Autopsy Profile of Sudden Cardiac Deaths
Reported in Mumbai Region of Maharashtra

Sanjay D. Gaiwale[1], Madhusudan R. Petkar[2], Vandana S. Gundla[3], Ashwinikumar B. Sapate[4], Ajay L. Ghangale[5]

Abstract

The study was conducted with an aim to find out the prevalence of cardiac pathology with its correlation to age, gender, occupation, risk factors and survival time in sudden cardiac deaths. 112 cases of sudden natural deaths due to cardiac and coronary pathology were reported, out of which 75% were male and 25% were female of which 45.5% were occupied with sedentary work. 42.0% cases were of lower middle class, followed by the upper middle class i.e. 29.5%. Peak incidence of sudden cardiac death was seen in the age group of 51-60 years. Maximum number of sudden deaths due to cardiac and coronary pathology were seen in obese individuals i.e. 55.4%. In these sudden deaths hypertension was seen in 29.5% cases, followed by Diabetes mellitus and Smoking in 25% and 9.8% cases respectively. Majority of sudden deaths i.e. 63.4%, occurred within 6 hours of onset of symptoms, 28% occurred within 6-12 hours and in 4% cases death occurred within 12-24 hours of onset of symptoms. Histroy of previous myocardial infarction was present in 31.2% cases. Sudden deaths due to cardiac and coronary pathology showed that 90 % of cases died due to coronary artery disease out of which 44.64% had acute coronary insufficiency while 33.9 % succumbed due to acute coronary insufficiency with Old Myocardial Infarction and 11.6 % due to Acute Myocardial Infarction.

Keywords: Sudden Cardiac Death; Coronary Pathology; Acute Myocardial Infarction; Hypertension**.**

Introduction

Sudden death is a death which is not known to have been caused by any trauma, poisoning or violent asphyxia, and wheredeath occurs all of a sudden or within 24 hours of the onset of the terminal symptoms [1]. Incidence of sudden cardiac death (SCD) has been increasing day by day through ought the world,specifically in the urban population [2,3]. In India incidence of ischemic heart disease has increased, to about 10 percent [4]. As per autopsy findings, majority of sudden deaths resulteddue to cardiovascular disease [5, 6]. Sudden cardiac death is commonly defined as an unexpected natural death due to cardiac cause within ashort time period (usually within one hour) with or without onset of symptoms and without any prior conditions that would appear fatal [7]. Some prodromal symptoms like palpitation, chest pain and dyspnea may suggest a cardiovascular etiology[8,9].

The present study was carried out with an aim to study the prevalence of cardiac pathology with its correlation to age, gender, occupation, risk factors and survival time in sudden cardiac deaths.

Material & Methods

The present study is a prospective cross-sectional study conducted for a period of two years in tertiary health care Centre, Mumbai, India.

The study included cases of sudden deaths

Authors Affiliation: [1]Assistant Professor [2]Associate Professor [4]Professor [5]Professor and Head, Forensic Medicine and Toxicology, Dr. D.Y. Patil Medical College, Hospital & Research Centre, Pimpri, Pune, Dr. D.Y. Patil Vidyapeeth, Pune, Maharashtra 411018, India. [3]Clinical Practice, Obstetrics and Gyanecology, Self Employed, Pimpri, Pune, Maharashtra 411018, India.

Corresponding Author: Madhusudan R. Petkar, Associate Professor, Forensic Medicine and Toxicology, Dr. D.Y. Patil Medical College, Hospital & Research Centre, Pimpri, Pune, Dr. D.Y. Patil Vidyapeeth, Pune, Maharashtra 411018, India.

E-mail: drmadhupetkar@gmail.com

Received on 26.02.2019,   Accepted on 06.03.2019

with post-mortem interval less than 24 hours to avoid artefacts due to early or late decomposition changes. Cases presenting as sudden unexpected deaths with history suggestive of heart disease were studied in detail. Detailed history as to the circumstances leading to death, any past history of myocardial infarction, or symptoms suggestive of heart disease like, breathlessness, chest pain, collapse, were obtained from the relatives, inquest papers and wherever possible from the hospital records. The cases presenting as sudden death were either the patient was found dead or was declared as "brought dead" in the hospital and hospital admitted patientswho died within 24 hours of admission. All the cases were subjected to medico legal autopsy after completion of Police/Magistrate Inquest. Final cause of death was ascertained after histopathological examination and Triphenyl Tetrazolium Choride (TTC) staining.

Results

Table 1: Age and sex distribution

Age (yrs.)	Male (%)	Female (%)	Total	Percentage
21-30	3 (3.57)	1(0.89)	4	3.57
31-40	4 (4.76)	5 (17.85)	9	8.0
41-50	13 (14.17)	11 (39.20)	24	21.42
51-60	36 (42.85)	10 (35.72)	46	41.0
61-70	26 (30.95)	1 (3.57)	27	24.10
71-80	2 (1.38)	00 (0)	2	1.78
Total	84 (100)	28 (100)	112	100

Total number of cases of sudden natural deaths due to cardiac and coronary pathology was 112. The minimum age was 21 years and maximum 72 years. Peak incidence of sudden cardiac death was seen in the age group of 51-60 years. Out of the total 112 cases 75% were male and 25% were females. However the observed difference in age groups between male and female cases was not found to be statistically significant (Table 1).

Table 2: Distribution of Occupation

Occupation	Frequency	Percentage
House Wife	9	8.0
Sedentary Workers	51	45.5
Govt.Service	7	6.3
Unemployed	9	8.0
Hard Workers	33	29.5
Not Known	3	2.7
Total	112	100

Out of total cases 45.50% were occupied with sedentary work (Small scale business, shopkeeper,

others working in private sector like mill, industries etc) followed by 29.5% of the cases were doing a occupation of heavy work such as labourer, street vendor, taxidrivers and in 3 cases occupation status was not known (Table 2).

The socioeconomic status was assessed by Kuppuswamy's socioeconomic status scale [10].
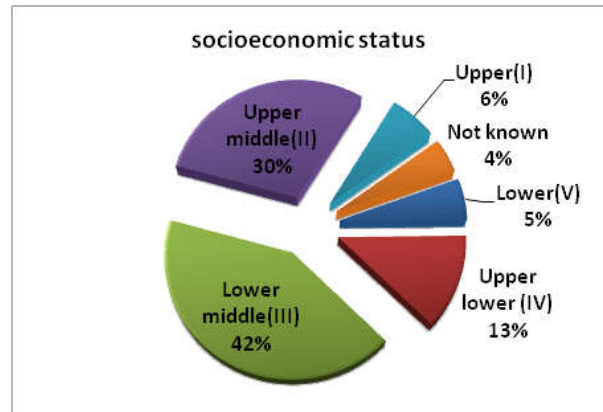
Fig. 1: Socioeconomical status

The above figure 1 shows that about 47 (42.0%) cases were of lower middle class, followed by the upper middle class 33 (29.5%), upper lower class 14 (12.5%), upper class 7 (6.3%),lower class 6 (5.4%) and in 5 (4.5%) cases status was not known (Fig. 1).
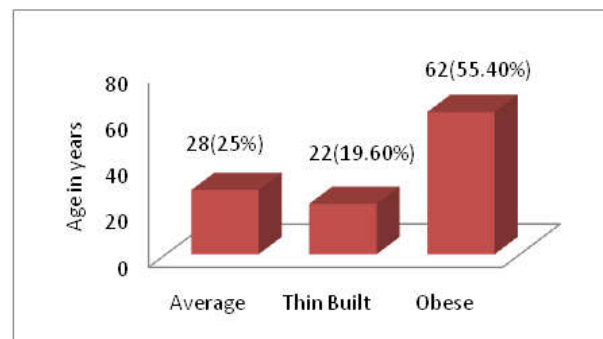
Fig. 2: Nourishment

In present study maximum number of cases of sudden deaths due to cardiac and coronary pathology were seen in obese individualsi.e. 62 cases (55.4%) and least number of deaths due to cardiac causes were seen in Thin built individuals i.e. 22 cases (19.6%) (Fig. 2).

Table 3: Distribution of Risk Factors for Sudden Cardiac Death

Risk Factors	Frequency	Percentage
Hypertension	33	29.5
Diabetes mellitus	28	25.0
Hypertension + Diabetes mellitus	10	8.9

Smoking	11	9.8
Tobacco chewing	4	3.6
Smoking + Tobacco chewing	6	5.4
Smoking + alcohol consumption	1	0.9
Smoking + Tobacco chewing+ alcohol consumption	3	2.7
No risk factor	16	14.3
Total	112	100

It was observed that out of 112 cases of sudden cardiac deaths, hypertension was seen in 33 (29.5%) cases, followed by Diabetes mellitus and Smoking in 28 (25%) and 11 (9.8%) cases respectively (Table 3).
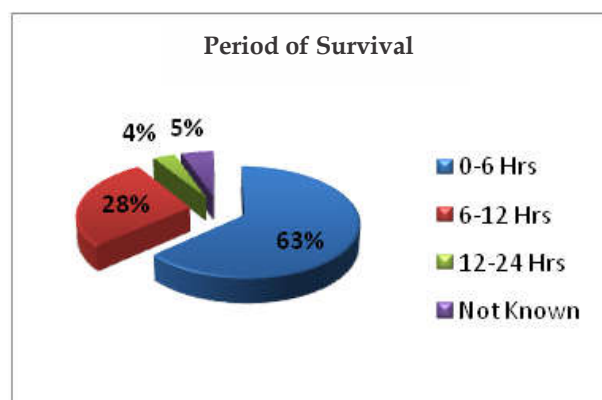

Fig. 3: Period of survival

In present study maximum number of sudden deaths occurred within 6 hours of onset of symptoms i.e. 71 (63.4%), 31 sudden deaths (28.0%) occurred within 6-12 hours and in 4% cases death occurred within 12-24 hours of onset of symptoms (Fig. 3).

Table 4: History of Previous Myocardial Infarction (MI)

MI	Frequency	Percentage
Present	35	31.2
Absent	77	68.8
Total	112	100

In present study, out of 112 cases, histroy of previous myocardial infarction was present in 35 (31.2%) cases and detail history was not available in rest of the cases (Table 4).

Table 5: Comparison of Cause of Death

Sex		Male	Female	Total	Percentage
Coronary artery disease (CAD)	A.C.I.	34	16	50	44.64
	A.C.I with O.M.I	34	4	38	33.9
	A.M.I.	10	3	13	11.6
Cardiac tamponade		1	0	1	0.9
Mitral stenosis		3	2	5	4.46
Dilated cardiomyopathy		2	3	5	4.46
Total		84	28	112	100

As per table 5 sudden deaths due to cardiac and coronary pathology showed that 90 % (101cases) ofcases dieddue to coronary artery disease out of which 44.64% had Acute Coronary Insufficiency (ACI) while 33.9 % cases had acute coronary insufficiency with Old Myocardial Infarction (OMI) and remaining 11.6 % died due toAcute Myocardial Infarction (AMI). Rest of the 11 cases died due to various cardiac pathology other than coronary insufficiency like cardiac tamponade, dilated cardiomyopathy and mitral stenosis (Table 5).

Discussion

In present study, majority of sudden cardiac deaths occurred in male (75%) which was comparable with the study of Kumar V et al., [11] Sarkioja T et al., [12] Zanjad NP et al., [13] Azmak AD [14] and Garg S et al. [15]. Male predominance is due to the fact that, males have more stress, smoking habits and absence of cardio protective hormone estrogens.

Most common age group involved was 51-60 years which covered 41% of cases which is similar to results of PJ Manvar et al study [16]. Sudden cardiac deaths found to be more in sedentary workers (45.50%) which is similar to results (30.60%) of Kumar et al. [11]. This study revealed that 42% sudden cardiac deaths were seen in Lower middle class population. Kuller L et al. [17] reported similar findings.

In the present study more number of sudden cardiac deaths due to coronary artery disease was associated with risk factors like obesity, hypertension and smoking. Similar findings were observed in study in Finland conducted by Pekka Jousilahti et al. [18].

We found that majority (63%) of patients died within first 6 hours of onset of fatal episodes. Similar findings were found in the study conducted by Spain DM et al. [19] which showed 91% of deaths occurred within one hour of fatal episodes. The present study revealed that 90.14% sudden cardiac deaths occurred due to coronary artery disease. Similar findings were observed by Papadodima SA et al., and Chandrakala Joshi [20,21].

Conclusion

The study concluded that 51-60 years age group was commonly involved and succumbed due to sudden cardiac death. People with low socioeconomic status and sedentary workers were more vulnerable compared with other class. Risk factors like Hypertension, Diabetes, Obesity and Smoking contributed to sudden cardiac deaths. Maximum deaths occurred within first 6 hours of onset of symptoms, indicating the fatality of the Coronary artery disease.

Authors of the study recommend that persons with age above 35 years with obesity and habits of smoking, engaged in sedentary occupation should carry out regular health checkup and modify their diet and lifestyle. They should engage themselves in regular physical activity and be at mental peace to lead a stress free life.

References

1. Apurba Nandy. Principles of Forensic Medicine including Toxicology. 3rd Edition, New Central Book Agency (P) Ltd: Kolkata, 2010.pp.226-29.

2. Goldberger JJ, Basu A, Boineau R, Buxton AE, Cain ME, Canty JM. et al. Risk stratification for sudden cardiac death a plan for the future. Circulation. 2014;129(4):516-26.

3. Harmon KG, Asif IM, Klossner D, Drezner JA. Incidence of sudden cardiac death in national collegiate athletic assoc-iation athletes. Circulation. 2011;123(15):1594-600.

4. Reddy KS. Cardiovascular disease in non-Western countries. N Engl J Med. 2004 June 10;350:2438-40.

5. Pouleur AC, Barkoudah E, Uno H, Skali H, Finn PV, Zelenkofske SL, et al. Pathogenesis of sudden unexpected death in a clinical trial of patients with myocardial infarction and left ventricular dysfunction, heart failure, or both clinical perspective. Circulation. 2010;122(6):597-602.

6. Sapate AB, Petkar MR, Ghangale AL, Arora PK, Datir SB. Autopsy profile of natural causes of sudden deaths and survival time. International J. of Healthcare and Biomedical Research. 2015;3(4):126-134.

7. Goldstein S. The necessity of a uniform definition of sudden coronary death: witnessed death within 1 hour of the onset of acute symptoms. Am Heart J. 1982;103(1):156-9.

8. Matoba R, Shikata I, Iwai K, Onishi S, Fujitani N, Yoshida K, et al. An epidemiologic and histo-pathological study of sudden cardiac death in Osaka Medical Examiner's office. JpnCirc J. 1989;53(12):1581-8.

9. World Health Organization. Myocardial infarction community registers: results of a WHO international collaborative study coordinated by the Regional Office for Europe. Public Health in Europe 5. Copenhagen: Regional Office for Europe, World Health Organization, 1976.

10. Kuppuswamy B. Manual of socioeconomic status (Urban), 1st ed. Delhi: Manasayan; 1981.pp.66-72.

11. Kumar V, Abbas AK, Fausto N, Aster, Robbin's and Cotran. Pathological basis of disease. 7th ed. Noida: Elsevier, Health sciences Education, Marketing: 2008.

12. Sarkioja T. Hirvoven J. Causes of sudden unexpected deaths in young and middle aged persons. FSI 1984;24(4):247-261.

13. Zanjad NP, Nanadkar SD. Study of Sudden Unexpected Deaths In Medico-Legal Autopsies. JIAFM. 2006;28(1):27-30.

14. Azmak AD. Sudden deaths in Edirne, Turkey, from 1984 to 2005. Med. Sci. Law 20007;47(2):147-155.

15. Garg S, Hasija S, Sharma P, Kalhan S, Saini N, Khan A. A histopathological analysis of prevalence of various heart diseases: an autopsy study.Int J Res Med Sci. 2018 Apr;6(4):1414-1418

16. PJ Manvar, DK Vadgama, HM Mangal, PR Varu, RD Vaghela. Autopsy study of coronary artery atherosclerosis in Rajkot Region. Indian Journal of Forensic and Community Medicine, 2016 Oct-Dec;3(4):251-253

17. Kuller L, Lilienfeld A, Fisher R,Sudden and Unexpected Deaths in Young Adults An Epidemiological Study. JAMA. 1966;198(3):248-252.

18. Jousilahti P, Vartiainen E, Tuomilehto J, Puska P. Sex, Age, Cardiovascular Risk Factors, and Coronary Heart Disease A Prospective Follow-Up Study of 14786 Middle-Aged Men and Women in Finland. Circulation. 1999;99(9):1165-72. PMID:10069784

19. Spain DM, Bradess VA, Matero A, Tarter R. Sudden Death Due to Coronary Atherosclerotic Heart Disease: Age, Smoking Habits, and Recent Thrombi. JAMA. 1969;207(7):1347–49.

20. Papadodima SA, Sakelliadis EI, Kotretsos PS, Athanaselis SA, Spiliopoulou CA. Cardiovascular disease and drowning: autopsy and laboratory findings.Hellenic J Cardiol. 2007 Jul-Aug;48(4):198-205.

21. Joshi C. Postmortem study of histopathological lesions of heart in cases of sudden death - an incidental findings. J Evid Based Med Healthc. 2016;3(6):184-86.