Original Article

Risk Factors for Coronary Artery Disease in a Semi-urban area of Tamil Nadu

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Abstract

Background : Coronary artery disease (CAD) is the most common cause of mortality in India with 3 million deaths annually. Deaths occurring due to CAD occur 5–10 years earlier in the Indian subcontinent than in Western countries. We studied the risk factors in a semi-urban area of Tamil Nadu with special reference to the conventional risk factors like diabetes, hypertension, hypercholesterolemia, smoking, and family history of coronary artery disease and other modifiable risk factors.

Methods : This study was a prospective and case controlled study where 50 patients with coronary artery disease and 50 control samples were studied.

Inclusion criteria included a positive treadmill test and/or angiographically proven coronary artery disease. A questionnaire in English and Tamil, was given to all patients diagnosed with coronary artery disease. Age, sex, diabetes, hypertension, hypercholesterolemia,smoking,family history of coronary artery disease, alcoholism, obesity and exercise levels were assessed.

Results & Conclusion : CAD was associated with diabetes and hypertension though not statistically significant. Hypercholesterolemia, smoking, family history of CAD, alcoholism, obesity and lack of exercise played a statistically significant role in CAD.

Key Words: Epidemiology, Coronary artery disease

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Introduction

Coronary artery disease (CAD) is the most common cause of mortality in India with 3 million deaths annually. India has 29.8 million symptomatic patients with CAD, 19.3 million diabetics and 118 million hypertensive individuals, who are at risk of developing metabolic syndrome, thus increasing their risk for CAD. CAD in India has been reported to present almost a decade earlier than in the West. Deaths occurring due to CAD occur 5–10 years earlier in the Indian subcontinent than in Western countries[1].

We studied the risk factors in a semi-urban area of Tamil Nadu with special reference to the conventional risk factors like diabetes, hypertension, hypercholesterolemia, smoking, and family history of coronary artery disease.

Materials and Methods

The study was a prospective and case controlled study and 50 patients with coronary artery disease and 50 control samples were studied. Institutional ethics committee approval was taken.

Inclusion criteria included a positive treadmill test and/or angiographically proven coronary artery disease. The control population was taken from patients undergoing master health checkup in our hospital, who did not have any chest pain or proven CAD and were TMT negative.

Data collection- A questionnaire in English and Tamil, was given to all patients diagnosed with coronary artery disease. At the end of the questionnaire, there were 6 questions to be filled by the attending doctor/physician assistant. Interviews were conducted in hospital wards or clinics. Informed consent was obtained from all study subjects.

Blood pressure >140/90mmHg was taken as hypertension. Blood sugar (fasting>110mg/dl, postprandial >140mg/dl after 2 hrs of a meal) were taken as diabetics; Serum cholesterol >200mg/dl was taken as hypercholesterolemia.

Alcohol intake of >4 times a week were taken as alcoholics. This included the Indian whiskey and local beer with an alcohol content of 42.8% and 6-8% respectively. Cigarette smoking of 1 packet/day was taken as smokers,though even smoking 1-4 cigarettes per day showed an increased risk of ischaemic heart disease[2]. Over weight when body mass index (BMI) was >25 kg/m2.

Family history of CAD, when a member of the family had proven CAD or there was unexplained sudden death in the family.

30 minutes or more of moderate-intensity physical activity like walking, on most (preferably all) days of the week was taken as evidence of exercise[3].

Statistical analysis was done by comparing cases and control subjects using SPSS version 21.The variables in the control and patient group were done using the chi-square test.

Results

Prevalence of CAD increased with increasing age. CAD was found more frequently in men, diabetics and hypertensive's, however this did not reach statistical significance(p>0.5).Hypercholesterolemia, obesity, sedentary lifestyle and alcohol ingestion all proved to be statistically significant risk factors for CAD (Table 1).

Discussion

In our study of 100 patients (50 patients and 50 controls) we found the majority to be males and above 50 years of age. Other studies have shown a greater incidence in young males as well as females[4,5].The incidence of diabetes mellitus and hypertension are traditional risk factors and are associated with higher cardio-vascular(CV) risk though in our study it was not statistically significant. Other statistically significant risk factors included smoking, hypercholesterolemia, family history of coronary artery disease, obesity and lack of exercise which was associated with a higher CV risk. This is in concordance with other studies[6,7,8,9].

It has been estimated that smoking will be the single largest cause of deaths by 2020. In India, the mortality from tobacco use will rise from 1.4% in 1990 to 13.3% in 2020, a great majority of which, will be due to cardio-vascular diseases[10,11,12].

Table 1 - Incidence of CAD with different parameters

Parameters	Cases(no/%)	Controls(no/%)	Odds ratio	P value
Age 20-29 30-39 40-49 >50	 1(0.04) 2(0.16) 13(6.76) 34(46.2)	 5(1) 8(2.5) 21(17.6) 21(17.6)		
Sex Male female	39(55.7) 11(36.7)	31(44.3) 19(63.3)	2.17	0.08
Diabetes Yes no	27(55.1) 23(45.1)	22(44.9) 28(54.9)	1.49	0.31
Hypertension Yes no	28(58.3) 22(42.3)	20(41.7) 30(57.7)	1.90	0.10
Dyslipidemia Yes no	26(68.4) 24(38.7)	12(31.5) 38(61.2)	3.43	0.002
Smoking Yes no	18(66.7) 32(43.8)	9(33.3) 41(56.2)	2.56	0.04
Family h/o of CAD Yes no	20(64.5) 30(43.5)	11(35.5) 39(56.5)	2.36	0.05
Obesity Yes no	34(59.6) 16(37.2)	27(62.7) 36(61.8)	2.49	0.04
Exercise Yes no	23(38.9) 27(65.8)	36(61.8) 14(34.1)	0.33	0.01
Alcohol Yes no	22(84.6) 28(37.8)	4(15.4) 46(62.2)	9.03	0.00

p value <0.05 significant

Hypercholesterolemia is a known factor in the causation of CAD and has been extensively studied in experimental animals and humans. In India, the LDL-C (low density lipoprotein) levels are not very high; there is greater preponderance of the more atherogenic dense LDL particles. The triglyceride levels are high and HDL-C (high density lipoprotein) levels are low. The presence of truncal obesity, metabolic syndrome and diabetes also modulate the impact of dyslipidemia on cardiovascular risk. In literature,this "atherogenic dyslipidemia" is more prevalent and is due to environmental and genetic factors[10]. However, that environmental factors play as important a role as genetic factors has been highlighted by a study, where 247 migrants from the Indian sub-continent of Punjabi origin living in West London were compared to 117 of their siblings living in Punjab, India. The study showed that there was a greater body mass index, systolic blood pressure, serum cholesterol, Apo B, lower HDL-C and higher fasting blood glucose in the West London cohort (p value <0.01)[13].

Lipid profile includes triglyceride (TG), total cholesterol (TC), HDL-C(high density lipoproteins)and LDL-C(low density lipoproteins). The TC, TG, and HDL-C are measured directly using enzymatic assays and LDL-C is derived indirectly. As consumption of food affects TG levels directly a fasting sample is essential to estimate LDL-C accurately. Absence of proximity to laboratories performing these tests in rural and semi-urban areas,may make testing in fasting state impractical for the patient. Thus, the Indian population maybe showing a spurious hypertriglyceridemia, if testing is not done in the fasting state. This can be overcome by calculating non-HDL-C which is a good alternative and is obtained by subtracting HDL-C from TC. It has the additional advantage of measuring atherogenic lipid molecules like VLDL (very low density lipoproteins), IDL(intermediate density lipoproteins), chylomicrons, chylomicron remnants and lipoprotein a[14].

Family history of CAD was an important risk factor in young Indian patients as was seen in our study. Modifiable variables like blood pressure, ApoB /ApoA1 ratio, serum cholesterol, and abdominal obesity are partly under genetic control. Potential genetic factors such as variance of genes involved in vascular homeostasis, hemostatic factors, lipid metabolism, and other metabolic factors may contribute to CAD[15]. In a large, prospective study, Parmar reported that 15% of coronary events were because of family history of coronary artery disease, at any age (not premature coronary artery disease) in first-degree relatives[16].

Obesity has been attributed to heart disease by increasing blood pressure, blood glucose and lipids[6,15]. Physical inactivity is an important risk factor for the development of CAD, hypertension, type II diabetes mellitus, obesity and, dyslipidemia. Physical activity has been shown to reduce TG and reduce the LDL-C particle size thus directly improving "atherogenic dyslipidemia"[17,18,19].

Our study showed a strong correlation of CAD with alcoholism. This is probably of semi-urban population alcohol consumption is usually associated with smoking,dietary indiscretion and lack of exercise. Therefore, alcoholism in this sub-group maybe taken a surrogate for coronary risk. Consumption of alcohol > 100g/day is a risk factor atherogenesis and consumption of<50g/day is protective due to the antithrombotic and inhibition of the atherogenic action of high levels of LDL[21].

Limitations of the study

Though there was a trend in traditional risk factors as causative for CAD, the number of study patients were insufficient to bring out statistical significance. Also, since the study was conducted in a semi-urban area the levels of stress was less compared to the urban counterpart ; stress is known to contribute to the pathogenesis of both diabetes and hypertension. Insulin resistance, levels of lipoproteina, plasma fibrinogen, plasminogen activator inhibitor-1, markers of infection or inflammation, raised homocysteine levels, which have been associated with atherosclerosis could not be assessed and will be evaluated in further studies[22].

Conclusion

Our study does bring out the significance of hypercholesterolemia, family history of CAD, obesity and lack of exercise in the aetiopathogenesis of CAD.

Authors declare no conflict of interest.

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