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CLINICAL PROFILE OF EXERCISE TREADMILL TEST POSITIVE PATIENTS WITH NORMAL CORONARY ANGIOGRAM

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ABSTRACT

Background: Normal coronary angiogram following abnormal exercise stress test puts patients at higher risk of developing future coronary heart disease. Even with no occlusion in coronary arteries, patients are at risk of recurring coronary events such as myocardial infarction and death. However, research performed at the University of Bologna suggests that those with non-obstructive coronary disease are still at high risk for future cardiac events.

Aim of study: is to study the demographic clinical and biochemical profile of patients with angina, positive exercise treadmill test and normal coronary angiogram and to determine the incidence of cardiac syndrome X in study population

Materials and Methods: Study conducted in Department of Cardiology, Sri Ramachandra Medical College and Research Institute, Chennai, This is a Cross Sectional study done from period March 2014 to February 2015. Selection of study population - Total sample size N = 253, Divided into 2 study groups, Group 1 (N=108) male TMT positive normal CAG patients satisfying inclusion and exclusion criteria, Group 2 (N=145) female TMT positive normal CAG patients satisfying inclusion and exclusion

Statistical Analysis: Continuous variables were analysed with the unpaired t test and categorical variables were analysed with Fisher Exact Test. Multiple logistic regression was used to assess the independent relation between risk factors and outcomes of the study. The data was analysed using SPSS Version 16.

Conclusion

- Higher incidence of Treadmill Test positive and normal Coronary Angiogram are found in younger age especially women with no effect of Smoking, alcoholism, family history of Coronary Artery Disease, physical activity and BMI
- The incidence of Diabetes, Hypertension, Dyslipidemia, Atypical Angina were higher in women with Treadmill test Positive and normal Coronary Angiogram.

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INTRODUCTION

Normal coronary angiogram following abnormal exercise stress test may be diagnosed when a patient complains of chest pain but, unlike in typical obstructive coronary disease, shows little or no evidence of plaque blocking the arteries. Even with no blockage in the arteries, patients are at risk of recurring coronary events such as myocardial infarction (heart attack) and death from heart attack. Cardiac syndrome X is a clinical entity that needs to be distinguished from angina pectoris due to typical obstructive coronary heart disease. It has three characteristic features; each of which can be seen in other disorders.

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Angina or angina-like chest pain with exertion, ST segment depression on treadmill exercise testing. Normal coronary arterio-graphy, with no spontaneous or inducible epicardial coronary artery spasm on ergonovine or acetylcholine provocation. Two main and not mutually exclusive pathogenic mechanisms have been proposed: myocardial ischemia; and heightened sensitivity to intra-cardiac pain or the so called "sensitive heart" syndrome. Cardiac syndrome X should not be confused with the metabolic syndrome, which is also called syndrome X but refers to the constellation of insulin resistance, obesity, hypertension, diabetes and dyslipidaemia. To study the demographic profile of patients with angina, positive exercise treadmill test and normal coronary angiogram, To study the clinical profile of patients with angina, positive exercise treadmill test and normal coronary angiogram, To study the biochemical profile of patients with

angina, Positive exercise treadmill test and normal coronary angiogram, To determine the incidence of cardiac syndrome X in study population.

MATERIALS AND METHODS

Study conducted in Department of Cardiology, Sri Ramachandra Medical College and Research Institute, Chennai, This is a Cross Sectional study done from period March 2014 to February 2015. Selection of study population - Total sample size N = 253, Divided into 2 study groups, Group 1(N=108) male TMT positive normal CAG patients satisfying inclusion and exclusion criteria, Group 2(N=145) female TMT positive normal CAG patients satisfying inclusion and exclusion.

Sample Size

Sample size was determined based on the study "Non-obstructive Coronary Artery Disease and Risk of Myocardial Infarction" authored by Thomas M. Maddox et al published in JAMA. 2014; 312 (17): 1754-1763. doi:10.1001/jama.2014.14681. In this study the incidence of non-obstructive CAD was reported at 20% taking the lower confidence limits. Estimating the confidence level at 95%, with a z value of 1.96, the confidence interval or margin of error estimated at +/-5 and assuming that the sample will have the specified attribute $p\% = 20$ and $q\% = 80$ $n = p\% \times q\% \times [z/e\%]^2$

$$n = 20 \times 80 \times [1.96/5]^2$$

$$n = 245$$

Therefore 245 is the minimum sample size required for the study. In our study we have taken 253 as the sample size. N=108 in male TMT positive normal CAG patients in group 1 and N=145 in female TMT positive normal CAG patients in group 2

Sampling method

- Judgement sampling method was adopted

RESULTS

This is across sectional study consisting of 253 patients presenting with symptoms of angina, exercise treadmill test positive and normal study in coronary angiogram studies.

Women with TMT positive and normal CAG tend to be younger compared to men with, TMT positive and normal CAG by 5.52 years and the difference was statically significant (P value 0.001) as per unpaired t-test. There was no significant difference in the smoking, alcoholism, family H/O CAD, physical activity and BMI status between the two groups indicating that the severity was the same between the male and female groups. The incidence of diabetes was higher in female group by 13.57 percentage points with a 1.21 time increase and the difference was statically significant P value 0.001 as per chi squared test.

Similarly the incidence of hypertension was higher in female group by 10.39 percentage points with a 1.39 time increase and the difference was statically significant P value 0.001 as per chi squared test. We also observed that dyslipidemia was more present in women with TMT positive and normal CAG 7.32 percentage points with a 1.19 times increase representing with a statically significant difference P value 0.002 as per chi squared test. Women in our study presenting with atypical chest pain had high incidence of TMT positive and normal CAG by .07 percentage points with 1.13 time increase and the difference between groups reached a statistical significance P value 0.001 as per chi squared test. Also 72% of women with TMT positive and normal CAG had an abnormal ECG findings compared with men and the difference was statistically significant P value 0.001 as per chi squared test. Left ventricular function estimated by EF was better in women with TMT positive and normal CAG than men with TMT positive and normal CAG by 8.60 percentage points and 1.22 times decrease in ejection fraction < 55% and the difference was statistically significant P value 0.001 as per chi squared test.

DISCUSSION

Our study analysed data about population of patients TMT positive and normal CAG with mean. Age 55 years women with documented TMT positive and normal CAG tend to be younger with mean age 51 years. Many studies are in line with our results and showed that young age is risk factors of TMT positive and normal CAG in women. Smoking, alcoholism, family H/o CAD, physical activity and BMI showed no significant difference and effects between the TMT positive and normal CAG gender based study groups. The same view was echoed by David Planer study 16 Diabetes mellitus is the most important risk factor for TMT positive and normal CAG,

Gender based clinical characteristics and risk factors for TMT positive normal CAG subjects

Variable	Total N=253	Male N=108	Female N=145	P value
Age in years	54.96±7.80	56.73±6.33	51.21±8.08	0.001*
Smoking	97	81	16	0.070
Alcoholism	81	75	6	0.109
Family H/O CAD	106	52	54	0.643
Physical Activity status (Sedentary)	147	68	79	0.925
BMI (Obese and Overweight)	149	58	91	0.789
Diabetes Mellitus	186	71	115	0.001*
Hypertension	83	29	54	0.001*
Dyslipidemia	109	42	67	0.002*
Angina (Atypical Anginal Pain/Myocardial Ischaemia/ Unstable angina/ Stable Angina)	171/9/28/45	68/4/11/19	103/5/17/26	0.001*
ECG (Abnormal)	170	66	104	0.001*
Ejection Fraction (< 55%)	107	51	56	0.001*

the Presence of diabetes in women increasing TMT positive and normal CAG risk by 1.21 times compared to increase in diabetic men. Our results correlated with findings of Zeina AR et al study 17 which suggest a higher incidence of TMT positive and normal CAG in diabetic women patients. This can be explained to the higher occurrence of coronary microvascular disease in asymptomatic diabetic women patients making them ideal candidate for atypical presentation of myocardial infarction and relatively higher risk of cardiovascular mortality.

In our study, women with TMT positive and normal CAG have high distribution of Hypertension, with a risk of 1.39. According to various review articles, hypertension is associated with two fold to threefold increase risk to develop TMT positive and normal CAG. The same finding was reported by Zeina AR et al study 17 where incidence of hypertension increases with increase in TMT positive and normal CAG status. This could be explained by the fact that hypertension is associated with adverse changes in the structure and function of arterial walls because they interfere with the normal functioning of microcirculation as well as the epicardial coronary arteries leading to Left ventricular hypertrophy and Ischemia. Dyslipidemia is a significant risk factor of TMT positive and normal CAG in both sexes, but more for women. In our study we found a statistically significant 1.19 times rise in incidence of TMT positive and normal CAG in women with dyslipidemia compared to men. All these data are in line with David Planer et al study.

The most common presentation of TMT positive and normal CAG women is atypical angina pain with a 1.13 times increase compared to men. Most of these patients with normal coronaries, the chest pain can be attributed to micro vascular dysfunction. The same can be seen in the David Planer et al study. In our study the incidence of abnormal ECG among women TMT positive and normal CAG patients was meaningfully significant 1.17 times increased when compared to males. The same view was echoed in the David Planer et al study. In our study ejection fraction showed significant difference between the female and male TMT positive and normal CAG patients with a 1.22 times significant decrease in < 55% patients belonging to female gender compared to male gender group. The same view was echoed by Lin FY et al study. The overall incidence of coronary X syndrome was 3.95% with a statistically significant 9 times increase in incidence (3.56%) in female group compared to 0.39% in male group. These findings are in tandem with Bitten court MS et al. 19 and Verlmet foort IAC, et al study. 20 Out of the 9 subjects 8 were post-menopausal women. This can be explained by the fact that, oestrogen deficiency may be a trigger for the syndrome in susceptible women with endothelial dysfunction and/or abnormal pain perception

Conclusion

Higher incidence of Treadmill Test positive and normal Coronary Angiogram in found in younger age especially women. Smoking, alcoholism, family history of Coronary Artery Disease, physical activity and BMI did not show any statistical significance. The incidence of Diabetes, Hypertension, Dyslipidemia, Atypical Angina were higher in

women with Treadmill test Positive normal Coronary Angiogram compare to men. The Women presented with often a typical angina than men the long term prognosis could not be ascertained in our study. Further follow up a larger studies need to assess the natural history and long term prognosis of the subset of patient. This is especially important as this subset of patients with Treadmill Test Positive and normal coronary angiogram is similar to cardiac syndrome X

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