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Prevalence of Coronary Atherosclerosis in Different Age Groups: A Postmortem Study.

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Abstract

The coronary atherosclerosis is one of common disease in elderly people. Now it is growing fast in young persons in developing countries. So this study was carried out to evaluate the coronary atherosclerosis in young verses older age group. The coronary arteries were procured from autopsied heart and luminal narrowing was observed after histopathology. The total 50 hearts were taken for study in which 36 (83.72%) were male and 4 (57.14%) female were noted with atherosclerosis. 18 (85.71%) male and 1(50%) female were affected with atherosclerosis in 30-40 years age group. In 41-50 years of age group, there were 13 males and 4 females, in which 10(76.92%) male and 2(50%) female were observed with atheromatous lesions. In 51-60 years of age group, atheromatous lesions were present in 8 (88.88%) male and 1(100%) female. The persons aged from 30 to 60 have almost equal prevalence of coronary atherosclerosis. We can conclude that younger age group is also highly prone for coronary heart disease.

Keywords: Coronary arteries, Atherosclerosis, Histopathology, Autopsy, Non-cardiac trauma

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Introduction

The development, progression and occurrence of atherosclerosis are the result of interplay of several predisposing and precipitating factors. The relative importance of which may vary among individuals and in the same individual at different times. Coronary atherosclerosis is great concern in young adult, because of its potential to cause great incapacitation .The commonest disease affecting the coronary arteries is atherosclerosis and an atherosclerotic lesion may be found at varying stages of its development in different age groups. The prevalence of atherosclerosis was noted 78.3% in<35 years age group, in 111 cases of non-cardiac trauma. **[1]** Coronary artery disease is responsible for over 70% of sudden cardiac deaths but in the young, primary cause of death is the non-atherosclerotic coronary abnormalities **[2]**. The coronary atheromas were seen from 25% to 75% in 21% left anterior descending coronary artery in 100 adult autopsy hearts **[3].**The prevalence of coronary atherosclerosis is highly variable according to age, sex and place. Studies from the India on the nature and prevalence of occlusive coronary artery diseases are limited; while risk factors for coronary atherosclerosis like hypertension, diabetes, cigarette smoking and high cholesterol diets are sharply rising in the developing world **[4].**All these data prevail to review the coronary arteries diseases prevalence in present context. So we planned a postmortem study to investigate the prevalence of coronary atherosclerosis in different age groups from 30-60 years old persons.

Material and Methods

A total 50 hearts were procured form postmortem bodies of both sexes in between the age group 30-60 years, having history of deaths due to natural as well as unnatural causes (accidental, suicidal, homicidal, etc.).The cases were brought to the mortuary of the department within 12 hours of death, for the autopsy examination. The study was conducted at Department of Forensic Medicine & Toxicology and associated Mortuary, C.S.M. Medical University, Lucknow. The legal proceedings and permission were availed from ethical committee and administration when ever required for study.

The hearts were grouped according age and sex. The specimens were fixed in 10% formalin solution for 2-5 days. The coronary arteries were dissected and examined grossly for other anomalies. Identified segments of the coronary arteries viz. left anterior descending coronary artery, left circumflex artery and right coronary artery were sectioned at 3-mm intervals and histopathological slides were made. The intimal changes, atherosclerotic changes and approximate luminal narrowing (in percentage of luminal area) were noted in each section. The degree of atherosclerosis was taken as the percentage of the cross-sectional area of occlusion of the lumen at the maximum point of occlusion of the respective artery. Photomicrographs of the sections were taken and observations were made.

Observations

In this study 50 hearts were observed for atherosclerotic changes, in which 43 cases were male and 7 cases were female. Among 43 males, 36 (**83.72%)** were noted with atherosclerosis and 7 (16.28%) hearts were normal. In 7 females, atheromatous lesions were found in 4 (57.14%) hearts and 3 (42.86%) hearts showed no atherosclerosis.

The observations of the study were grouped according age of cases.

Age group 30-40 years

Out of 21 male and 2 female of age group 30-40 years, 18 (**85.71**%) male 1(50%) female were affected**.** 3 males (14.29%) and 1 female (50%) showed normal histology. 3 males (14.29%) showed ≤ 25% luminal narrowing, 8 males (38.10%) and 1 female (50%) were observed with luminal narrowing ≤ 50% while 7 males (33.33%) showed ≤ 75% luminal narrowing.

Age group 41-50 years

In 41-50 years of age group, there were 13 males and 4 females, out of which 3 males (28.08%) 2 females (50%) showed normal histology and lumen. 10(76.92%) male and 2(50%) female were observed with atheromatous lesions **.**8 males (61.54%)were found with luminal narrowing ≤ 75% of luminal diameter, one male (7.69%) and one female (25%) showed luminal narrowing ≤ 50% of luminal diameter, again 1 male (7.69%) and 1 female (25%) showed luminal narrowing ≤ 25% of luminal diameter.

Age group 51-60 years

In 51-60 years of age group, there were 9 males and 1 female, out of which, 1 male (11.11%) was normal. Total atheromatous lesions were present in 8 (88.88%) male and 1(100%) female. 4 males (44.44%) and 1 female (100%) showed ≤ 75% luminal narrowing, 1 male (11.11%) showed ≤ 50% luminal narrowing ,3 males (33.33%) showed ≤ 25% luminal narrowing. (Table 1)

So, overall, out of 43 males and 7 females, ≤ 75% luminal narrowing were seen in 19 males (41.17%) and 1 female (14.29%), ≤ 50% luminal narrowing were seen in 10 males (23.26%) and 2 females (28.57%), ≤ 25% luminal narrowing were seen in 7 males (16.28%) and 1 female (14.29%), while normal histology and lumen were shown in 7 males (16.28%) and 3 females (42.86%)

Table 1. *Prevalence of coronary atherosclerosis in different age groups*

Age group	Total hearts		Atherosclerotic Luminal narrowing						Total Atheromatous lesions	
			≤ 25%		≤ 50%		≤ 75%			
	M	F	M	F	M	F	M	F	M	F
30-40	21	2	3	-	8	1	7	-	18(85.71%)	1(50%)
41-50	13	4	1	1	1	1	8	-	10(76.92%)	2(50%)
51-60	9	1	3	-	1	-	4	1	8 (88.88%)	1(100%)
Total	43	7	7	1	10	2	19	1	36(83.72%)	4(57.14%)

Discussion

Age is a powerful risk factor for coronary heart disease. The development of atherosclerosis increases markedly with age up to an age of about 65, regardless of sex and ethnic background [5, 6]

The major cardiovascular risk factors are similar for both sexes, but men develop Coronary heart disease 10 to 15 years earlier than women. By age 60 in the United States, only 1 in 17 women has a coronary events, as compared with 1 in 5 men. After age 60, however, CHD becomes the leading cause of death among women as well as among men, and as many women as men may eventually die of the disease [7]. The autopsy findings of coronary arthrosclerosis in different reports are variable in relation of age and sex.

Tabib et al. [8] studied 1000 cases of "natural" unexpected sudden death in subjects under 65 years old. The macro and microscopic examination of hearts detected 448 potentially lethal lesions of which 407 cases corresponded to coronary disease (Atherosclerosis in 340 and other diseases in 67 cases), 190 coronary stenosis (> 75%) without thrombosis (139 triple vessel, 31 double vessel and 20 single vessel diseases). In an autopsy study by Thomas et al [9] among 124 men (age range, 50 to 69 years) who died of non cardiac causes, 10.3% had one-vessel, 2.8% had two-vessel, and 1.4% had three-vessel coronary disease.

Our study shows that coronary atheromatous lesions were present in 88.88% male in age group between 51-60 years. This Prevalence of coronary atherosclerosis is higher but supported by other investigators. The coronary atherosclerosis is also increasing with rapid pace in younger age group also

In vivo intra-vascular USG study the coronary atherosclerosis was noted 17% in individuals <20 years old and up to 85% in subjects >/=50 years old .For all age groups, the average intimal thickness was greater in men than women, although the prevalence of atherosclerosis was

similar in both sexes (52% in men and 51.7% in women)[10].

We found that Out of 21 male and 2 female in between age group 30-40 years, 85.71% male and 50%female were affected while 41-50 years age group, there were 13 males and 4 females in which 10(76.92%) male and 2(50%) female were observed with atheromatous lesions. These observations show higher involvement of coronary atherosclerosis in young hearts. It is almost equal to old age group. In comparison of our observations with other investigators it also has seen increase in incidences of coronary atherosclerosis in young. Autopsies performed on casualties of the Korean War revealed coronary artery involvement in 77.3% of the hearts studied, and data after the Vietnam War noted the presence of atherosclerosis in 45% of casualties with severe disease in 5%. One hundred eleven victims of non-cardiac trauma underwent pathologic examination of their coronary arteries to estimate the presence and severity of coronary atherosclerosis .Signs of coronary atherosclerosis were seen in 78.3% of the total study group. [1] In a study by Corrado et al [11] sudden cardiac death was attributed to one-vessel disease in 33 of 37 young persons, with coronary thrombosis noted in 27% subjects. Even active coronary lesions have been observed in cases of non-cardiac sudden death, plaque fissure and intra intimal thrombi (without intra luminal thrombus) were present in 8.9% of 69 cases of non-cardiac sudden death [12].In a study conducted in African adults, over 50% luminal narrowing was observed in the 12 vessels and two vessels had over 75% narrowing [3]. Sudden coronary death (SCD) in older individuals is generally associated with extensive coronary atherosclerosis, although it may be the first manifestation of ischemic heart disease. In younger age-groups, SCD may occur in the presence of less severe disease [13]. All studies are indicating higher trends of coronary lesions in young ones and in elders too. A sharp change in life style in developing world is leading to a great enhancement in coronary heart diseases. We predict that there is steep rise in coronary diseases in young age group along with elderly persons.

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