

Original Article

Frequency of Atherosclerotic Lesions in Coronary Arteries of Autopsy Specimens in Isfahan Forensic Medicine Center

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ABSTRACT

Background: Atherosclerosis of coronary arteries and myocardial infarction are the most common fatal cardiac diseases discovered in autopsies. The fact that formation of these lesions are preventable through exact health care programs necessitates collecting baseline information on the prevalence of such lesions as performed in this study.

Methods: In this descriptive, cross-sectional study, from October 2002 to November 2003, during a randomly chosen month of every season, the hearts of autopsy specimens aging 15-50 years referred to Isfahan forensic center (204 specimens) were dissected and fixed in formalin 10% and coronary arteries were sectioned. In case of a definite or suspicious lesion, microscopic slides were also prepared. Otherwise, 3 random slides from each branch of coronary arteries were studied by a pathologist. Then the percentage of vessel obstruction was detected and stages of lesions were classified as fibrotic and complicated.

Results: Frequency of atherosclerotic lesions in 204 studied specimens (182 male and 22 female) was 29.4%. Atheromatous plaques were observed in 31.3% of the male and 13.6% of the female specimens. The most frequent involved branches were left anterior descending, right coronary, left main and left circumflex arteries respectively. Relative frequency of lesion increased with age.

Conclusion: The frequency of atherosclerotic lesions in this study is comparable to other studies. The difference in relative frequency of atheromatous plaques in both sexes is expectable, probably due to low number of studied women or the low prevalence of atherosclerotic lesions among young women.

Keywords: Atherosclerosis, Coronary artery, Autopsy

Atherosclerosis is a common phenomenon, which is seen with various prevalences in different races. According to its definition, it is a disease of elastic vessels (aorta, carotid, iliac, coronary, etc)¹. Yet the vessels of some organs such as heart, brain and kidneys are considered to be the primary targets of atherosclerosis due to their special susceptibility¹. Atherosclerosis of coronary arteries and myocardial infarction are the most common fatal cardiac diseases found in autopsies².

Nowadays different agents such as age,^{2,3} race,^{2,3} smoking,³ weight,^{3,4,5} and dyslipidemia^{3,5,6,7} are mentioned as risk factors for atherosclerotic lesions of coronary arteries.

Atherosclerotic lesions vary pathologically from microthrombus to macroscopic obvious lesions⁶. One of the lesions is fatty streak, which occurs in aorta in the youth and seems to move towards atheromatous plaque formation.⁸

The most common cause of death worldwide is vascular diseases including coronary arteries primarily and cerebrovascular lesions in the second rank, while in many cases, the earliest manifestation of atherosclerosis is sudden cardiac death. According to the points mentioned and the fact that formation of atherosclerotic lesions start from very early ages, in fact before its complications are identified, and that the progression of atherosclerotic lesions is

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varying due to environmental factors, this study was designed to evaluate the prevalence of such lesions in Isfahan, central Iran.

Materials and Methods

This study was a descriptive, cross-sectional survey, carried out on the referred specimens to Isfahan forensic medicine center with various causes of death (homicide, suicide, accident, etc.) since October 2002 to November 2003.

In order to avoid probable environmental and temporal biases, a month was randomly chosen of every season through which all specimens were observed. The age of subjects ranged from 15 to 50 years (204 specimens). Those with a history of cardiovascular disease were excluded. A signed letter of consent was taken from the relatives of the dead bodies.

The excised hearts of the subjects were immediately put in formalin 10% (as fixator) and sent to the Department of Pathology at Isfahan University of Medical Sciences. Their coronary arteries were sectioned transversely at 5 millimeters from aortic origin.

The section would continue to where the branches of coronary arteries were visible by un-armed eye.

Sections were studied grossly and in the absence of any specific lesions, 3 random sections were taken from every coronary branch. If a definite macroscopic lesion or suspicious area was noted, some more sections were taken from the involved area; 4

micron sections were stained with H&E method¹⁰ and were studied microscopically. Extent of lesions was evaluated according to the length and percentage of the transverse diameter of the vessel obstructed by the lesion by two assistants of pathology and confirmed by a pathologist. The stages of lesions were classified into fibrotic (lesions having collagen only) and complicated (lesions with hemorrhage, calcification or aneurysm). The results were analyzed statistically using Chi-Square test on a computer.

Results

Among the 204 subjects studied, 182 (88.5%) were male and 22 (11.5%) were female. The age average was 31.09 years (table 1). Among the samples, atheromatous plaques were observed in 60 (29.4%) of which 57 were male (31.3% of the male population) and 3 were female (13.6% of the female population).

Relative frequency of the cases increased with age (except in age group of 41-45 and 46-50 years old) (figure 1). There was no significant difference between various age groups (except in age group of 46-50 years, $p>0.05$). Studied hearts showed no significant differences in the percentage of obstruction in relation to age groups ($p>0.05$). From the standpoint of anatomy, most lesions were located in left anterior descending (19.6%), right coronary (13.7%), left main coronary (9.8%) and left circumflex artery (5.4%) respectively.

Table I. Frequency distribution of atheroma in male and female subjects

	Total number	Atheroma		No atheroma	
		frequency	Percentage	frequency	percentage
Male	182	57	31.3	125	68.7
Female	22	3	13.6	19	86.4
Total	204	60	29.4	144	70.6

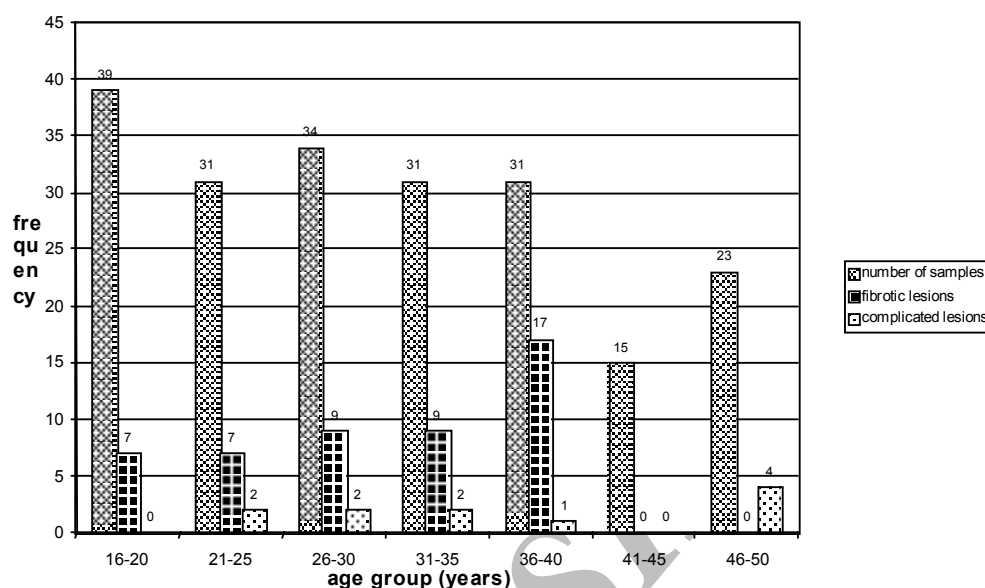


Figure 1. Frequency distribution of the studied samples according to age besides frequency of fibrotic and complicated plaques in each age group.

Discussion

As mentioned before, studied samples were chosen in 4 months of different seasons to avoid probable interfering temporal factors. However no study has shown a direct and strong relation between atherosclerotic lesions and the time of autopsy⁹. Heterogeneous sex distribution and the higher number of autopsied men were the problems in this study and other similar studies as well^{10,11,12}. The cause is perhaps cultural reasons since in forensic center (the site of this study), autopsied cases are those with unknown causes of death, and this group mostly includes the victims of different events such as driving accidents or fights which usually involve men rather than women.

The frequency of atherosclerotic lesions was 28.9% which corresponded to the results of similar studies^{2,11,13,14}. In the studies done on different age groups, the frequency of these lesions were reported between 16% to 75%^{2,11}. The reason for this diversity can be the variability of race, culture (varied dietary habits, different socioeconomic status) and finally, time and the age of the studied samples.

Since the number of women with atheromatous plaques was very low, determining frequency distri-

bution of lesions based on the intensity of atheromatous changes by age and finding the probable relation between sex and intensity and location was impossible.

The difference in relative frequency of atheromatous plaques in both sexes was expectable, though not discussable, probably due to the low number of studied women or the low prevalence of atherosclerotic lesions among young women worldwide due to hormonal factors (estrogen)¹⁵.

The increase in relative frequency of the atheromatous plaques with age was expectable too, because atherosclerosis starts at young ages¹¹ and progresses with age^{2,13}. Of course in this study relative frequency of atherosclerotic lesions in age groups of 41-45 and 46-50 years was lower than the younger age groups which can be due to the low number of studied specimens in these two groups.

Relative frequency of complicated lesions in different age groups in this study was not well assessed due to the low number of specimens in every age group. Actually, it was expected that the relative frequency of complicated lesions and their intensity increase by age^{10,14,15}.

Frequency distribution of anatomical location of detected lesions in this study matched with other studies^{10,12,14}. Another study showed that in most cases of death due to myocardial infarction, two or three pericardial coronary arteries were involved¹⁶.

We suggest that similar studies with definite time intervals and higher number of samples should be

done to identify the risk factors of these lesions and their variations in the society so that good programming to exclude the risk factors and promoting public health level and increasing life span would be achieved.

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