Original article

Cardiovascular changes in young with sudden death

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Abstract: *Cardiovascular disease is the number one cause of death worldwide with about 80% of the burden occurring in developing countries. Sudden cardiac death is commonly defined as an unexpected death due to cardiac cause within a short time period (usually within one hour) with or without onset of symptoms and without any prior conditions that would appear fatal. Natural death represent a large proportion of sudden deaths. The aim behind this study was to identify various causes, risk factors, age and sex distribution associated with sudden death in an Indian setting. Detail study of medical records and autopsy study of all cases of sudden death in young adults from 18 yrs to 40 yrs that occurred instantaneously or within 24 hours of onset of symptoms in a tertiary care hospital , was carried out.*

Key Words: *cardiovascular, infarct, young, sudden death.*

1. INTRODUCTION:

Cardiovascular disease is the number one cause of death worldwide with about 80% of the burden occurring in developing countries. Cardiac dysfunction can be associated with devasting physiological consequences. Diseases of arteries are responsible for more morbidity than any other type of human disease.[1] Sudden cardiac death is commonly defined as an unexpected death due to cardiac cause within a short time period (usually within one hour) with or without onset of symptoms and without any prior conditions that would appear fatal .[2]

In India incidence of ischemic heart disease has increased to about 10% .[3] As revealed in autopsy findings , majority of sudden and unexpected deaths result as a sequel to cardiovascular disease [4]. Probably most common cause of death recorded in autopsy is myocardial infarction (MI) due to coronary insufficiency (coronary occlusion due to atheroma and coronary thrombosis). [5]

Reduced mortality from infectious diseases and the adoption of Western lifestyle has led to increased prevalence of ischemiac heart disease in developing nations . [6,7]

In recent years coronary heart disease has been recognised more frequently in young age groups .[8,9,10,11,12,13] In most studies however, the vast majority of young myocardial infarction (MI) patients described are in their fourth decade. Therefore , the purpose of this study was to describe the risk factor ,age and sex distribution in young adult ranging from 18 yrs to 40 yrs.

2. MATERIAL & METHODS:

This is a descriptive study carried out at a tertiary care institution in India. Data from January 2016 to December 2016 was collected. WHO definition (death that occurs with in 24 hrs after onset of symptoms) of sudden death was used as criteria for selection of cases. All the adult cases above 18 years of age and upto 40 years of age , with or without past history of heart disease, fulfilling the criteria of sudden death were included in the study. The cases in which death occurred due to unnatural causes like accident, homicide, suicide were excluded from the study.

The clinical records were scanned for age, sex, mode of presentation, past history, the presence of risk factor and investigations if any. The details of autopsy findings, were obtained from the autopsy records. Hearts were studied in detail both grossly and microscopically.

3 RESULTS:

In total 89 cases were studied during the period of January 2016 to December 2016 .Out of 89 cases ,58 cases (65.16%) showed pathology of heart in age groups of cnn 18 to 40 yrs . No specific cardio vascular lesion were seen in 31 cases.

Table 1 : Various pathological lesions found in heart and their incidence:

PATHOLOGICAL LESION	NO.OF CASES (out of 89)	PERCENTAGE
Atherosclerotic Coronary artery disease	47	52.80%
Hypertensive heart disease	4	4.49%
Hypertrophic cardiomyopathy	2	2.24%
Myocarditis	3	3.37%
Infective endocarditis	1	1.12%
Rheumatic heart disease	1	1.12%
No specific cardiovascular lesion	31	34.83%

The clinical presentation were breathlessness in 29 (32.58%) cases, sudden collapse /unconsciousness was observed in 24 (26.96%) , chest pain in 20 (22.47%) cases and brought dead in 16 (17.97%) cases. In the present study 8 cases had history of hypertention (HT). 5 cases had history of diabetes mellitus (DM) and 4 cases had previous history of heart disease. HT and DM coexisted in 3 cases out of which 2 cases had past history of heart disease.

Table : Age and sex distribution of cases .

AGE GROUP (IN YEARS)	NUMBER OF CASES (%)	MALES	FEMALES
18-20	5 (5.61%)	3	2
21-30	31 (34.83%)	24	7
31-40	53 (59.55 %)	38	15

The age ranged from 18 years to 40 years (table-2). 31-40 years was the most common age group affected . Males are 65 cases (73.03 %) were significantly more affected than the females are 24 cases (26.96%) total male to female ratio was 2.7 : 1.

Atherosclerotic coronary artery disease (CAD) seen in 47 cases (52.80%) was the most common lesion followed by hypertensive heart disease in 4 cases (4.49%) . Triple vessel disease was the most common morphological lesion observed in 25 cases (53.19%) of atherosclerotic. Coronary thrombosis (fig 1) was observed in 4 (8.51%) cases of atherosclerosis.

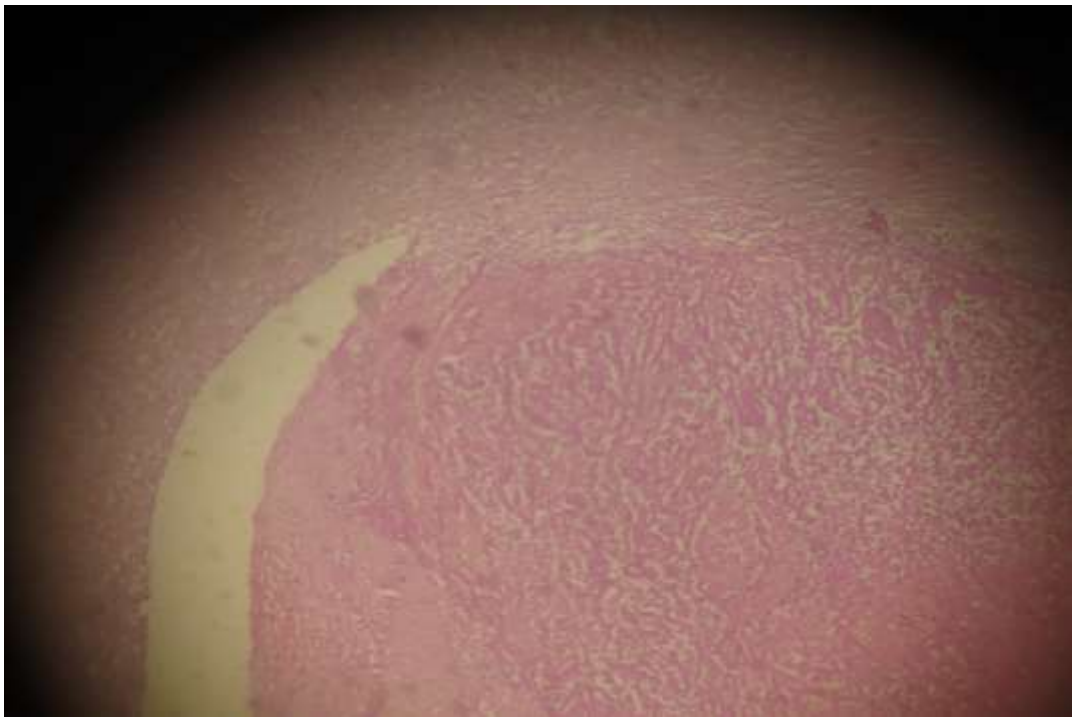

Figure 1 - Microphoto showing near total occlusion of right coronary artery by fibroatheromatous plaque. (H & E Stain).

Myocardial infarction (MI) was observed in 16 out of 47 cases of atherosclerotic coranory artery disease. Old healed MI (fig 2) was the prominent type of MI observed in 08 cases (50%) , followed by recent MI constituting 05 cases (31.25%) .Changes of both recent and old MI were seen in 03 (18.75%) cases .In majority of cases infarction was found to be of transmural type.

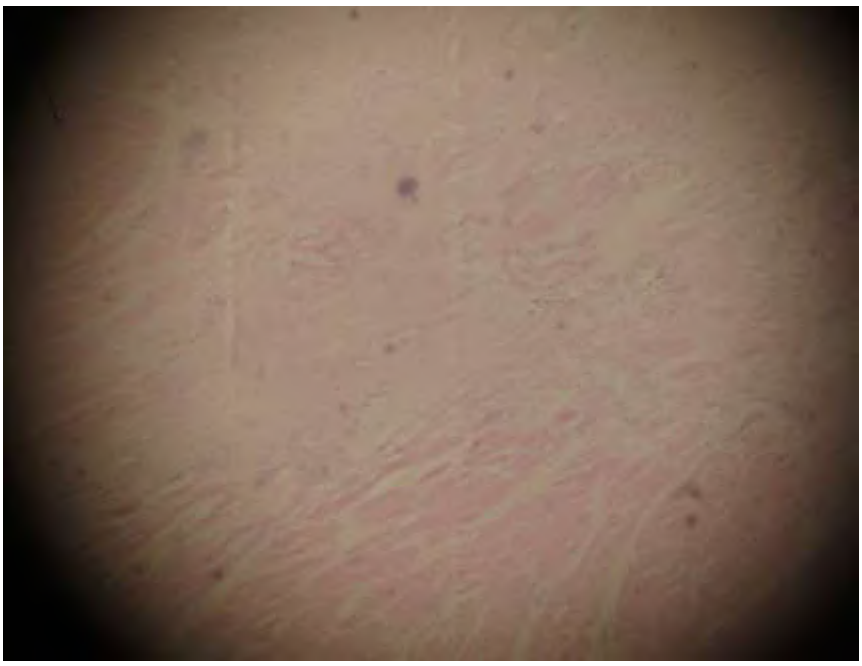

Figure 2 - Microphotograph showing healed infarct.(H & E).

In present study changes of hypertensive heart disease were observed in 4 out of 89 cases (4.49%). Age ranged was found to be from 35 to 40 years. 3 out of 4 cases were male and 1 was female. Grossly weight of heart in cases exceeded 450 gms and left ventricular thickness varied from 1.8—2.7 cm. All cases showed varying degrees of atherosclerosis in coronaries. Changes of hypertention were also evident in other organs like benign nephrosclerosis in kidney , concentric hypertrophy of blood vessel walls etc. Microscopically , there was variation in cell size with cellular and nuclear enlargement and interstitial fibrosis.

Hypertropic cardiomyopathy was seen in 2 cases (2.24%) and acute myocarditis in 3 cases (3.37%) . both the conditions were found to be in young male. In Hypertropic cardiomyopathy the heart weight exceeded 550 gms. There was concentric symmetric hypertrophy in both the cases.

Infective endocarditis was observed in 1 case. There was a single case of Rheumatic heart disease in the present study.

4. DISCUSSION:

Among adolescents and young adults, the incidence of sudden cardiac death (SCD) is approximately 1 per 100,000 population per year. It begins to increase in adults older than 30 years to approximately 1–2 per 1000 per year. [14] In developed countries, coronary atherosclerosis is by far the most common finding in cases of SCD in patients over 30–35 years of age. Coronary atherosclerosis may result in sudden death by acute ischemia or arrhythmias secondary to healed infarct. [15] Similar observations were noted in the present study. However, overall incidence of SCD in the present study was very less as compared to other studies . This may be due to the difference between the age distribution of the other study groups (20–45 years and 20–39 years) and that of the present study (18–40 years) .

In the present study ,age ranged from 18 to 40 years , out of which 31 to 40 years (59.55 % cases) was the most common age group involved similar to Kasturi et al, reported most cases in 31-40 years and a study conducted in Brazil by Braggion -santos et al.[16,17] .

In the present study , atherosclerotic coronary heart disease was the principle cause of death (52.80%) followed by hypertensive heart disease (4.49%) , hypertrophic cardiomyopathy (2.24%) ,myocarditis (3.37%), infective endocarditis (1.12%) . Atherosclerotic coronary artery disease was the leading cause of death in all the studies however Wang et al, reported the lowest percentage (50.3%) while Farioli et al, reported the highest percentage of (78%) of deaths due to atherosclerotic CAD.[18,19] Coronary thrombosis was found in 4 cases (8.51%) in the present study which was lower as compared to Ahmed et al, who found thrombosis in 71.11% cases (37of 52) and Burke et al , reported thrombosis in 52.21% cases (59 of 113) .

In the present study, Myocardial infarction was observed in 34.04% cases (16 out of 47 cases) of atherosclerotic CAD. Out of these , old healed MI was the predominant type of MI seen in 8 out of 47 cases (50 %) followed by recent MI in 05 out of 47 cases (31.25 %). Both recent and old MI were seen in 03 cases (18.75%). Ahmed et al, classified MI into 2 categories – recent and old MI, reported old MI in 35.1% cases and recent MI in 20% cases respectively [20]. In the present study, there were 4 cases (4.49%) of hypertensive heart disease with left ventricular hypertrophy. In a study conducted by Farioli et al left ventricular hypertrophy coupled with hypertensive heart disease was the underlying cause of death in 7 cases (7%) [22].

Both myocarditis and hypertrophic cardiomyopathy as causes of death showed high degree of variation in different studies. In case of myocarditis our findings (3.37%) were closes to Ahmed et al, (3 %) while in case of hypertrophic cardiomyopathy findings (2.24%) were closes to Farioli et al, (4%) [20,22].

Most cases of hypertrophic cardiomyopathy were observed in young men in present study similar to that observed in other studies. Margey et al, conducted a study in Ireland on causes of sudden death in patients in age range of 14-35 years .[23] Hypertrophic cardiomyopathy accounted for 14.7% cases in their study, there were 10 patients in similar age group of 18 -35 years and we found Hypertropic cardiomyopathy in 1 out of those 10 cases that is (10%). Changes are seen due to difference in age group study.

There was no specific cardiovascular pathology in 31 out of 89 (34.83 %) cases in present study. Cause of death remained undetermined. But the heart that is normal even after complete post mortem examinations may still harbour the cause of sudden death, the current standard of general autopsy practice is not sufficient to detect certain abnormalities. Death could be due to sudden spam of coronaries without obvious pathological findings in them.

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