ANGIOGRAPHIC PROFILE IN WOMEN WITH CORONARY ARTERY DISEASEManoj Ravi¹, Nisha Narendran²¹Associate Professor, Department of Cardiology, Jubilee Mission Medical College, Thrissur, Kerala, India.²Associate Professor, Department of Paediatrics, Government Medical College, Thrissur, Kerala, India.**ABSTRACT****BACKGROUND**

Coronary artery disease is the leading cause of morbidity and mortality among women as well as men in the industrialised world. Women represent 60 percent of those over the age of 65 years in the United States and more women than men have died of cardiovascular disease. Women and men with Acute Coronary Syndromes (ACS) have been found to have different clinical profiles and presentation with a smaller percentage of women than men presenting with ST-elevation MI, but more presenting with unstable angina. Women are more likely to die of first myocardial infarction, experience more long-term disability and have more comorbidities as presentations is later in life. Women also are less likely to undergo angioplasty or bypass surgery. Fewer women receive cardiac rehabilitation and medications. Hence the purpose of the study was to analyse the angiographic profile in relation to clinical presentation and risk factors.

Aims and Objectives- To analyse the angiographic findings in relation to clinical presentation and risk factors.

MATERIALS AND METHODS

Female patients with STEMI, NSTEMI or chronic stable angina without significant comorbidities were studied after Institutional Committee approval and informed consent from subjects and results were analysed.

RESULTS

Of the 140 patients studied, 85% belonged to post-menopausal age and the mean age of patients was 54.19 +/- 9.89 years. 68% had angiographic evidence of coronary artery disease, of which 48% had significant coronary artery disease. LAD (41%) was the commonest vessel and single vessel disease (39%) predominated among significant CAD cases. The relationship between diabetes (p= 0.009), BMI >= 25 (p= 0.007), family history of premature CAD (p= 0.006), total cholesterol >= 200 (p= 0.011), LDL >= 100 (p= 0.006) and HDL <= 40 (p= 0.009) were found to be statistically significant in the study.

CONCLUSION

The incidence of coronary artery disease is high in postmenopausal women as compared to premenopausal women. Women with acute coronary syndromes present more with unstable angina/ NSTEMI. Women are less likely to present with the syndrome associated with occlusive thrombus, that is with infarction with ST elevation.

KEY WORDS

Angina, Coronary Angiography, Coronary Artery Disease, NSTEMI, Risk Factors, STEMI, Women.

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BACKGROUND

Coronary artery disease is the leading cause of morbidity and mortality among women as well as men in the industrialised world. Women represent 60 percent of those over the age of 65 years in the United States⁽¹⁾ and more women than men have died of cardiovascular disease. Women and men with Acute Coronary Syndromes (ACS) have been found to have different clinical profiles and presentation with a smaller percentage of women than men presenting with ST-elevation MI, but more presenting with unstable angina. Women are more likely to die of first myocardial infarction, experience more long-term disability and have more comorbidities as presentation is later in life.^(2,3,4) Women also are less likely to undergo angioplasty or bypass surgery.

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Fewer women receive cardiac rehabilitation and medications.⁽⁵⁾ Hence, the purpose of the study was to analyse the clinical and risk factor profile of women admitted with CAD and their angiographic correlation.

Aims and Objectives

To analyse the angiographic findings in relation to clinical presentation and risk factors.

MATERIALS AND METHODS

Female patients with STEMI, NSTEMI or chronic stable angina without significant comorbidities were studied after Institutional Committee approval and informed consent from subjects and results were analysed.

Type of Study-Prospective observational study.

Study Setting- Lokmanya Tilak Municipal Medical College, Sion, Tertiary Care Hospital in Mumbai.

Study Period- Jan 2005 to July 2006

Sample Size- The sample size as considering the prevalence of CAD in women in India was fixed as 140 patients.

Inclusion Criteria

- Female patients with acute ST elevation myocardial infarction by standard definition.
 - Characteristic chest pain suggestive of ischaemia for prolonged period (> 30 mins).
OR
 - Evolutionary changes in ECG showing ST elevation of at least 1 mm in two contiguous limb leads or 2mm in two contiguous chest/ precordial leads.
OR
 - Characteristic rise and fall of enzymes (CK-MB and Troponins) suggestive of myonecrosis.
- Female patients presenting with unstable angina/NSTEMI. Unstable angina is defined as angina with at least one of the following:
 - Occurring at rest (or minimal exertion) and usually lasting more than 20 mins.
 - Being severe and described as frank pain and of new onset (i.e. within a month).
 - Occurring after a crescendo pattern.

Patients with elevated biomarkers of cardiac necrosis (CPK MB, Troponin) are diagnosed as having NSTEMI.

- Female patients with chronic stable angina.
 - Typical angina.
 - Substernal chest discomfort with a characteristic quality and duration that is provoked by exertion or emotional stress, and
 - Relieved by rest or nitroglycerine.
 - Atypical angina (probable) meeting 2 of the above characteristics.
 - Who had other standard indications for coronary angiography.

Exclusion Criteria

- Patients with serious comorbidities in whom the risks of the procedure outweighs the benefit of the procedure.
- Patients with non-cardiac chest pain (meets < 1 of the typical angina features).
- Patients not willing for revascularisation.

Method

The study was done after approval by the Institutional Research and Ethics Committee. The subjects were included after getting informed consent and demographic data. Clinical laboratory and angiographic profile was analysed using a proforma. Coronary angiography was performed on Siemens Image Intensifier based Cathlab System in the department. It was performed in multiple projections by the Judkins technique using either femoral or transradial approach. Images were acquired on cine films and stored in Hicor system.

Angiograms were analysed from cine recording and reports were compared with QCA measurements for extent of stenosis. Presence, location and extent of CAD were noted. For the purpose of study, significant stenosis of CAD was defined as luminal stenosis more than 70%. Patients with less than 70% luminal stenosis was defined as having minor lesions. Patients were classified as single vessel disease if only one vessel had significant stenosis, double vessel disease

if two vessels were involved and triple vessel disease if 3 vessels were involved. If there was a significant left main disease, it was considered to have left main disease.

Statistical Analysis

Data was entered in Excel and analysed using SPSS version 10. Quantitative variables have been expressed as mean with their standard deviation. Qualitative variables have been described in percentages. Quantitative variables like BMI, HDL were dichotomised using appropriate cut-off values suggested for this population. Analysis of risk factors have been done using Chi-square test. Significance level was placed at < 0.05.

RESULTS

140 subjects were included in the study-

- The mean age of patients was 54.19 +/- 9.89 years, maximum number of patients were > 60 yrs.
- 21 (15%) were premenopausal and rest 119 (85%) were postmenopausal. 95 (68%) patients had angiographic evidence of CAD, while coronary angiography was normal in 45 (32%) patients.

Figure 1. Risk Factor distribution in Patients with and without Angiographically proven CAD

	Patients with CAD (n=95)		Patients with Normal Coronaries (n=45)	
	n	%	n	%
Total cholesterol >=200 mg% (n=35)	30	31	5	13
LDL >=100 mg% (n=34)	37	39	7	18
HDL <=40 mg% (n=34)	31	33	3	7
Triglycerides >=150 mg% (n=40)	31	33	9	20
Table 1. Abnormal Lipid Values in patients with Normal Coronaries and patients with CAD				
	No. of Patients (n=13)			
Diabetes mellitus	5		38	
Hypertension	8		62	

Passive smoking	4	31
Tobacco chewing	3	23
Family history of premature CAD	4	31
BMI ≥ 25	1	8
Total cholesterol ≥ 200	5	38
LDL ≥ 150	6	46
OCP use	2	16

Table 2. Risk Factor distribution in Premenopausal Women with Angiographically proven CAD

Figure 2. Type of Presentation in patients with normal Coronaries and patients with CAD

Coronary Vessel	No. (n=192)	%
LAD	78	41
LCX	50	26
RCA	56	29
Left Main	8	4

Table 3. Distribution of Lesions in Coronary Vessels

Figure 3. Relation of Type of Presentation with Type of Coronary Lesion

Risk Factor	Total No.	CAD		P value
		Present	Absent	
Diabetes	45	39	6	0.009

Without diabetes	95	56	39	0.058
Hypertension	71	55	16	
Without hypertension	69	40	29	
Passive smoking	20	16	4	0.301
Without passive smoking	120	79	41	
Family history of premature CAD	19	18	1	0.006
Without family history of premature CAD	121	77	44	0.304
Tobacco chewing	19	17	2	
Without tobacco chewing	121	78	43	
BMI ≥ 25	24	22	2	0.007
BMI ≤ 25	116	73	43	
Total cholesterol ≥ 200	35	30	5	0.0114
Total cholesterol ≤ 200	105	65	40	
LDL ≥ 100	44	37	7	0.006
LDL ≤ 100	96	58	38	
HDL ≥ 40	33	31	3	0.009
HDL ≤ 40	107	64	42	
TG ≥ 150	40	31	9	0.161
TG ≤ 150	100	64	36	
Postmenopausal	119	82	37	0.613
Premenopausal	21	13	8	

Table 4. Relationship of Risk Factors with Coronary Artery Disease

DISCUSSION

This study was done to assess the clinical and risk factor profile of women admitted with coronary artery disease and to analyse the angiographic findings in relation to risk factors.

The mean age of affected group in the study was 54.19 $\pm$ 9.89 years, maximum patients being in > 60 years' age group. Youngest patient was 30 years and oldest was 75. The mean age is in par with findings from many other studies. Women are about 10 years older than men at first manifestation of CAD in the absence of other risk factors.^(6,7,8,9)

119 (85%) patients in our study population were postmenopausal age group.

Out of 140 patients 45 (32%) had normal coronaries, while 95 (68%) had coronary lesions on angiography. This is similar to the 30.7% normal coronaries as concluded by Dave TH et al after analysing a similar set of 101 female patients.⁽¹⁰⁾ Analysis of coronary angiograms from a large series of women enrolled in the WISE study who had suspected ischaemic chest pain, 34% had no detectable coronary lesion. This can be attributed to atypical chest pain in women.

Out of 21 premenopausal females 13 (62%) had evidence of coronary artery disease on angiography, of which 48% had significant coronary artery disease. In a study of women under the age of 45 years referred for coronary angiography, De S et al found that 65% had completely normal coronary arteries.⁽¹¹⁾

Of the 323 women enrolled in the pilot phase of Women's Ischaemia Syndrome Evaluation study who had suspected ischaemic chest pain, age, hypertension, diabetes mellitus, prior myocardial infarction, current hormone replacement therapy and unstable angina were all significant independent predictors of significant disease.⁽¹²⁾

The prevalence of cardiac risk factors and the rate of angiographically critical coronary artery disease in women under the age of 45 years for the first time evaluation of chest pain was studied by De S et al.⁽¹¹⁾ When compared to people without angiographic evidence of CAD, women with CAD had a higher prevalence of dyslipidaemia (72% versus 47%, $p=0.002$), diabetes (29% versus 9%, $p < 0.001$) and smoking (67% versus 50%, $p=0.03$). The association of risk factors with angiographically proven coronary artery disease was analysed in this study. The relationship between diabetes ($p=0.009$), BMI ≥ 25 ($p=0.007$), family history of premature CAD ($p=0.006$), total cholesterol ≥ 200 ($p=0.011$), LDL ≥ 100 ($p=0.006$) and HDL ≤ 40 ($p=0.009$) were found to be statistically significant.

In the study by De S et al to determine the rate of angiographically critical coronary artery disease in women under the age of 45 years who sent for the first time evaluation of chest pain requiring cardiac catheterisation, 52 percent patients with significant coronary artery disease had single vessel disease. In the present study, single vessel disease was commonest followed by double vessel disease as well.

Left anterior descending (41%) was the most common vessel followed by right coronary artery (29%). The LAD was the most commonly affected as per study by Pinto RJ et al as well.⁽¹³⁾ Among patients with TVD, 75% (12 out of 16) presented with unstable angina/ STEMI. This relation was found to be statistically significant.

CONCLUSION

The incidence of coronary artery disease is high in postmenopausal women as compared to premenopausal women.

Women with acute coronary syndromes present more with unstable angina/ NSTEMI. Women are less likely to present with the syndrome associated with occlusive thrombus - that is with infarction with ST elevation.

A substantial percentage of women presenting with symptoms of angina pain have angiographically normal coronaries suggesting that angina as a presenting symptom is less predictive of occlusive coronary artery disease in women.

Among premenopausal women with coronary artery disease, hypertension and low HDL are the most common risk factors.

In women with coronary artery disease, majority has a single vessel disease. Most involved vessel is left anterior descending artery.

Diabetes mellitus and body mass index more than or equal to 25 are significantly associated with angiographically proven coronary artery disease in women.

Family history of premature coronary artery disease is an important risk factor in women.

Elevated total cholesterol and LDL and decreased HDL is significantly associated with coronary artery disease in women. However, relation with elevated triglycerides is not statistically significant. Women with triple vessel disease are more likely to present with unstable angina. Triple vessel disease is more common in women with diabetes mellitus, elevated total cholesterol, elevated LDL and elevated triglyceride levels.

Limitations of the Study

This is an observational study and controls were not included. Men were not included in the study for comparison between genders. Sample size being small, broad conclusions cannot be made from the study. The effect of various risk factors on disease progression was not studied as no follow-up was done as part of the study. Premenopausal patients formed only a small group in the study.

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