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Original Research Article

A Hospital-based Study to Evaluate the Autopsy Profile of Sudden Cardiac Deaths: An Observational Study

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Conflict of interest: Nil

Abstract

Aim: The aim of the present study was to assess the Autopsy profile of sudden cardiac deaths reported in Bihar region.

Methods: The present study was conducted in the Department of Forensic Medicine and Toxicology, Patna Medical College and Hospital, Patna, Bihar, India from Jan 2023 to Dec 2023. 100 patients were included in the study.

Results: 90% were males as compared to females. Most of the patients were belonged to 50-59 years of age. 38% belonged to high income class and 75% died outside the hospital. 68% had cause of injury had road traffic collision and 65% had firearm injuries.

Conclusion: The progress in autopsy diagnosis of sudden death depends respectively on the following criteria-scene investigation, number and quality of autopsies and use of complementary technique especially molecular biology. Indeed, molecular autopsy is now needed to overcome autopsy diagnosis difficulties, although molecular investigation is not yet available in daily work of forensic pathologist.

Keywords: Cardiovascular disease, post-mortem certificate, sudden death.

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Introduction

Incidence of sudden cardiac death (SCD) has been steadily increasing all over the world particularly in the urban population during last five decades.[1,2] In India incidence of ischemic heart disease has increased, to about 10 percent.[3] As revealed in autopsy findings, majority of sudden and unexpected deaths result as a sequel to cardiovascular disease.[4] Probably the most common cause of death recorded in autopsy is myocardial infarction (MI) due to coronary artery insufficiency (coronary occlusion due to atheroma and coronary thrombosis).[5]

Knowing the cause of sudden death is always one of the favorites of the physicians involved with these cases. On the other hand, a very difficult and challenging task for the forensic physician, conducting the autopsy, is to ascertain cause and nature of death.[6,7] One difficulty which is mostly encountered in sudden unexpected deaths, whether cardiac or no cardiac, is the lack of precision of collecting antecedent factors involved within the 24-hours, duration prior to death.[8] These diseases are epidemic in urban locations of these countries and are rapidly increasing in rural areas as well.[9] With demographic shifts, epidemiological transition and increasing urbanization associated with increase in CVD risk factors (smoking, sedentary lifestyle, obesity, hypertension and hypercholesterolemia), and a lack of policy directives aimed at chronic disease control, CVDs are poised to accelerate further.[10]

In study of 500 consecutive autopsies of ages 20-99 years Dimaio et al[11] found acute thrombosis in 13.4% as cause of death. The left coronary and its branches showed higher incidence of thrombosis when compared with right. Hence it is acceptable to see in all deaths due to coronary artherosclerosis severe artherosclerosis of the coronary vessels. However, this is obscured in hypertensive cardiovascular disease as this is lacking because of plaque formation resulting to thickening of the walls by artheriosclerotic deposits. In elderly the lumina are patent, vessels rigid, calcified tubes because of calcium deposits in vessel walls. In some others while epicardial coronary arteries are non-occluded, microscopic examination of myocardium shows severe occlusive dysplasia of the intramural coronary arteries. The aim of the present study was

to assess the Autopsy profile of sudden cardiac deaths reported in Bihar region.

Materials and Methods

The present study was conducted in the Department of Forensic Medicine and Toxicology, Patna Medical College and Hospital, Patna, Bihar, India from Jan 2023 to Dec 2023. . 100 patients were included in the study.

Source Population: All cases of sudden cardiac death brought for autopsy.

Inclusion Criteria: All autopsies in which death was due to sudden cardiac death were included in the study.

Exclusion Criteria

1. All unidentified bodies.
2. All decomposed bodies.

Data Collection: Baseline data like age, sex, history of any previous illness, and a brief history of the case were collected from the requisition provided by the investigating officer. Details of the post-mortem findings were collected from the post- mortem certificate.

Analysis: Data collected was entered in MS-Excel and analysed using SPSS version 20.

Results

Table 1: Demographic data

Variable	N	%
Gender		
Male	90	90
Female	10	10
Age (year)		
15-19	1	1
20-29	0	0
30-39	2	2
40-49	6	6
50-59	61	61
60-69	30	30
70-above	0	0
Socio-economical class		
Low Income Class	30	30
Middle Income Class	12	12
High Income Class	38	38
Unclassified population	20	20
Place of death		
Outside the Hospital	75	75
Hospital Deaths	25	25
Duration of onset of symptoms and death		
Instantaneous(<30min)	17	17
Early(<6hrs)	38	38
Delayed(<24hrs)	30	30
Unknown	15	15

90% were males as compared to females. Most of the patients were belonged to 50-59 years of age. 38% belonged to high income class and 75% died outside the hospital.

Table 2: Causes of death

Causes of death	N	%
Firearm injuries	65	65
Sharp force	54	54
Sudden cardiac deaths	45	45
Road traffic collision	68	68
Blunt force	45	45
Hanging	34	34
Burns	43	43
Sudden and natural death	30	30
Drowning	28	28
Poisoning	26	26
Fall from height	23	23
68% had cause of injury had road traffic collision and 65% had firearm injuries.		

Table 3: autopsy profile of sudden cardiac death cases (N=45)

Mean heart weight	342.16 ± 11.18 grams
Coronary artery pathology	Right coronary-12 Left coronary-28
Other associated observations	Left ventricular hypertrophy-2 Pericardial effusion-01 Myocarditis-02

Discussion

Sudden cardiovascular deaths is currently described as natural, unexpected death occurring within an hour of onset of final symptoms. If sudden cardiovascular deaths were to occur in the young, a systematic forensic autopsy including toxicological analysis must be done.[12] The toxicology is to exclude toxic causes and to determine any drug-related cardiomyopathy as cocaine or amphetamine induced cardiomyopathy which could lead to sudden death. Also cardiac toxicity of anabolic steroid abuse must also be taken into account.[13] It is also well known that coronary artery disease (CAD) including acute myocardial infarction, recent thrombosis and high grade coronary stenosis (>75%) due to atheroma is still major cause of death in people of 35 years. Pulmonary diseases are usually caused by pulmonary embolism and asthmatic attack.

90% were males as compared to females. Most of the patients were belonged to 50-59 years of age. 38% belonged to high income class and 75% died outside the hospital. 68% had cause of injury had road traffic collision and 65% had forearm injuries. Kuller et al. showed that nearly two third of sudden non-traumatic deaths are due to arteriosclerotic diseases.[14] In addition, Harmon et al. demonstrated that SCD is the leading cause of death in athletes.[2] The age-related trend of SCD increases with age regardless of sex or race.[15] In this context, the highest prevalence is in the geriatric age group (75-85 years).[16] One study demonstrated that sudden death from coronary artery disease is six times more common at age between 60-69 while for those over 80 it is only two fold.[17] The average age in the present series was between ages 50-59 years. Similar age incidence has been observed in the study series of Pentilla to be given 55-66 years.[18]

The majority of the hospitalized patients with a known history who passed away unexpectedly had an enlarged heart with left ventricular hypertrophy and mild coronary arthero-sclerosis, as was discovered during autopsy. An abrupt cardiac arrhythmia, most likely ventricular fibrillation, is the cause of death in each of these cases. It has been seen in clinical practice that people who have left ventricular hypertrophy have more ventricular premature contractions than normal individuals or individuals who have hypertension but do not have left ventricular hypertrophy of the ventricles in the heart. This observation supports the findings of our research, which found that a sizeable proportion of people who pass away suddenly and unexpectedly who have a clinical history of hypertension had only left ventricular hypertrophy without considerable artherosclerotic involvement of their coronary arteries. A couple of our patients had berry aneurysms that had burst, and they were always located at the apex. These factors caused bleeding to occur within the subarachnoid spaces as well as the substance of the brain. The subarachnoid haemorrhage caused a generalised vasospasm, which ultimately led to the death of the patient as a result of an ischemic damage to the brain.

Conclusion

In conclusion, the progress in autopsy diagnosis of sudden death depends respectively on the following criteria- scene investigation, number and quality of autopsies and use of complementary technique especially molecular biology. Indeed, molecular autopsy is now needed to overcome autopsy diagnosis difficulties, although molecular investigation is not yet available in daily work of forensic pathologist. A major problem for cardiologist will be to identify assymptomatic patients at high risk of sudden death as to avoid early manifestation of the diseases.

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