

Status of coronary atherosclerosis in population of MP: An autopsy based study

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Abstract

Objectives: Coronary heart disease resulting from atherosclerosis of coronary arteries. It is the most common cardiac disease found in autopsies. As number of cases of coronary heart diseases are increasing worldwide and it also a huge challenge in India became challenging in India. The study was designed to assess the histomorphological atherosclerotic changes in coronary arteries based on autopsy and to find out the age and sex related prevalence of atherosclerosis in population of mp of which hearts are received in department of pathology, MGM medical college Indore, India. This study will help in collecting baseline information of prevalence of such lesions which will help in framing health care programs to prevent the formation of these lesions.

Methods: In the present study, a total of 200 cases were autopsied to study and grade atherosclerotic lesions in the coronaries. Slides were prepared by sections of these specimens and stained with hematoxylin and eosin for microscopic examination.

Results: In the present study, it was observed that 162 cases (81.0%) were males and 38 (19.0%) were females showing atherosclerotic changes. Commonest type of atherosclerosis seen was grade 3. The most frequently involved branch was left anterior descending artery. Relative frequency of lesions increased with age.

Conclusions: With high prevalence of cardiovascular disease, the study of clinical atherosclerosis is the need of the day to estimate the disease burden in population. In this study atherosclerotic lesions was observed in very young population which may be an indication that there is need of implementation of anti atherogenic preventive measures in young individuals. It also highlights the importance of cardiovascular risk factors screening from early ages.

Keyword: coronary arteries, autopsy, atherosclerosis

Introduction

Cardiovascular disease becomes a major health problem worldwide as atherosclerosis being the major cause Indian population also during the past three to four decades ^[1]. Ischemic heart diseases (IHD) due to atherosclerosis are the most common causes of cardiac deaths worldwide and the incidence of coronary artery diseases has increased in Indians ^[2]. Also since last few decades wide proportion of Indians are having increasing prevalence of cardiovascular disease and associated risk factors ^[3].

Atherosclerosis is primarily a disease of aorta, carotid, iliac, coronary recent advances in the field of modern

medicine. With effective treatment life expectancy has been increased and an improvement in the quality of life but despite these achievements, the prevalence of coronary artery disease (CAD) still remains high^[4]. However, the exact data on the prevalence of coronary atherosclerosis or are extremely diverse^[5]. The variations in lifestyle, dietary and racial patterns, habit of smoking, alcohol in our population it is required to study the morphology and evolution of coronary atherosclerosis in our specific population. Autopsy is considered as important tool for various pathologies, which are difficult to assess in the living^[6]. Autopsy studies have been proved to be an effective method for assessing atherosclerosis in developing countries including India as in the living population it is difficult, invasive as well as expensive^[7].

With the limited amount of resources available in population in India for studying atherosclerosis, autopsy plays a major role in documenting the prevalence of atherosclerosis in the population. It also provides gives a valuable measure of the prevalence, grading and distribution pattern of atherosclerotic lesion. Studying the incidence of atherosclerosis in a population helps in framing health care plans for prevention and for reversal of atherosclerosis^[8]. Since atherosclerosis is a major killer disease, which gives a major financial burden on the nation's economy in health sector, even slight reduction in its incidence goes a long way in constructing the health of the future generation of the nation. Hence, this study was made to find out the prevalence of atherosclerosis in the population of MP.

Aim and objective: The objective of the study was to determine the possible association between the histopathological changes of the coronary atherosclerotic lesions.

Materials and Methods: our study is an Retrospective and Prospective 5yrs study performed in the Department of Pathology, M.G.M medical college and M.Y Hospital, Indore on 200 cases based histopathological analysis of autopsy specimen (Heart) received in our department and their association of smoking history as per record. For Retrospective study: Case sheet and reports used and for Prospective study we receive specimen containing submitted to the department of pathology, M.G.M. Medical college, Indore. We included sealed container and well preserved in formalin-with labeling of specimen, seal namuna of police station, panchanama report and hospital documents, if H/O of hospitalization present and we excluded autolytic sample. Gross examination done inflow and outflow method is used for Grossing of heart and for microscopic examination H&E staining method was used. The heart was dissected following standard autopsy protocol at autopsy. We used inflow and outflow method for dissection of heart. First of all sections of coronary arteries was taken after tracing in corresponding groove. After gross a 5 cm section of the right coronary artery (RCA) in the atrioventricular groove from its origin, a 5 cm segment of the left anterior descending artery (LADA) distal to the origin of the circumflex artery and a 5 cm section of left circumflex artery was also taken. All the sections of coronary arteries from each case were fixed in 10% formalin, marked for identification and sent for histopathological analysis. Paraffin sections were made and the sections stained using Hematoxylin and Eosin (H & E) dyes. Histopathological examination. In all subjects, the heart was fixed with 10% formalin. All specimens of coronary arteries were taken from each heart for histopathological examination. Twenty-six blocks from the right and left coronary artery were cut into 5- μ m-thick serial sections and each section was stained with hematoxylin and eosin stains.

The atherosclerotic lesion type of each artery was graded as per American Heart Association (AHA) classification of atherosclerosis.

AHA criteria for grading atherosclerotic lesions.

Grade 1: Isolated intimal foamy cells (minimal change).

Grade 2: Numerous intimal foamy cell soften in layers (fatty streaks).

Grade 3: Pools of extra cellular lipid without a well-defined core (intermediate lesion or pre-atheroma).

Grade 4: Well defined lipid core with luminal surface covered by normal intima (atheroma or fibro plaque).

Grade 5: Lipid core with a fibrous cap with or without calcification (fibro-atheroma).

Grade 6: Fibro-atheroma with cap defect such as haemorrhage and thrombosis.

Grade 7: Calcification prominent.

Grade 8: Fibrous tissue change prominent.

Result: The present study was conducted on 200 hearts of autopsy cases which 162 were males and 38 were females who died from myocardial infarction and have atherosclerotic changes the subjects in study were divided into different age groups according to the age at the time of death and also depending upon sex (Table 1). Most of the deceased belonged to 41 years to 50 years of age group the mean weight of heart in study sample was 284 \pm 74 grams for males and 260 \pm 70 grams for females.

The incidence of atheromatous plaques was 81.0% in males and 19.0% in females. Total 200 autopsy cases taken for study of heart. All these cases were received in the Department of pathology, MGM Medical college, Indore.

Table 1: Showing Age Group Distribution

Age Group (Years)	Frequency	Percent (%)
0-10	00	00
11-20	1	0.5
21-30	30	15
31-40	46	23
41-50	47	23.5
51-60	42	21
61-70	25	12.5
71-80	6	3
81-90	3	1.5
Total	200	100

Maximum number of cases in our study lies between 41-50 yrs(23.5%) followed by 31-40 yrs of age (23.0%) then 51-60 yrs (21%).

Below 20 years only 1 cases of atheroma was found, who died from myocardial infarction in 19 yrs of age was chronic alcoholic and smoker

Table 2: Gender Distribution of autopsy cases

	Frequency	Percent
Female	38	19
Male	162	81
Total	200	100.0

Table 3: Showing Gender Distribution of Autopsy Cases of MI

Age Group (Years)	Frequency (Male)	Frequency (Female)	Percent (Male)	Percent (Female)
11-20	1	0	0.5	
21-30	27	3	13.5	1.5
31-40	41	5	20.5	2.5
41-50	35	12	17.5	6.0
51-60	33	9	16.5	4.5
61-70	18	07	9	3.5
71-80	5	1	2.5	0.5
81-90	2	1	1	0.5
	162	38	81	19
Total	200		100	

In our study out of 200 cases maximum number of male lies between 31-40 yrs of age (20.5%) followed by 41-50 yrs (17.5%), 51-60 yrs of age (16.5%).

Among female maximum number of cases lies between 41-50 yrs of age group (5.5%) followed by 51-60 yrs (4.5%) and 61-70 yrs (3.5%).

In present study maximum number of over all cases including males and females lies between 41-50 yrs of age.

Table 4: Showing Distribution of atherosclerotic lesion in Autopsy Cases

Age Group (Years)	In LAD	Percent	LCA	Percent	RCA	Percent
11-20	1	0.5	1	0.5	1	0.6
21-30	29	14.5	25	12.7	22	14.3
31-40	47	23.5	46	23.4	28	18.3
41-50	43	21.5	43	21.9	36	23.5
51-60	43	21.5	42	21.4	33	21.5
61-70	23	11.5	23	11.7	20	13.1
71-80	11	5.5	13	6.9	11	7.1
81-90	03	1.5	03	1.5	02	1.3
Total	200	100%	196	100%	153	100%

Discussion

There is considerable increase in the number of deaths due to coronary atherosclerosis in India and this number is probably expected to increase in the coming decades if not controlled. The most concern is the early age of CHD deaths in the developing countries as compared to the developed countries, which will definitely lame the major work force of our nation.^{9,10} As it increase with ageing, the basic need of the days are to assess the incidence of atherosclerosis in the young population. Prevalence of CAD in various studies were compared with present study table 4. In the present study 98 (78.4%) cases were males and 27 (21.6%) cases were females which are near similar to previous studies.^{11,12} Moreover males indulge more in smoking, alcoholism etc. which definitely increases the risk of atherosclerosis. The mean weight of heart in study sample was 284±74 grams for males and 260±70 grams for females which is comparable to the study of Monika Garg *et al.*¹⁶

Studies	Males (%)	Females (%)
Present study	78.4	21.6
Agravat <i>et al.</i>	73.7	26.3
Bhargava <i>et al.</i>	74.8	24.2
Murthy <i>et al.</i>	82.0	18.0
Padmavathi	66.5	33.5

Singh <i>et al.</i>	85.0	15.0
Tandon	66.5	33.5

In the studies of Sudha *et al.*^[14], Virmani *et al.*^[15] and Stary. *et al.*^[16] the most common type of lesion was ruptured plaque with the frequency of 11%, 37.5% and 33% respectively. Atherosclerotic lesions develop quite early in life starting from age 20 years onwards. Overall incidence of atherosclerosis was found to be 49.03% which was comparable with the frequency given by Yazdi *et al.* (40%)^[2] and Golshahi *et al.* (28.9%)^[12]. Significant atheroma appeared in third decade onwards (25.0%) and there after its severity and frequency gradually increases from third decade onwards. Maximum incidence was in seventh decade (80.0%).

In studies carried out by Yazdi *et al.*^[2], Singh *et al.* and Golshahi *et al.*^[17] on different age groups, the prevalence of atherosclerosis was reported to be between 16%-75%. The reason for this diversity could be the variability of culture (difference in dietary habits, different economic status), race and various other environmental factors^[17]. In the present study the involvement of Left Anterior Descending artery, Right Coronary Artery and Left Circumflex Artery was 39.81%, 35.18% and 33.33% respectively. The findings were similar to as observed by Sudha *et al.*^[15], Monika *et al.*^[18] and Yazdi *et al.*^[2].

Conclusion

- 1) Incidence of atherosclerosis is more in males, but it is alarming in both sexes.
- 2) There is need of screening for cardiovascular risk factors from early ages of third decade to prevent some of the unexpected death.
- 3) The best possible way to study the prevalence of atherosclerosis in a population is autopsy based studies, as it is very difficult to study this in living persons.
- 4) it also help in estimating the future burden of atherosclerosis in our population, proper health policy framing and planning of preventive measures to be taken in order to serve the target population.
- 5) Similar studies should be carried out on regular time interval and with larger sample size to identify the risk factors.

References

1. Mohan V, Deepa R. Risk factors for coronary artery disease in Indians. J Assoc Physicians India. 2004; 52:95-7.
2. Yazdi SA, Rezaei A, Azari JB, Hejazi A, Shakeri MT, Shahri MK. Prevalence of atherosclerotic plaques in autopsy cases with non-cardiac death. Iran J Pathol 2009;4:101-4.
3. Indrayan A. Forecasting vascular disease cases and associated mortality in India.
4. NCMH Background Papers: Burden of Disease in India. National Commission on Macroeconomics and Health, Government of India 2005.
5. Schoen FJ. Blood vessels. In: Cotran RS, Kumar V, Robbins SL, eds. Pathological basis of disease. Philadelphia: WB Saunders 1994, 473-484.
6. Widimsky P, Andel M. Prevalence of coronary atherosclerosis in asymptomatic population. Eur Heart J 2000;21:13-14.
7. Fausto N. Atherosclerosis in young people: The value of the autopsy for studies of the epidemiology and pathobiology of disease. Am J Pathol 1998;153:1021-2.

8. Naher S, Naushaba H, Mukhtadir G, Rahman MA, Khatun S, Begum M. Percentage area of intimal surface of the abdominal aorta affected by atherosclerosis: A Postmortem Study. *J Med Sci. Res.* 2007; 9:26-30.
9. Curtiss LK. Reversing Atherosclerosis? *N Engl J Med* 2009; 360:1144-6.
10. Noeman A, Ahmad N, Azhar M. Coronary artery disease in young: Faulty life style or heredofamilial or both. *Annals* 2007;13:162-4.
11. Singh H, Oberoi SS, Gorea RK, Bal MS. Atherosclerosis in Coronaries in Malwa Region of Punjab. *J Indian Acad Forensic Med* 2005;27(4):32-5.
12. Bhargava MK, Bhargava SK. Coronary atherosclerosis in North Karnataka. *Indian J Pathol Microbiol* 1975;18:65-77.
- Murthy MSN, Dutta BN, Ramalingaswami V. Coronary atherosclerosis in North India (Delhi Area). *J Pathol Bacteriol* 1963;85:93-101.
13. Virmani R, Kolodgie FD, Burke AP, Farb A, Schwartz SM. Lessons from sudden coronary death-Virmani R, Kolodgie FD, Burke AP, Farb A, Schwartz SM. Lessons from sudden coronary death-A comprehensive morphological classification scheme for atherosclerotic lesions. *Arterioscler Thromb Vasc Biol* 2000;20:1262-75.
14. Sudha ML, Sundaram S, Purushothaman KR, Kumar PS, Prathiba D. Coronary atherosclerosis in sudden cardiac death: An autopsy study. *Indian J Pathol Microbiol* 2009;52(4):486-9.
15. Singh H, Oberoi SS, Gorea RK, Bal MS. Atherosclerosis in Coronaries in Malwa Region of Punjab. *J Indian Acad Forensic Med* 2005;27(4):32-5.
16. Golshahi J, Rojabi P, Golshahi F. Frequency of atherosclerotic lesions in coronary arteries of autopsy specimens in Isfahan forensic medicine center. *J Res Med* 2005;1(10):16-9.
17. Monika Garg, Akash Deep Agarwal, Sant Prakash Kataria. Coronary Atherosclerosis and Myocardial Infarction an Autopsy Study. *J Indian Acad Forensic Med* 2011;33(1):39-42.