Original Article

Premature coronary artery disease in India: coronary artery disease in the young (CADY) registry

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ABSTRACT

Background: Coronary artery disease (CAD) occurs at younger age in India but only a limited number of studies have evaluated risk factors and management status. This is a multisite observational registry to assess risk factors and treatment patterns in young patients presenting with acute coronary syndrome (ACS) and stable ischemic heart disease (IHD).
Methods: We recruited 997 young patients (men <55, women <65 y) presenting with ACS or stable IHD successively at 22 centers across India. Details of baseline risk factors and management status were obtained. Descriptive statistics are reported.
Results: Mean age of participants was 49.1 ± 8y, 72% were men and 68% had ACS. Family history of CAD was in 50%, diabetes 44%, hypertension 49%, history of dyslipidemia 11%, smoking/tobacco use 39%, and sedentary habits in 20%. 1.3% had "possible familial hypercholesterolemia". Metabolic risk factors (high BMI, diabetes and hypertension) were significantly greater in women ($p < 0.01$). Women were older at diagnosis of CAD and presented more often with non-ST elevation ACS. In the study cohort antiplatelet use was in 85%, beta-blockers 38%, statins 63% and ACE inhibitors/ARBs in 41% while in ACS patients it was 80.5%, 54.6%, 80.8% and 40.8%, respectively. 35.9% patients underwent percutaneous coronary intervention while coronary bypass surgery was performed in 10.4%.
Conclusions: Conventional risk factors including family history continue to play a pivotal role in premature CAD in Indians. Women have more of metabolic risk factors, present at a later age and have non-ST elevation ACS more often. There is a need to focus on improving use of evidence-based drug therapies and interventions.

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1. Introduction

Cardiovascular diseases (CVD) are the most important causes of mortality and morbidity in India[1]. Global Burden of Diseases (GBD) Study has reported that from year 1990 to 2013, IHD in India increased to become number 1 cause of death[2]. This study also reported that number of patients with IHD increased from less than a million to 2 million. IHD in India is characterized by increasing numbers, regional variations, premature onset, poor management and greater mortality[1,3].

Premature IHD can have devastating consequences for the individual, the family, and the society[4]. INTERHEART study reported that 9 standard risk factors- dyslipidemia (high apolipoprotein B/apolipoprotein A1 ratio), smoking, hypertension, diabetes, high waist-hip ratio, unhealthy diet, low physical activity, irregular alcohol consumption and psychosocial stress- explained more than 90% of the first acute myocardial infarction[5]. Premature IHD in the South Asian region was explained due to premature

Table 1
Socio-demographic characteristics.

	Total	Male	Female
Age, years – Mean (SD)	49.07 (8)	46.67 (7)	55.14 (7)
Psychosocial (n %)			
Excellent	44 (4)	28 (4)	16 (6)
Good/Fair	937 (94)	675 (95)	262 (93)
Poor	11 (1.10)	6 (0.84)	5 (1.76)
Socioeconomic characteristics (n %)			
Upper	87 (9)	74 (10)	13 (5)
Middle	755 (76)	570 (80)	185 (65)
Lower	139 (14)	64 (9)	85 (30)

onset of the same biological risk factors in the INTERHEART study[6]. Smaller case-control studies in India have reported importance of these risk factors[7]. A case-control study highlighted importance of thrombotic (smoking, low fruit/vegetables intake, fibrinogen, homocysteine) as well as atherosclerotic (hypertension, high fat diet, dyslipidemia) risk factors in causing premature IHD[8]. Quality of care of acute coronary syndrome (ACS) patients in India has been reported in large registries. The nationwide CREATE registry (n = 20468) reported that use of evidence based medical drugs (thrombolytics, beta-blockers, antiplatelets, RAAS blockers and statins) as well as revascularization (coronary interventions or surgery) was low[9]. Similar results were reported in Kerala ACS registry (n = 25748)[10] and multicenter DEMAT[11] and SPREAD[12] registries. However, all these studies were focused in all age-groups and not in premature IHD patients. We undertook a multi-centric, prospective, observational study across India to find out possible risk factors associated with CAD among young Indian population. The study included not only patients of ACS but also patients with stable IHD, and analyzed different treatment strategies.

2. METHODS

Coronary Artery Disease in the Young (CADY) is a prospective observational study to examine the risk factor profile and management strategies in premature CAD in a cohort of Indian patients. 997 patients were recruited in 22 participating centers between November 2010 and January 2012. The centers are distributed across India, more from South India (Fig. 1). Men less than 55 years of age and women less than 65 years presenting with CAD or those with established CAD on follow up were included in the study. The diagnosis of CAD was made by a positive stress test or a definite imaging technique. Patients who had prior PTCA or CABG were also included in the study. Ethics clearance was obtained from the central coordinating unit and individual sites. Informed consent was obtained from all patients.

The data collection was performed either by the designated staff or trained research coordinators. Demographic data regarding socioeconomic status and age were collected. Medical history of associated risk factors such as hypertension, diabetes, dyslipidemia, stroke and peripheral vascular disease were documented. Data on lifestyle factors such as diet, smoking, non-smoked tobacco use, alcohol consumption, exercise patterns and psychosocial factors were also obtained. Data regarding socioeconomic status was obtained using Kuppuswami classification[13] and for psychosocial stress we used the modified INTERHEART questionnaire[14]. Details of hospitalization including diagnostic tests, medications and laboratory tests were obtained from hospital records. Dutch lipid clinic network (DLCN) criteria was used to identify patients with familial hypercholesterolemia. TIMI score for patients with non-Q ACS[15] were also calculated during hospitalization. Treatment advice at discharge was noted from the hospital records. Although the study was designed to gather follow-up information up to 24 months after enrolment this report is restricted to the data available at discharge.

2.1. Statistical analyses

All the data were computerized and data analysis performed using EpiInfo programme. Descriptive statistics are reported.

The study is registered with Clinical Trials Registry of India at www.ctri.nic.in (CTRI/2012/12/003232).

3. Results

Patient enrolment was performed in different parts of the country to cover various geographical regions. Of the 997 participants, 714 (72%) were men. Mean age of study participants was 49.1 years, 46.7 years in men and 55.1 years in women. Out of 997 patients, 680 (68%) had ACS and 317 (32%) stable IHD. Of the 680 ACS patients, 51% had ST-elevation myocardial infarction (STEMI) and 49% had NSTE-ACS. According to the universal definition of myocardial infarction[16], it was determined that 3 patients had type-2, 2 had type-4b and the rest had type-1 infarctions. Of these, 348 had STEMI and 158 had non-STEMI. 57.6% of patients with NSTE-ACS had a TIMI score of 3 or greater.

Socio-demographic characteristics and associated risk factors are shown in Tables 1 and 2. 75.6% of participants belonged to middle socioeconomic status. Moderate to high psychosocial stress level was reported in 55.9% of the study population. Family history of premature IHD was present in half of the participants (49.6%) and was more in men (72.3%) as compared to women (27.7%). Significant proportion of participants had modifiable risk factors: hypertension 49.3%, diabetes 44.2%, dyslipidemia 11.4%, smoking

Table 2
Associated Risk Factors.

Charactertistics	CAD n (%) 997	Male n (%) 714	Female n (%) 283	P-value
Age	49.1 ± 8	46.67 ± 7	55.1 ± 7	<0.001
Diabetes Mellitus	441 (44.23)	265 (37.11)	176 (62.19)	<0.0001
Hypertension	492 (49.35)	288 (40.34)	204 (72.08)	<0.0001
Dyslipidemia	114 (11.43)	76 (10.64)	38 (13.43)	0.2119
Psychosocial (fair and poor)	559 (56.07)	403 (56.44)	156 (55.12)	0.7050
Physical activity (low)	195 (19.56)	120 (16.80)	75 (26.50)	0.0005
Socioeconomic characteristics (upper)	87 (8.73)	74 (10.36)	13 (4.59)	0.0036
Socioeconomic characteristics (Middle)	755 (75.73)	570 (79.83)	185 (65.37)	<0.0001
Socioeconomic characteristics (Lower)	139 (13.94)	64 (8.96)	85 (30.04)	<0.0001
Family history (Positive)	495 (49.65)	358(72.32)	137 (27.68)	0.6241
Substance Use (Tobacco)	385 (38.62)	376 (52.66)	9 (3.18)	<0.0001
Waist circumference	362 (36.31)	251(35.15)	111 (39.22)	0.2301
Body Mass Index (≥23)	562(56.37)	395 (55.32)	167 (59.01)	0.2891

Note: P < 0.05 implies significant difference between proportions.