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Original Article

Effectiveness of a community screening program for metabolic syndrome and cardiovascular risk factor identification in young South Asians adults



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ABSTRACT

Aims: Metabolic syndrome has been associated with increased risk of cardiovascular disease. We aimed to determine the effectiveness of a community-based screening program in identifying cardiovascular risk factors in healthy young South Asian population.

Materials and Methods: Between 2006 and 2011, 3314 patients of all ages were recruited as a part of a prospective cohort study investigating cardiovascular risk in South Asians. We analyzed 1537 patients between the ages of 18 and 40. Demographic and baseline characteristics including baseline laboratory markers and blood pressures were obtained at initial visit.

Results: The total cohort of 1537 patients was 66.5% male, and the mean age was 35 ± 5 years. Among participants who denied a history of hypercholesterolemia, 62% had elevated LDL-C (>100 mg/dL), and 8% had markedly elevated LDL-C (>160 mg/dL). Overall, diabetes was present in 4%, hypertension was present in 12% and hyperlipidemia was present in 46%. Low HDL-C (50% of men, 52% of women) and elevated triglycerides (44% of men, 18% of women) were the most prevalent components of metabolic syndrome. Metabolic syndrome was present in 14% of men and 8% of women and one-third (30%) of men and one-fifth (19%) of women had at least two component risk factors.

Conclusions: This is the largest study to date assessing effectiveness of a community based screening program aiming to identify cardiovascular risk in young South Asians. We note significant modifiable risk at a young age. Such community based interventions can be effective at detecting and managing risk factors early in this vulnerable population.

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1. Introduction

South Asians are individuals with ancestry from the Indian subcontinent, including the countries of India, Pakistan, Nepal, Bangladesh, Bhutan, Sri Lanka, and the Maldives. The prevalence of coronary artery disease (CAD) in South Asians is three to five times higher than in Caucasians [1–4], and this high prevalence has been observed in both native and immigrant populations [5,6]. South Asians present with more severe CAD at a younger age than their ethnic counterparts [6–10]. Large international cohort studies have

demonstrated that the mechanism underlying risk for myocardial infarction in South Asians is the onset of traditional CAD risk factors at a young age [6,7,11]. Metabolic syndrome is a cluster of risk factors, including abdominal adiposity, elevated fasting glucose, and dyslipidemia associated with increased risk for CAD, peripheral vascular disease, stroke and type-2 diabetes (T2D) [5,12–14]. Metabolic syndrome is highly prevalent in South Asians populations [15–17,5], and is present in up to 60% of young South Asians, less than 45 years old, with myocardial infarction (MI) [18,19]. For these reasons, early detection of risk factors, including metabolic syndrome, in young adult South Asian patients could lead to earlier risk factor modification and a reduction in CAD, MI, and mortality.

Educational campaigns and community-based risk screening are effective methods for increasing the awareness of CAD and T2D

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risk factors in the general population [20–26]. However, implementation of community-based programs in immigrant and minority populations, who have decreased awareness of CAD risk factors compared to native Caucasian populations [27], is less well studied.

The South Asian Heart Center is a not-for-profit organization located in Mountain View, CA dedicated to addressing the known increased risk for cardiovascular disease in South Asians by providing comprehensive preventative cardiovascular care for this specific ethnic group.

We therefore evaluated the effectiveness of this community-based screening program for identification of cardiovascular risk factors and metabolic syndrome among South Asians below the age of 40.

2. Methods

This was a retrospective observational study of participants in the Bay Area South Asian study conducted at the South Asian Heart Center (El Camino Hospital, Mountain View, CA). The South Asian Heart Center is a not-for-profit cardiovascular risk reduction program targeting South Asians [15]. Participants were recruited through community and work-place outreach and provider-referral. All consecutive participants aged 18–40 years who completed the baseline risk assessment between 2006 and 2011 were included in this study. The Institutional Review Board at El Camino Hospital provided a waiver of consent for all participants in the Bay Area South Asian study.

2.1. Measurement

A standardized, scripted questionnaire was administered via telephone to obtain demographics, medication use, behaviors, medical and surgical history, and family medical history. Anthropometric and clinical variables, including waist circumference, height, weight, and blood pressure, were measured by trained study personnel. Baseline lipid measurements were obtained by peripheral venipuncture after a 10-h fast. Total cholesterol, high-density lipoprotein cholesterol (HDL-C), triglycerides (TG), and glucose were measured using reagents from Roche Diagnostics run on the Roche Modular PPP Analyzer (Berkeley Heart Lab, Berkeley, CA). Low-density lipoprotein cholesterol (LDL-C) was calculated using the Friedewald Formula [28].

Metabolic syndrome was defined by the NCEP ATP III definition as the presence of at least three of five risk factors, measured as part of the SAHC evaluation in accordance with international consensus guidelines: abdominal adiposity (waist circumference >40 inches for men and >35 inches for women), elevated triglycerides (≥ 150 mg/dL), low HDL-C (<40 mg/dL for men and <50 mg/dL for women), elevated fasting blood glucose (≥ 100 mg/dL), and elevated blood pressure ($\geq 130/85$ mm Hg) [29].

2.2. Statistical analysis

Statistical analysis was performed using STATA Version 10. Sample means and proportions were compared using the Student's *t*-test and Pearson's Chi-square test.

3. Results

Table 1 demonstrates the demographics and clinical characteristics of the 1537 participants. The cohort was 66.5% male, and the mean age 35 ± 5 years. The majority (88%) were first generation immigrants from South Asia. Self-reported prevalence varied for diabetes (4%), hypertension (12%), and hyperlipidemia (46%), while CAD, peripheral vascular disease, cerebral vascular disease, carotid disease or heart failure were rare (<1% for each). Men more commonly had a history of hypertension or dyslipidemia.

Screening revealed that the most prevalent components of metabolic syndrome were low HDL-C and elevated triglycerides (Table 2). Low HDL-C was present in 50.4% of the overall population. Women were more likely to have abdominal adiposity (19.0% vs. 10.1% $p = 0.001$). Hypertriglyceridemia was more common among men (43.5% vs. 17.5%, $p = 0.001$). Men were also more likely to have impaired fasting glucose (4.4% vs. 1.9%, $p = 0.014$). Elevated systolic and diastolic blood pressure were more common amongst men (systolic: 25.4% vs. 7.2%, $p = 0.001$; diastolic: 17.8% vs. 5.2%, $p = 0.001$).

The prevalence of component risk factors for the metabolic syndrome was high (Fig. 1). Thirty-three percent had already developed one component of metabolic syndrome and 26% had already developed two components. The metabolic syndrome (three components) was present in 14% of men and 8% of women.

Not only was a significant prevalence of risk factors noted in our sample, but also, we found that many individuals were not aware of risk factors identified by our screening protocol. Our community

Table 1
Demographic and clinical characteristics.

	Total (n = 1537)	Men (n = 1022)	Women (n = 515)	p-Value
Mean \pm SD or n (%)				
Age (years)	34.6 \pm 4.5	34.7 \pm 4.4	34.2 \pm 4.8	
Birth country				
US	117 (7.61)	7.83 (80)	7.18 (37)	0.263
South Asia	1321 (85.95)	878 (85.91)	443 (86.02)	
Married	1383 (89.98)	908 (88.85)	475 (92.23)	0.091
Medical history (self-report)				
Diabetes	60 (3.90)	38 (3.72)	22 (4.27)	0.085
Hypertension	183 (11.91)	146 (14.30)	37 (7.18)	0.001
Dyslipidemia	711 (46.29)	586 (57.39)	125 (24.27)	0.001
Coronary artery disease	9 (0.59)	7 (0.69)	2 (0.39)	0.177
Heart failure	3 (0.20)	1 (0.10)	2 (0.39)	0.101
Measured risk factors				
Blood glucose (mg/dL)	87 \pm 13	89 \pm 14	84 \pm 11	0.014
HDL-C (mg/dL)	45 \pm 24	42 \pm 28	50 \pm 14	0.408
LDL-C (mg/dL)	116 \pm 31	121 \pm 32	105 \pm 26	0.001
Triglycerides (mg/dL)	141 \pm 89	159 \pm 95	107 \pm 62	0.001
Systolic blood pressure (mm Hg)	117 \pm 15	121 \pm 14	110 \pm 13	0.001
Diastolic blood pressure (mm Hg)	79 \pm 199	84 \pm 245	69 \pm 9	0.001
Waist circumference (inches)	35 \pm 4	36 \pm 4	32 \pm 4	0.001

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