Original Articles

"Coronary Atherosclerosis"- A Post-Mortem Histopathological study of 7 years

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ABSTRACT

Background : The incidence of coronary heart disease has markedly increased in India over the past few years. Coronary atherosclerosis, the largest cause of morbidity & mortality in developed and developing country.

Aim : To study the prevalence of coronary atherosclerosis cases on histopathology. To study different morphology of coronary atherosclerosis on histopathology.To assess cases according to gender, age and socioeconomic profile.

Material and Methods : Prospective and retrospective study of 7 years was designed to evaluate common coronary atherosclerosis reported on autopsy viscera at histopathology department from August 2014 to August 2021.

Result : The study comprises the cases in the age group between 10 to 90 years. Both side coronary vessels involvement is more common than single vessels involvement. The most common type of atherosclerosis seen was Grade 2.

Conclusion : coronary atherosclerosis was most commonly diagnosed in the age group of 41 – 50 years and have a male preponderance. Urban population more affected than rural. Most common observed complication is myocardial infraction.

INTRODUCTION

Coronary artery disease (CAD) is a multifactorial disease usually affecting people in "middle age." According to the World Heart Federation, 35% of all deaths caused by cardiovascular disease in India occur in that aged 35-64 years.[1] Aging is associated with structural and functional changes of the vessel wall, which result in decreased vascular distensibility and elevated arterial stiffness. Chronic systemic inflammation has been implicated in atherogenesis, and may play a role in destabilizing vulnerable coronary plaques, thereby precipitating acute thrombosis and clinical coronary vessel events. [2,3]

Atherosclerosis is a pathologically diverse disease with heterogeneous mechanisms of progression. Irreversible atherosclerotic plaques begin with smooth muscle cell-rich lipid pool lesions referred to as pathologic intimal thickening and it is a lipid-driven, chronic inflammatory disease of the vessel wall in which both innate and adaptive immune responses play a role.[4] Coronary calcium is a specific marker of atherosclerosis.[3]

Coronary artery calcification (CAC) is a linear estimate of the total burden of coronary atherosclerosis that highly correlates with autopsy and intravascular ultrasound assessment.[2,4] Major advances in medical, interventional, and surgical therapy, together with effective secondary prevention, have resulted in extended life expectancy and an improvement in the quality of life of most patients with clinical CAD. Despite these achievements, the prevalence of CAD seems to remain high.[5]

AIMS AND OBJECTIVES

1. To study the prevalence of coronary atherosclerosis cases on histopathology.
2. To study different morphology of coronary atherosclerosis on histopathology.
3. To assess coronary atherosclerosis cases according to gender, age and socio demographic profile.

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MATERIALS AND METHOD

Present study of — coronary atherosclerosis"- A postmortem histopathological study of 7 year was carried out in Histopathology Laboratory Department of Pathology, P.D.U. Medical College and Hospital, Rajkot

Records maintained in the department post-mortem registry were retrieved manually. This number was be used as population (denominator) for further calculation.

Prospective and Retrospective study of 7 years was designed to evaluate common coronary atherosclerosis reported on autopsy viscera received at Histopathology laboratory from August 2014 to August 2021time duration.

Specimen was received in 10% formalin, twenty times that of the specimen's volume. And were kept for 24 hours in 10% formalin for proper fixation.

PROCESSING OF SPECIMEN

The specimens were fixed in 10% formalin, subsequently dehydration; clearing embedding in paraffin was carried out. Blocks were made, section of 3 micron thickness were cut and stained with Harris Haemotoxylin and Eosin stain. There slides were mounted and microscopy was done subsequently.

PROCEDURE OF STAINING

- Dewax section in xylene giving two changes for 20 mins.
- Hydrate section in descending grade of alchol, bringing them to water.
- Place in haemotoxylin for 8 to 10 mins.
- Washing in running water for 5 mins.
- Decolorise with 1% acid alcohol.
- Washing with water immediately
- Place in running water for 5 mins
- Place in eosin for 10 sec
- Give 5 dips in running water
- Dehydrate in alcohol
- Mount in DPX

RESULTS

A total of 252 post-mortem hearts were studied. The heart was examined grossly as well microscopically for the presence of coronary atherosclerosis and then graded for morphological type according to the American Heart Association.

Table 1: Year wise distribution of cases.

Years	No. of Cases
2014	30
2015	22
2016	77
2017	23
2018	27
2019	21
2020	27
2021	25
TOTAL	252

According to table no 1, Out of total 252 coronary atherosclerosis cases, 30 cases were reported in 2014, 22 cases were reported in 2015, 77 cases were reported in 2016, 23 cases were reported in 2017, 27 cases were reported in 2018. 21 cases reported in 2019. 27 cases were reported in 2020 and 25 cases reported in 2021.

Table 2: Gender wise distribution of cases.

Gender	No. of cases
Male	191(75.8%)
Female	61(24.2%)
Total	252

According to table no 2, Present study shows prevalence of coronary atherosclerosis among male is 191 (75.8%) out of 252 patients while female having 61 (24.2%) cases of coronary atherosclerosis respectively.

Table 3: Age wise distribution of coronary atherosclerosis cases among different sex group.

Age Range (year)	Male	Female	Total
10-20	04	02	06
21-30	23	08	31
31-40	45	19	64
41-50	54	17	71
51-60	44	08	52
61-70	16	06	22
71-80	02	00	02
81-90	03	01	04
Total	191	61	252

According to table no 3, most common age group in which coronary atherosclerosis diagnosed was between 41-50 years which was 71 cases out of total number of 252 cases and least common age group was 71-80 years.

Table 4: Region wise distribution of cases.

Region	No. of cases
Urban	170(67.5%)
Rural	82(32.5%)
Total	252

According to table no 4, this study shows prevalence of coronary atherosclerosis in urban region more than to rural region, Out of 252 cases 170(67.5%) coronary atherosclerosis cases found in urban region and, 82(32.5%) coronary atherosclerosis cases found in rural region respectively.

Table 5: Histopathological grading of coronary atherosclerosis.

HISTOPATHOLOGICAL GRADING OF CORONARY ATHEROSCLEROSIS	
Grade	Total case (%)
Grade 1	07 (2.7%)
Grade 2	113 (44.8%)
Grade 3	100 (39.7%)
Grade 4	29 (11.5%)
Grade 5	03 (1.2%)

According to table no 5, shows histopathological (microscopy) Grading 2 (44.8%) type coronary atherosclerosis found most cases, and histopathological (microscopy) Grading 5 (1.2%) found least postmortem cases of coronary atherosclerosis , out of 252(100%) of coronary atherosclerosis cases.

Prevalence of coronary atherosclerosis in both artery (left and right coronary artery) found most cases 200 (79.40%), and left coronary artery atherosclerosis found 33(13.1%) cases and right coronary artery atherosclerosis found 19 (7.53%) cases out of 252 cases respectively.

Mild (atheroma thickness) coronary atherosclerosis found in most post mortem cases, among 113(44.8%) cases found out of 252 cases, and least common very mild (atheroma thickness) coronary atherosclerosis found 08 (3.17%) cases, out of 252 cases.

DISCUSSION

There is an alarming increase in the number of deaths due to coronary atherosclerosis in India and this number is expected to escalate rapidly in the next decade. Atherosclerosis is a common phenomenon which is seen with different prevalence in different races. It begins in childhood and progresses through young adulthood to form the lesions that causes coronary heart disease.[5]

According to table no 6, in present study most common age group affected was 41-60 year. It was correlated with the study given by Yazdi et al[6], Kumar et al[7] and mexico[8] study.

According to table no 7, Present study was found 75.8% male and 24.2% female affected, were comparable to other study. Bhargava et al[9] studied 81% males and 19% females affected. In Singh et al 65% were male and 35% female affected. The reason being that as males are bread earners and females usually doing house hold works, which makes the males more vulnerable to accidents, violence and stress. Also males were more indulged in smoking, alcoholism etc. Which are predisposing causes for atherosclerosis.

According to table no 8, in our study most common histopathological observation was grade 2, it was correlated with the study given by Yazdi et al[6], Virmani et al[11], and, study in Mexico[8] city.

According to table no 9, in our study Single vessel involvement was seen in 20.63%, while both side coronary vessels involvements was seen in 79.40%. Two vessels involvement was the most common in our study. It was correlated with the study given by Yazdi et al,Virmani et al, Kumar S et al.

According to table no 10, Prevalence of coronary atherosclerosis is more common in urban region than rural.

CONCLUSION

Coronary atherosclerosis was diagnosed most commonly in the age group of 41-50 years.

Out of 252 total post mortem cases 191 males showed coronary atherosclerosis and 61 female showed coronary atherosclerosis.

Urban population more commonly affected than rural population and histological grading 2 is most commonly observed microscopically.

This study highlights the importance of atherosclerosis as a cardiovascular risk factor which needs to be screened from young age group. Our study aids valuable data to the literature regarding the morphology of atherosclerotic lesions.

The study of human atherosclerotic lesion is an extremely difficult task in a living subject so autopsy study is the best way to work on it.

Table 6: Comparative study of age wise distribution of coronary atherosclerosis.

Age (Years)	Present study (Aug 2014 - Aug 2019)	Yazdi et al[6] (Oct 2007 - Mar 2008)	Kumar S et[7] al.2012	Cardiology Research & Practice[8] MEXICO city 2014
10-20	2.3%	-	-	-
21-40	37.7%	24%	15%	18%
41-60	48.8%	48%	65%	58%
61-80	9.6%	28%	20%	15%
81-100	1.6%	-	-	9%

Table 7: Comparative study of gender wise distribution of coronary atherosclerosis.

Gender	Male	Female
Present study (Aug 2014 - Aug 2019)	75.8%	24.2%
Bhargava et al9 2011(Jan - Mar 2011)	81%	19%
Singh et al10 2005(Jan -Dec 2005)	65%	35%
Kumar S et al7.2012	76%	24%

Table 8: Histopathological observation of coronary atherosclerosis in different study.

Grading	Present study (Aug 2014 - Aug 2019)	Yazdi et al[6] (Oct 2007 - Mar 2008)	Virmani et al[11] (Jan 2000 - Dec 2000)	Kumar S et al[7].2012	Cardiology Research & Practice[8] MEXICO city 2014
Grade 1	2.7%	1%	2%	15%	1%
Grade 2	44.84%	38%	36%	16%	36%
Grade 3	39.7%	35%	26%	24%	26%
Grade 4	11.5%	30%	30%	40%	34%
Grade 5	1.2%	11%	6%	5%	3%

Table 9: Comparative study of involvement coronary vessels.

Involvement of vessels	Single vessel involvement	Right and left vessel involvement
Present study (Aug 2014 - Aug 2019)	20.63%	79.40%
Yazdi et al6(Oct 2007 - Mar 2008)	20%	80%
Virmani et al11(Jan 2000- Dec 2000)	44%	56%
Kumar S et al7.2012	50%	50%
Cardiology Research & Practice MEXICO8 city 2014	15%	85%

Table 10: Comparative study of urban/rural distribution of cases.

Urban/Rural	Present study (Aug 2014 - Aug 2019)	Yazdi et al[6] (Oct 2007 - Mar 2008)	Virmani et al[11] (Jan 2000 - Dec 2000)	Kumar S et al[7].2012	Cardiology Research & Practice[8] MEXICO city 2014
Urban	67.5%	58%	62%	68%	78%
Rural	32.5%	42%	38%	32%	22%

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