An Autopsy Study of "Sudden Death Cases" in Tertiary Care Hospital

Rajesh Para[1], Vijay Halmandge[2]

Abstract

Introduction: Sudden death is one of the common mode of the death now a days. According to ICD 10 of the World Health Organization sudden death is defined as "Death occurring in less than 24 hours from onset of symptoms not otherwise explained". It also emphasizes that sudden death is better known as non-violent or instantaneous for which no cause can be discovered. Despite modernization in medicine, the diagnosing tools lack in accuracy to find clinical cause of death in comparison with autopsy cause of death. Across all age groups, cardiac related diseases play a significant role in both sudden and unexpected death. In this study, cases of sudden deaths are examined histopathologically to establish possible causes of the sudden deaths. *Aim:* To study histopathology of the organs of sudden death cases in autopsy and identify common but clinically important causes of sudden death. This study would show the impact of lifestyle of our society and thus help to increase awareness in population at risk as well as lifestyle modification which might reduce the incidence of sudden death. *Material and Method:* A study of autopsies of sudden deaths between August 2014 to July 2017(3 Years) at department of Pathology, BRIMS, Bidar. *Result:* Total autopsies received during August 2014 to July 2017 were 198, among which those with sudden death were 54 cases (27.27%). The age ranged from 11 years to 90 years, among which sudden death was maximum in 41 to 60 years of age and males were affected more than the females. Out of 54 sudden deaths, 37 cases (68.52%) died of cardiovascular causes, mainly myocardial infarction; while 17cases (31.48%) were of non cardiac causes, in which pulmonary aetiologies predominate. Among 37 cases of cardiovascular causes, 9 had other co-morbid conditions. *Conclusion:* It is concluded that sudden deaths were more common in 4th and 5th decade of life with male preponderance and most common causes are cardiovascular, while sudden deaths between 11 to 30 years of age were mainly due to non cardiac causes.

Keywords: Sudden Death; Autopsy; Cardiovascular and Non Cardiac Causes.

Introduction

Sudden, unexpected deaths can occur in all age groups; however etiologies vary by age [1]. According to ICD 10 of the World Health Organization, sudden death is defined as "Death occurring less than 24 hours from onset of symptoms not otherwise explained." It also emphasizes that, sudden death is better known as non- violent or instantaneous for which no cause can be discovered [2]. Despite modernization in medicine, the diagnosing tools lack in accuracy to find clinical cause of death in comparison with autopsy cause of death [3]. Across all age groups, cardiac-related diseases play a significant role in both sudden and unexpected death [1]. Sudden cardiac death can be prevented, if high risk patients are identified and referred to a cardiologist [4]. According to Birth and Death Registration Act 1969 in India, it is mandatory to issue a death certificate. Hence, such deaths must undergo an autopsy to determine the exact cause of death [5].

Materials and Methods

The study was conducted in the department of Pathology, BRIMS, Bidar, Karnataka, India between

Authors Affiliation: [1]Associate Professor, Department of Pathology, Bidar Institute of Medical Sciences, Bidar, Karnataka 585401, India. [2]Associate Professor, Department of Pathology, Bidar Institute of Medical Sciences, Bidar, Karnataka 585401, India.

Corresponding Author: Dr. Rajesh Para, Associate Professor, Department of Pathology, Bidar Institute of Medical Sciences, Bidar, Karnataka 585401, India.

E-mail: drrajeshpara.brims@yahoo.in, drpararajesh@gmail.com

August 2014 to July 2017. During this period total number of autopsies done were 198 cases, out of which those of sudden death were 54 cases.

Inclusion Criteria

1. All cases of sudden deaths within 24 hours of onset of symptoms, of all age groups.

2. Cases of sudden deaths of any sex.

3. Cases which had controlled diabetes and hypertension were included in the study .

Exclusion Criteria

1. Cases of deaths after 24 hours of onset of symptoms.

2. Cases with any assault, road traffic accidents, suicides or identifiable cause.

3. Cases with pregnancy and related deaths.

4. Unidentified dead body were excluded from the study.

Information about time of death since appearing of symptoms were checked in Post-mortem notes of all cases labelled as "Sudden Deaths" in Department of Forensic Medicine, BRIMS, Bidar.

In all cases, organs received were Heart, Lungs, Liver, Kidneys, Spleen, Brain with detailed information at autopsy from the Department of Forensic Medicine.

All organs were grossly examined and then fixed in 10% Formalin for atleast 24 hours. Multiple sections of 4-5 mm thickness were taken. All sections were numbered and processed in automated tissue processor, subjected to paraffin section of 4µm thickness and then were stained with routine haematoxylin and eosin stains [5]. All slides were histopathologically examined and cause of death was ascertained.

Results

Total number of Autopsies received during Aug 2014 to July 2017 in the Dept of Pathology, BRIMS, Bidar for Histopathological study of organs were 198 cases, out of which those of sudden death were 54 cases (27.27%). Among these cases, Males (45 cases) outnumbered females (9 cases) with M: F with ratio of 5:1. The age of these cases ranged from 11 to 90 years with peak seen in 41-60 years age group (Table 1).

Table 1: Age Distribution of cases of Sudden Death

Age (in years)	No. of Cases	Percentage (%)
0-10	0	0%
11-20	4	7.40%
21-30	9	16.66%
31-40	8	14.81%
41-50	12	22.22%
51-60	13	24.10%
61-70	06	11.11%
71-80	01	1.85%
81-90	01	1.85%
91-100	00	00%
Total	54	100%

Table 2: Histopathological distribution of cases of sudden deaths

Cause	No. of cases	Percentage (%)
Cardiovascular	37	68.52
Non cardiac	17	31.48
Total	54	100

Table 3: Distribution of non cardiac cases of sudden death

Systems involved	No. of Cases of the Deaths	Percentage (%)
Pulmonary	11	64.7
Renal	2	11.76
Central Nervous System	2	11.76
Hepatobillary	2	11.76
Total	17	100

Table 4:

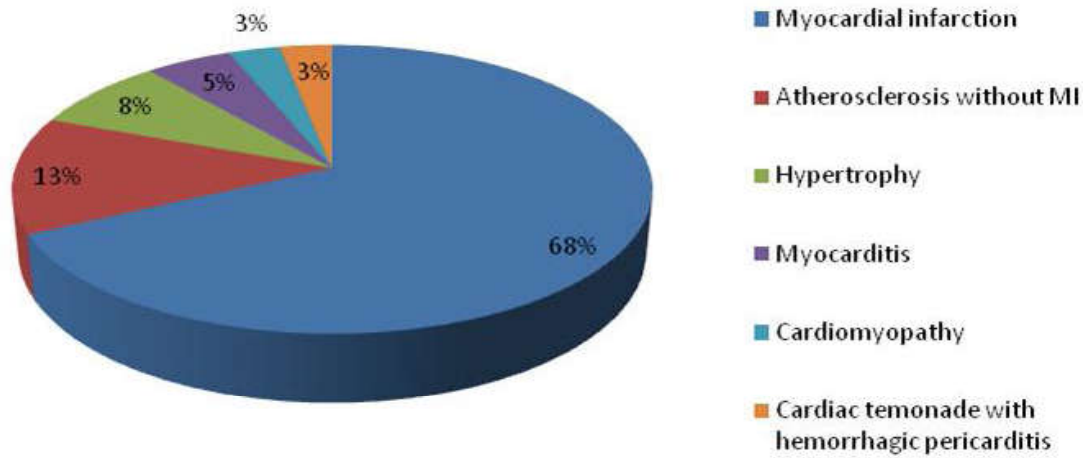| Comorbid Conditions	Number of the Cases
Hypertrophy of left ventricular wall	5
Benign nephrosclerosis	1
Acute tubular necrosis	1
Hypertension	1
CVC lung	1
Total	9

Chart 1: Distribution of cardiovascular causes
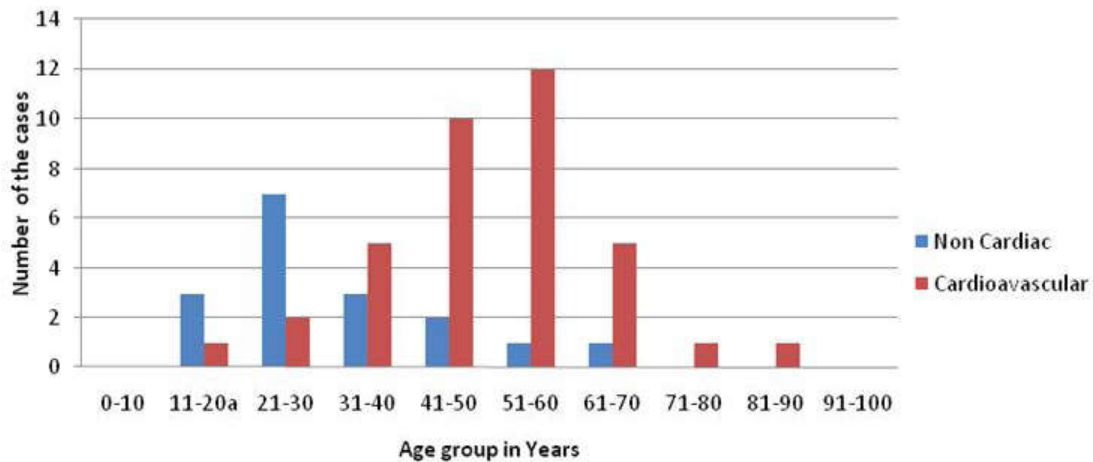

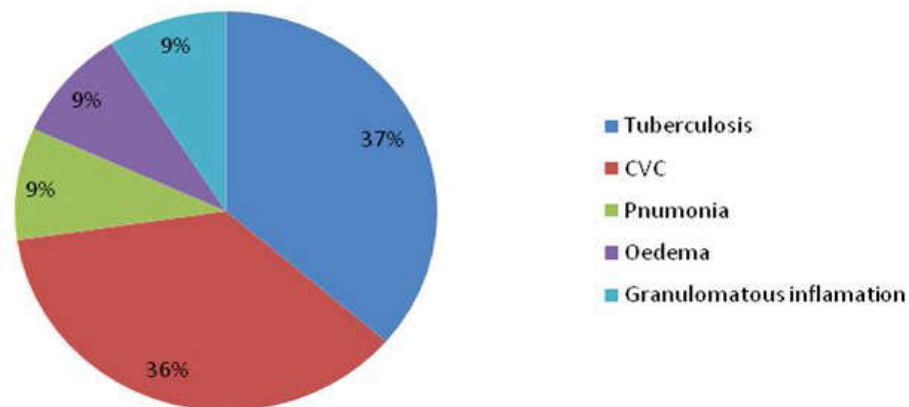**Chart 2:** Age wise distribution of cardiovascular and Non cardiac causes

Chart 3: Pulmonary causes

Cardiovascular causes [37cases (68.52%)] was the commonest cause of sudden death, while non cardiac causes [17 cases (31.48%)] were least common. In the latter category, aetiologies were pulmonary causes 11 cases (64.70%), followed by renal, CNS and Hepatobiliary with 2 cases (11.76%) each.

Among the cardiovascular causes, 25 cases (67.56%) had aetiology of myocardial infarction, while 5 cases (13.51%) had atherosclerosis without any changes of myocardial infarction or hypertrophy. While 3 cases (8.10%) had only hypertrophy of left ventricle, myocarditis was identified in 2 cases (5.40%) and Cardiomyopathy and cardiac tamponade with hemorrhagic pericarditis was present in 1 case each (2.70%) (Chart 1).

Categorisation of cardiovascular and non cardiac aetiologies were done to study age groups. Sudden deaths in 11 to 30 years age groups were mainly due to non cardiac causes, while deaths in age of 31 to 70 years age group were due to cardiac causes (Chart 2).

Discussion

Determination of cause of death in natural deaths, particularly when the death occurred suddenly, unexpectedly or in the young, is an important part of Autopsy practice [1]. Most of the literature identified cardiovascular causes as the most common cause [6-10]. Sequential autopsy examination in sudden death investigation was suggested by Sheppard et al where the first step was to consider natural death, followed by exclusion of noncardiac natural death-like hemorrhage, next was to consider macroscopic findings (e.g., ischemic cardiac disease) and microscopic findings (e.g., myocarditis) in heart. Finally, reappraisal of history and toxicology screen need to be done [11-12].

From Total 54 cases of sudden death, 37(68.52%) deaths were due to cardiovascular causes. Among cardiovascular causes myocardial infarction (MI) was the most common cause comprising of 25 cases (67.56%) followed by atherosclerosis without any change of MI or hypertrophy, Hypertrophy of left ventricle, myocarditis, cardiomyopathy and cardiac tamponade with hemorrhagic pericarditis as shown in Chart 1. These results are comparable with the literature of Pathology of Sudden Natural Death and WHO/ Cardiovascular Diseases; fact sheet review [1&13]. Similar studies by Thomas A C et al , Farb A et al and chugh s s et al also stated that sudden

deaths were most common due to cardiac diseases and occurred most commonly in males [6,7,10].

According to WHO fact sheet about cardiovascular disease of June 2016, CVDs (Cardio Vascular Diseases) are the number one cause of death globally, more people die annually from CVDs than from any other cause. An estimated 17.7 million people died from CVDs in 2015, representing 31% of all global deaths. Of these deaths, an estimated 7.4 million were due to coronary heart disease and 6.7 million were due to stroke. Over three quarters of CVD deaths occur in low- income and middle-income countries. Out of the 17 million premature deaths (under the age of 70 years) due to non communicable disease in 2015, 82% are in low-and middle – income countries and 37% are caused by CVDs [13].

In the present study, among 25 cases of Myocardial Infarction, 9 cases had comorbid conditions, most common being hypertrophy of left ventricular wall and others were renal, hypertension and CVC (Chronic Venous Congestion) lung (Table 4).

Comorbid Conditions	Number of the Cases
Hypertrophy of left ventricular wall	5
Benign nephrosclerosis	1
Acute tubular necrosis	1
Hypertension	1
CVC lung	1
Total	9

These results are comparable with study of David D et al and Lekston A et al with respect to Multiple cardiovascular comorbidities and acute myocardial infarction and Impaired renal function in acute myocardial infarction [14,15].

In this study, other than the cardiovascular diseases, second most common cause of sudden death was pulmonary cause [11 cases (20.37%)] . Among these tuberculosis and chronic venous congestion (CVC) predominates accounting for 4 cases each. Few of them attributed to oedema, pneumonia and granulamatous inflammation comprising of a case each (Chart 3).

This study corroborated with study conducted by Bobrowitz [16]. The increase in frequency of sudden death due to undiagnosed tuberculosis is a major concern, where some individuals may have had a coexisting condition, masking it [17].

Other causes include renal 2 cases (11.76% of total), central nervous system disease 2 cases(11.76% of total), Hepatobilliary 2 cases (11.76% of total). Among the renal causes, ATN (Acute Tubular Necrosis) was found in both cases. This result was in comparison with study done by Gill N et al [18].

Among CNS causes, subarachnoid hemorrhage was seen in one single case while one case had associated reactive gliosis. These findings are comparable with study of M Black et al [19].

The hepatobilliary cause was CVC(Chronic Venous Congestion). This is similar to study by Jamila Alagarsamy et al [20].

Conclusion

This study concludes that sudden deaths are more common in 4th and 5th decade of life with male preponderance and most common causes are cardiovascular, while sudden deaths due to non cardiac causes are mainly seen in 11 to 30 years age group.

References

1. Pathology of Sudden Natural Death: Candace H Schoppe, MD; Chief Editor: J Scott Denton, MD; Patrick E Lantz, MD.

2. WHO International Classification of Diseases and related health problems 10th revision (ICD 10) version for 2016.

3. Goldman L, Sayson R, Robbins S, Cohn LH, Bettman M, Weisberg M. The value of the autopsy in three medical eras. N Engl J Med 1983;308:1000-5.

4. Kwok KM, Lee KL, Lau CP, Tse HF. Sudden cardiac death: Prevention and treatment. Hong Kong Med J 2003;9:357-62.

5. Bancroft J, Suvarna K. Theory and Practice of Histological Techniques.7th ed. Philadelphia: Churchill Livingstone; 2013.p.69-179.

6. Thomas AC, Knapman PA, Krikler DM, Davies MJ. Community study of the causes of "natural" sudden death. BMJ 1988;297:1453-6.

7. Farb A, Tang AL, Burke AP, Sessums L, Liang Y, Virmani R. Sudden coronary death. Frequency of active coronary lesions, inactive coronary lesions, and myocardial infarction. Circulation 1995;92: 1701-9.

8. Park K. WHO report. Parks textbook of Social and Preventive Medicine. 17th ed. Banarsi Bhanat; 1999. p. 273-6.

9. Doolan A, Langlois N, Semsarian C. Causes of sudden cardiac death in young Australians. Med J Aust 2004; 180:110-2.

10. Chugh SS, Kelly KL, Titus JL. Sudden cardiac death with apparently normal heart. Circulation 2000;102:649-54.

11. Bowker TJ, Wood DA, Davies MJ, Sheppard MN, Cary NR, Burton JD, et al. Sudden unexpected cardiac or unexplained death in England: A national survey. QJM 2003;96:269-79.

12. Sheppard M, Davies MJ. Investigation of sudden cardiac death: Practical cardiovascular Pathology. London: Arnold; 1998. p. 191-204.

13. WHO/ Cardiovascular Diseases; Fact sheet, reviewed in June 2016. Assessed on www.who.int/ cardiovascular diseases/en/.

14. David D McManus, Hoa L Nguyen, Jane S Saczynski, Mayra Tisminetzky, Peter Bourell, Robert J Goldberg. Multiple cardiovascular comorbidities and acute myocardial infarction: temporal trends (1990–2007) and impact on death rates at 30 days and 1 year: Clinical Epidemiology 2012;4:115–123.

15. Lekston A, Kurek A, Tynior B. Cardiol J. Impaired renal function in acute myocardial infarction. 2009;16(5):400-6.

16. Bobrowitz ID.Active tuberculosis undiagnosed until autopsy. Am J Med 1982;72:650-8.

17. Rastogi P, Kanchan T, Menezes RG. Sudden unexpected deaths due to tuberculosis: An autopsy based study. J Foren Med Toxicol 2011;28:81-3.

18. Renal failure secondary to acute tubular necrosis: epidemiology, diagnosis, and management.Gill N[1], Nally JV Jr, Fatica RA. Chest 2005 Oct;128(4):2847-63.

19. Sudden unexplained death in adults caused by intracranial pathology: M Black, D I Graham. J Clin Pathol 2002;55:44–50.

20. Incidentally Discovered Liver Diseases- An Autopsy Study of Fifty Cases Jamila Alagarsamy1, Yogambal Muthureddy2, N. Subhash Rao Yadav3. International Journal of Science and Research (IJSR) ISSN (Online): 2319-7064 Impact Factor 2012;3:358.