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CORONARY ARTERY CALCIUM SCORE IN YOUNG PATIENTS WITH MYOCARDIAL INFARCTION -AN OBSERVATIONAL PILOT STUDY

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Abstract

Background: A pilot study to assess the coronary artery calcium score(CAC) in young aged patients <40 years with myocardial infarction. **Subjects and Methods**: The PCAD registry has 3450 patients till date, of which 28 patients were selected for the pilot study. The entire clinical data, biochemical parameters, and coronary artery calcium score of these patients were documented. The data were analyzed by statistical software R version 3.5.0. **Results**: The study enrolled 28 patients after satisfying the entry criteria. The mean age of this study group was 29.64 years, with 93% male population and 7% females. 1 patient had hypertension, 1 was obese, and 15 were smokers. A total of 26 (93%) patient had CAC of Zero **Conclusions**: Coronary artery calcium score has poor association in young patients presenting with coronary artery disease and does not correlate in predicting cardiovascular events, however larger study is required.

Keywords: Premature coronary artery disease, observational study, coronary artery calcium score

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Introduction

Although Myocardial infarction primarily affects individuals over the age of 40, it may also be seen in young men or women. When it occurs at a younger age, this illness has severe morbidity, psychological impacts on the patient. Factors such as cigarette smoking, increased weight and inactivity are the reason for increased prevalence of Coronary heart disease(4). The coronary artery calcium score(CAC) measures the amount of calcified plaque in the arteries. Coronary plaque is the main underlying precursor to atherosclerotic cardiovascular disease (ASCVD). A calcium test is the most accurate predictor of ASCVD and is a safe, non invasive and a relatively inexpensive variety(5). CAC is a measure of sub clinical coronary heart disease, may be useful in identifying asymptomatic persons at risk. The CAC score is also an independent predictor of the risk of major cardiovascular events , with superiority over the C-reactive protein and carotid intima-media thickness. The use of CAC score is not indicated in high-risk patients, as aggressive preventive measures would already be indicated in such patients(6).The values obtained from CAC score can be interpreted and classified in two ways : using the absolute values with cut-off points and adjusting values for patient age,gender and ethnicity as well as calculating distribution percentiles in the general population(7). The CACS adds to risk assessment beyond the traditional ASCVD risk factors(8). Higher CAC score was strongly associated with long-term, all-cause mortality and a greater proportion of deaths due to CVD and CHD. Absence of CAC identified people with a low risk over 12 years of follow-up, with most deaths being non-CVD in nature, regardless of risk factor burden (9).

Aims And Objectives

To assess the coronary artery calcium score in young aged patients <40 years with myocardial infarction

Methodology

The PCAD registry is a prospective, multicenter, descriptive, observational study examining a cohort of young Indian adults aged <40 years with CAD. This is registered under the Clinical Trials Registry of India. The study protocol was approved by the Institutional Ethics Committee and an informed consent form was signed by all participating patients.

Inclusion criteria

Our study included all patients aged less than 40 years with a coronary artery calcium score admitted for ischemic heart disease as outlined by

1. Documented episode of ACS by a history of typical chest pain, diagnostic ECG, cardiac biomarkers and coronary angiogram.
2. Chronic stable angina with documented evidence of CAD.

Exclusion criteria

1. Patients who were previously diagnosed with CAD or on medications such as antiplatelets and statins
2. Patients with a history of cardiac surgery.

Patients satisfying the inclusion criteria were enrolled. The demographic details, presence

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of CAD risk factors like diabetes, hypertension, smoking and family history were recorded.
Coronary artery calcium score was assessed using dedicated software and was quantified using the Agatston method.

Statistical methods

The qualitative data were summarized by counts and percentages, while quantitative data were tabulated by descriptive statistics such as mean, median, and standard deviation. The data were analyzed by R statistical analysis and computing language version 3.5.1 (R core team, 2018).

Patient characteristics

	Total population	CAC = 0	CAC > 0
	(n=28)	(n= 26)	(n= 2)
age	Mean: 29.64	Mean: 29.346	Mean: 33.5
	stdev: 4.039	Stdev: 4.019	Stdev: 2.121
male	28 (100%)	26 (100%)	2 (100%)
hypertension	1 (3.571%)	0	1 (50%)
smoking	15 (53.57%)	13 (50%)	2 (100%)
obesity	1 (3.571%)	1 (3.846 %)	0
alcohol	15 (53.47%)	13 (50%)	2 (100%)

Results

Out of the total 3450 patients registered under the PCAD registry, 28 patients were eligible to be included in the study group. The mean age of this group was 29.64 years. 26 patients were male and 2 patients were female, 1 patient had hypertension, 1 was obese, and 15 were smokers.
In the CAC = 0 group, there are a total of 26 patients of whom the mean age was 29.346 years. Out of these 26 patientsl\[, 50% were smokers, and only 1 patient was obese.
In the CAC > 0 group, there are a total of 2 patients whose average age is 33.5 years. Both patients are smokers and 1 patient had hypertension.

Discussion

Coronary artery calcium is an already established marker for atherosclerotic heart disease in the west [1]. Different studies have shown CAC to be a reliable marker for cardiovascular risk stratification, however, studies done with Indian subjects imply that there may be more than meets the eye. Other studies show that in comparison to other ethnic groups, Indians and Caucasians have the highest CAC scores at a baseline in the absence of symptomatic cardiovascular disease [2]. In a study of symptomatic angina patients, it was found that South Asians had a significantly elevated CAC when compared their Caucasian counterparts [3].
Our cross sectional study found that CAC score was not significantly related to the development of symptomatic ACS in young Indians. This shows that CAC may not be as effective as previously thought in predicting atherosclerotic cardiovascular disease,

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especially in symptomatic young Indian patients. In older Asian adults however, CAC has shown to be significantly correlated with angina [3]. This suggests that the risk profile for the development of ASCVD in younger Indians may be different from that of the aging population and so will require more robust screening and stratification tools to properly contain the problem.

Several cohort studies have highlighted the value of CAC scoring in CAD risk assessment in young adults. Most of the population had a screening of calcium score at the age of above 50. However, mass screening of young adults using CAC score might be challenging [10]. More study is required with large cohorts to determine whether CAC can be used reliably to predict risk of adverse cardiovascular outcomes in young Indians.

Conclusion

Coronary artery calcium score has poor association in young patients with coronary artery disease, however larger study is required to determine the role of coronary artery calcium score in predicting cardiovascular disease in young patients.

Limitations of the study

A limitation of our study is the low sample size, which limits the generalization of the findings to Indians as a whole.

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