

## Original Article

### **Analysis of Histo-Pathological Findings in Heart and Coronaries in Autopsy Viscera cases with alleged Sudden and Natural Cause of Death- A Retrospective Study**

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#### **ABSTRACT:**

**Introduction:** Incidence of sudden cardiac death has been gradually increasing all over the world. Sometimes sudden deaths occur in older individual and generally under circumstances which arouse no suspicion. But such deaths in younger individuals are likely to draw out suspicion. Therefore, there is a need to develop complementary strategies for management of sudden cardiac death. Hence the present study aimed to analyze causes of sudden death to find out measures to prevent such unexpected deaths. **Material and Methods:** The present study was carried out over 48 Viscera cases of sudden Natural cardiac death which were subjected to Histopathology after postmortem examination. Cases with alleged History of death within 24 hours of the onset of symptoms in an individual who was not known to be suffering from any disease, injury or poisoning, considered as criteria for selection of cases and cases with alleged Non cardiac but sudden natural death e.g. stroke were excluded from study. Hearts were studied in detail both grossly and microscopically. Findings were correlated with the findings of Autopsy report and History of the case as per Police papers submitted along with the viscera. The information was analyzed to find out the etiology of sudden death in all the cases. **Results:** The present study found that among 48 cases, maximum cases (15) (31.25%) were in the age group 50-59, followed by 14 (29.16%) in 40-49 age group. Among 48 cases, 33 (68.75%) patients were found pathologically diagnosed as atherosclerotic coronary artery disease (CAD), 3 (6.25%) as hypertrophic cardiomyopathy, 2 (4.16%) as hypertensive heart disease, 1 (2.08%) as rheumatic heart disease, 3 (6.25%) as acute cardiac tamponade and 6 (12.5%) with no cardiac lesion. **Conclusion:** The present study revealed that atherosclerotic coronary artery disease as the major cause of sudden cardiac death. Comprehensive preventative approaches, concentrating on various risk factors in populations with low-risk and known high-risk are required to decrease the burden of sudden cardiac death.

**Keywords:** Cause of Death; Autopsy Viscera; Coronary Artery Disease; Sudden Natural Death.

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#### **INTRODUCTION**

Sudden and unexpected deaths accounts for 10% of all deaths. Among these, sudden cardiac death is the leading cause of death in men between 20 to 65 years of age and incidence has been gradually increasing all over the world particularly in the urban population during last five decades. As revealed in autopsy findings, 80% of sudden and unexpected cardiac deaths are result of coronary artery disease.<sup>1</sup> Preexisting heart disease may not have known to be present, but the time and mode of death are unexpected.<sup>2</sup> The most common site of occlusion is the left anterior descending artery (LAD) and hence it's also called widow

maker as it makes widows by killing suddenly and unexpectedly. In case death is due to coronary artery spasm, autopsy does not reveal any infarct and coronaries too would be patent without significant atherosclerosis. Coronary artery spasm is also known to occur in cocaine addicts.

Bridging is another condition which can result in sudden deaths during exercise or struggle in otherwise healthy and fit individual. It is a condition found in about 1 % population in which coronary artery instead of lying in the epicardial fat of the heart, dips down into the myocardium for a short distance and gets compressed

during systole resulting in occlusion of lumen. However Ventricular filling occurs in diastole normally, during exertion, tachycardia result in shorter diastole and hence posing risk of sudden death in such individuals.

Cause of death can be apparent from just gross examination of Heart in most of the Normal autopsy cases. Sometimes cause of Death is ascertainable but not ascertained scientifically by subjecting viscera to Pathological examination due to some constraint on the part of Medical officers, hospital, facilities etc and result in defective autopsies. Sometimes gross findings are minimal or Indecisive and histopathology report also not of much help in establishing the diagnosis but microbiology, serology or toxicological examinations etc are required before declaring it as obscure autopsy. If cause of death still not clear it is declared to be a negative autopsy. Negative autopsies are mostly reported in case of children and young adults and accounts for 5 to 10 percent of all autopsies. Cardiac conditions that can result in obscure or negative autopsies are Brugada syndrome, Coronary artery spasm, long QT Syndrome, wolff Parkinson White syndrome, Early MI (as no changes detectable up to 3 hours), flutter and fibrillation.

In cases with alleged Sudden Natural death, other non cardiac, unsuspected and obscure conditions which leave minimal and or indefinite signs can be: Epilepsy, emotional outburst, work stress, laryngeal spasm, Vaso-vagal inhibition, cerebral concussion etc.

It is estimated that about 40-50% of all cardiovascular deaths are sudden cardiac deaths (SCDs) and the survival rate from sudden cardiac arrest is less than 1% worldwide.<sup>3</sup> Alleged Sudden Cardiac deaths in case of older individual, in Indian circumstances generally arouse no suspicion, But such deaths in younger individuals are likely to draw out suspicion. A meticulous autopsy is highly indicated in such cases.<sup>4</sup>

Moreover, there is still a huge cardiovascular disease burden globally. Therefore, there is a need to develop complementary strategies for management of sudden cardiac deaths.<sup>3</sup> Hence the present study aimed to analyze causes of sudden cardiac death to find out measures to prevent such unexpected deaths.

**MATERIAL AND METHODS**

The present study was carried out over 48 Viscera cases of sudden cardiac death which were subjected to Histopathology after postmortem examination. Cases with alleged History of death within 24 hours of the onset of symptoms in an individual who was not known to be suffering from any disease, injury or poisoning, considered as criteria for selection of cases. Hearts were studied in detail both grossly and microscopically. Findings were correlated with Autopsy findings, History as per Police papers. The information was analyzed to find out the etiology of sudden death in all the cases.

**RESULTS**

**Table 1:** Age and Gender wise distribution of sudden cardiac deaths

Age	Gender		Number of cases	Percentage of cases
	Male	Female		
18-29	1	0	1	2.08%
30-39	5	2	7	14.58%
40-49	10	4	14	29.16%
50-59	13	2	15	31.25%
60-69	6	3	9	18.75%
70-79	2	0	2	4.16%
Total	37	11	48	

The present study found that among 48 cases, maximum cases (15) (31.25%) were in the age group 50-59, followed by 14 (29.16%) in 40-49 age group. 9 (18.75%) cases were in 60-69 age group, 7 were in 30-39 age group, 2 were in 70-79 and 1 was in 18-29 age group (table 1). Among 48 cases, 12 were brought dead and 36 died within 24 hours of admission (table 2).

**Table 2:** Duration after onset of symptoms

Duration	Number of cases	Percentage of cases
Brought Dead	12	25%
Died Within 24 hours of admission	36	75%
Total	48	

**Table 3:** Pathological Findings in cases of Heart with alleged sudden cardiac deaths

Pathological diagnosis	Number of cases	Percentage of cases
Atherosclerotic coronary artery disease (CAD)	33	68.75%
Hypertrophic Cardiomyopathy	03	6.25%
Hypertensive heart disease	02	4.16%
Rheumatic heart disease	01	2.08%
Cardiac Temponade	03	6.25%
With No specific cardiac lesion	06	12.5%
Total	48	

Among 48 cases, 33 (68.75%) patients were found pathologically diagnosed as atherosclerotic coronary artery disease (CAD), 3 (6.25%) as hypertrophic cardiomyopathy, 2 (4.16%) as hypertensive heart disease, 1 (2.08%) as rheumatic heart disease, 3 (6.25%) as cardiac temponade and 6 (12.5%) with no specific cardiac lesion (table 3) (graph 1).

**DISCUSSION**

Sudden cardiac death remains a major unresolved clinical and public health problem.<sup>5</sup> The present study revealed that major cause of sudden cardiac death was atherosclerotic coronary artery disease (CAD), found in 68.75% cases. 3 (6.25%) cases as hypertrophic cardiomyopathy, 2 (4.16%)

as hypertensive heart disease, 1 (2.08%) as rheumatic heart disease, 3 (6.25%) as cardiac tamponade and 6 (12.5%) with no specific cardiac lesion. Mukhopadhyay S et al<sup>4</sup> conducted a retrospective study to identify various causes, risk factors, age and sex distribution associated with sudden and unexpected natural deaths in adults of aged above 18 years from cross sectional analysis of autopsy reports, inquest reports and medical records of cases in Medical College and Hospital, Kolkata. The study reported 72 (37.5%) cases in adults aged between 41-60 years of age and considered single most important system responsible for sudden death was CVS which is predominant (50.0% alone) among all the other causes of sudden death. Sonawane SY et al<sup>6</sup> carried out a detailed review of medical records and an autopsy study of all cases of sudden cardiac death that occurred instantaneously or within 24 hours of onset of symptoms in a tertiary care institution and reported that in total, 124 cases of sudden death, 109 cases (87.90%) showed pathology in heart and aorta. Atherosclerotic coronary heart disease was the most common cause of death (72.58%) followed by hypertensive heart disease (4.83%), hypertrophic cardiomyopathy (3.22%), myocarditis (3.22%), infective endocarditis (1.61%), rheumatic heart disease (0.8%), aortic dissection (0.8%), and syphilitic aortitis (0.8%). Kannel WB et al<sup>7</sup> assessed sudden death risk in overt coronary heart disease and revealed that the onset of CHD put young and old at equal risk of sudden death. The proportion of coronary attacks presenting as sudden death increased from 13% at ages 35 to 64 years to 20% at ages 65 to 94 years.

The rate range has been reported from 50 to 100 per 100 000 in the general population in recent prospective studies using multiple sources in the United States carried out by Nichol G et al<sup>8</sup> and Chugh SS et al,<sup>9</sup> in Ireland by Byrne R et al,<sup>10</sup> in Netherlands by de Vreede-Swagemakers JJ et al,<sup>11</sup> in China by Hua Wet al.<sup>12</sup>

In a significant proportion of patients, SCD can present without warning or a recognized triggering mechanism.<sup>13</sup> In the present study among 48 cases, maximum cases (15) (31.25%) were in the age group 50-59, followed by 14 (29.16%) in 40-49 age group. The mean age of those affected is in the mid 60s, and at least 40% of patients will suffer SCD before the age of 65.<sup>13</sup> The growing heterogeneity of the pathologies and mechanisms underlying SCD present major challenges for SCD prevention, which are magnified further by a frequent lack of recognition of the underlying cardiac condition before death.<sup>14</sup>

In spite of the need for multiple sources of surveillance to provide a more accurate estimate of SCD incidence, it is evident that the overall burden in the population remains high.<sup>15</sup> Consequently, enhancement of methodologies for prediction and prevention of SCD requires a unique and critical importance for management of this significant public health issue.<sup>13</sup>

## CONCLUSION

Sudden cardiac death has become a social burden. The present study revealed that atherosclerotic coronary artery disease as the major cause of sudden cardiac death. Comprehensive preventative approaches, concentrating on various risk factors in populations with low-risk and known high-risk are required to decrease the burden of sudden cardiac death.

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