

## ORIGINAL ARTICLE

# Atherosclerosis in 110 postmortem hearts of people of Bangladesh

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### Abstract:

Coronary arteries were studied on 110 postmortem human hearts during January 2000 to December 2001 in the department of Anatomy and Microbiology, Bangladesh Medical College. Hearts were collected from mortuary of Dhaka Medical College. These were the hearts of deceased persons suspected of abnormal deaths. Atherosclerosis was found in 49(44.5%) samples, among which 37 (5.%) were from male and 12(26.7%) from female hearts. This difference was significant ( $P<0.01$ ). Atherosclerosis was present in 11(10.0%), 22(20.0%) and 16(14.5%) samples on right coronary artery, anterior descending and circumflex branch of left coronary artery irrespective of sex. Grade I lesion was higher among lower age group and grade II lesion was higher among higher age group. It may be concluded that atherosclerosis was present in almost half of the studied subjects and was found more in anterior descending arteries and among in males. Extent and severity of atherosclerosis increased with age.

**Key words:** Heart, atherosclerosis, gender, Bangladesh

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**Introduction:** Heart disease is the commonest cause of adult mortality and morbidity from the fourth decade onwards among the people of western affluent nations <sup>1</sup>. Recent studies suggest that the heart disease is no longer restricted to affluent nations, rather the incidence of disease in developing countries is also on rise <sup>2</sup>. The epidemiology of cardiovascular disease of the people of Bangladesh is not yet established. However, a report by Rahman et al reveals that in 1994 a total of 6652 patients were admitted in National Institute of Cardiovascular Disease (NICVD) where ischaemic heart disease (IHD) consisted of 56.4% of total admitted cases. Among those suffering from IHD, 65.4% expired <sup>3</sup>. Though this data do not reflect the overall situation of cardiovascular diseases of the country, at least one can presume that heart disease is not at all uncommon in Bangladesh.

Previously it was thought that heart disease was a man's disease. Most research about treatment for heart disease was focused on men. But recent studies suggest that females are also very prone to develop heart disease. In USA since 1984, cardiovascular disease has claimed the lives of more females than males. More than 450,000 women succumb to heart disease and 250,000 to coronary artery disease annually <sup>4</sup>.

Our knowledge regarding frequency of atherosclerosis in coronary arteries among people of Bangladesh is far from being complete. It is still entirely based on the data from Euro-American cardiovascular research works. The present study has been undertaken to observe the frequency, extent and severity of atherosclerosis among people of Bangladesh.

**Materials and Methods:** This observational study was carried out on 110 cadaveric hearts of people of Bangladesh. The study was conducted during January 2000 to December 2001 in the department of Anatomy and Microbiology, Bangladesh Medical College (BMC) Dhaka. The specimens were collected from dead

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bodies that underwent medico legal examinations in the morgue of Dhaka Medical Collage, Dhaka.

Since no routine postmortem examination is done in our country for cases other than unnatural deaths, only medico legal cases such as accidental, suicidal or homicidal cases could be selected for the study. Thus, their deaths were not caused by any known cardiovascular ailment. Specimens that had any sign of putrefaction were rejected. The subjects below age of 20 years were also excluded from the study.

Atherosclerosis was detected by method recommended by WHO <sup>5,6</sup>. To detect atherosclerosis, the right coronary artery was cut from its root up to first 3 cm. For left coronary artery, first 3 cm of anterior descending and circumflex arteries were taken. They were then split longitudinally and pressed tightly between two glass slides. The flattened arteries were then kept in this state and immersed into formalin for 48 hours. Then the vessels were stained with Sudan-IV solution (Herxheimer's solution). Atherosclerotic lesions stained bright red. The value of the atherosclerosis on coronary arteries represents the combined value of the three main coronary arteries (anterior descending, circumflex and right coronary artery). For assessment of extent and severity of atherosclerosis lesions were grouped as per method applied by Gore and Tajeda <sup>5</sup>. Subjects were divided into lower (20-29 years), Middle (30-39 years) and Higher (40-48 years) age group. From each group 6 specimens had been taken by random choice. A transparent plastic sheet was placed on the luminal side of the each flatten vessels. The outline of the atherosclerotic plaque as marked by Sudan V stain were traced with marker pen (Lumocolor, permanent). The total surface area of the cut vessels was also measured. Tracing were subjected to planimetric measurement which was done in the department of Mechanical Engineering, Bangladesh University of Engineering & Technology (BUET). The extent of atherosclerosis was categorized into different Group as explain in the result section.

**Results:** The study was carried out on 110 postmortem hearts of people of Bangladesh of which 65 were from male and 45 from female hearts. The age of the subjects ranged between 20 to 48 years with a mean ( $\pm$  SD) of 28.5 ( $\pm$  7.0) years irrespective of sex (not shown in the table).

Atherosclerosis was found in 49(44.5%) samples of which 37(33.6%) in male and 12(10.9%) in female hearts (Table 1). This difference was significant ( $P < 0.01$ ). Atherosclerosis was present in 11(10.0%), 22(20.0%) and 16(14.5%) cases in right, left and both coronary arteries respectively (not shown in table).

**Table 1.** Atherosclerosis in coronary arteries relation to sex.

Atherosclerosis	Sex		X <sup>2</sup>	P
	Male	Female		
Present	37 (56.9%)	12 (26.7%)	9.854	.002
Absent	28 (43.1%)	33 (73.3%)		

Table 2 Shows the extent of atherosclerotic lesions in the different age group. In lower age group, 50% of the coronary arteries belonged to the least extensive atherosclerotic group 0 and the remaining 50% belonged to group A and B. No specimen belonged to C or D group. In middle age group, about one third of specimens belonged to the least extensive group 0 and A group. But more than two third belonged to group B. In the higher age group 50% of the specimens belong to group B while 50% of the specimens belonged to group C.

**Table 2.** Extend of atherosclerosis among different age group.

Age group (Years)	No of specimen	Group Frequency				
		0	A	B	C	D
Lower (20-29)	6	3 (50.0%)	2 (33.3%)	1 (16.6%)	0	0
Middle (30-39)	6	1 (16.6%)	1 (16.6%)	4 (66.6%)	0	0
Higher (40-48)	6	0	0	3 (50.0%)	3 (50.0%)	0

Group: O-Less than 5% surface involved

A-6-15% surface involved  
 B-16-33% involved  
 C-34-50% surface involved  
 D-More than 50% surface involved

Table 3 shows the severity of atherosclerotic lesion. Severity of the lesions was either in grade I (fatty streak) or grade II (atherosclerotic plaque). No grade III (ulcerated) or grade VI (Calcified) lesions was found in our study. Mean percentage area of grade I lesions was highest (60.80%) in the lower age group and lowest (8.14%) in the higher age group. Mean percentage area of the grade II lesions was lowest (39.20) in the lower age group and highest (91.86%) in the higher age group. Middle age group showed intermediate value for both grade I and grade II lesions.

Age group years	No of Specimens	Percentage area (Mean)	
		Overall lesion	grade
Lower (20-29)	6	6.18	GI 60.80% GII 39.20
Middle (30-39)	6	13.00	GI 39.74 GII 60.26
Higher (40-48)	6	38.79	GI 8.14 GII 91.86

Grade I: Lipid streaks, spots and plaque this is thin yellow sub endothelial which may not perceptively elevate internal surface  
 II: Elevated smoothly surfaced fibrous plaque.  
 III: plaque with ulceration, necrosis and hemorrhage  
 IV: Calcified Plaque

**Discussion:** The present study was carried out to observe the frequency, extent and severity of atherosclerosis of coronary arteries among people of Bangladesh.

The age of the individuals was taken from police report at the Department of Forensic Medicine, Dhaka Medical College. These records depended on the statements made by the attendants of the deceased or an eye estimation made by concerned officer. Therefore, the age of each individual should be considered as approximate one.

Hearts of individuals age below 20 were excluded from the study. Firstly, because adult weight of the heart is achieved between 17 and 20 years and secondly, the evidence of atherosclerosis in coronary artery starts from second decade <sup>5,6,8</sup>. Postmortem studies on diseased heart may some times introduce bias as the terminal illness could influence the presence or extent of atherosclerosis. In this study chance of such bias is less as our samples were taken from accidental deaths. Holman indicated that no difference existed between the hearts of accidental and natural deaths <sup>6</sup>. He also concluded that atherosclerotic condition of hearts from accidental death could be representative of living population.

In our study we found that the atherosclerosis is significantly higher among males and anterior descending branch of left coronary artery had higher percentage of atherosclerosis than other arteries. This finding is similar to that of other literatures <sup>5,9-11</sup>. We also found that almost half of the studied subjects had atherosclerosis. Since mean age of our study population was only 28.5 years, it may be presumed that frequency of occurrence of coronary atherosclerosis might be much higher among the elderly people of Bangladesh.

Our study reveals that with advancement of age, there was a tendency of coronary artery to change the atherosclerotic grouping from least extensive lesion. Similar findings were noted by various worker in different geographical regions such as USA, Jamaica, South India and Japan <sup>5,12</sup>. However, the degree of difference in various age group varied to some extent from population to population, country to country or even town to town of same country<sup>13,14</sup>.

In our study we found that severity of atherosclerotic lesions increases gradually from lower to higher age group. Similar trend was also found in other studies <sup>5,12</sup>.

It may be worth mentioning that no grade III or grade IV type of atherosclerotic lesions was found in our study. This might be due to low mean age ( $28.5 \pm 7.0$  years). On the other hand, literature shows that grade IV lesions was present in 19% in Jamaica and 4.5% in North India in lower age group <sup>12</sup>.

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