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To Determine Coronary Artery Calcium (CAC) Score in Patients Who Develop Acute Coronary Syndrome But Do Not Have Traditional Risk Factors Namely Diabetes Mellitus, Hypertension, Dyslipidemia, Obesity and Smoking

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Abstract: A zero coronary calcium score was obtained in out study in 28.33 % participants of which only 4 (13.35% of cases) patients who developed ACS had a zero CACS, while 13 (43.3% of controls) people among control had a zero CACS. In this study, we analysed the distribution of Coronary artery calcium scores in patients of ACS who do not have traditional risk factors namely obesity, diabetes, smoking, dyslipidemia, hypertension was significantly different as compared to asymptomatic people without CAD and having none of above mentioned risk factors. Even though there were no traditional risk factors coronary calcium scores were significantly higher in patients who developed ACS as compared to controls.

Keywords: Coronary artery calcium, acute coronary syndrome, diabetes mellitus, hypertension.

INTRODUCTION

Epidemiological studies have revealed that the prevalence of CVD in India is increasing. Presently there is a health transition from predominance of infections to the preponderance of cardiovascular disorders. CVD is now responsible for 24.8% of all deaths in India [1]. Indians have one of the highest rates of heart disease in the world and the disease also tends to be more fatal and manifests at a younger age. Consequently, prevention of CVD has become one of the most important public health challenges of our times.

Several modifiable and non-modifiable factors such as HT, DM, smoking are recognized as major risk factors for CVD and aggressive correction of these play vital role in CVD prevention. However, not all adverse CV events can be predicted or explained by these conventional risk factors, which limits our ability to accurately identify the individuals who are at high risk of developing CVD. Therefore, a host of alternate or emerging risk assessment approaches such as imaging of subclinical atherosclerosis are being evaluated to overcome this limitation and to provide more accurate risk estimates in any given individual. For the past 2 decades, the consensus paradigm for prevention of therosclerotic cardiovascular disease has been based on the concept that the intensity of prevention efforts should match the absolute risk of the individual patient. Application of this concept in international guidelines has improved identification of those most likely to benefit from preventive therapies [2-4].

MATERIALS & METHODS

The study was done from April 2016 to September, 2017 at MY Hospital & MGM Medical College Hospital, Indore. MGM Medical College Hospital is a tertiary care referral centre. Study included 30 patients admitted with acute coronary syndrome (ACS) for first time and 30 controls without ACS to compare coronary calcium score, both having no established or newly detected traditional risk factors namely obesity, smoking, hypertension, diabetes mellitus and hypercholesterolemia. The study protocol was approved by the Institutional Research and Ethical Committee.

Study design: Observational study

Sample size: 30 cases and 30 controls

Inclusion criteria for cases

- Patients more than 25 years of age.
- Patients has been admitted with acute coronary syndrome (ACS) either unstable angina, NSTEMI, or STEMI, and have been stabilised.
- Patient does not have established or newly detected traditional risk factors namely previous myocardial infarction, diabetes mellitus, hypertension, obesity, dyslipidemia, smoking history.
- Patient who give consent for the study.

- Patients who are stable to be shifted to CT scan room.

Inclusion criteria for controls

- Patients more than 25 years of age.
- Patients has no history of CAD and is asymptomatic.
- Patient does not have established or newly detected traditional risk factors namely diabetes mellitus, hypertension, obesity, dyslipidemia, smoking history.
- Patient who give consent for the study.
- Patients who are stable to be shifted to CT scan room.

Exclusion criteria

- Patients less than 25 years of age
- Patients in whom major traditional risk factors namely arterial hypertension, diabetes mellitus, dylipidemia, smoking, obesity are present
- Patient with past history or family history of CAD
- Patients with hypercalcemia due to any cause.
- Patients who do not consent for CT scan
- Patients with previous bypass surgery or stent placement.
- Patients with hemodynamic instability or those who require immediate interventions
- Patients who cannot be shifted to CT Scan room.

METHODS

Patients admitted in M Y hospital Indore over a period of one and half year with acute coronary syndrome but no known risk factors and 30 individuals without CAD who give informed consent were included for the study.

Patients with ACS included unstable angina (UA), non-ST elevation myocardial infarction (NSTEMI) and ST elevation myocardial infarction (STEMI). UA was diagnosed if the patient had at least one of the following- angina chest discomfort at rest lasting for ≥ 20 min, recent onset (less than one month) angina of sufficient severity or exertional angina with a crescendo pattern, along with either ST segment depression ≥ 0.5 mm or T inversion ≥ 0.3 mV in any two contiguous leads. If the patient also had elevated Troponin T as a marker of myocyte necrosis, he was labeled to have suffered NSTEMI. However, for the diagnosis of STEMI, the patients needed to have symptoms consistent with acute myocardial infarction (AMI) [chest discomfort with or without radiation to arm(s)/jaw/back/epigastrium, weakness, diaphoresis, nausea, light headedness] of greater than 30 min duration, with ECG changes of STEMI i.e. ST elevation of at least 0.1 mV in 2 contiguous precordial leads or 2 limb leads or new/presumably new left bundle branch block.

Participants were initially asked in detail asked about information regarding current and past medical history and medication use, family history and smoking habits. A positive family history of premature CAD was defined as the presence of documented CAD in a first-degree relative before 55 years of age in males and before 65 years of age in females. Current and former smokers were defined as subjects with a positive history of cigarette smoking.

If no relevant risk factors is noted in history, then detailed general physical examination, determination of height, weight was done. Height and weight was measured to the nearest 0.1 cm and 0.5 kg respectively. Body mass index (BMI) (kg/m^2) was used as measure of overall obesity.

Next resting blood pressure was measured in the right arm after five minutes in the seated position. A mercury sphygmomanometer and appropriate cuff size was used. Three readings were taken at different occasions. Hypertension was identified based on prior prescription of antihypertensive drugs or when blood pressure exceeded 140/90 mmHg in at least three measurements. A 12-lead ECG was obtained in all participants.

Blood samples were taken for assessment for serum calcium levels. Blood glucose, cholesterol profile (total, HDL, and LDL cholesterol), and triglyceride were measured in each participant. Patient was asked for 12 hour fasting and fasting blood samples sent for lipid profile and for blood sugar levels. Post prandial blood sugar was also sent to laboratory to rule out diabetes mellitus will be done. Blood glucose estimation was done in the laboratory by commercial kits using Glucose oxidase method (GOD POD Calorimetric method). Diabetes was defined as prior prescription of antidiabetic medications or fasting glucose levels above 126 mg/dL, postprandial blood sugar above 200 mg/dl, .In a few cases HBA1C was done.

RESULTS

The study included 30 patients with ACS without traditional risk factors namely smoking, obesity, diabetes, hypertension and dyslipidemia and 30 people without CAD as well as above risk factors.

Of total 60 participants (30 cases and 30 controls) in the study, 35 (56.6 %) were males and 25 (43.33 %) were females.

Table-1: Gender wise distribution of study participants

Gender	Cases	Controls
Male	17	17
Female	13	13

Table-2: Correlation between CAC Score and Gender

	CAC score		Gender
CAC score	Pearson Correlation	1	0.154
	Sig. (2-tailed)	-	0.239
	N	60	60
Gender	Pearson Correlation	0.154	1
	Sig. (2-tailed)	0.239	-
	N	60	60

In this study there was no significant correlation between gender and coronary artery calcium score. (p value = 0.239)
Mean age of the study participants was 48.63 ± 9.857 (age range 28-65 years)

Table-3: Distribution of coronary artery calcium score among patients with ACS without traditional risk factors

Calcium artery calcium score	Number of patients	Percentage (%)
0-0	4	13.3
1-10	1	3.3
11-100	12	40.0
101-400	7	23.3
>400	6	20.0
Total	30	100

DISCUSSION

The CVD epidemic in India is of particular causes of concern, due to its accelerated buildup, the early age of disease onset in the population, and the high case fatality rate. In about 50% of individuals, the initial presentation of CAD is a myocardial infarction (MI) or cardiac death .It is sometimes seen that some patients especially in the younger age groups, who suffered a first myocardial infarction or angina pain but may not always have traditional risk factors for atherosclerosis. The focus on screening for atherosclerosis is far less as compared to that for diseases like cancer. Moreover these patients without conventional risk factors would not have received primary prevention in anyway if they were screened earlier using traditional risk factor criteria. The traditional risk factor assessment tools like FRS only predict 60%–65% of cardiovascular risk, leaving many individuals to have cardiovascular events in the absence of traditional risk factors for atherosclerosis [7]. The potential role of novel risk factors and more individualised risk assessment hence needs study [5, 6]

CONCLUSION

In this study, we analysed the distribution of Coronary artery calcium scores in patients of ACS who do not have traditional risk factors namely obesity, diabetes, smoking, dyslipidemia, hypertension was significantly different as compared to asymptomatic people without CAD and having none of above mentioned risk factors. Even though there were no traditional risk factors coronary calcium scores were significantly higher in patients who developed ACS as compared to controls.

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