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RESEARCH ARTICLE

“CLINICAL AND ANGIOGRAPHIC PROFILE OF CORONARY ARTERY DISEASE IN YOUNG WOMEN - A TERTIARY CARE CENTRE STUDY FROM NORTH EASTERN INDIA”

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Abstract

Background: Coronary artery disease (CAD) is the biggest killer of women globally. CAD among young women as a group is less easily recognized worldwide. Young women are underrepresented in most of the CAD studies. This study assessed Clinical and angiographic profile of CAD in young women of North-East India to have a better understanding of the nature and course of the disease.

Material and Methods: This was a prospective, observational, single centre analytical study. Total participants were divided into 2 groups – young women less than 55 years and old women more than or equal to 55 years. Modes of presentation, risk factors, clinical and angiographic profile of CAD were compared. Risk factors studied were smoking, hypertension, diabetes mellitus, dyslipidaemia, obesity and family history of premature CAD. CAD severity was assessed by Syntax score and Gensini score.

Results: A total of 143 women were studied. Out of these 57 women were < 55 years and 86 women were ≥ 55 years of age. Hypertension was the most common risk factor found in both groups of women followed by diabetes and dyslipidaemia. Most common presentation among younger women were chronic stable angina followed by ST elevation myocardial infarction (STEMI). In younger women most of them had normal Left Ventricular Ejection Fraction, 54.4 % vs 41.9% of patients (p=0.04). Younger women had normal coronaries in 19.3% vs. 9.3% in older women (p=0.072). Younger women had significantly lower number of multivessel diseases than older women, 29.8% vs 44.18% (p = 0.045). Left Anterior Descending coronary artery (LAD) was the most common coronary artery involved in both groups (43.9% vs 52.3%). Low Syntax score (≤22) and low Gensini score (≤20) were found in younger women 75.4% vs older women 67.4% (p=0.201) and 56.1% vs. 40.7% (p=0.05), respectively. The increase in Syntax and Gensini score with increase in number of risk factors were found to be statistically significant in both the groups.

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Conclusion: In younger women, most of the patients presented with chronic stable angina and STEMI with a preceding history of angina. Hypertension and diabetes were most common risk factors; both being modifiable needs utmost attention for prevention. Coronary angiography revealed less severe CAD in younger women than older women as assessed by coronary severity score.

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Introduction:-

Coronary artery disease is the biggest killer of women globally. Coronary artery disease causes 8.6 million deaths among women annually, a third of all deaths in women worldwide (Heart Disease and Stroke Statistics-2009 Update). India is now estimated to be the coronary artery disease (CAD) capital of the world. CAD among women especially in young women as a group is less easily recognized worldwide. It is a major cause of mortality and morbidity among women in developing countries. The onset of occurrence of CAD in women is usually significantly later than in men due to the vascular protective effect of oestrogen which helps to delay the formation of atherosclerosis. However, coronary artery disease has come to be recognized as an increasingly important killer of both young and old women, although the data are more difficult to obtain due to the overall low incidence of the disease in this population. But there is lack of awareness about CAD in young women not only in the general population but also among the health care professionals as well. Females are underrepresented in most of the CAD studies. Most of the research-based evidence have been gathered from studies in men.

It is not generally known that CAD is quite common in women and that more women than men die of it every year. Also, it has become clear in the past few years that CAD in women has many unique features which are not present in men. The lack of published literature on this important subset of patients from this region is the basis for the present study. Therefore, study of the demographic profile, risk factors and angiographic profile in young women with CAD will help to guide health care providers for better identifying and targeting primary and secondary preventative strategies.

Materials and Methods:-

This study was conducted in the Department of Cardiology, Gauhati Medical College & Hospital, Guwahati, Assam from April, 2016 to September, 2017.

Inclusion Criteria:

In this study we included all women > 18 years of age admitted in our hospital with a diagnosis of CAD - Unstable angina (USA), Non ST segment elevation myocardial infarction (NSTEMI), ST segment elevation myocardial infarction (STEMI) or Chronic stable angina (CSA) who had undergone coronary angiography from April, 2016 to September, 2017 and were divided into two groups Young women < 55 years and Old women $\geq$ 55 years of age.

Exclusion Criteria:

1. Patients not willing for coronary angiography
2. Patients allergic to contrast agent or presence of any serious comorbidities that precludes coronary angiography
3. Age <18 years

Study Design:

Prospective, observational, single centre, analytical study.

Methodology:-

Detailed history of every patient was taken and thorough physical examination carried out. Written informed consent were obtained from all the study participants prior to enrolment. The clinical profile, conventional cardiovascular risk factors [Smoking/tobacco use, Hypertension, Diabetes Mellitus, Dyslipidaemia, Obesity (BMI, Waist-Hip ratio, waist circumference and hip circumference), Family history of premature CAD in first degree relatives] and coronary angiographic characteristics were recorded and analysed using relevant statistical methodology. All younger women < 55 years of age from the study cohort were compared with the older women $\geq$ 55 years of age [8,1,10,3] especially with regards to the clinical profile and coronary angiographic features. ECG and

Two-Dimensional Transthoracic Echocardiography were performed in all the patients. Treadmill Test was performed as appropriate when necessary. All patients had undergone coronary angiography which was performed by the standard Judkin's technique after adequate preparation.

A history of angina pectoris was considered to be present if patients complained of retrosternal pain of short duration related to exertion or excitement and relieved by sublingual nitroglycerin. Current smokers were defined as those who reported to smoke regularly during the preceding 3 years and non-smokers and former smokers if they had stopped smoking for at least 1 year prior. Hypertension was considered to be present if the patient were taking anti-hypertensive treatment at the time of hospital admission or if blood pressure was recorded to be > 140 mmHg systolic and/or > 90 mm Hg diastolic, at least on two occasions during admission. Diabetes mellitus was diagnosed on the basis of ADA criteria or any patient already on anti-diabetic medications. Dyslipidaemia was defined as per NCEP-ATP III guidelines [Total cholesterol (TC) > 200 mg/dl, Low Density Lipoprotein cholesterol (LDL-C) > 130 mg/dl, High Density Lipoprotein cholesterol (HDL-C) < 40 mg/dl and Triglycerides (TG) > 150 mg/dl]. In addition, use of lipid lowering medications was also used as criteria for dyslipidaemia. Family history of premature Coronary heart disease was considered to be positive when it occurred in male first degree relative < 55 years and in female first degree relative < 65 years of age. BMI, used as a measure of total obesity, was derived from Quetlet's formula (weight in Kg / height in meter²). A BMI of 18.5 - 24.9, 25.0 - 29.9 and > 30.0 was considered to be normal, overweight and obese respectively. For waist circumference, the International Diabetes Federation criteria for South Asians were taken as reference and values > 80 cm in women was considered significant. A waist - hip ratio of > 0.85 cm in women according to the World Health Organization criteria was taken as reference values to indicate substantially increased risk of metabolic complications. Standard diagnostic criteria were used for CSA, USA, NSTEMI and STEMI. The coronary angiographic profile was studied in all patients to assess the number [Single Vessel Disease (SVD), Double Vessel Disease (DVD), and Triple Vessel Disease (TVD)] and the type [Left Main Coronary Artery (LM), Left Anterior Descending Coronary Artery (LAD), Left Circumference Coronary artery (LCX), Right Coronary Artery (RCA)] of the vessel involvement. Significant CAD (obstructive CAD) was defined as 70% reduction in luminal diameter of major epicardial coronary arteries (LAD, LCX, RCA) or >50 % narrowing of the left main coronary artery. A narrowing of < 50% was considered insignificant (nonobstructive) CAD. The absence of any appreciable narrowing in coronary diameter on angiography was considered evidence of a normal coronary artery. Other angiographic features (slow flow, ectasia, coronary anomalies, chronic total occlusion, bifurcation lesions, coronary dominance) were also recorded. Coronary angiography data of all the patients were obtained from the Phillips software system database of our cardiac catheterization laboratory. Arterial access was obtained with femoral artery or radial artery with 5F or 6F intra-arterial sheaths by using modified Seldinger technique. Details of the angiography were obtained and weighed using SYNTAX SCORE. The SYNTAX scores were calculated with the help of professional website tool: <http://www.syntaxscore.com> and Gensini score was calculated.

Syntax score was classified as tertiles as: low Syntax score (≤ 22), intermediate Syntax score (23-32), and high Syntax score (≥ 33). Gensini score was classified as: low risk Gensini score ≤ 20 and high risk Gensini score as > 20.

Statistical Analysis:

Data were collected on study proforma forms. Patients were divided into two groups, young women (<55 years) and old women (≥ 55 years). Young women were included as cases and old women were as controls. Data were presented as frequencies and percentages for categorical variables and mean $\pm$ standard deviation (SD) for continuous variables, unless otherwise indicated. Differences between groups were assessed by using the chi-square and ANOVA. Correlation between continuous variables was determined by Pearson correlation coefficients. Linear regression analysis was performed to show association between severity of CAD & risk factors. Multivariate logistic regression was used to show individual risk factor as independent predictor of severity of CAD. $P < 0.05$ was considered as statistically significant. The analysis was carried out using SPSS Version 21.0.

Investigations:

All patients were investigated as follows:

1. Hemogram (Hb, total leukocyte count, Platelet count)
2. Blood sugar (postprandial or fasting)
3. Glycosylated Hemoglobin (HbA1c)
4. Fasting Lipid Profile at hospital admission
5. Renal function test

6. Liver function test
7. Thyroid function test
8. Prothrombin time, INR, aPTT
9. Cardiac biomarkers – Troponin, CK MB
10. 12 leads Electrocardiogram
11. Two-dimensional transthoracic Echocardiography
12. TMT (as appropriate)
13. Coronary angiography

Ethical Clearance:

Permission/clearance from the Institutional Ethics Committee, Gauhati Medical College, Guwahati was obtained prior to commencement of the study.

Disclosure and conflicts of interest

There is no financial or any other substantive conflict of interest.

Results and Observations:-

The present study comprised of total of 143 consecutive women of CAD of which 57 women were young < 55 years (39.8%) and 86 women were ≥ 55 years (60.2%). The Clinical presentation of CAD, their pattern, risk factors, coronary angiographic findings and severity were compared between these two groups of women. The mean age of young women was 47.05 years and mean age of older women was 64.77 years.

Table 1:- Baseline characteristics.

Baseline characteristics	Young women (<55 years) N=57	Old women (≥ 55 years) N=86
Age (mean)	47.05 years	64.77 years
Urban	48 (84.2%)	69 (80.2%)
Rural	9 (15.8%)	17 (19.8%)

Hypertension was the most common risk factor found in both younger and older age group of women populations (63.2% Vs 58.1%) followed by diabetes (40.4% Vs 40.7%) and dyslipidaemia (26.3% Vs 27.9%). There was no significant difference of number of risk factors in both group but number of smokers were higher in older age group (12.8% Vs 5.3%). Family history of premature coronary artery disease was found in 5.3% of younger women and 1.2% in older women. Obesity is slightly higher in younger women (26.3% Vs 19.8%) though statistically not significant.

Table 2:- Distribution of Risk factors for coronary artery disease.

Risk factors	Young women (<55 years) N=57	Old women (≥ 55 years) N=86	p value
Smoking	3 (5.3%)	11 (12.8 %)	0.138
Diabetes Mellitus	23 (40.4%)	35 (40.7%)	0.967
Hypertension	36 (63.2%)	50 (58.1%)	0.548
Dyslipidaemia	15 (26.3%)	24 (27.9%)	0.834
Obesity	15 (26.3%)	17 (19.8%)	0.358
Family history of premature CAD	3 (5.3%)	1 (1.2%)	0.145

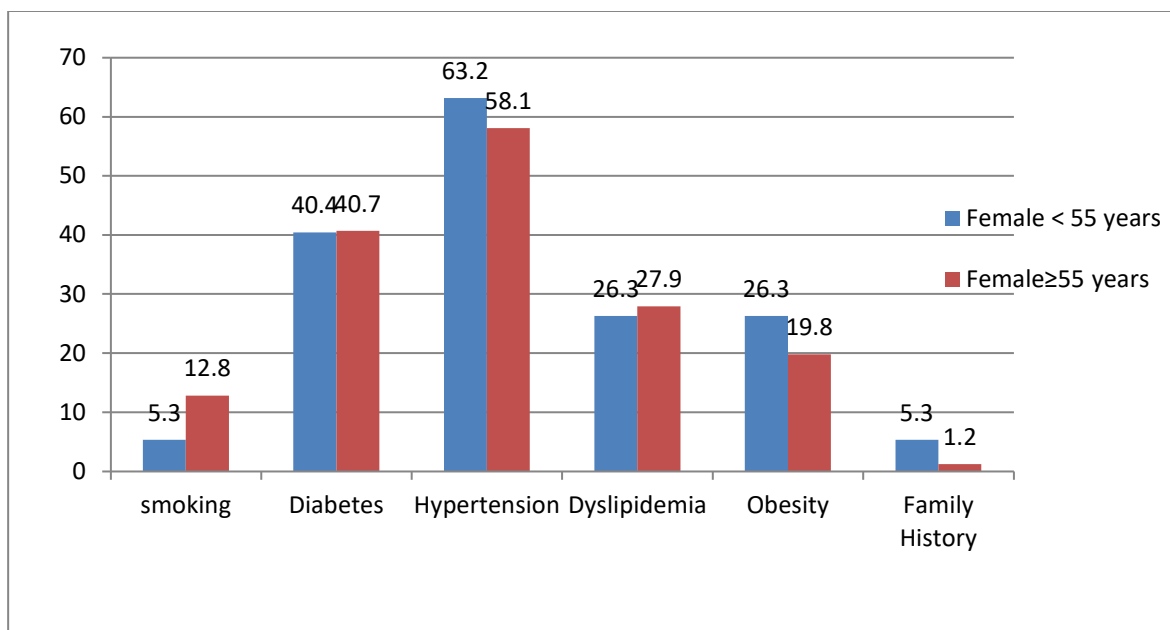


Fig 1:- Bar diagram showing distribution of Risk factors for coronary artery disease.

In younger women, 59.6% patients had ≥ 2 risk factors, 33.3 % patients had single risk factor and only 7% had no risk factors. In the older women 58.1% patients had multiple risk factors and 32.6% had single risk factor while 9.3% patients had no risk factors. None of these differences were found to be significant in both age group.

Table 3:- Stratification according to number of risk factors present.

Number of risk factors	Young women (<55 years) N=57	Old women (≥ 55 years) N=86	P value
No risk factors	4 (7.0%)	8 (9.3%)	0.629
Single risk factor	19 (33.3%)	28 (32.6%)	0.923
Multiple risk factors	34 (59.6%)	50 (58.1%)	0.858

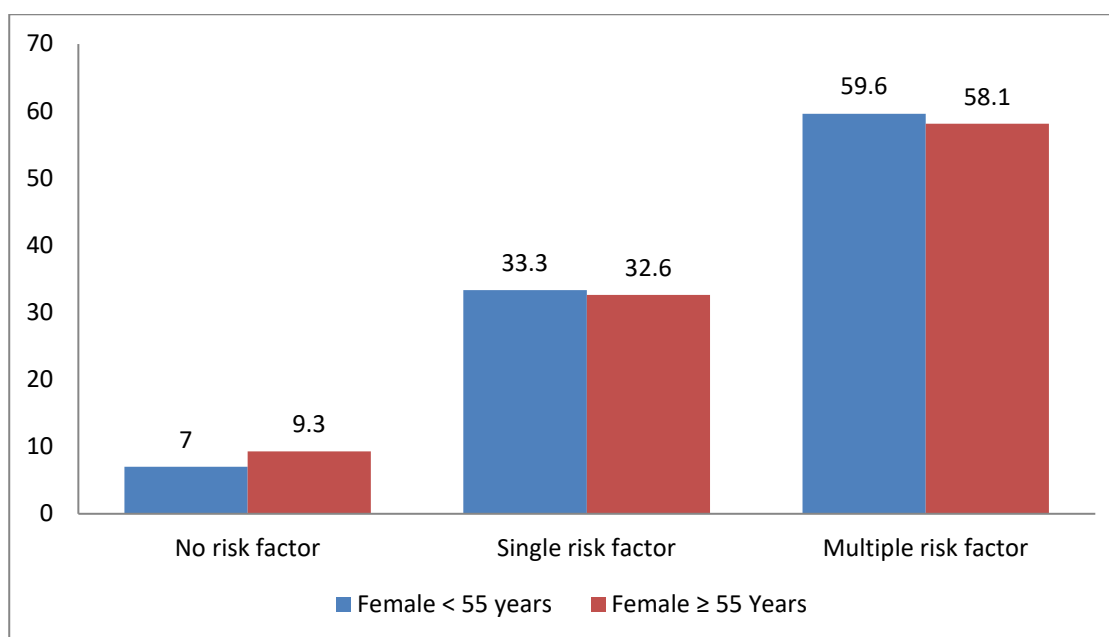


Fig 2:- Bar diagram showing distribution according to number of risk factors present.

In younger women most patients had normal EF, 54.4 % cases. Mild LV dysfunction was found in 22.8% patients and 21.1% had moderate LV dysfunction. Only one patient (1.8%) in younger women age group was found to have severe LV dysfunction.

In older women population 41.9% had normal LV function, 30.2% had mild LV dysfunction, 25.6% had moderate LV dysfunction and 2.3 % had severe LV dysfunction.

Number of patients with normal LV function was found to be significantly higher in younger women ($p=0.04$), while mild and moderate and severe LV dysfunction were similar in both groups statistically.

Table 4:- Ejection fraction as per echocardiography evaluation.

LVEF	Young women (<55years) N=57	Old women (≥ 55 years) N=86	P value
>55%	31 (54.4%)	36(41.9%)	0.04
45-55%	13 (22.8%)	26 (30.2%)	0.329
30-45%	12 (21.1%)	22 (25.6%)	0.533
<30%	1 (1.8%)	2 (2.3%)	0.815

Most common symptom of CAD was chest pain in both groups. Clinical spectrum of young women consisted of chronic stable angina in 45.6% cases as compared to 32.6% in women age ≥ 55 years which was statistically not significant. ST Elevation MI were found in 42.1% young women as compared to 39.5% in women age group ≥ 55 years which was statistically not significant. But among STEMI group, anterior wall MI was the most common presentation in 28.1% cases in young women as compared to 15.1% women ≥ 55 years which was statistically significant ($p=0.048$). Non-ST elevation MI were found in 5.3% young women as compared to 17.4% in women ≥ 55 years which was statistically significant ($p=0.026$). Unstable angina was found in 7% young women < 55 years and 10.5 % in women ≥ 55 years.

Table 5:- Study population distribution as per clinical diagnosis in female age group.

Clinical Diagnosis	Young women (<55 years) N=57	Old women (≥ 55 years) N=86	P value
Chronic stable angina	26 (45.6%)	28 (32.6%)	0.081
Unstable angina	4 (7.0%)	9 (10.5%)	0.481
Non-ST elevation MI	3 (5.3%)	15 (17.4%)	0.026
ST Elevation MI	24 (42.1%)	34 (39.5%)	
Anterior wall MI	16 (28.1%)	13 (15.1%)	0.048
Lateral wall MI	1 (1.8%)	2 (2.3%)	0.651
Inferior wall MI	7 (12.3%)	19 (22.1%)	0.101

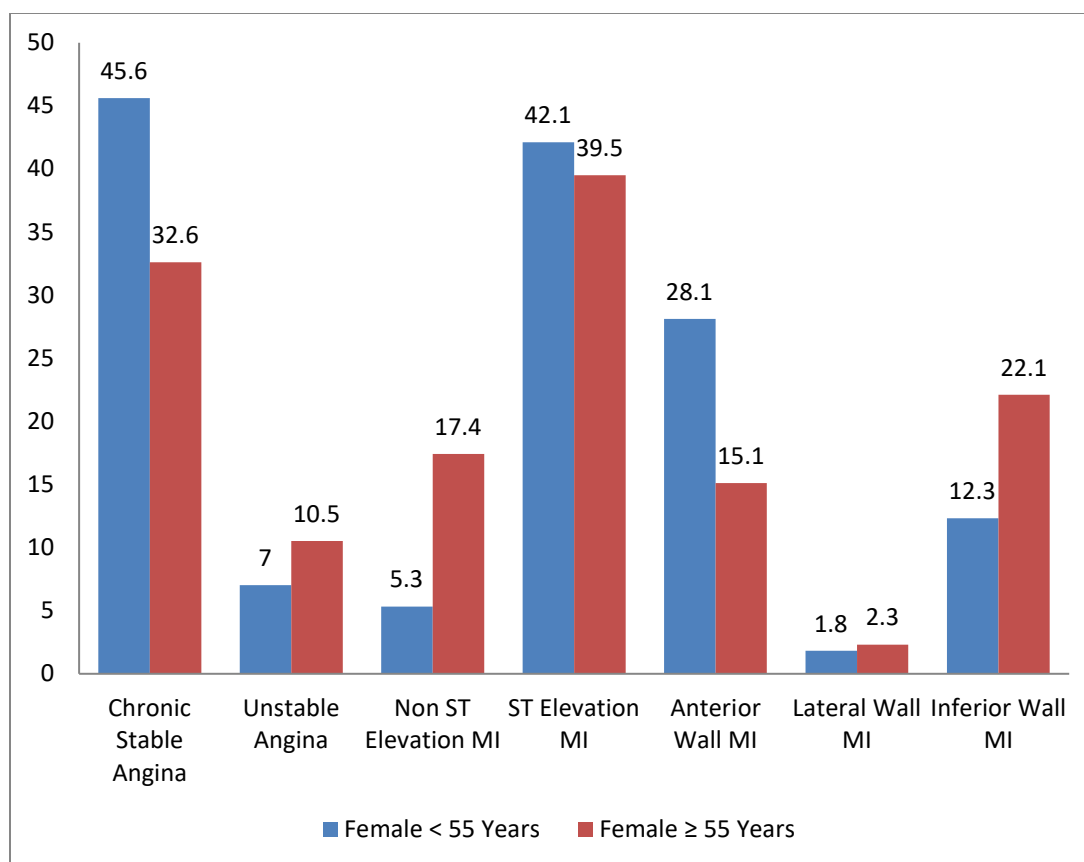


Fig3:-Bar diagram showing study population distribution as per clinical diagnosis.

On coronary angiogram, most common presentation was SVD, 31.6% in younger women age group and 29.1% in older age group ($p=0.445$). DVD was found in 12.3% cases under 55 years and 22.1% in over 55 years. TVD was seen in 10.5% in younger women as compared to 20.9% in older women. Difference in DVD and TVD involvement in older women were more in number though statistically not significant. But as a whole multivessel involvement was significantly higher in older women population ($p=0.045$). Younger women had normal coronaries in 19.3% as compared to 9.3% in older women group ($p=0.072$). Insignificant CAD was similar in both groups, 19.3% in younger and 17.4% in older women group.

Table 6:- Distribution of study population as per coronary angiographic findings.

Coronary angiographic findings	Young women (<55 years) N=57	Old women (≥55 years) N=86	P value
Normal coronaries	11 (19.3%)	8 (9.3%)	0.072
Insignificant CAD	11 (19.3%)	15 (17.4%)	0.472
Single vessel disease	18 (31.6%)	25 (29.1%)	0.445
Multi vessel disease	17 (29.8%)	38 (44.18%)	0.045
Double vessel disease	7 (12.3%)	19 (22.1%)	0.101
Triple vessel disease	6 (10.5%)	18 (20.9%)	0.078
Left Main Disease	4 (7.0%)	1 (1.2%)	0.082

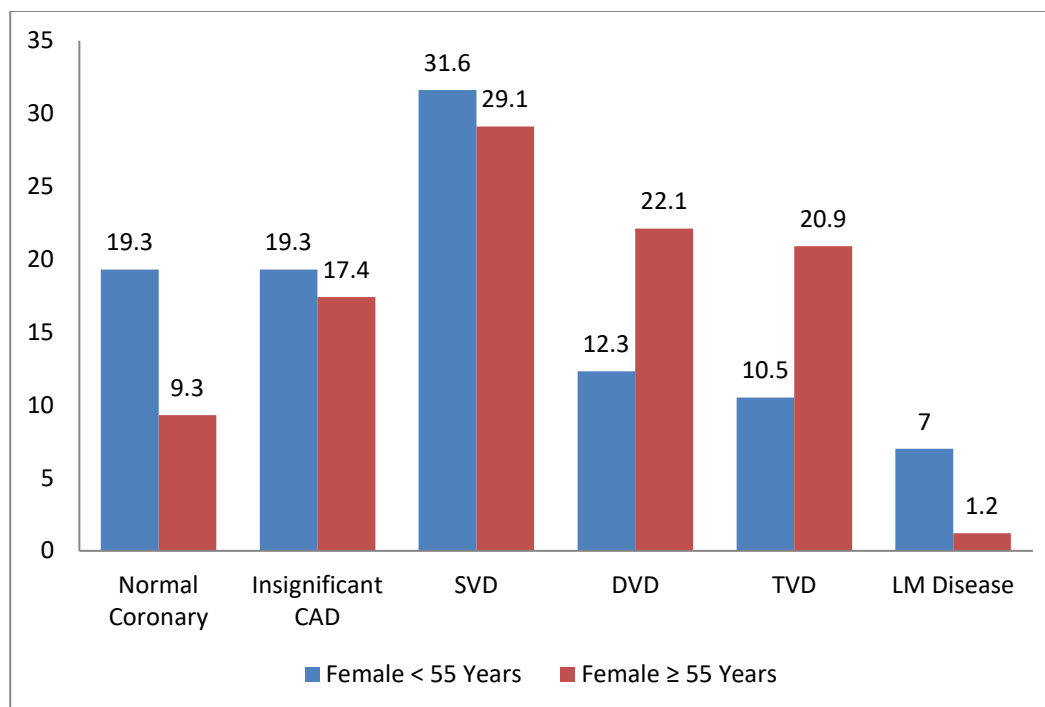


Fig 4:-Bar diagram showing distribution of study population as per coronary angiography findings.

Most commonly involved artery was LAD in both the women age groups, 43.9% in younger women and 52.3% in older women group, which was not statistically significant. LCX involvement was seen in 19.3% women under 55 years and 36% women over 55 years which was statistically significant ($p = 0.023$). RCA disease was found in 38.6% younger women and 51.2% older women ($p = 0.096$). Left main involvement was seen in 4(7%) younger women as compared to only 1 (1.2%) in older woman ($p = 0.082$).

Table 7:- Distribution of study population according to specific vessel involvement on coronary angiography.

Vessel involvement	Young women (<55 years) N=57	Old women (≥55 years) N=86	P value
LAD	25 (43.9%)	45 (52.3%)	0.206
LCX	11 (19.3%)	31 (36.0%)	0.023
RCA	22 (38.6%)	44 (51.2%)	0.096
LM	4 (7%)	1 (1.2%)	0.082

Low Syntax score (≤ 22) was found in 75.4% younger women as opposed to 67.4% older women which was found to be statistically insignificant ($p = 0.201$). Intermediate risk was seen in 17.5% younger women and 18.6% in older women, statistically insignificant ($p = 0.528$), whereas only 7% younger women had high risk Syntax score as compared to 14% older women ($p = 0.154$).

Mean Syntax score was 13.2 in younger women group as compared to 17.62 in older age group and this difference was found to be statistically insignificant ($p = 0.321$).

For Gensini score, low score that is ≤ 20 , was seen in 56.1% female patients less than 55 years of age and in 40.7% female patients over 55 years, the difference was statistically significant ($p = 0.05$). High Gensini score was found in 43.9% young and 59.3% older group, which was statistically significant ($p = 0.05$).

Mean Gensini score was 25.47 in young group as compared to 34.72 in older age group and this difference was found to be significant with $p = 0.05$.

On comparison of mean Syntax and Gensini score based on number of risk factors associated, we found that in patients with no risk factor, mean Syntax score was 0.4 and mean Gensini score was 1 in younger women age group which increased to 10.5 and 25.53 respectively in patients having single risk factor. In patients having multiple risk factors had mean syntax score increased to 16.24 and mean Gensini to 28.32.

This increase in Syntax and Gensini score with increase in risk factors was found to be statistically significant. ($p=0.02$ and $p=0.023$ respectively)

In older women age group patients with no risk factor, mean Syntax score was 14.13 and mean Gensini score was 25.38. But with single risk factor it was not increased (10.3 and 25.11 respectively). On the other hand, in patients having multiple risk factors had mean Syntax score increased to 22.28 and mean Gensini to 41.6. This increase in Syntax and Gensini score with risk factors was found to be significant statistically ($p=0.04$ and $p=0.043$ respectively).

Table 8:- Coronary severity scores.

Severity scores		Female (<55 years) n=57	Female (≥ 55 years) N=86	P value
Syntax score	≤ 22	43 (75.4%)	58 (67.4%)	0.201
	23-32	10 (17.5%)	16 (18.6%)	0.528
	≥ 33	4 (7.0%)	12 (14.0%)	0.154
	mean	13.20	17.62	0.321
Gensini score	≤ 20	32 (56.1%)	35 (40.7%)	0.05
	> 20	25 (43.9%)	51 (59.3%)	0.05
	mean	25.47	34.72	

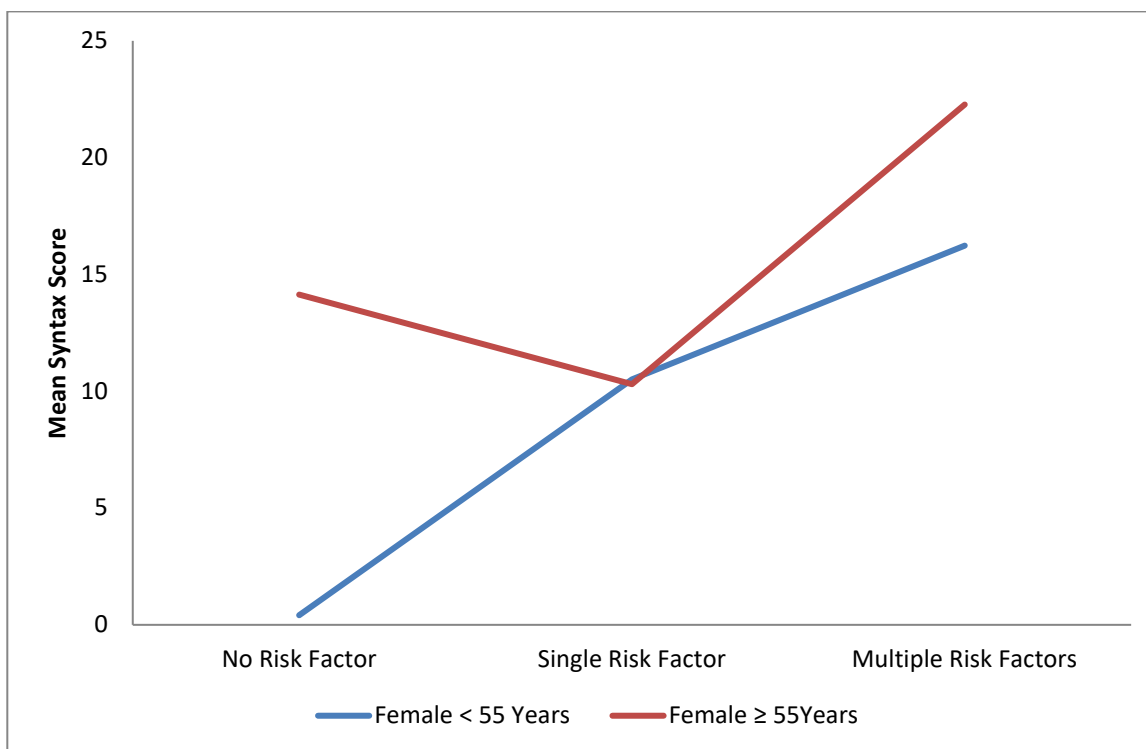


Fig 5A:-Mean Syntax score as per risk factors in the study population.

(Pearson correlation coefficient in female < 55 years 0.237, Pearson correlation coefficient in female ≥ 55 years 0.252)

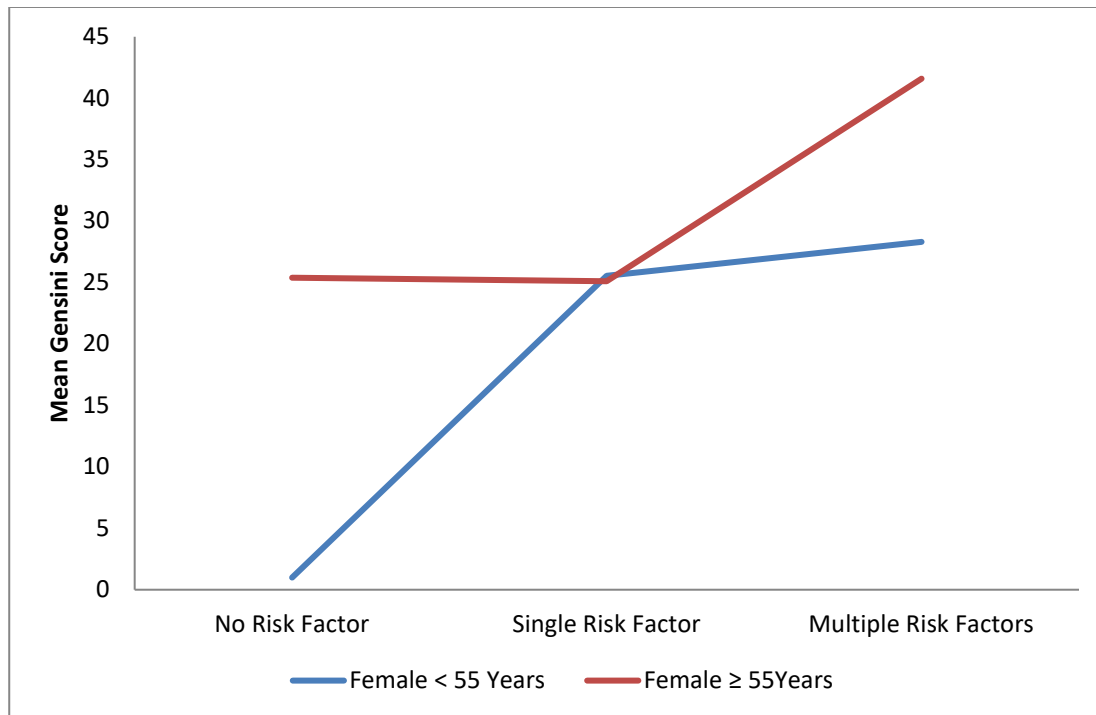


Fig 5 B:- Mean Gensini score as per risk factors in the study group (Pearson correlation coefficient in female < 55 years 0.198, Pearson correlation coefficient in female ≥ 55 years 0.245).

Discussion:-

Baseline characters:

In our study out of total 143 women studied, there were 57 younger women < 55 years of age, i.e. 39.8%, with mean age of 47.05 years. Older women ≥ 55 years were taken as controls and were 86 in total with mean age of 64.77 years.

In one study **T N Dubey et al** [7] divided their female group as <55 years and >55 years.

Mean age of young female (<55 years) was 47 years and mean age of older female (>55 years) 60.8 years in another study by **Babu Ezhumalai et al** [1] which is similar as our study.

The National Cholesterol Education Programme Adult Treatment Panel (ATP III) considers age 55 years or older to be a risk factor for women as compared with 45 years for men.

Another study from Malaysian registry by **Zuhdi AS et al** [9] defined young female as < 55 years and they had divided their women group as <55 years and >55 years.

Another study by **Ford E S et al** [3] had taken their young group of patients as 35 – 54 years. They had taken both male and female patients and divided their groups as 35 – 54 years and more than or equal to 55 years. **Welch CC et al** [8] in their study CAD in young women studied risk factors of 1000 women under age of 50 years.

Study population distribution as per clinical diagnosis:

In our study chronic stable angina was most common presentation in both age groups followed by STEMI. But Anterior Wall Myocardial Infarction was significantly more in younger women than older women. Significantly lower number of younger women had Non-ST elevation MI in comparison to older women.

T N Dubey et al [7], in their study with female ACS patients found STEMI in 63.1%, UA in 30.4%, and NSTEMI in 5.5% of patients.

In Kerala ACS registry [5], STEMI constituted 40% of female patients.

By **Shruthi Bettgowda**[6] in their study found 58% female with acute MI followed by 24% chronic stable angina and 18% unstable angina.

In the study by **Manish Sahni et al** [4], among the Acute MI study population 53.75% female had STEMI and 46.25% had NSTEMI. Among STEMI 27.5% had anterior wall myocardial infarction, 12.5% had IWMI, 11.25% had IWMI with right ventricle myocardial infarction (RVMI) and 1.25% had anteroseptal myocardial infarction, 1.25% had AWTMI with IWMI.

Risk factors for coronary artery disease:

In our study hypertension was the most common risk factor found in both younger and older age group of women populations followed by diabetes and dyslipidaemia. There was no significant difference of number of risk factors in both groups but number of smokers were higher in older age group. Family history of premature coronary artery disease was found in 5.3% of younger women and 1.2% in older women. Obesity is slightly higher in younger women though statistically not significant.

Study by **Babu Ezhumalai et al** [1] found that there were more hypertensives in elderly women group (>55 years) than young women (<55 years) group. There were no differences with respect to diabetes, obesity and dyslipidemia between the two age groups.

A study by **T N Dubey et al** [7], found 62% female with hypertension, and 34.8% were diabetes. Dyslipidaemia (90.2%) followed by obesity (68.5%) were most prevalent risk factors in their study. 31.5% had a positive Family history of CAD and smoking in only 2.2%.

Left Ventricular Ejection fraction as per echocardiography evaluation:

In our study number of patients with normal LV function was found to be significantly higher in younger women ($p=0.04$), while mild, moderate and severe LV dysfunction were similar in both groups statistically.

Chokkalingam M et al [2] found most of their young female had normal LV function (83%). Only 2.52% had severe LV dysfunction, 6.9 % had moderate LV dysfunction, 2.9% had mild LV dysfunction.

As per **Babu Ezhumalai et al** [1] in their study Echocardiography revealed significantly a greater number of younger women with normal left ventricular (LV) function than older women more than 55 years of age ($p = 0.005$). But number of patients with moderate LV dysfunction was more in older women. There was no difference in the number of patients with severe LV dysfunction.

Distribution of study population as per coronary angiography findings:

In our study on coronary angiogram, most common presentation was SVD in both groups. Difference in DVD and TVD involvement in older women were more in number though statistically not significant. But as a whole multivessel involvement was significantly higher in older women population ($p=0.045$). Younger women had normal coronaries in 19.3% as compared to 9.3% in older women group ($p=0.072$). Insignificant CAD was similar in both groups.

In a study by **Babu Ezhumalai et al** [1], elderly women did not show much variation in the proportion of SVD (19.7%), DVD (19.7%) and TVD (16.5%), but young women with lesser atherosclerotic burden had predominantly SVD (15.2%) and DVD (12.4%) than TVD (7.8%). In this study, the prevalence of multivessel disease (DVD and TVD) is 28% among women undergoing CAG.

Distribution of study population according to specific vessel involvement on coronary angiography:

In our study most commonly, involved artery was LAD in both the groups. LCX involvement was significantly lower in number in younger women than older women ($p = 0.023$). there was no significant difference in RCA disease in both groups. Left main involvement was seen in 4(7%) younger women as compared to only 1 (1.2%) older woman ($p = 0.082$).

In the study of **Babu Ezhumalai et al** [1] the angiographic distribution of CAD in women showed involvement of LAD in 35.2% women, LCX in 25.6% women, RCA in 26% women and LMCA in 3.4% women. LAD was the most common vessel involved followed by almost equal prevalence of LCX and RCA. LMCA was the least affected vessel.

T N Dubey [7] in a study reported that most common coronary artery involved was LAD (58.5%) followed by RCA (40%), and LCX (34.2%). LMCA disease was seen in 2.8% of females.

Other studies have shown LAD to be the vessel most commonly involved followed by LCX and RCA. **Chokkalingam Metal** [2] reported that most commonly compromised artery was the left anterior descending (LAD) coronary artery in both young and older groups.

Coronary severity scores in the study population:

Mean Syntax score was 13.2 in younger women group as compared to 17.62 in older age group and this difference was found to be statistically insignificant ($p=0.321$).

For Gensini score, significantly higher number of younger women had low Gensini score that is ≤ 20 , suggest less severe disease in younger women. Significantly a smaller number of younger women had high Gensini score in comparison to older women also suggest less severe disease in younger women.

Mean Gensini score was 25.47 in young group as compared to 34.72 in older age group and this difference was found to be significant with $p=0.05$.

On comparison of mean Syntax and Gensini score based on number of risk factors associated, we found increase in mean Syntax and Gensini score with increase in number of risk factors which was found to be statistically significant in both the groups.

Babu Ezhumalai et al [1] found angiographically severe CAD in their elderly women group than the younger women group ($p<0.0001$) as we got in our study.

T N Dubey et al[7]found positive correlation with increase number of risk factors with severe CAD in their women population with acute coronary syndrome ($p < 0.05$).

Limitations of our study

The low proportion of women recruited in our study may have influenced the outcomes. Our study was done in a single Centre and all our patients were symptomatic and being investigated for CAD and therefore there was no standardized patient population. This limits the generalizability of our results to the general population.

Lastly, we did not collect information on noninvasive investigations such as myocardial perfusion imaging performed preceding angiography as these were not available. Further, we were unable to perform novel ancillary investigations such as coronary flow reserve, PET scan or cardiac MRI or IVUS which would be useful to correlate the findings.

Summary and Conclusion:-

Our study has highlighted the clinical and angiographic presentation of CAD in young women and also compared these findings with older women. Hypertension was the most common risk factor found in both younger and older women population followed by diabetes and dyslipidaemia.

Number of patients with normal LV function was found to be significantly higher in younger women while mild, moderate and severe LV dysfunction were similar in both groups statistically.

Chronic stable angina was most common presentation in both age group followed by STEMI. But Anterior Wall Myocardial Infarction was significantly more in Younger women than older women.

On coronary evaluation by angiography, multivessel involvement was significantly higher in older women population. More number of younger women had normal coronaries as compared to older women. Most common

coronary artery involvement was Left Anterior Descending coronary artery in both groups of patients. But LCX involvement was significantly higher in older women group.

Majority of patients both younger and older women had low risk Syntax score. The difference of Mean Syntax score was not significant between the groups. But there is significant difference in mean Gensini score between the groups suggest more severe disease in older women group.

Mean Syntax and Gensini scores were increased with increase in the number of risk factors present in both groups of patients with a strong linear positive correlation.

To conclude, most of these patients presented to the hospital with Chronic stable angina and ST-elevation MI with preceding history of angina. On evaluation, hypertension and diabetes were found to be the most common risk factors, both being preventable, needs at-most attention. Coronary angiography revealed less severe coronary artery disease in young women. More number of women patients had normal coronaries suggestive of better prognosis. Coronary severity scores had a strong positive linear correlation with increase in number of risk factors in both study groups, again stressing on the need for life style modification.

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