. Sudden and unexpected deaths in young adults. An epidemiological study. JAMA. 1966 Oct 17;198(3):248-52.
13. Azmak AD. Sudden natural deaths in Edirne, Turkey, from 1984 to 2005. Med Sci Law. 2007 Apr;47(2):147-55.
14. Nordrum I, Eide TJ, Jorgensen L. Unexplained and explained natural deaths among persons above 1 year of age in a series of medico-legal autopsies. Forensic Sci Int. 1998 May 11;93(2-3):89-98.
15. Kumar V, San KP, Idwan A, Shah N, Hajar S, Norkahfi M. A study of sudden natural deaths in medico legal autopsies in University Malaya Medical Centre (UMMC), Kuala Lumpur. J Forensic Leg Med. 2007 Apr;14(3):151-4.
16. Sarkioja T, Hirvonen J. Causes of sudden unexpected deaths in young and middle-aged persons. Forensic Sci Int. 1984 Apr;24(4):247-61.
17. Singh AM, Subadani DS, H N, L. F. Sudden deaths in Manipur – A preliminary study. Sudden deaths in Manipur – A preliminary study. 2002;19(2):26-8.
18. Gupta S, Panchal R, Sondarva D. An Approach to Sudden Natural Deaths in Medicolegal Autopsies at Karamsad, Gujarat J Indian Acad Forensic Med. Jan-Mar 2011;33(1):30-2.
19. Di Maio VJ, Di Maio DJ. Natural death as viewed by the medical examiner: a review of 1000 consecutive autopsies of individuals dying of natural disease. J Forensic Sci. 1991 Jan;36(1):17-24.
20. Puranik R, Chow CK, Duflou JA, Kilborn MJ, McGuire MA. Sudden death in the young. Heart Rhythm. 2005 Dec;2(12):1277-82.
21. Anderson RE, Hill RB, Broudy DW, Key CR, Pathak D. A population-based autopsy study of sudden, unexpected deaths from natural causes among persons 5 to 39 years old during a 12-year period. Hum Pathol. 1994 Dec;25(12):1332-40.
22. Nandy A. Principles of Forensic Medicine: Including Toxicology. 3 ed. Calcutta: New Central Book Agency; 2005.
23. de la Grandmaison GL, Durigon M. Sudden adult death: a medico-legal series of 77 cases between 1995 and 2000. Med Sci Law. 2002 Jul;42(3):225-32.
24. 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. IJCRR. 2013;5(2):37-42.