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Original Research Article

Autopsy findings in sudden death in adults: a study of 150 cases

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ABSTRACT

Background: World Health Organization (WHO) defines sudden death as "deaths within 24 hours from the onset of the symptoms". It is also defined as death, which is sudden, unexpected, clinically unexplained. Aims of the study was to classify underlying causes of sudden death, to find out risk factors, associated diseases and triggers of sudden deaths in the autopsy specimens received in the Department of Pathology, Government Medical College, South Gujarat.
Methods: A review of autopsies of sudden deaths performed between January 2018 to August 2018 in age group 15-45 years at Department of Pathology, Government Medical College, South Gujarat were done.
Results: A total of 150 cases were studied for sudden deaths during the study. The age ranged from 15 to 45 years. Maximum deaths occurred in the age group between 35-45 years. Males (n=120) were affected more than females (n=30). The cause of deaths in 84 cases (56%) were attributed to cardiac causes and the remaining cases (44%) were due to noncardiac causes like pulmonary diseases (17.3%) followed by hepatobiliary diseases (5.4%), cerebrovascular (2%) and others like suicide by ingestion of poisoning, hanging and asphyxia (9.3%). Major cardiac cause for sudden deaths was Coronary Artery Disease (CAD) (95.2%).
Conclusions: Sudden deaths were common in young adults and most are attributed to a cardiac cause. This study highlights the serious health concern in our society and a necessity to create awareness among the population at risk so that sudden deaths can be averted and life expectancy can be improved.

Keywords: Autopsy, Coronary artery disease, Sudden death

INTRODUCTION

Despite modernization in medicine, the diagnosing tools lack in accuracy to find clinical cause of death in comparison with autopsy cause of death. Main aim of autopsy is to establish the final diagnosis and determine the most possible cause of death.[1] World Health Organization (WHO) defines sudden death as "death within 24 hours from the onset of the symptoms". It can also be defined as deaths which are sudden, unexpected, clinically unexplained, or otherwise obscure even though there need to be no unnatural element in their causation.[2] Such a rapid death is often attributed to a cardiac cause. Sudden cardiac death can be prevented if high risk patients are identified and referred to a cardiologist.[3] Incidence of coronary artery disease has doubled in Indians during the past three to four decades.[4] The number of deaths due to coronary artery disease in India is projected to increase from 1.59 Million in 2000 to 2.034 Million by year 2010 (WHO report 1999).[5] Clinical presentations of sudden death include wide spectrum from symptom complex to completely asymptomatic. Sudden cardiac deaths are accounted for >60% of all sudden deaths.[6] Death occurs within minutes or hours of onset of an arrhythmia, usually ventricular fibrillation and in most instances, no evidence of any recent coronary

thrombosis or acute myocardial infarction can be identified as the trigger event and so there is no obvious morphologic change to explain the fatal arrhythmia.[7] In many adults, sudden cardiac death is a first clinical manifestation of Ischemic heart disease.[8,9] About 1 in every 20 cases of sudden cardiac death, no definite cause of death can be found, even after the heart has been examined by an expert cardiac pathologist. This is called sudden arrhythmic death syndrome. The most common electrophysiologic mechanisms leading to sudden cardiac death are tachyarrhythmias such as Ventricular fibrillation or Ventricular Tachycardia.[10]

METHODS

Present study includes autopsy cases in adults ranged between 15-45 years age, received in department of pathology, affiliated with a tertiary care hospital, south Gujarat, from January 2018 to August 2018. Total 690 Autopsy of sudden death were received in this period (All age group), out of which 150 cases were due to sudden death in the age group 15-45 Years, these cases were included in the present study. Inclusion criteria: (1) Age groups of 15-45 years who died within 24 hrs from the onset of symptoms. Exclusion criteria: (1) Deaths after 24 hrs of onset of symptoms (2) Cases with age less than 15 years or more than 45 years. The duration of the patient's stay in hospital from admission until death was extracted from the Autopsy Report form which stated the date of admission and date of death. The criteria for selection of cases were as per WHO definition- "Sudden death is a death which occurs sudden or within 24 hours of the onset of the terminal symptoms." The clinical Cause of Death (COD) was either derived from the Mortuary Registration Form or from the clinical case notes. Specimens were fixed in 10% formalin and received in the Department of Pathology. Gross examination of the fresh specimen done and necessary details like weight, size and other parameters were noted. Multiple sections were taken with 5 Micron thicknesses. After 24 hours of fixation, sectioning from representative sites has been done and sections sent for processing and cutting and routine H&E stain and other special stains like Ziehl Neelsen stain (whenever necessary) were performed.

RESULTS

A total of 690 autopsy specimens due to sudden death were received in Department of Pathology, from January 2018 to August 2018; out of which 150 were sudden deaths in 15 to 45 years age group and included in study, it constitutes about 21% of total autopsies reported. The age ranged from 15 to 45 years. Maximum number of deaths were in the age group of 35-45 years: 48% (72/150) (Table 1), out of 72 cases, 63 deaths were due to cardiac cause. Males were 120 and females were 30, M:F ratio is 4:1 (Table 2). Among the autopsied sudden death cases, most of the deaths were due to cardiac causes contributing 56% (84 cases) of all cases (Table 3) Major cardiac cause for sudden deaths was Coronary Artery Diseases (CAD) 95.2% (80 cases). Out of 80 cases, 67 cases show infarction in the heart with advanced atherosclerosis lesions (Calcification and recanalization) in coronaries, 10 cases show changes of myocardial infarction with mild Atherosclerosis, 3 cases show atherosclerotic changes without any ischemic changes in heart (Table 3) Other cardiac causes for sudden deaths were Giant cell myocarditis 3.6% (3 cases) and Rheumatic endocarditis 1.2 % (1 case) (Table 3).

Giant cell Myocarditis is characterized by a mixed myocardial infiltrate with multinucleated giant cells and cardiomyocyte necrosis (Figure 1). 1 case of Rheumatic heart disease was found, it showed presence of Aschoff bodies consists of macrophages with lymphocytes (Figure 2). It was seen in both Mitral valve leaflets and in left ventricular wall.

Table 1: Age wise distribution of cases (n=150).

Age group (years)	Age range (%)
15-25	35 (23.4)
25-35	43 (28.6)
35-45	72 (48)
Total	150

Table 2: Gender wise distribution of cases (n=150).

Gender	Cases no. (%)
Male	120 (80)
Female	30 (20)
Total	150

Table 3: Cardiac causes of sudden death (n=84).

Cardiac causes	No. (%)
Mi with advanced atherosclerotic lesion	67 (79.8)
Mi with mild athersclerosis	10 (11.8)
Atherosclerosis without mi	3 (3.6)
Giant cell myocarditis	3 (3.6)
Rheumatic endocarditis	1 (1.2)
Total	84 (100)

Table 4: Different causes of sudden death (n=150).

Causes of sudden death	No. (%)
Cardiac	84 (56)
Respiratory	26 (17.3)
Hepatobiliary	08 (5.4)
Cerebrovascular	03 (2)
Renal causes	02 (1.4)
Others	14 (9.3)
Negative autopsy	13 (8.6)
Total	150 (100)

Various noncardiac causes of sudden deaths in present study were respiratory diseases 17.3% (26 cases) followed by hepatobiliary diseases 5.4% (8 cases),

cerebrovascular causes 2% (3 cases), renal causes 1.4% (2 cases) and others like suicide by ingestion of poisoning (9 cases), hanging (4 cases) and strangulation (1 case) (Total 9.3%) (Table 4) In 13 cases (8.6%), no cause was found and therefore it was considered as a negative autopsy (Table 4).

Second most common cause of sudden death in present study was respiratory diseases like Tuberculosis 53.9% (14 cases), Pneumonia 42.3% (11 cases) (Figure 3) and Bronchiectasis with Pulmonary edema 3.8% (1 case) (Table 5) Total 11 cases of Tuberculosis (Figure 4) were found in one or both lungs. There was presence of multiple well-formed epithelioid granuloma in 8 cases and 3 cases show presence of caseous necrosis without granuloma. Ziehl Neelsen stain was performed in all 11 cases, it was positive in 7 cases (Highlights presence of Acid-Fast Bacilli) and negative in 4 cases (Figure 5).

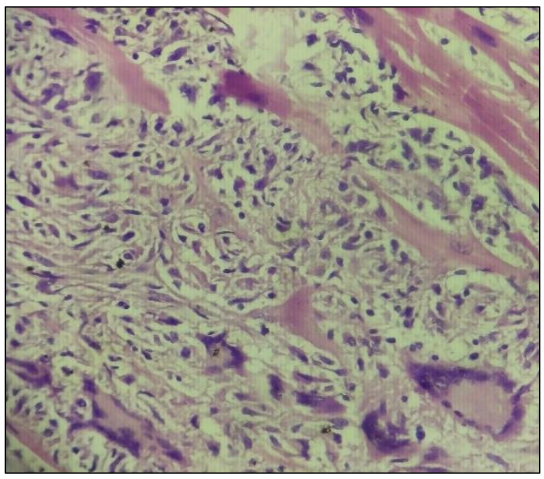

Figure 1: Giant cell myocarditis (H and E stain- 40 X) presence of multinucleated foreign body giant cells along with lymphocytes in the myocardium.

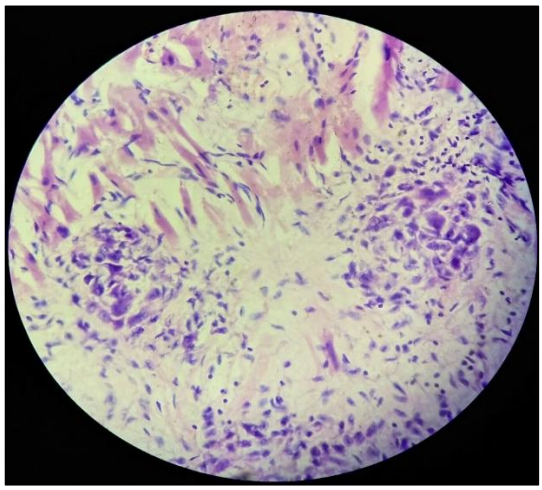

Figure 2: Rheumatic Heart disease (H and E stain- 10 X) presence of Anitschkow cells with lymphocytes in the myocardium (Aschoff bodies).

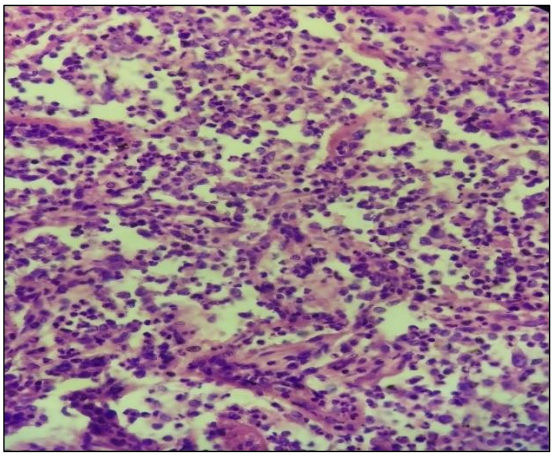

Figure 3: Pneumonia (H and E stain- 10 X) presence of acute inflammatory cells predominantly neutrophils in the alveoli and interstitial spaces.

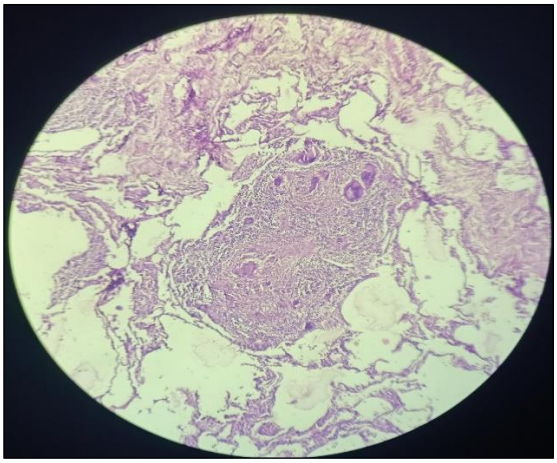

Figure 4: Pulmonary tuberculosis (H and E stain- 40 X) presence of well-formed epithelioid granuloma consisting of lymphocytes, plasma cells and langhans type of multinucleated giant cells with presence of caseous Necrosis in the lung.

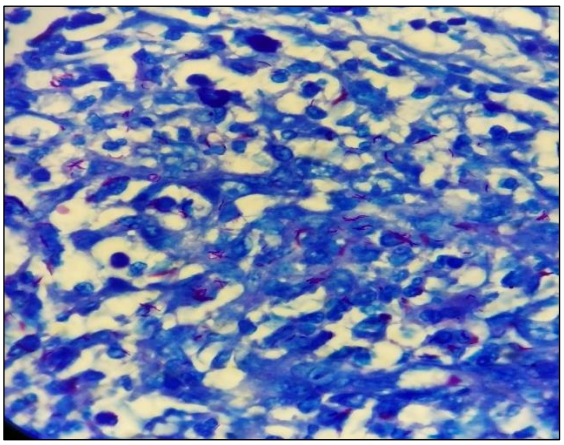

Figure 5: Pulmonary tuberculosis (Ziehl Neelsen Stain- 100 X) presence of numerous TB Bacilli stained as pink colour (Long slender rod shape).

Table 5: Respiratory causes of sudden death (n=26).

Pulmonary cause of death	No. (%)
Pneumonia	14 (53.9)
Tuberculosis	11(42.3)
Bronchiectasis with pulmonary edema	1 (3.8)
Total	26 (100)

DISCUSSION

The chief cause of death in present study was cardiac diseases (56%). In study conducted by Eckart RE et al, cause of sudden death due to cardiac diseases was 61 %.[11] In Owada M et al, study it was 62 % and in Drory Y et al, study it was 73 %.[6] The Zheng Z et al, had sudden death due to cardiac causes (Table 6).[13] Results of present study show comparable results with other studies. Present study shows that sudden deaths in the age group of 35 to 45 Years was mainly due to cardiac cause (63/84 cases) (75%) (Table 7). The reason for such a disturbing trend may be multiple, like stressful life, altered food habits (junk food), smoking habit and other risk factors like, hypertension, diabetes mellitus, hyperlipidemia etc.[14] The present study shows that 95.2% of sudden cardiac deaths were due to coronary artery disease. Atherosclerosis is a major risk factor for ischemic heart disease and sudden cardiac death. Most cases of myocardial ischemia are due to reduction in coronary blood flow by atherosclerotic coronary arterial obstruction. Myocardial ischemia is a major cause of sudden cardiac death in patient with coronary artery disease.

Table 6: Comparison of causes of sudden death in different studies.

Causes	Eckart RE et al	Owada M et al	Drory Y et al.	Present study
Cardiovasculard	61%	62%	73%	56%
Cerebrovascular diseases	4%	5%	12%	2%
Others	45%	33%	15%	42%

Table 7: Causes of Sudden death (Age wise distribution).

Causes of sudden death	15-25 years (no.)	25-35 years (no.)	35-45 years (no.)	Total (no.)
Cardiac	2	19	63	84
Other	29	18	6	53
Negative autopsy	4	6	3	13
Total	35	43	72	150

In Present study, cerebrovascular causes accounts for only 2 % cases, while it was 4% in Eckart RE et al, 5% in Owada M et al, and 12% in Drory Y et al, (Table 6).[11,12] Present study shows comparable results. Frequency of Cerebrovascular causes were less in all the studies. Table 7 shows that incidence of cardiac causes was maximum in 35-45 years (63/150 cases). It suggests that as the age advances the incidence of cardiac cases increases. Incidence of other causes was maximum in 15-25 years age group (29/150).

CONCLUSION

In this study authors found a significant number of sudden deaths occurring in middle age adults (35 to 45 years), posing a health concern in society. Cardiac causes contributed the maximum number. It is a challenge to the healthcare providers and increased awareness is needed among the population at risk. Regular check-up after the age of 30 may be made, so that sudden deaths can be averted and life can be improved. Sudden death remains an important clinical and public health problem and become the subject of pathologic investigation to determine the cause of death. Major non-modifiable risk factors for sudden cardiac deaths are increasing age and sex. Other potentially controllable risk factors are atherosclerosis, diabetes mellitus, hypertension, hyperlipidemia and cigarette smoking. Presence of two or more risk factors have added/ multiplicative effect. Sudden death of young adult and working person is a great loss for their family and surrounding community. Authors aim is to find out underlying causes of sudden death, triggers and risk factors (modifiable and non-modifiable) and associated diseases with sudden death. It's used to decrease the incidence of sudden death by preventive measures and to decrease the risk of sudden death in family members of victim.

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Ethical approval: The study was approved by the Institutional Ethics Committee

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