

Comparative Analysis of Incidence and Severity of Coronary Artery Disease in Females of Different Age Groups

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Abstract

Background: Coronary artery disease (CAD) is a group of cardiovascular disorders which include stable and unstable angina, myocardial infarctions and sometimes present as sudden cardiac death. It is believed that the males are at more risk of CAD than females but recently it has been found that CAD is becoming the principal cause of death in postmenopausal women universally.

Materials and Methods: A total of 240 patients between 25 and 65 years of age were selected for the study at our tertiary care teaching hospital. All vessels were analyzed by quantitative coronary angiography (QCA) using a preinstalled software in the system. The disease severity was analyzed on grounds of the percentage of stenosis of coronary arteries. A coronary artery having stenosis of more than 70% of its diameter or coronary arteries with more than 50% of stenosis on left sided arteries were called as significant stenosis. Based on these parameters we evaluated the stenosis of coronary arteries as single/double/triple vessel disease by QCA.

Results: All females underwent angiography out of which 63% were of postmenopausal age, whereas 37% of pre-menopausal age. The most common clinical presentation in both the groups was stable angina. The severity of disease was mild in a premenopausal group, whereas it was more severe in postmenopausal group.

Conclusion: The severity and incidence of CAD are more in postmenopausal women as compared to perimenopausal.

Key words: Angiography, Coronary artery disease, Peri-menopausal females, Pre-menopausal, Stenosis

INTRODUCTION

Coronary artery disease (CAD) is a group of cardiovascular disorders which include stable and unstable angina, myocardial infarctions (MI) and sometimes present as sudden cardiac death. The patient usually presents as discomfort or pain in the shoulder, arm, neck and back, heart burn, shortness of breath. Mostly, the symptoms aggravate with exercises and emotional stress, but rest is the relieving factor. The subjects with high blood pressure,

diabetes, obesity, poor nutrition, addiction of nicotine and alcohol are at risk of CAD.^{1,2}

In 2013, 8.14 million deaths occurred due to CAD globally, whereas in 1990 the reported deaths due to this disease were 5.74 million. So, CAD is becoming a burden to the society. Studies institute that in developed countries like the United States the risk of death from CAD has decreased between 1990 and 2000. So, it becomes clear that developing countries like India are major contributors of death incidence due to CAD.^{3,4}

According to literatures,³⁻⁵ the males are at more risk of CAD than females but recently it has been found that CAD is becoming the principal cause of death in postmenopausal women universally. Many studies favor that, although the rate of occurrence of CAD in premenopausal females is less, but the prognosis is very poor. Mortality rate due to MI for females is

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higher than males for all age groups and poorer for young females.^{6,7}

In Framingham Heart Study, 44% of mortality rate was seen in females 1 year after MI as compared to 27% in males.⁶ A study done by Women's Ischemia Syndrome Evaluation reports that endogenous estrogen deficiency increases the risk of CAD seven times.⁵ Regarding the age, National Health And Nutrition Surveys have found that the incidence of MI is more in 35-54 years in women, while it is less in likewise aged men.⁷

In a recent study conducted in India, it was found that the lifetime possibility of death from CAD is 10 times greater in females than from breast cancer, whereas it is commonly believed that the breast cancer is one of the major causes of mortality in females in developing countries.^{8,9}

Various possibilities have been suggested behind the increasing incidence of CAD in women. Studies suggest that smaller vessel size, imprecise electro-cardiographic changes at rest and decrease exercise aptitude might contribute in this respect. Newer risk factors for CAD includes increase levels of lipoprotein A, triglycerides, Apo-B, high level of low density lipoprotein, low levels of high density lipoprotein, increased plasma homocysteine, and C-reactive protein.^{9,10}

Micro-vascular abnormalities and diffuse non-obstructive coronary atherosclerosis are more customary in women as compared to men. Angiography is considered as the most essential diagnostic tool, but since non-obstructive CAD is common in women, so the diagnosis of the disease becomes difficult. In premenopausal women acute coronary syndrome which show normal coronary arteries angiographically is also common than men.⁹⁻¹¹

The aim of present study is to do the comparative study of the severity, clinical presentation of CAD and involvement of coronary arteries in premenopausal and postmenopausal women.

MATERIALS AND METHODS

After obtaining approval from the Institutional Ethical Committee and due consent from 240 patients between 25 and 65 years of age were enrolled at our tertiary care teaching hospital. The study was conducted between January and December 2014. The patients who refused to give consent for the study, with chronic liver/renal diseases were excluded from the study.

The patients were enquired with symptoms of difficulty in breathing on exertion, chest pain, and any other

cardiac complaints. After thorough history taking and cardiovascular examination, all patients underwent electrocardiogram and echocardiogram on rest. Other routine investigations such as complete hemogram, blood glucose, (random) and renal function tests (blood urea and serum creatinine) were also performed. All cases underwent coronary angiogram (conventional and modified views) and left anterior descending, right coronary and left circumflex arteries were evaluated.

All vessels (individual vessels and their major branches) were analyzed by quantitative coronary angiography (QCA) using a preinstalled software in the system. The disease severity was analyzed on grounds of the percentage of stenosis of coronary arteries. A coronary artery having stenosis of more than 70% of its diameter or coronary arteries with more than 50% of stenosis on left sided arteries were called as significant stenosis. Based on these parameters we evaluated the stenosis of coronary arteries as single/double/triple vessel disease by QCA.

Statistical Analysis

All data were presented as mean \pm standard deviation. Student's *t*-test was applied on parametric data. Data analysis was done using SPSS (19 version) software. A *P* < 0.05 was taken as significant.

RESULTS

During the period of study 240 females underwent angiography out of which 63% were of postmenopausal age, whereas 37% of pre-menopausal age (Table 1 and Figure 1). The most common clinical presentation in both the groups was stable angina. Anterior MI was more common in both the groups as compared to inferior and lateral MI (Table 2 and Figure 2). The mean age of 60.85 years is most common presentation in the postmenopausal females and 37.75 years in the premenopausal. The most common indication for coronary angiogram in both pre and postmenopausal females was unstable angina. However, the second most common presentation in premenopausal females was unstable angina and in postmenopausal females was anterior MI. The least common MI in both the groups is lateral MI. In

Table 1: Baseline characteristics (mean \pm SD)

Variables	Premenopausal women (n=90)	Postmenopausal women (n=150)	P value
Mean age (years)	37.75 \pm 6.83	60.85 \pm 7.71	-
Mean systolic blood pressure (mm of Hg)	127.86 \pm 17.31	131.63 \pm 20.17	0.82
Mean diastolic blood pressure (mm of Hg)	78.91 \pm 10.49	82.35 \pm 12.83	0.39

SD: Standard deviation

Table 2: Clinical presentation of pre/postmenopausal patients presented for CAD

Clinical presentation	Premenopausal women (n=90)	Postmenopausal women (n=150)
Stable angina	21	56
Unstable angina	19	27
Anterior MI	16	33
Inferior MI	9	10
Lateral MI	3	8
Miscellaneous	22	16

CAD: Coronary artery disease, MI: Myocardial infarction

Table 3: Severity of CAD in pre/postmenopausal patients

Severity of CAD	Premenopausal women (n=90)	Postmenopausal women (n=150)
Mild disease	32	15
Single artery disease	29	20
Double artery disease	12	48
Triple artery disease	9	58
Others	8	9

CAD: Coronary artery disease

our study, we found that severity of disease was mild in a premenopausal group, whereas it was more severe in the postmenopausal group (Table 3 and Figure 3).

The percentage of triple artery disease is very high (38.6%) in the postmenopausal group but it is very less (10%) in another group. Mild disease is more common in premenopausal group (35.5%) which implies that severity of disease is less in women having regular menstrual cycles.

DISCUSSION

The differences in cardiovascular ailment in males and females advocate a lack of knowledge and awareness among females regarding risk declining efforts. This might be the reason why since 1984, the average figure of deaths from cardiac diseases has been larger for females when compared to males.¹²

Another study recommends that mortality rate after MI is also more in females. Age at the time of clinical presentation and adverse risk factors are two important factors which affect the outcome of disease in females. However, when the risk factors are guarded women also tend to have a better prognosis than men.¹³

Certain studies suggest that from 1990 to 2020, mortality due to CAD would boost by 38% in men and 30% in women in developed countries. Whereas, in developing countries like India, the mortality rates due to CAD were 127% in females and 130% in males. These percentages

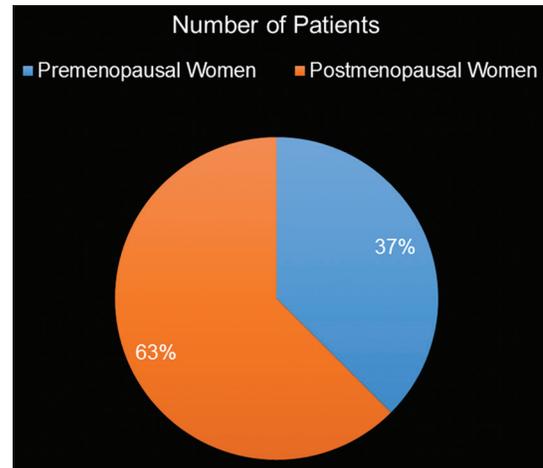


Figure 1: Number of pre/postmenopausal patients included in the study

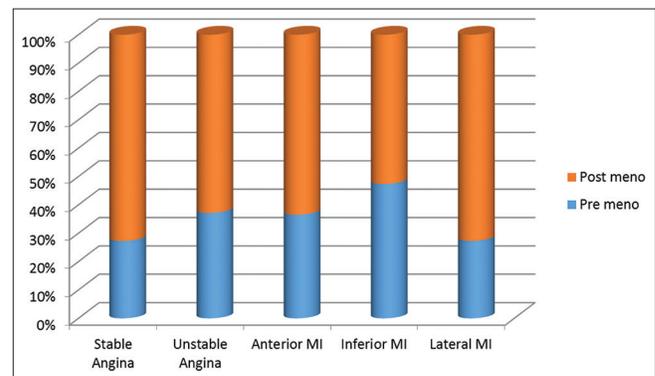


Figure 2: Comparison (%) of clinical presentations of coronary artery disease in pre and postmenopausal women

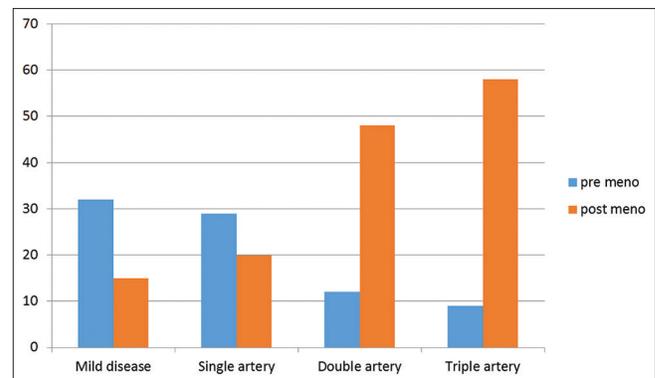


Figure 3: Comparison of severity of disease in pre and postmenopausal women

are very high in developing countries as compared to developed one.^{9,14}

In our study, most of the female patients of cardiovascular disease who were admitted to hospital with MI were of postmenopausal age. Our findings were supported by another study who reported that the incidence of obstructive CAD is comparatively less before menopause.

Another factor which is considered for higher rate of CAD disease in postmenopausal group is diabetes which is responsible for increasing the severity of disease.¹⁵

Admission of patients in hospitals with acute coronary conditions was nearly equal in both the groups. However, a study done by Saleh *et al.* on Asian people have shown the high proportion of ST elevation MI among premenopausal women.¹⁶ Various studies suggest that severe CAD including double-vessel and triple vessel diseases were found to be more frequently seen among postmenopausal patients.^{15,17}

According to coronary artery surgical study registry, many females with chest discomfort are clinically inseparable from angina pectoris. They had no significant CAD in angiography with 50% presenting non-significant coronary obstruction.^{18,19} In our study, most of the women had coronary symptoms, but no definite lesion on angiography was found.¹⁸

In a later stage, chronic diseases such as hypertension and diabetes show significant augmentation in risk factors in the incidence as well as the severity of CAD. Another study reported that the occurrence of obstructive CAD with stenosis is found in more than 50% of females having cardiac problem. According to age, it includes 27% of women of age <50 years and up to 64% of age 80 years.^{7,15}

CONCLUSION

Though the predictable risk factors play a significant role in the expression of CAD, occurrence of noteworthy CAD in premenopausal women desires further assessment for non-predictable risk factors.

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