High Risk Factors and Angiographic Investigation among Indian Women with Coronary Artery Disease

Siddhartha Rout[1*], Nusrath Fathima[4], Sandeep Kumar Vishwakarma[2], Aleem Ahmed Khan[3#]

[1]Associate Professor, The Heart Institute, Owaisi Hospital and Research Centre, Deccan College of Medical Sciences, Kanchanbagh, Hyderabad-500 058, Andhra Pradesh, INDIA.

[2]Centre for Liver Research and Diagnostics, Deccan College of Medical Sciences, Kanchanbagh, Hyderabad-500 058, Andhra Pradesh, INDIA.

[3]Professor, Salar-E-Millat Sultan Salahuddin Owaisi Centre for Cellular and Molecular Medicine, Princess ESRA Hospital, Sahalibanda, Hyderabad, Andhra Pradesh, INDIA

[4]Department of Genetics, Osmania University, Hyderabad-500 027, Andhra Pradesh, INDIA.

Corresponding Addresses:

[*]srout2005@gmail.com, [#]aleem_a_khan@rediffmail.com

Research Article

Abstract: **Background:** Cardiovascular disease (CVD) is globally considered as the leading cause of death with 80% of CVD related deaths being reported from low and middle income countries like India. Several emerging risk factors are being involved in its increasing prevalence due to lack of proper screening, evaluation and management. Indian women are less likely to be referred for coronary angiogram or revascularization procedures. Even after underlying procedures like angioplasty or bypass grafts, the women have poorer outcome, when compared to their male counterparts. **Aim of the study:** To assess the risk factor and angiographic profile of coronary artery disease in Indian women. **Methodology:** Indian women patients having CAD were screened based on the exclusion and inclusion criteria. Coronary angiography was performed and all risk factors were analyzed and correlated with the severity and extend of the lesion. **Results:** Among 106 females, 81 (76%, age: 55±14 years) were postmenopausal. DM, HTN, Dyslipidemia, family history of CAD and past history of MI was present in 27, 58, 28, 33 and 17 patients respectively. TMT was positive in 70 (66%) patients. Clustering of risk factors like DM, HTN, Dyslipidemia particularly low HDL occur commonly in women. Single vessel disease is more common particularly involvement of LAD. **Conclusion:** Highest group of women was found to be postmenopausal. HTN, DM, HDL and dyslipidemia were most commonly associated risk factors among Indian women with CVD. Most of the patient (>50%) had coronary stenosis and SVD were most commonly involved with increased LAD lesion severity.
Keywords: Cardiovascular disease, risk factors, epidemiology in Indian women.

Introduction

Cardiovascular disease (CVD) is globally considered as the leading cause of death with 80% of CVD related deaths being reported from low and middle income countries like India. Coronary artery disease (CAD) is raising its ugly head engulfing both sexes. In America women represent 60% of population over age of 65 years and more women than men have died of cardiovascular disease (CVD) since 1984 [1]. In women, the age related increase in CVD tends to lag behind that of men by approximately one decade; it increases after menopause, leading to the concept that endogenous estrogen is protective in premenopausal women [2]. Various risk factors like age, hypertension, diabetes, smoking and dyslipidemia play a role in accelerating atherosclerosis process in women also. In 1990, there were 783,000 deaths due to CAD in India and this is projected to double by the year 2015 [3]. From 1960 to 1995, the prevalence of CAD in adults increased from 3% to 10% in urban Indians and 2% to 4% in rural Indians, with women having rates similar to men [4]. Women have worse prognosis when they suffer from myocardial infarction (MI). In the Framingham Heart Study, the one year mortality following MI was 44% in women versus 27% in men [2]. The overall short term and long term mortality following an MI are about 40% higher in women after adjustment for age and other risk factors. Inspite of the excess risk, the women are half as likely as men to receive aspirin beta blockers or thrombolytic therapy. They are also less likely to be referred for coronary angiogram or revascularization procedures. Even after underlying procedures like angioplasty or bypass grafts, the women have poorer outcome, when compared to their male counterparts. Women are more likely than men to present with angina as the initial complaint but the reliability of typical angina as a feature of CAD is extremely poor in women. Women having myocardial infarction (MI) are more likely to present with atypical chest pain and atypical symptoms like indigestion, nausea, vomiting and dyspnea [5]. They present to the hospital significantly later than men, which decreases the

benefit of reperfusion therapy. Among Indian women, the presence of hypertension, diabetes, low levels of high density lipoprotein and high levels of total cholesterol (TC), triglycerides (TG), low density lipoproteins (LDL) and LP (a) are correlated with CAD [6]. When compared with western counterparts, Indian men and women have lower prevalence of hypertension, hypercholesterolemia, obesity and smoking, but a higher prevalence of high TG, low HDL, glucose intolerance and central obesity. Unlike in men, whose LDL levels plateau at 50 years of age, the LDL levels in women rise steadily by an average of 2mg/dl/year between age of 40 and 60. Low HDL is an important risk factor even if TC and TG level are normal [3]. It is a strong predictor of CAD in women than in men, especially after the age of 65; indeed, the protective effect of HDL is twice as important as the atherogenic effect of LDL. HDL levels are twice as important as the atherogenic effect of LDL. HDL levels are an about 10mg/ dl higher in premenopausal women than in men. Among women, the HDL level varies markedly depending on the ethnicity, with Indian women having the lowest levels. The HDL level among India women (45mg/dl) is about 10mg/d; lower than in whites (55mg/dl). This may be one of reasons why Indian women suffer from CAD more commonly than their western counterparts. Total cholesterol/HDL (TC/HDL) ratio is widely recognized as the single best predictor of CAD. Indian women have high TC/HDL ration by virtue of low HDL, even women TC levels are not elevated. The optimum TC/HDL ratio is 3 and the average ratio is 4. A TC/HDL ratio >5 appears to be a strong predictor of CAD and is observed in 25% of industrial and 32% of urban female populations in India [7]. A high triglyceride level is a strong predictor of CAD in women than in men. An increase in TG level of 90mg/dl increases CAD risk by 75%in women versus 30% in men. A high TG level is significantly associated with cardiac and total mortality in women. A low level of HDL often accompanies a high TG. Among women, a history of an MI or sudden death before the age of 55 in a sister is more strongly associated with risk of MI than that in a brother or parent. A family history of premature CAD in a sister is associated with 12 fold higher risk versus 6 fold for a brother and 3 fold a parent [8]. Women with a family history of premature CAD should follow a course of action similar to the one recommended for those who have survived an MI. Compared with the age group 34Y - 44Y, CAD mortality among women increase 40 fold by the age of 80, when its incidence becomes identical in both sexes. Women are 10 years older than men at first manifestation of CAD, although they have similar plaque load [9]. Women lose the 10 years advantage of the smoke, have diabetes or had a premature menopause. The post menopausal increase in

the risk of CAD is related to a higher incidence of hypertention, diabetes, dyslipidemia and obesity. The steady increase in CAD mortality with age is in sharp contrast to the breast cancer, which peaks between the age of 40 and 50 years and declines steadily thereafter. Diabetes is now regarded as CAD risk equipment and is a stronger risk factor for CAD in women than in men, with a 3 to 7 fold higher CAD incidence and mortality compared to 2 to 3 fold higher risk in men. Diabetes eliminated the protective effects of estrogen and removes the normal sex differences in the prevalence and shorter survival than men. Women have smaller coronary arteries than men despite controlling for differences in body size. Hypertension also confers a 4 fold risk of CAD in women as compared to men (3 fold).

Aim of the study

To assess the risk factor profile and angiographic profile of coronary artery disease in women in the Department of Cardiology.

Selection of patients

Female patients of chest pain with high suspicion of CAD were taken by the following Inclusion and Exclusion criteria in this study.

Exclusion criteria

Patients with recent MI or unstable angina within prior 2 months, CCF, renal failure, hepatic failure, valvular heart disease, congenital heart disease, pregnancy, angiography, and CABG were excluded from the study.

Inclusion criteria

Details history physical examination and risk factors were ascertained. These are family history of premature CAD, smoking, dyslipidemia, DM, HTN. After admission blood investigation including routine blood sugar, urea, serum creatinine, lipid profile analysis, ECG and echocardiography were done in all patients. All patients underwent Trademint testing.

Coronary angiography

All patients were subjected to coronary angiography through femoral approach (Judkins method). The angiographic pattern of coronary arteries was classified according to the number of major coronary arteries was classified according to the number of major coronary artery involved. It is called single, double, triple vessel disease when one two or three major coronary artery is diseased respectively. The arterial segments were viewed in such view that have minimal overlapping or fore shortening of the lesions. The lesion is taken as significant when the degree of stenosis is ≥50% of the luminal diameter. Less than 50% of diameter stenosis was taken as minor disease and as normal when there is no stenosis.

At the end of the study all the risk factors were analysed and correlated with the severity and extend of the lesion. Results were compared with that of other studies.

Results

A total number of 106 female patients were included in this study. The details beseline characteristics of patients have been shown in Fig. 1. Hypertyension was present in 58 (52.4%) of patients, diabetes in 27 (25.4%) patients and family history of premature CAD in 20 patients (18.8%). Of all, 81 (76%) were post menopausal. smoking was not found in any patient. Dyslipidemia was present in 28 (24.5%) cases. Of all the patients with dyslipidemia raised TC was found in 12 (42%) patients, with an average value of 226±12mg%. raised LDL was seen in 14 (50%) patients with an average of 136±18.4mg%. low HDL was found in 22 (78.6%) raised TG in 18 patients (64.2%) in the range of 188±22mg%. past history of MI was evident in 17 (16%) cases. The baseline resting ECG was abnormal in 28 cases (26.4%) in the form of non specific ST changes and T wave inversion. TMT was positive in 70 (66%) cases.
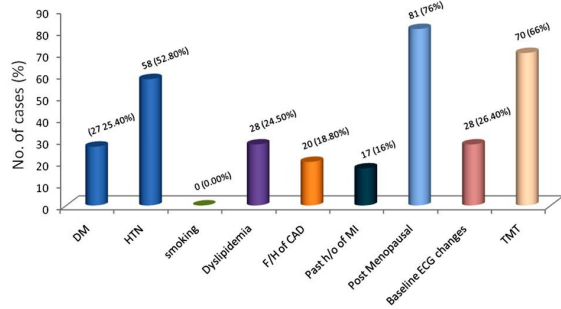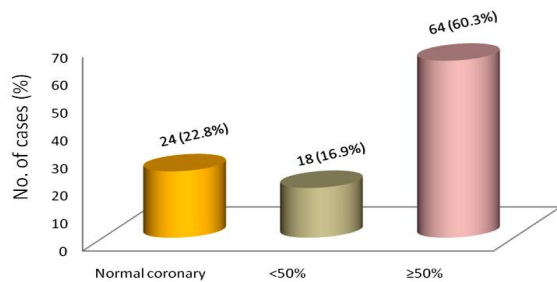

Figure 1: Baseline characteristics (n=106) showing risk for various risk factors associated with the included subjects

Low HDL is the commonest pattern of lipid abnormality in this present study (Table 1).
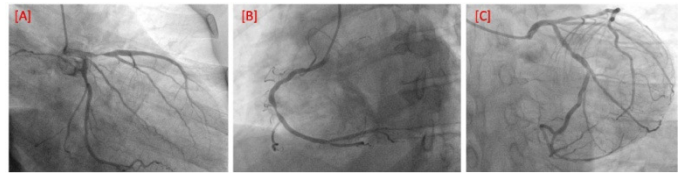
Table 1: Abnormal lipid profile

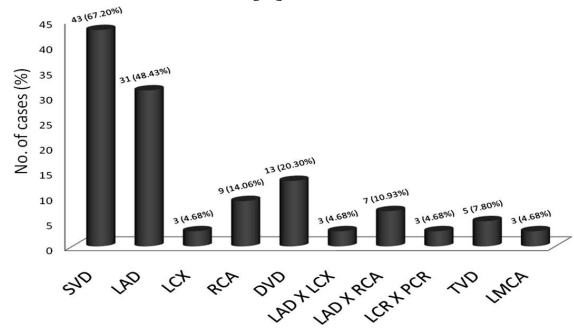|	No. of Women	Mean value (mg %)	percentage
↑TC	12	226±16	42%
↑LDL	14	136±18	50%
↓HDL	22	34±6	78.6%
↑TG	18	188±22	64.2%

Figure 2: Angiographic profile of the patients. 64 (60.3%) patients had significant coronary artery disease,

24 (22.8%) patients had normal coronaries and 18 (16.9%) patients had <50% stenosis of coronary artery.

**Figure 3:** Coronary angiogram of subjects showing [A] LAD [B] RCA and [C] LAD X RCX

Figure 4: Angiographic pattern of coronary artery involvement among women. Out of 64 patients with significant CAD, 43 (67.2%) patients had single vessel disease, 13 (20.3%) patients had double vessel disease and 5 (7.8% patients had triple vessel disease. 3 (4.7) patients had left main coronary artery involvement.
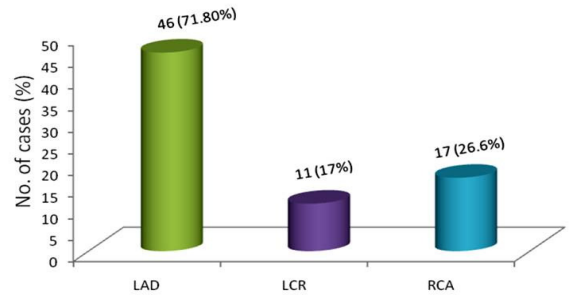
Figure 5: Angiographic pattern of coronary artery involvement with ≥ 50% stenosis (n=64)

In total the involvement of LAD was found to be in 46 (71.8%) patients. Left circumflex artery in 11 (17%) patients and RCA in 17 (26.6%) patients (Fig. 4).
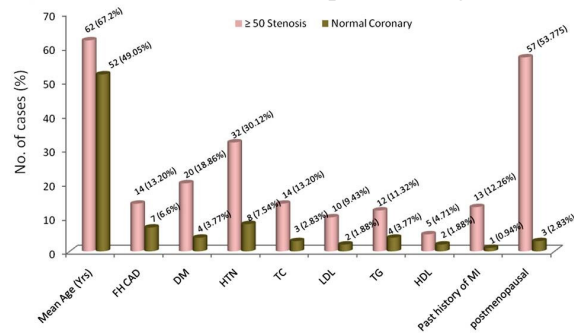
Figure 6: Shows those women having >50% of stenosis was in the higher age group and more likely to be diabetic, hypertensive and dyslipidemic. 13 (58%) patients with past history of MI had significant coronary artery disease. Significant coronary artery disease was seen in 57 postmenopausal women.

Discussion

In the present study the risk factors that were found more commonly in women are hypertension (52.8%), diabetes (25.4%) and dyslipidemia (24.5%). This is in agreement with other reports in literature. Family history of CAD was found in 18.8% cases. This is consistent with the other studies. However reported incidence of family history of CAD in women is much less in Indians. None of our patients were smokers. Smoking is rare amongst women in this part of the country. Among dyslipidemic patients low HDL was found in 78.6% followed by increased TG in 64%, increases LDL in 50% and increased TC in 42% of patients. This suggests low HDL is a predominant risk factor for coronary artery disease in this part of country. The similar observation was reported by Robert *et al* (2002) in this study 60.3% of women showed significant coronary artery disease which is slightly higher than the reports of WISE study 43% had significant artery disease [10]. This report is comparable to the reports of Dave *et al* (1991) which showed 70 out of 101(69.3%) women had significant CAD [11]. Higher incidence of significant CAD amongst women in our study may be a chance finding or higher prevalence of CAD in this part of the country or due to clustering of risk factors in women. In this present study SVD, DVD, TVD and left main involvement was found in 67.2%, 20.3%, 7.8% and 4.7% of patients with significant CAD. Similar percentage of involvement has been shown in WISE study. Dave *et al* (1991) from AIIMS have reported higher incidence of TVD (39.6%) [11]. Significant LAD lesion was found 71.8% of cases. WISE study reported significant LAD lesion in 62% of women. But Srinivasan *et al* (2002) reported LAD to be involves 85% of women [12].

Conclusion

81 (76%) women (aged: 55±14 years) were postmenopausal. DM, HTN, Dyslipidemia, family history of CAD and past history of MI was present in 27, 58, 28, 33 and 17 patients respectively. TMT was positive in 70 (66%) patients. Clustering of risk factors like DM, HTN, Dyslipidemia particularly low HDL occur commonly in women. Single vessel disease is more common particularly involvement of LAD. Therefore women presenting with chest pain particularly if postmenopausal should be subjected to detail investigations to confirm or rule out CAD as advised for men.

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Conflict of interest The authors declare that they don't have any conflict of interest

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