

## To Evaluate the Prevalence of Carotid Artery Plaques in Patients of Coronary Artery Disease

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### Original Research Article

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**Abstract:** Coronary artery disease is a leading cause of mortality and morbidity in the world. India is now in the middle of a CAD epidemic with urban having CAD rates similar to overseas Indians, which is 4-fold higher than Americans. Recent studies have shown that the presence of carotid plaques is a strong predictor of cardiovascular disease, independent of CIMT. Duplex sonography, combining high resolution imaging and Doppler spectrum analysis has proved to be popular, noninvasive, accurate and cost effective means of detecting and assessing extra cranial carotid disease. 50 known patients of Coronary Artery Disease (CAD) underwent Doppler examination of extra cranial carotid arteries to evaluate the presence and absence of plaque. Among 50 patients, 18 were plaque positive and 32 were plaque negative. The incidence of male to female ratio of CAD is 2:1. In plaque positive cases male to female ratio was 2:1 in plaque negative cases male to female ratio was 2.2:1. In plaque positive cases majority of pts were in 50 – 60 year age group (39% male and 22% female), in plaque negative cases majority of patients were in 40-50 year age group (44% male and 6% female).

**Keywords:** Carotid Artery Plaques, Prevalence & Coronary Artery Disease.

### INTRODUCTION

Coronary artery disease is a leading cause of mortality and morbidity in the world. The pathogenesis of CAD is complex and involves a number of environmental and genetic factors. These lead to overlapping pathophysiologic pathways, including endothelial dysfunction, atherosclerosis and thrombotic disease.

In turn these pathways produce a broad spectrum of clinical conditions ranging from chronic stable angina to catastrophic cardiovascular events.

Coronary artery disease (CAD) rates vary 10-fold among populations. The CAD rates among overseas Asian Indians worldwide are 50% to 400% higher than people of other ethnic origin irrespective of gender, religion, or social class [1]. India is now in the middle of a CAD epidemic with urban Indians having CAD rates similar to overseas Indians, which is 4-fold higher than Americans. Whereas the CAD rates halved in the West in the past 30 years, the rates doubled in India with no signs of a downturn yet [2, 3]. The average age of first myocardial infarction (MI) has decreased by 20 years in India. Among Asian Indian men, about half of all MI occur under the age of 50 and 25% under the age of 40.

### MATERIALS & METHODS

This study was conducted in Maharaja Yeshwant Rao Hospital Indore (ICCU and Medical

wards) in 6 month period from April 2010 to September 2010.

Study subjects consisted of 50 known CAD patients (on the basis of their ECG records, history and clinical examination) b/w age 40 to 80 years visited to MYH in department Of medicine in above mentioned study duration. In these 33 were male and 17 were female.

#### Inclusion criteria

Patients having Coronary Artery Disease of 40-80 year age group.

Diagnosis of acute myocardial infarction was made according to “WHO” criteria for definite myocardial infarction. The WHO diagnosis of MI depends on the presence of atleast two of the following:

#### Typical chest pain

Lasting for more than 20 minutes

**ECG changes mentioned below**

ST segment elevation in  $\geq 2$  contiguous leads with or without ST segment depression in reciprocal leads. ST segment elevation included 1 mm or more, with or without coving lasting  $> 24$  hours.

**Hyperacute phase of acute myocardial infarction**

ST segment elevation, tall widened T waves  
Reciprocal ST Segment depression

**Evolved phase**

Pathological Q wave's duration 0.04 sec or more and Amplitude 4 mm or more or  $> 25\%$  of respective 'R' wave

**Localization of acute myocardial infarction**

**Anterior wall**

Anteroseptal infarction pattern ECG changes (ST elevation) in chest lead V1 to V4.

Anterolateral infarction pattern ECG changes (St Elevation) in leads I, aVL, V5-V6.

Extensive anterior wall Infarction (A+B)

**Inferior wall infarction**

ECG changes (ST elevation) in leads II, III and aVF

**Subendocardial infarction**

Deep symmetrical, arrow head, inverted "T" waves.

**RV infarction**

ST elevation of  $> 1$ mm in RV 3 and RV 4 in associated with inferior wall ST/T changes.

**Posterior wall infarction**

Tall R with ST depression and Tall T waves in V1 and V2

**Exclusion criteria**

- Haemodynamically unstable patients.
- Patients with poor quality of carotid image.

- Patients suffering from chronic liver disease, chronic kidney disease, any malignancy4-patients who refused to be a part of the study.

**Carotid ultrasonography**

All carotid ultrasonography examinations were performed with the use of GE LOGIQ 3 sonographic machine equipped with a 7.5 to 12 MHz linear-array transducer. With the subject in the supine position and the neck in slight hyperextension the common carotid artery, carotid bulb, and the extracranial part of internal carotid artery' were identified of both side and IMT were measured as the distance between the luminal Intimal interface and the medial adventitial interface. Severity of carotid atherosclerosis was evaluated by presence and various characteristics of plaque.

**RESULTS**

The study was carried out in known CAD patients in the Department of Medicine MYH Indore during a period from April 2010 to September 2010. Study included pts b/w age group 40-80 years who visited /admitted in our department in above mentioned period. With the help of radiology department of our hospital carotid examination was done and presence or absence of carotid plaques was evaluated. Plaque positive cases were further assessed in relation to other well established risk factors of CAD. Various characteristics of plaque were also assessed using carotid Doppler and B mode USG.

In plaque positive cases (n=18), 12 pts (67%) were male and 6 pts (33%) were female.

- In plaque negative cases (n=32), 22 pts (69%) were male and 10 pts (31%) were female.
- In plaque positive cases majority of pts were in 50 – 60 year age group (39% male and 22% female ) f/b 40-50 year age group (22%),60-70 year age group (11%),70-80 year age group (6%).
- In plaque negative cases majority of patients were in 40-50 year age group (44% male and 6% female) f/b 50 -60 year age group (29%),60-70 year age group (10%).

**Table-1: Age and sex wise distribution of plaque positive and plaque negative cases**

Age (years)	Plaque positive (n=18)				Plaque negative (n=32)			
	Male		Females		Males		Females	
	No.	Percentage	No.	Percentage	No.	Percentage	No.	Percentage
40-50	4	22	0	0	14	44	2	6
50-60	7	39	4	22	5	16	4	13
60-70	0	0	2	11	2	6	4	13
70-80	1	6	0	0	1	3	0	0

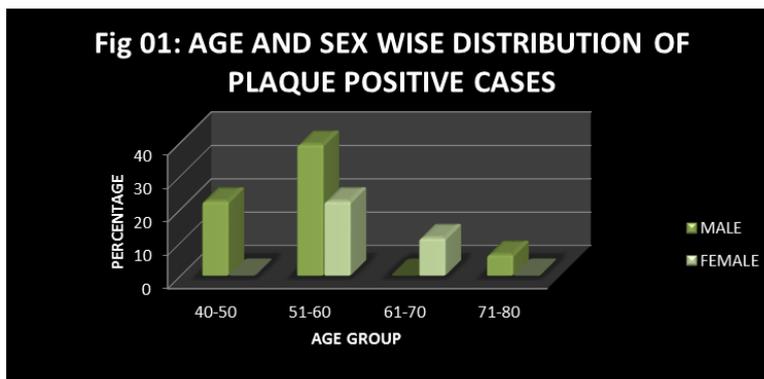


Fig-1: Age and sex wise distribution of plaque positive and plaque negative cases

Table-02: Risk factor wise distribution of plaque positive and plaque negative cases

Risk factors	Plaque positive (n= 18 )		Plaque negative (n= 32 )	
	Number	Percent	Number	Percent
Diabetes mellitus	5	28	6	19
Hypertension	7	39	11	34
Smoking	10	56	13	41
Alcohol	7	39	6	19
Obesity	10	56	15	47
Family history	6	33	8	25
H/O CVA/PVD	2	11	1	3
Dyslipidemia	13	72	11	34

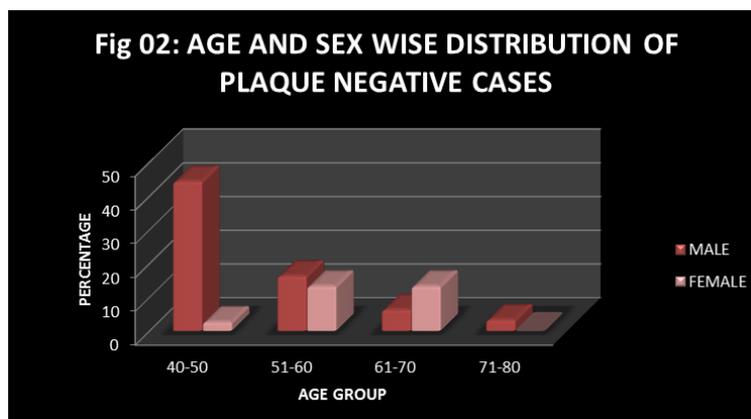


Fig-2: Risk factor wise distribution of plaque positive and plaque negative cases

**DISCUSSION**

Cardiovascular disease is a major killer today, and incidence and prevalence of CAD is increasing. Especially in Asian countries it is a major emerging problem. As per American statistics studies in past have indicated that there is an unusually high prevalence of atherosclerotic disease especially cardiovascular disease in Indians in spite of the fact that the prevalence of traditional risk factors for atherosclerosis is low. This paradox has been proved by several studies on Indian immigrant population in USA, Great Britain, Australia and other European countries.

The main role of carotid Doppler examination in the carotid artery disease is the detection of occlusive

lesions in the vicinity of carotid bifurcation and internal carotid artery (ICA).the accurate diagnosis of critical stenosis (more or equal to 80% decrease in diameter) is important because these are the patients who carry an increased risk of death from CAD or cerebral infarction.

Also important clinically are those patients with lesser degree of stenosis, as coronary embolism may result from thrombosis of these vessels according to chambers BR, NORRIS JW and Caplan LR, Motera GL, Taylor DC [4].

Nicholls L *et al.* [5] have noted that the carotid lesions with less than 70% stenosis are generally treated

medically with drugs that inhibit platelet aggregation and thrombus formation.

The north American symptomatic carotid Endarterectomy Trial [6] study, and the Asymptomatic Carotid Atherosclerosis Study [7] as quoted by Michelle L Robbin, Mark *et al.* [8] have demonstrated that the surgical treatment of endarterectomy should be reserved for those patients who have carotid stenosis more than 70%.

Angiography as the “gold standard” has been replaced by duplex ultrasonography in most diagnostic circumstances. Positive experience with carotid duplex ultrasonography scanning unassisted by angiography in the setting of an impending surgical intervention has been embraced by a growing number of doctors.

So the present study was done to evaluate extra cranial carotid arterial system by carotid Doppler in the population who presented with cardiovascular disease.

#### AGE AND SEX

Total no of CAD pts in study were 50. Out of those 18 were plaque positive and 32 were plaque negative

In plaque positive cases (n=18), 12 pts (67%) were male and 6 pts (33%) were female.

In plaque negative cases (n=32), 22 pts (69%) were male and 10 pts (31%) were female.

In plaque positive cases majority of pts were in 50 – 60 year age group (39% male and 22% female) f/b 40-50 year age group (22%), 60-70 year age group (11%), 70-80 year age group (6%).

In plaque negative cases majority of patients were in 40-50 year age group (44% male and 6% female) f/b 50 -60 year age group (29%), 60-70 year age group (10%).

These findings correlated well with both the NASCET and ACAS STUDIE, where NASCET had a mean age of 60 years with 72% male and 28% female patients. The ACAS study had 50% of patients above the age of 60 years.

In our study out of 18 plaque positive cases, 12 were male and 6 were female with a ratio of 3:2, this is comparable to the study of Paiv Ansalo M, Leinonen S, Turunen J *et al.* [9], where male to female ratio was 4:2.

#### CONCLUSION

The present clinical study was undertaken to evaluate the prevalence and clinical significance of carotid plaque in CAD patients and also evaluate various characteristics of plaques.

From the results observed thereof and discussion outlined in the previous chapter, the following broad conclusion could be derived.

- 50 known patients of Coronary Artery Disease (CAD) underwent Doppler examination of extra cranial carotid arteries to evaluate the presence and absence of plaque.
- Among 50 patients, 18 were plaque positive and 32 were plaque negative.
- The incidence of male to female ratio of CAD is 2:1.
- In plaque positive cases male to female ratio was 2:1 in plaque negative cases male to female ratio was 2.2:1.
- In plaque positive cases majority of pts were in 50 – 60 year age group (39% male and 22% female), in plaque negative cases majority of patients were in 40-50 year age group (44% male and 6% female).

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