

## Study on Clinical Profile and risk factors of Coronary Artery Disease in Indian Women

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### Abstract

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*Background:* Coronary artery disease (CAD) is a common cause of death or disability in men and women, but CAD manifests differently in women. Besides traditional risk factors, diabetes and hypertriglyceridemia carry greater risk to women than men. CAD is commonly under diagnosed in women. *Objective:* To study the frequency, risk factors and presenting symptoms associated with CAD. *Materials and Methods:* The study was conducted in Air Force Command Hospital, Bangalore from 01 Oct 2013–31 Mar 2015 after obtaining approval from Institutional Ethical Committee. All females who were diagnosed of CAD in emergency room, medical/cardiology OPD, intensive coronary care unit and medical wards of Command Hospital were enrolled for the study. *Results:* In the present study 91.26% were post menopausal female falling in the age group of 41-80yrs. Among the study subjects, 46.6% had diabetes, 62.13% had hypertension, 4.8% had past history of dyslipidemias and 52.44% were overweight or obese. 17.47% had family history of CAD or CAD risk factors. *Conclusions:* Coronary Artery Disease commonly affects postmenopausal women. Overweight, Obesity, Hypertension, Dyslipidemia and Diabetes are the major risk factors in women. They present more often with atypical symptoms.

**Keywords:** Coronary Artery Disease; Cardiovascular Disease; Risk Factors; CAD in Women.

### Introduction

It was believed by many that coronary artery disease (CAD) was primarily a “man’s disease.” With increased awareness of the fact that the leading cause of death in women is CAD, this notion is slowly eroding [1]. CAD is a common cause of death or disability in men and women, but CAD manifests differently in women. Cardiovascular diseases (CVDs) are the number one cause of death globally, more people die annually from CVDs than from any other cause. Low and middle income countries are disproportionately affected and CVDs occur almost equally in men and women. An estimated 17.3 million people died from CVDs in 2008, representing 30% of all global deaths [2]. Of these deaths, an estimated 7.3 million were due to coronary artery disease and

6.2 million were due to stroke [3]. The number of people, who die from CVDs, mainly from heart disease and stroke, will increase to reach 23.3 million by 2030 [2, 4]. CVDs are projected to remain the single leading cause of death [4]. More women have died from CAD than of cancer, chronic lower respiratory disease, Alzheimer disease, and accidents combined [5]. CAD mortality is higher in women compared to men [5]. The incidence of CAD in women lags behind men by 10 years and by 20 years for more serious clinical events such as sudden death and MI [6]. Among individuals with premature MI (under age 50), women experience a 2-fold higher mortality rate after acute MI compared to men [7]. Among older individuals (over the age of 65), women are more likely to die within the first year after MI [5]. In individuals 45 to 64 years of age, women are more likely than men to have heart failure within 5 years

of MI [5]. Women have higher rates of angina than do men [5,8]. The burden of CAD is high among women. It appears that the pathophysiology of CAD varies between women and men. On cardiovascular computed tomography women have been shown to have smaller coronary artery diameters than men. [9]. Women are less likely than men are to have obstructive CAD at the time of coronary angiography [10,11]. Due to the occurrence of CAD in women without obstructive lesions, the phrase “female-specific ischemic heart disease” has been recommended when discussing disease of the coronary arteries in women [12]. Traditional risk factors such as age, family history of CAD, hypertension, diabetes, dyslipidemia, smoking, and physical inactivity are important predictors of risk in women. In contrast to the linear increase in CAD in men as they age, there is a more exponential increase in CAD in women after the age of 60 [13]. Hypertension is more prevalent in women, particularly older women [14]. Women with hypertension have a higher risk of developing congestive heart failure than men do [15]. The presence of diabetes is a relatively greater risk factor for CAD in women versus men, increasing a woman’s risk of CAD by 3- to 7-fold, with only a 2- to 3-fold increase in diabetic men [16]. Furthermore, women with diabetes have a greater than 3-fold increase in CAD risk than non diabetic women [16]. Elevated triglycerides have been shown to be of greater risk to women than to men [17-19]. Truncal obesity and increased body mass index (BMI) have recently been proposed as potential independent risk factors, particularly in young women with CAD. In the St. James Women Take Heart Project, asymptomatic women who were unable to achieve 5 metabolic equivalents (METs) on a Bruce protocol have a 3-fold increased risk of death compared with women who achieved >8 METs, even after correcting for traditional risk factors [20]. When women with 2 or more risk factors were compared to women with no risk factors, those without risk factors had a substantially lower lifetime risk of CAD (8.2% vs. 50.2%) [21].

#### *CAD in Indian women*

The risk of CAD in Indians is 3-4 times higher than White-Americans, 6-times higher than Chinese and 20 times higher than Japanese [22,23]. In the Western population incidence of CAD in the young is up to 5% as compared to 12-16% in Indians [24,25]. In some studies from India the percentage of patients below the age of 45 years suffering from Acute Myocardial Infarction (AMI) is reported as high as 25-40% [26,27]. The prevalence of CAD is two-times

higher (10%) in urban than in rural India [28,29]. South Indians have higher prevalence, 7% in rural and 14% in urban areas [30,31]. This study is undertaken to assess the frequency, risk factors and presenting symptoms associated with CAD in females more than 18 yrs of age.

#### *Objectives of the study*

To study the clinical profile including frequency in different age groups, risk factors, presenting symptoms and clinical syndrome at presentation among women with CAD.

#### **Material and Methods**

The study was conducted in Air Force Command Hospital, Bangalore from 01 Oct 2013 – 30 Sep 2014 after obtaining approval from Institutional Ethical Committee. All females who were diagnosed of CAD in emergency room, medical/cardiology OPD, intensive coronary care unit and medical wards of Command Hospital were enrolled for the study.

#### *Inclusion Criteria*

- All female patients diagnosed of CAD at the time of study.
- Age  $\geq$  18

#### *Exclusion Criteria*

- Patients less than 18 years of age.
- Patients who refused to give consent.

#### *Presenting Symptoms*

Symptoms were categorised as follows

*Typical angina:* All three features need to be present

- a. Substernal chest pain or discomfort
- b. Provoked by exertion or emotional stress
- c. Relieved by rest and/or nitroglycerin

*Atypical angina:* When two of above three features are present, it was atypical angina

*Non angina chest pain:* When less than two features or none of the features were present.

The following risk factors for CAD in women were specifically looked into and noted.

1. Age
2. Family history of CAD
3. Hypertension
4. Diabetes mellitus
5. Hypercholesterolemia/Dyslipidemia
6. Obesity
7. Hypercoagulable states

*Patients were diagnosed with one of the following*

1. ST segment elevation MI (STEMI)
2. Non- ST segment elevation MI (NSTEMI)
3. Unstable angina (UA)
4. Chronic stable angina (CSA)
5. Asymptomatic ECG abnormality/ Silent MI

*STEMI* was diagnosed by having elevated biochemical markers of myocardial necrosis and ECG changes demonstrating either: ST segment elevation > 1 mm in two consecutive leads or new or presumed new left bundle branch block.

*NSTEMI* was determined by elevated biochemical markers of myocardial necrosis and either: ischemic symptoms compatible with ACS or ST-segment depression or T wave abnormalities.

*Unstable angina* was diagnosed by ischemic symptoms compatible with ACS and ST-segment depression or T wave abnormalities

*Stable angina pectoris* or CSA typically manifest as deep, poorly localized chest or arm discomfort (rarely described as pain), reproducibly precipitated by physical exertion or emotional stress and resolved within 5-10 min by rest or sublingual nitroglycerine.

In contrast *unstable angina* was defined as angina pectoris (or equivalent type of ischaemic discomfort) with at least one of the 3 features

1. Occurring at rest (or minimal exertion) and usually lasting >20 min (if not interrupted by administration of nitrate or analgesic)
2. Being severe and usually described as frank pain or
3. Occurring with crescendo pattern (i.e pain that awakes the patient from sleep or that is more severe, prolonged or frequent than previous pain)

*Myocardial infarction* also divided on the basis of wall involved and on the basis of ST -T changes in the ECG. STE AAMI- ST elevation anterior wall myocardial infarction is said to be present when ST elevation is mainly present in chest leads - V1-V6. IWMI-inferior wall myocardial infarction-said to be present when ST elevation is present in leads, II, III, and aVF.

#### Diagnosis

The diagnosis was made based on history, biochemical tests and non invasive tests like ECG, Treadmill, 2D ECHO and Stress MPI Scan. Coronary Angiography was carried out for diagnosis whenever it was necessary and as a part of management protocol.

Statistical analysis: It was an observational study. The data were collected carefully and entered. Means with Standard deviation were calculated for continuous variables and proportions were calculated for discrete variables.

#### Observations and Results

A total of 103 female patients were enrolled for the study. The results were stratified according to age groups, presenting symptoms, risk factors and

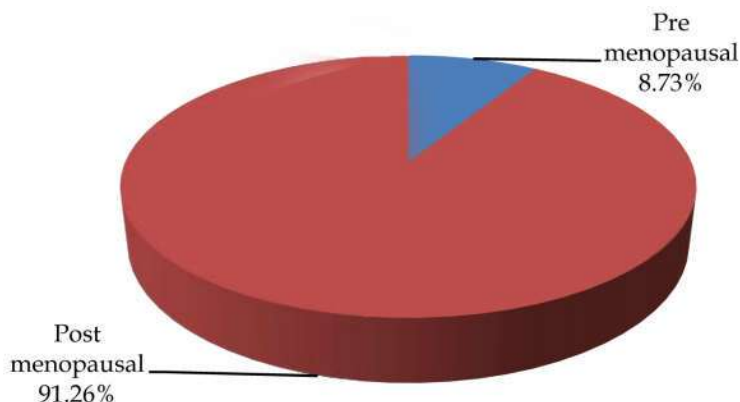


Fig. 1: Distribution of the subjects based on menstrual status

type of clinical syndrome of CAD. Most of the study subjects were of postmenopausal age and were distributed in the age group of 41-80 years. Age wise distribution of cases is summarized in Table 1. Maximum number of patients were noted in 61-70 year age group. Most of the CAD women were post menopausal ( Figure 1).

**Table 1:** Age Wise Distribution of Cases.

Sl. No.	Age	Patients
1	21- 30	01 (0.97 %)
2	31-40	02 (1.94 %)
3	41-50	26 (25.24 %)
4	51-60	27 (26.2 %)
5	61-70	35 (33.98 %)
6	71-80	12 (11.6 %)
<b>TOTAL</b>		<b>103 (100 %)</b>

Presenting symptoms are summarized in Table 2. Out of 103 patients, 97 (94.2 %) presented with chest pain and 06 (5.8%) patients presented with asymptomatic ECG abnormality. Majority of patients (72.87) did not have typical angina.

**Table 2:** Distribution of Presenting Symptoms.

S. No.	Symptoms	No of cases
1	Typical angina	28 (27.13 %)
2	Atypical angina	43 (41.74 %)
3	Non anginal pain	26 (25.24 %)
4	Asymptomatic ECG abnormality	06 (5.8 %)
Total		103 (100 %)

**Table 3:** Distribution of Selected Risk Factors.

Sl. No.	Risk factor	No of cases	
1	Hypertension	64 (62.13%)	
2	Type 2 DM	48 (46.6 %)	
3	Dyslipidemia	64 (62.1 %)	
4	Tobacco consumption in any form	06 (5.8%)	
5	Obesity (BMI ≥ 25 kg/m2)	54 (52.42%)	
6	Family h/o	Hypertension	03 (2.9 %)
		Type 2 DM	06 (5.8 %)
		CAD	09 (8.7 %)

Risk factor profile of our study cohort is depicted in table 3. In the present study, 64 (62.13%) patients had a past history of hypertension and 48 (46.60%) patients were known case of diabetes. Previous history of dyslipidemia was present in 64 patients (62.1% ) and 06 patients (5.8%) consumed tobacco in some form. Out of 103 patients 06 patients (5.8%) had a family history of diabetes and 03 patients (2.9%) had family history of hypertension. Nine patients (8.7%) had a family history of CAD. 54 patients had BMI of more than 25 kg/m<sup>2</sup> (52.42%).

**Table 4:** Distribution of Cases According To Clinical Presentation of Coronary Artery Disease.

Sl. No.	No of cases	
1	MI	45(43.68 %)
	(a)STEMI	30 (66.66%) 29.12%
	(b) NSTEMI	15 (33.33%) 14.56%
2	UA	25 (24.27%)
3	CSA	27 (26.21%)
4	Asymptomatic ECG abnormality	06 (5.8%)
Total		103(100%)

Type of clinical syndrome at presentation/ diagnosis is summarized in Table 4. A total of 45 patients (43.68%) were diagnosed to be having MI and with further stratification of MI patients, 30 (66.66%) were suffering from STEMI and 15 patients (33.33%) from NSTEMI. 25 patients (24.27%) presented with UA and 06 patients (5.8%) presented with asymptomatic ECG abnormality. 27 patients (26.21%) presented with Chronic stable angina (CSA).

## Discussion

In our study, out of 103 female patients 94 patients (91.26%) were postmenopausal (aged 60±20 years). A similar study conducted by Rout S et al. [33], observed 76% to be post menopausal subjects (aged 55±14 years). Lokesh S et al. [34] in their study on IHD among women in south India observed 74% of the women in the age group of 45-70 years .

In the present study of 103 patients, presentation as typical angina was seen in 28 individuals (21.73%). Forty three (41.74%) individuals presented with atypical angina, 26 (25.24%) patients presented with non anginal type of chest pain and 06 (5.8%) presented with asymptomatic ECG abnormality. In a study conducted by Rout S et al. [33], out of 106 patients, baseline resting ECG was abnormal in 28 cases (26.4%) in the form of non specific ST changes and T wave inversion. A study of 127 men and 90 women by Milner et al. [35], showed that dyspnea, nausea/vomiting, indigestion, fatigue, sweating, and arm or shoulder pain as presenting symptoms in the absence of chest pain were all more frequent among women than men. In our study we had majority of women presenting with atypical/ non anginal chest pain, similar to above study.

Rout S et al. [33] in their study of 106 women observed hypertension in 52.4% of patients, diabetes in 25.4% of patients and family history of premature CAD in 18.8% of patients. In our present study past history of hypertension was present in 62.13%, diabetes in 46.6% and family history of CAD in

11.65% of the patients. Diabetes was more frequent in our study possibly due to the fact that majority of women were from south India where prevalence of diabetes is higher.

In our study, overweight or obesity with BMI more than 25 kg/m<sup>2</sup> was seen in 54 patients (52.44%). Study done by Willett WC et al. [32] showed that body mass index of 25-29 kg/m<sup>2</sup> had twice the risk of CHD compared with women of body mass index <21 kg/m<sup>2</sup> [32]. Available evidence suggests that unrestrained weight gain worsens the atherogenic risk factor profile.

Dyslipidemia is an important risk factor for CAD. In our study, dyslipidemia was present in majority of cases. Total cholesterol was found raised in 35 (33.98%) patients, with an average value of 250±50 mg %, raised LDL was seen in 23 (23.33%) patients in the range of 125±20 mg %, low HDL was found in 30 (29.12%) and raised triglycerides in 48 patients (46.66 %) in the range of 200± 50 mg %. Similar results were observed in the study by Rout S et al. [33] and Lokesh S et al. [34].

The commonest clinical diagnosis at presentation was myocardial infarction (43.68%) followed by chronic stable angina (26.21%).

### Summary and Conclusion

In the present study of 103 women with CAD, we included the entire spectrum (CSA, UA, MI, asymptomatic ECG abnormalities and silent CAD). In our study 91.26% were post menopausal female in the age group of 41-80 yrs which is the most vulnerable age group. In the study group, 46.6% had diabetes, 62.13% had hypertension, 62.1% had past history of dyslipidemia and 52.44% were overweight or obese. 17.47% had family history of CAD or CAD risk factors. During investigations it was noted that majority had dyslipidemia, 46.66% of 103 patients had hypertriglyceridemia and 29.12% of them had low HDL.

We conclude that CAD affects post menopausal women more commonly than pre menopausal women (91.26% vs 8.73 %). Among them 41-80 yr is the most vulnerable age group, more so with associated risk factors of hypertension, dyslipidemia, obesity and diabetes. Majority of them do not present with typical angina but the commonest diagnosis at presentation is myocardial infarction. Therefore women presenting with chest pain particularly if postmenopausal should be subjected to detailed investigations to confirm or rule out CAD.

### Recommendations

Primordial and Primary preventive measures are recommended to reduce the incidence of coronary artery disease. Screening would prove to be an effective tool in early detection of the disease as CAD follows a typical iceberg phenomenon. Life style modifications are strongly recommended as it will help in reducing the key risk factors associated with CAD and hence can bring down the incidence of CAD among women.

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