

Sudden Death Cases: An Autopsy Study In Tertiary Care Hospital

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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 less than 24 hours from onset of symptoms not otherwise explained." It also emphasizes that sudden death known not to be 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 sudden death incidence. *Material And Method:* A prospective study of autopsies of sudden deaths between October 2015 to July 2016 (10 months) at department of Pathology, SMIMER, Surat. *Result:* Total autopsies received during October 2015 to July 2016 were 554, among which cases with sudden death were 108 (19.49%). 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 108 sudden deaths, 74 (68.52%) cases died of cardiovascular causes mainly myocardial infarction while 34 (31.48%) cases were of non cardiac causes in which pulmonary causes predominates. From 74 cases of cardiovascular causes, 26 had other comorbid conditions. *Conclusion:* It is concluded 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 of 11 to 30 years are 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 known not to be 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 prospective study is conducted in the department of Pathology, SMIMER, Surat, Gujarat, India between

October 2015 to July 2016. During this period total number of autopsies received were 554, out of which sudden death cases were 108.

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 with stable diabetes and hypertension.

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. Unknown dead body found dead.

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.

In all cases organ received were Heart, Lungs, Liver,

Kidneys, Spleen, Brain with detailed information in autopsy receiving form from the department of Forensic Medicine.

All organs are grossly examined and then fixed in 10% formalin at least for 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 at 4µm thickness, and then were stained with routine hematoxylin and eosin staining method.⁵ All slides histopathologically examined and cause of death determined.

Results:

Total autopsies received during October 2015 to July 2016 were 554 in the department of Pathology, SMIMER, Surat, Gujarat, India, out of which cases with sudden death were 108(19.49%). Males died more than females by sudden death as there were 93 males and 15 females with ratio of 6.2:1. The age ranged from 11 to 90 years with maximum sudden deaths in age group of 41-60 years.(Table 1).

Histopathological examination identified cardiovascular causes as the commonest causes of sudden death comprising of 74(68.52%) cases of all sudden deaths while remaining 34(31.48%) were died of non cardiac causes. Among non cardiac causes most common was the pulmonary causes 22(64.70%), followed by renal and CNS causes having 4(11.80%) of each. Hepatobiliary causes and sickle cell disease were 3(8.80%) and 1(2.90%) respectively (Table 2 and 3).

Among the cardiovascular causes 48(64.86%) cases died of myocardial infarction while 11(14.86%) cases had atherosclerosis without any changes of myocardial infarction or hypertrophy. 10(13.51%) cases had only hypertrophy of left ventricle and myocarditis was identified in 3(4.05%) cases. Cardiomyopathy and cardiac temponade with hemorrhagic pericarditis was present in 1(1.36%) cases of each (Chart 1).

We also categorised cardiovascular and non cardiac causes according to study age groups. Sudden deaths in 11 to 30 years were mainly due to non cardiac causes while deaths in age of 31 to 70 years 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 forensic autopsy practice.¹ Most of the literature identified cardiovascular causes as the most common cause.⁶⁻¹⁰

Table 1: Age Wise Distribution of Sudden Death Cases

Age in years	No. of the cases	Percentage
0-10	0	0%
11-20	6	5.56%
21-30	17	15.74%
31-40	22	20.37%
41-50	24	22.22%
51-60	25	23.15%
61-70	10	9.26%
71-80	3	2.78%
81-90	1	0.92%
91-100	0	0%
Total	108	100%

Table 2: Histopathological Causes of Sudden deaths

Causes	Number of the deaths	% of total
Cardiovascular	74	68.52
Non cardiac	34	31.48
Total	108	100

Table 3: Distribution of Non Cardiac Causes

Causes	Number of the deaths	% of Non cardiac causes
Pulmonary	22	64.7
Renal	4	11.8
Central Nervous System	4	11.8
Hepatobillary	3	8.8
Sickle cell disease	1	2.9
Total	34	100

Chart 1: Distribution of Cardiovascular Causes

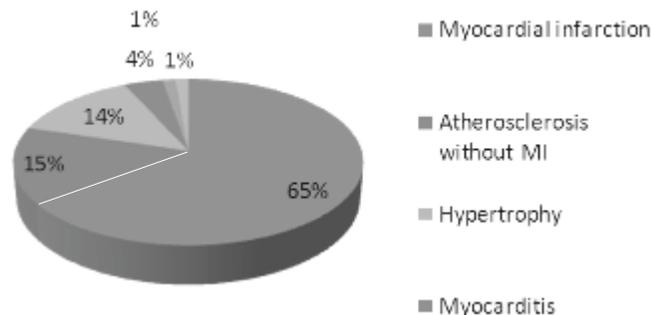
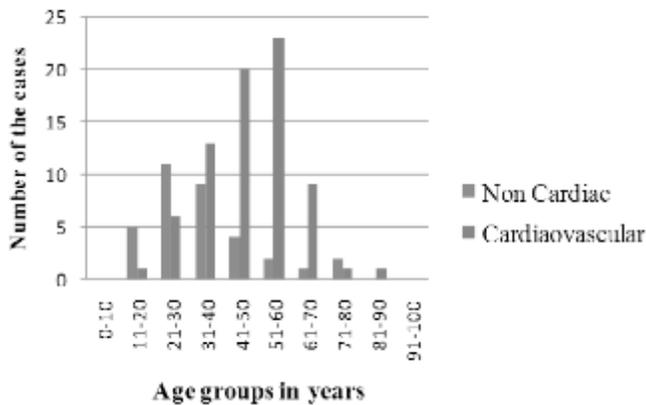


Chart 2: Age wise distribution of Cardiovascular and Non Cardiac Causes



heart. Finally, reappraise history and do toxicology screen.¹¹⁻¹²

From total 108 cases of sudden death, 74(68.52%) deaths were due to cardiovascular causes. Among cardiovascular causes myocardial infarction (MI) was the most common cause comprising of 48(64.86%) cases, 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 information given in literature of Pathology of Sudden Natural Death and WHO/ Cardiovascular Diseases; Fact sheet review.1&13 Another studies also stated that sudden deaths are most common due to cardiac diseases and most common in males.^{6,7,10}

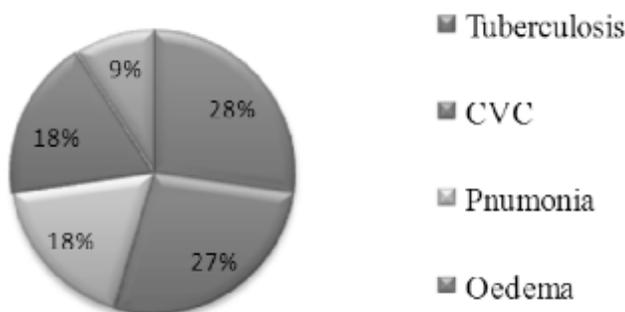
According to WHO fact sheet about cardiovascular disease reviewed in June 2016, CVDs (Cardio Vascular Diseases) are the number 1 cause of death globally, more people die annually from CVDs than from any other cause. An estimated 17.5 million people died from CVDs in 2012, representing 31% of all global 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 take place in low- and middle-income countries. Out of the 16 million deaths under the age of 70 due to non communicable disease.¹³

Table 4: Showing distribution of Comorbid Conditions

Comorbid Condition s	Number Of the Cases
Hypertrophy of left ventricular wall	9
Benign nephrosclerosis	7
Acute tubular necrosis	4
Hypertension	2
Pericarditis	1
CVC lung	1
CVC liver	1
Chronic Hepatitis	1
Total	26

In our study among 48 cases of Myocardial Infarction, 26 cases had comorbid conditions, most common being hypertrophy of left ventricular wall. Others are renal, hypertension, pericarditis, CVC (Chronic Venous Congestion) lung and liver, chronic hepatitis (Table 4)

Chart 3: Pulmonary Causes



These results are comparable with study in Multiple cardiovascular comorbidities and acute myocardial infarction and Impaired renal function in acute myocardial infarction.^{14,15}

In our study beside the cardiovascular diseases, 2nd most common cause of sudden death was pulmonary 22 cases(20.37% of Total). Among the pulmonary causes tuberculosis and chronic venous congestion (CVC) predominates having 6 cases of each. Others are oedema, pneumonia and granulomatous inflammation comprising of 4, 4 and 2 cases respectively (Chart 3).

Sequential autopsy examination in sudden death investigation was suggested by Sheppard et al. The first step is to consider natural death, followed by exclusion of noncardiac natural death-like hemorrhage. Next is to consider macroscopic findings (e.g., ischemic cardiac disease) and microscopic findings (e.g., myocarditis) in

This is comparable with study done by Bobrowitz.¹⁶ The increase in frequency of sudden death due to undiagnosed tuberculosis is a major concern. Individuals may have had a coexisting condition masking it.¹⁷

Other causes include renal 4(3.70% of total) cases, central

nervous system disease 4(3.70% of total) cases, Hepatobiliary 3(2.78% of total) cases, sickle cell disease 1(0.93% of total).

Among the renal causes ATN (Acute Tubular Necrosis) was found in 3 cases. This result is matched with study done by Gill Net all.¹⁸

Among CNS causes most common was subarachnoid hemorrhage in all 4 cases and 1 case had associated reactive gliosis. These findings are comparable with study by M Black et al.¹⁹

All 3 hepatobiliary causes were CVC(Chronic Venous Congestion). This is similar to study by Jamila Alagarsamy et al.²⁰

Only one case died to be found due to Sickle Cell disease which actually an undiagnosed case result in sudden death. Undiagnosed cases of sickle cell disease could be the cause of sudden unexpected death as per the study by Lalitha V. Pillai.²¹

Conclusion:

It is concluded 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 of 11 to 30 years are mainly due to non cardiac causes.

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