

Atherosclerosis of Coronary Arteries -An Autopsy Study

Prabhu.M.H¹

¹ Basaveshwara Medical College

Received: 15 April 2013 Accepted: 2 May 2013 Published: 15 May 2013

5

Abstract

Atherosclerosis is a complex and common disease contributing to increased mortality and morbidity. The exact global incidence of atherosclerosis is beyond calculation. Autopsy studies can provide information about the impact and course of atherosclerosis. Present study is undertaken to study the spectrum and distribution of atherosclerotic lesions in the coronary arteries and the association of age, sex, diet, socio-economic status, smoking and alcohol consuming habits with atherosclerosis. Methods : Heart specimens were obtained from medicolegal autopsies. Sections from representative areas were studied for gross and microscopic evidence of atherosclerosis. Results : Among the 50 cases studied 35 were males and 15 were females. Coronary arteries of 24 males (72.72

16

Index terms— autopsy, atherosclerosis, coronary arteries.

1 Introduction

The disease atherosclerosis has great relevance today. Atherosclerosis is a distinctive form of arteriosclerosis known from ancient times. The terms 'atherosclerosis' (meaning-porridge) and 'sclerotic' (hardening or fibrosis) derived from Greek terminology, do not represent the complete morphology of disease. Despite our familiarity with this disease, some of its fundamental characteristics remain poorly recognized and understood. The cause and pathogenesis of atherosclerosis remains subject of lively speculation and controversy. 1 Atherosclerosis is a pathological entity and a multifactorial disease of large and medium sized arteries, characterized by plaque like intimal deposits which contain neutral fats, cholesterol, lipophages, blood elements, at times, other evidence of hemorrhage and calcium deposits. Complications of which are disastrous -ischaemic heart disease, cerebral stroke, peripheral gangrene and so on. It is a pandemic, percentage incidence of morbidity varies from country to country. It is a modern epidemic in U.S.A., Europe, Canada, New Zealand and Australia. 2 Among the diseases in the western world, atherosclerosis is overwhelmingly the prime disorder leading to death and serious morbidity. Despite recent reduction in mortality of coronary heart diseases (CHD) about 50% of all deaths in US are still attributable to atherosclerosis related diseases. 1 The developing countries such as India, Singapore, Malaysia and Sri Lanka are catching up and registering a steady increase in the mortality rates due to atherosclerotic heart diseases. 3 In India coronary heart disease accounts for 10-15% of all cardiovascular diseases. 4 The exact global incidence of atherosclerosis is impossible to calculate because it can exist without producing any symptoms or signs. These asymptomatic cases can be diagnosed only if an autopsy is done, in all cases of death due to any cause. However, the magnitude of the problem can be assessed by looking at the mortality rates in different countries due to atherosclerotic heart disease. In a survey conducted in males in the 45 to 54 years age group, 5 the mortality rates due to atherosclerotic heart disease in different countries are lowest in Japan (8%) and highest in Finland (41%). In U.K., U.S.A., and Canada the average mortality rate is 36%. The disease is increasing in countries undergoing industrialization. 6 Unfortunately, in India there are no statistics giving the national incidence of this disorder. 3 However, Padmavathi and associates, 7 gave the average incidence of atherosclerotic heart disease in seven different states during 1958-59 as 0.51% per 1,000 population. In another study conducted at All India Institute of Medical sciences, New Delhi, with the help of autopsy studies and taking atherogenic index as an indicator, the incidence of coronary heart disease is given as 35.5% in males and in females as 14%.

4 DISCUSSION

45 Although global incidence, a wide range of variation in the prevalence and severity of atherosclerosis has been
46 shown to exist in different geographic population. Against this background the present study has been taken
47 in order to determine the severity and distribution of coronary atherosclerosis in the selected autopsies of the
48 deaths occurring in general population Karnataka state, which has good representation of all social classes. 5 II.

49 2 Methodology a) Materials And Methods

50 The material for the present study included 50 (fifty) heart specimens obtained from medico legal autopsies
51 performed in the Department of Forensic Medicine, Basaveshwara Medical College and Hospital, Chitradurga
52 and other heart specimens received at the Department of Pathology, Basaveshwara Medical College and Hospital,
53 Chitradurga, sent for histopathological examination to define any suspected cardiovascular pathology. Hearts
54 were obtained by standard procedures from all autopsies.

55 The age, sex and relevant information including age, sex, socio-economic status, dietary habits of the deceased
56 were obtained from the informant accompanying the deceased.

57 The methods used for the analysis of the material was as per the procedure recommended by 1. White, Edward
58 and Dry (1950). 2. Gore and Tejada (1957). All autopsies were carried out within four to twenty four hours
59 after death. 10,11,12 All the specimens of right and left coronary arteries blocks were taken at a particular fixed
60 distance at from 1.5 cm and 3 cm from the Ostia, also From the circumflex branch of the left coronary artery, bits
61 were taken at the same distance form the point of branching of the left coronary artery into anterior descending
62 and circumflex branches. Additional bits of tissue were taken from other regions of the vessels which showed
63 stenosis. This stenosis is graded based on the luminal narrowing of the coronaries when examined by hand lens
64 and is graded from grade 0 (no narrowing / normal) to grade IV (complete obliteration). Grade -0 : Normal
65 Grade -I : 1-25% stenosis Grade -II : 26-50% stenosis Grade -II : 51-75% stenosis Grade -IV : 76-100% stenosis
66 The bits of the tissue were fixed in 10% formalin and embedded in paraffin. Sections for histological study were
67 taken from the paraffin blocks and stained with haematoxylin and eosin. Special stains were also done whenever
68 indicated, namely Verhoeff and Van-Gieson's for demonstration of elastic tissues, smooth muscle and collagen,
69 and Alcain blue for the demonstration of mucopolysaccharide ground substance. All histological sections were
70 studied for microscopic evidence of atherosclerotic lesions.

71 3 III. Results

72 The coronary arteries of fifty specimens of heart were examined in the department of Pathology, Basaveshwara
73 Medical College and Hospital, Chitradurga, observations made from the study are as follows:

74 The youngest subject was 19 years and the oldest was a male of 80 year age, forming a age range of 19-80 years.
75 The majority of the cases were from 3 rd to 4 th Of the 50 cases studied 33 cases showed coronary atherosclerosis.
76 This table shows that coronary atherosclerosis will increase with age and it also shows that males are more
77 affected i.e., 24 cases (72.72%) and females are affected in 9 cases (27.27%). The coronary atherosclerosis was
78 much common in males but after 5 th Graph 3 : Coronary Atherosclerosis decade it takes the same course in
79 both male and female.

80 Of the 50 heart specimens studied 33 showed coronary atherosclerosis with various histological changes such
81 as fibroblastic activity, mucopolysaccharide deposition, degeneration of internal elastic lamina, accumulation of
82 lipid cholesterol crystals, hyalinization, calcification and hemorrhage. Salient features of atherosclerotic lesions i.
83 Fatty streaks. ii.

84 Fibrous plaques. iii.

85 Atheroma. Histological examination of representative plaques in the second and third decades showed the
86 presence of fat with little or no cellular reaction. In the 4 th and 5 th decades, there was generally a fibrous
87 tissue reaction to the presence of fat. By the 5 th decade, the fibrous reaction had become more pronounced and
88 was associated with degenerative changes.

89 4 Discussion

90 The autopsy study provides a means of understanding the basic process which sets a stage for clinically significant
91 atherosclerotic cardiovascular disease. There is no valid method of sampling of living population. It was, therefore,
92 considered that deaths suspected due to cardiovascular pathology, probably provide the best sample of the living
93 population for studying atherosclerosis. Many epidemiological studies have brought to light a number of factors
94 that are of indisputable importance in the development of atherosclerosis. In the present study the cases from
95 the first decade were not included as the disease started in the 2 nd decade, as stated by Gore et al (1960). 9
96 ??fig 13 In the 2 and associates observed that atherosclerosis started appearing in teen age itself. nd decade, the
97 incidence of atherosclerosis was 50% in the present study which was higher compared to Wig 13 and Associates
98 Study (38%) and Bhargava's 16 Study (10%). This may be due to small sample survey. Results of third decade
99 were almost similar to the Wig and Associates, 40% incidence in the Bhargava's Study which was lesser when
100 compared to present study (66%). The increase of incidence in our study may be due to change of life style of
101 people in recent decades.

102 After fifth decade almost all the cases in the present study showed the evidence of atherosclerosis. The present
103 study was almost comparable to the above studies in the remaining decades.

105 **5 Conclusion**

106 The present study concludes that coronary artery atherosclerosis is common in majority of cases. Atherosclerosis
107 is a complex and multifactorial disease. Age has a dominant influence. Males are affected more than females.
108 Smoking and alcoholism can accelerate the development of atherosclerotic lesions, though they are not atherogenic
109 on their own.

110 All the observation in the present study showed that the incidence of atherosclerosis in the developing countries
111 (like India) is same as developed countries. There is need of life style change in general public as well as
cardiologists and treating physicians to think of early treatment, to avoid untoward complications. ^{1 2}



Figure 1: T

5 CONCLUSION



3

Figure 2: 8 3 .



9

Figure 3: 9

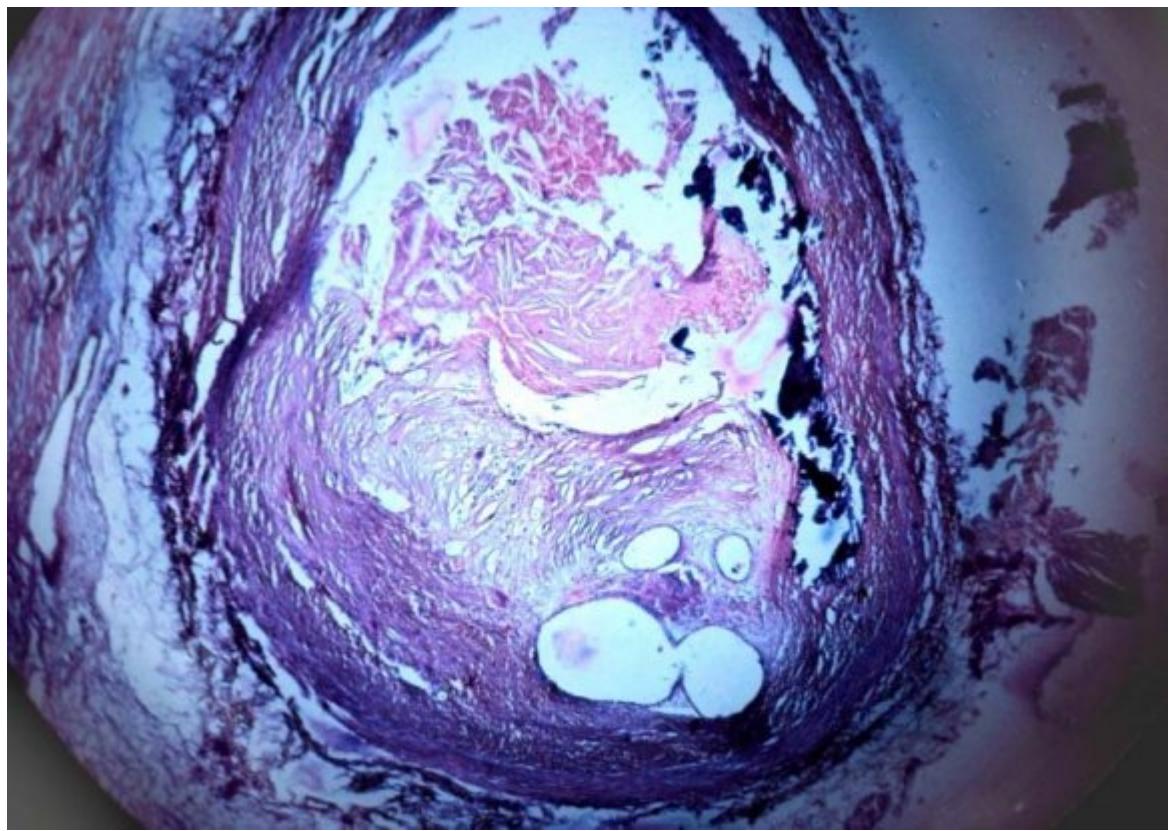
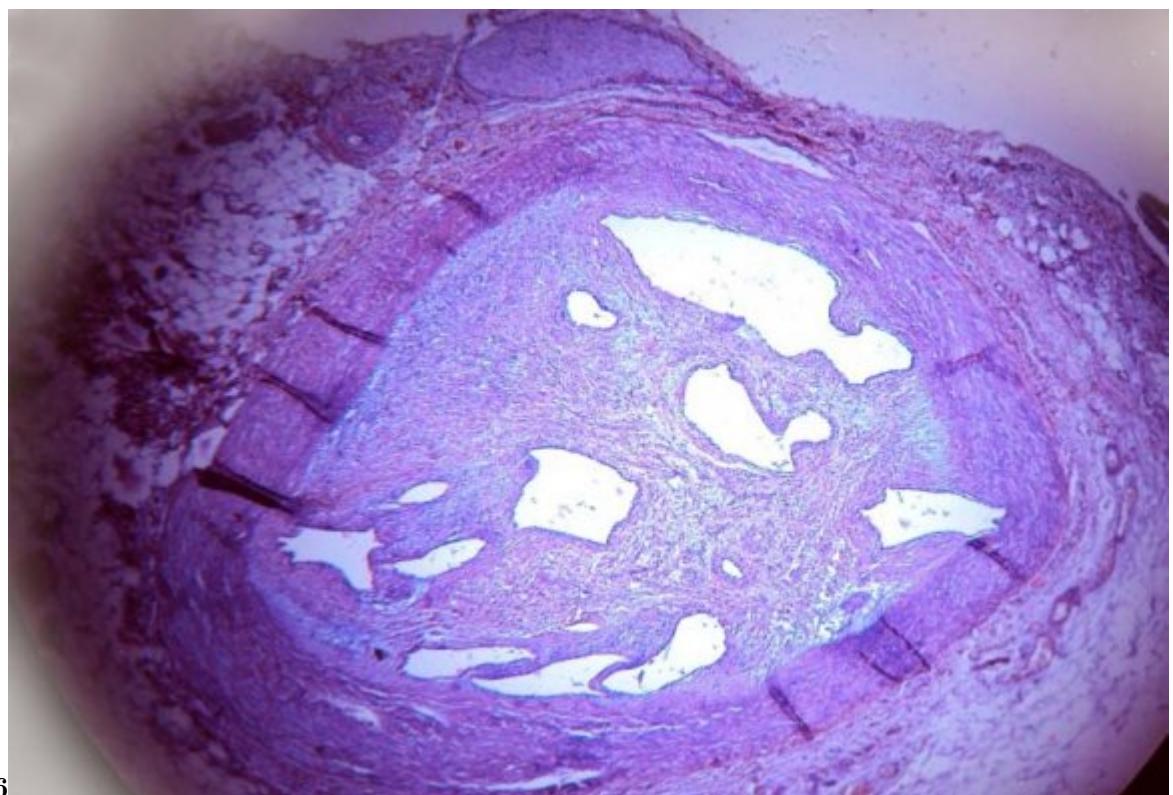


Figure 4:



123456

Figure 5: Fig. 1 :Fig. 2 :Fig. 3 :Fig. 4 :Fig. 5 :Fig. 6 :

5 CONCLUSION

1

Habit of Smoking	No. of cases	Positive cases	No. of cases	Percentage
Smokers	24	19		79.16
Non-smokers	26	14		53.84
Total	50	33		-

The above table showed higher incidence in smokers (79.16%). When compared to non-smokers (53.84%).

Graph 1: Smoking and Atherosclerosis

2 : Alcoholism and Atherosclerosis

Alcoholism and habit	No. of cases	Positive cases	No. of cases	Percentage
Alcoholics	23	18		78.26
Non-alcoholics	27	15		55.55
Total	50	33		-

Incidence of atherosclerosis was greater in alcoholics (78.26%) than in non-alcoholics (55.55%).

Figure 6: Table 1 :

3

Age group	Sex	Total of cases	No. of cases positive	Total posi- tive	Percentage
11-20	Male Female	2 2	2 0	2/4	50
21-30	Male Female	6 2	4 1	5/8	62.5
31-40	Male Female	12 5	7 3	10/17	64.7
41-50	Male Female	8 4	5 3	8/12	66.66
51-60	Male Female	5 1	4 1	5/6	83.33
61-70	Male Female	1 1	1 1	2/2	100
70 and above	Male Female	1 0	1 0	1/1	100
		50	33	33	66

Figure 7: Table 3 :

4

Study	Place	Percentage
1. Wig and associates (1962)	13 North India	64
2. Enos et al., (1953) 14	Korea	77.3
3. Subramaniam R. et al., (1964) 15	Madras	62
4. Bhargava and Bhargavan (1975) 16	North	69.9
	Karnataka	
5. Shirani J et al., (1995) 17	USA	65
6. Strong J.P. et al., (1999) 18	USA	60-80
7. McGill et al., (2000) 19	USA	58
8. Present Study	karnataka	66

Figure 8: Table 4 :

5

Study	Age range
1. Wig and Associates, (1962) 13	0-80
2. Enos et al., (1953) 14	18-48
3. Subramaniam R. et al., (1964) 15	2.5-94
4. Bhargavan and Bhargava, (1975) 16	0-90
5. Shirani J. et al., (1995) 17	71-80
6. Strong J.P. et al., (1999) 18	15-36
7. McGill et al., (2000) 19	15-34
8. Present study	19-80

Figure 9: Table 5 :

6

Decade	Wig and Associates (1962) 13	No. with lesions %	Bhargava and Bhargava 16 (1975)
< 1 year	-	-	0/13 0
1 st	Decade 2/18	11	2/20 10
2 nd	Decade 7/18	38	2/21 10
3 rd	Decade 24/38	63	12/30 40
4 th	Decade 23/24	95	21/25 84
5 th	Decade 23/25	92	17/21 80
6 th	Decade 19/19	100	10.12 83
7 th	Decade 8/9	88	3/3 100
8 th	Decade -	-	1/1 100

Figure 10: Table 6 :

5 CONCLUSION

113 [Strong et al.] , J P Strong , G T Malcom , C A McMahan , R E Tracy . Newman WP 3 rd.

114 [WH O] 1958) study group on the classification of atherosclerotic lesions, WH O . series No. 143. (Technical
115 report)

116 [Glasgow et al. ()] 'Atherosclerosis of human aorta and its coronary and renal arteries'. S Glasgow , D A Rowley
117 , R I Kohut . *Arch of Pathol* 1961. 73 p. .

118 [Grundy ()] 'Atherosclerosis. Pathology, Pathogenesis and role of risk factors'. S M Grundy . *Disease-a-Month*
119 1983. 29 p. 3.

120 [Abraham et al. ()] *Autopsy study of atherosclerosis at Madras*, C Abraham , Kulangara , R Subramaniam .
121 1964. South India. *Circulation*. 29 p. .

122 [Hughes ()] 'Cardiovascular diseases in Chinese, Malaysians, Indians and in Singapore differences in mortality'.
123 K Hughes . *J Epidemiol Community Health* 1990. 44 p. .

124 [Tejada and Gore ()] 'Comparison of atherosclerosis in Guatemala city and New -Orleans'. C Tejada , I Gore . *Am
125 J Path* 1957. 33 p. 887.

126 [Bhargav and Bhargava ()] 'Coronary atherosclerosis in North Karnataka'. M K Bhargav , S V Bhargava . *Indian
127 J Path Micr* 1975. 18 p. .

128 [Enos et al. ()] 'Coronary disease among United Soldiers killed in action in Korea'. W F Enos , R H Holmes , J
129 Beyer . *JAMA* 1953. 152 p. .

130 [Padmavati et al. ()] 'Dietary fat serum cholesterol level and incidence of atherosclerosis in Delhi'. S Padmavati
131 , S Gupta , Gva Pantulu . *Circulation* 1959. 19 p. .

132 [McGill et al. ()] 'Grading stenosis in the right coronary artery'. H C McGill , B W Brown , Gorel . *Circulation*
133 1968. 37 p. .

134 [Shirani et al. ()] 'Major cardiac findings at necropsy in 366 American octogenarians'. J Shirani , J Youseti , W
135 C Roberts . *Am J Cardiol* 1995. 75 p. .

136 [Nagalotimath ()] 'Panel discussion on atherosclerosis Part-I. I'. S J Nagalotimath . *J of the Scientific Society*
137 1982. 9 p. .

138 [Prevalence and extent of atherosclerosis in adolescents and young adults: Implications for prevention from the pathobiological D
139 'Prevalence and extent of atherosclerosis in adolescents and young adults: Implications for prevention from
140 the pathobiological Determinants of Atherosclerosis in Youth Study'. *JAMA* 1999. 281 (8) p. .

141 [Wig et al. ()] 'Prevalence of coronary atherosclerosis in Northern India'. K L Wig , R P Malhotra , N L Chitkara
142 . *Br Med J* 1962. 24 p. .

143 [Reddy ()] 'Recent concepts on aetio-pathogenesis and morphology of atherosclerosis'. Jagannath Reddy , D .
144 *Circulation* 1986. 4 p. .

145 [Kumar ()] *Robbins and Cotran pathologic basis of disease*, V Kumar . 2004. Philadelphia: Elsevier Publications.
146 p. . (7th ed)

147 [WH O ()] *Study group on classification of atherosclerotic lesions*, WH O . 1962. (Technical report)

148 [WH O ()] *Study group on classification of atherosclerotic lesions*, WH O . 1964. (Technical report)

149 [Park ()] *Text book of Preventive and Social Medicine*, K Park . 2000. Jabalpur: Banarasidas Bhanot Publishers.
150 p. . (16th ed)

151 [White ()] 'The relationship of the degree of coronary atherosclerosis with age in men'. Edward White , Dry .
152 *Circulation* 1950. 1 p. 645.