Original Research Article

A study of Prevalence, Demographic Profile and Risk factors of Coronary Artery Disease

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Abstract

Introduction: In India CHD prevalence has increased in last six decade from1% to 9%-10% in urban populations and <1% to 4%-6% in rural populations. This epidemiological transition is mainly because of the increase in the prevalence CHD risk factors among Indian population. The present study has been undertaken with the objectives of studying the prevalence rates of coronary risk factors as well as demographic profile, age and sex specific high- risk groups.**Materials and Methods:** A cross-sectional study was conducted by using stratified multistage random sampling. 270 participants aged ≥40 years participated in this study. The Study variables were age, sex, occupation, addiction, food habit, physical activity, body mass index, blood pressure, and electrocardiogram change were recorded. **Results:** The prevalence of IHD among smokers was higher than among non-smokers (P<0.01) Table 4. Prevalence of IHD increases with the increase in blood pressure (P<0.01). The highest prevalence of IHD was found among the severe hypertensive population (33.3%) and the lowest prevalence was found in those patients with normal blood pressure (5.2%). The prevalence of IHD increased with higher BMI (P<0.05). **Conclusion** CAD among the study population is significantly associated with hypertension and smoking.Risk factors for coronary heart disease which were higher among males.

Keywords: coronary heart disease, hypertension, smoking.

Introduction

The prevalence of coronary artery disease in India increased from 1% in 1960 to 9.7% in 1995 in urban populations, and in rural populations it has almost doubled in the last decade[1].There is an epidemiological transition from infective to degenerative diseases, increases in the prevalence of cardiovascular risk factors, and ageing of the population, which eventually leads to an increase in the absolute numbers of people with coronary heart disease (CHD) and increased health awareness and demand for health care facilities.

The burgeoning burden of CHD in India can be explained by the alarming rise in the prevalence of coronary risk factors like diabetes, hypertension, atherogenic dyslipidemia, smoking, central obesity and physical inactivity. Rapid urbanization and change in lifestyle that occurred during the past two decades have led to the growing burden of coronary risk factors in India. Previous studies conducted in migrant Indians were misinterpreted to indicate that conventional risk factors do not account for the high prevalence and premature occurrence of CHD among Indians;[2] they were thought to be genetically preordained to develop the disease. However, the large interheart study which recruited significant number of Indian subjects found that the conventional risk factors accounted for most of the CHD burden[3]. The INTERHEART study was a large cross-sectional study of around 30,000 participants from 52 countries representing every inhabited continent. The relation of smoking, history of hypertension or diabetes, waist/hip ratio, dietary patterns, physical activity, consumption of alcohol, blood apolipoproteins (Apo), and psychosocial factors to myocardial infarction was studied. The highest proportion of cases with first acute myocardial infarction at the age of 40 years or younger was in men from the Middle East (12.6%), Africa (10.9%), and south Asia (9.7%).Mortality from CAD in Indians is predicted to increase rapidly and overtake that of the high-income countries. Among adults over 20 years of age, there has been a two-fold rise in CHD in rural areas and a 6-fold rise in urban areas during the period from 1960 to 2002[4].Previous studies have shown high prevalence of CHD in Asian Indians residing in the United States[5]. However there are no robust and contemporary data on CHD in native Indians. In a systematic review of CHD prevalence from India, Ahmed et al. commented that none of the studies conformed to the requirements of a high-quality epide- miologic study[6]. Kerala, with a population of over 33million, is the most advanced state in epidemiological transition and has the highest prevalence of CAD risk factors in India.[7]The state has been reported to be the harbinger of what the rest of India is going to face in the near future[7]. The INTERHEART study reported the importance of conventional risk factors associated with CHD[8]. Although the CHD risk factor prevalence is the highest in the state of Kerala, there are no recent studies on the prevalence of CAD in this state. The only one community based study in 1993 from the rural area of the southernmost district of the state reported a CHD prevalence of 7.4 %[9].Deaths due to coronary heart diseases and strokes were more common among the urban population at the turn of the century. But the trend has reversed since then. Between 2000 and 2015, the age-standardized rate of mortality (per 100,000 person years) due to coronary heart diseases increased among rural men by over 40% even as it declined among urban men. For females, the increase was over 56% in rural India.

In the high-burden states of the North-East, West Bengal and Chhattisgarh, stroke mortality rates were about three times higher than the national average[10].Family history of coronary artery disease and having hyperlipidemia, hypertension, diabetes, obesity

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and tobacco use are known major risk factor for coronary artery disease.In this context, the present study has been undertaken with the objectives of studying the prevalence rates of coronary risk factors as well as age and sex specific high- risk groups in our community.

Materials and Methods

A cross-sectional study was carried out in the department of general medicine SVS Medical college, Mahabubnagar, Telangana state. Ethical clearance was taken prior to the study. The study was carried out for a period of six month from January 2019 to June 2019. The study participants of both sexes and aged from 40 to 80 years were enrolled from the patients visited medicine OPD during study period. The written informed consent was obtained from the study participants. An adequate sample (270 subjects) was drawn to carry out the present study and stratified multistage random sampling has been used.

Inclusion criteria: Those who agreed to participate in the study & aged 40 to 80 years

Exclusion criteria*:* Those who not willing to participate in the study and severely ill and less than 40 years or more than 80 years[11].Presence of diabetes mellitus (DM) in any of the first-degree relatives was taken as positive family history for DM. Height, weight, waist circumference and hip circumference were measured as per standard guidelines laid down by World Health Organization (WHO)[12].A cut off point of body mass index (BMI) more than or equal to 25 kg/m² was considered as risk factor for CHD[13]. Truncal obesity was calculated by estimating waist hip ratio (WHR). WHR more than or equal to 0.95 in males and 0.85 in females was taken as the cut off point for diagnosing truncal obesity[14]. Socio–economic status (SES) was calculated based on Prasad's scale of social stratification for rural areas. It is based on per capita income per month in Rupees[15]. Blood pressure was measured and classified as suggested by WHO[16]. Physical activity of subjects was assessed taking into consideration the occupational as well as non- occupational physical activity. Based on this, a score of physical activity status was calculated as suggested by Singh et al[17]. For estimation of alcohol consumption, the quantity frequency index developed by Strauss and Bacon was used. Users of all types of tobacco products were included in the category of tobacco users[18].

Statistical analysis

We entered data into CS Pro software (the US Census Bureau) version 4 · 0 for Windows. Nominal data and prevalence was reported in terms of numbers or/and percentages. Data cleaning and statistical analysis were performed using Stata (Stata Corp, Texas, USA) version 13 · 0 for Windows. All pro- portions were age-adjusted using WHO population data. Frequency distribution was done for categorical variables. Comparisons of age-adjusted prevalence between different categories were done using two-tailed proportion test. The difference in the age-adjusted prevalence and its 95 % confidence intervals are provided. *P* value <0 · 05 defined the level of statistical significance.

Results

Table 1 depicts the demographic and behavioral characteristics of the participants. Age was categorized into four groups: 40–49 years, 50–59 years, 60–79, and 70-80 years. Prevalence was noted in second group (33.3).There were 107 men (39.62%) and 163 women (60.37%). Approximately 5.18% of the total cohort reported vegetarian diet, 94.8 % was non-vegetarian, 49.2% were non smokers, 33.3 were current smokers, and 17.40 % were former smokers. 78.8% reported low physical activity and 21.11% were Non-sedentary. The BMI of the participants was noted low in 6.6% individuals, normal in 33.3%, with the majority either overweight (19.25%) or obese (41.11%). The prevalence of abdominal obesity was 60.37%. The prevalence of diabetes was 63.7%, and of these participants, 4.4% were on insulin therapy, 28.1% received oral hypoglycemic agents (OHAs), 2.9% received both (insulin and OHAs), and 28.1% received no treatment.

Table 1: Baseline demographic and behavioral characteristics of the participants

Variable	Number	Percentages
Age		
40–49	79	29.2
50–59	90	33.3
60–69	73	27.03
70–80	28	10.37
Sex		
Men	107	39.62
Women	163	60.37
Area		
Rural	152	56.3
Urban	118	43.7
Socio-economic status		
Low	104	38.51
Middle	83	30.74
High	83	30.74
Educational status		
No formal education	15	5.55
1–4years	33	12.22
5–10years	157	58.14
>10years	65	24.07
Smoking		
Never	133	49.25
former	47	17.40
Current	90	33.33
Physical activity		
Sedentary	213	78.88
Non-sedentary	57	21.11

Dietary habits		
Vegetarian	14	5.18
Non-vegetarian	256	94.81
BMI		
Low	18	6.66
Normal	90	33.33
Overweight	52	19.25
Obese	111	41.11
Diabetes	172	63.7
On insulin alone	12	4.4
On OHA alone	76	28.1
On both	8	2.9
Not on prescription drug	76	28.1
Abdominal Obesity		
Yes	163	60.37
No	107	39.62

Out of the 291 individuals age ≥40 years old enrolled in the study, 270 took part in the study. The mean age of the study population was 53.5 years only (+ 13.7). The mean age of males was 54 years only and the mean age of females was 52.6 years old. Among 270 study subjects, 49 (18.1%) had IHD. The prevalence of IHD significantly increased with an increase in age (P<0.01). Around 79% participants were following sedentary life style& abdominal obesity was observed in 60% participants. Smoking was present among 36% participants. Among 270 study participants , 49 people (18.1%) had IHD. The prevalence of IHD significantly increased with an increase in age(P<0.01).The prevalence of symptomatic IHD was 9.6% and that of asymptomatic IHD was 8.5% Table 2. Prevalence of IHD was higher among males (14.8%) as compared with females (10.6%)(P>0.05).

Table 2: The prevalence of ischemic heart disease in different age groups among the study population

Age groups(years)	Study population	Symptomatic (A)	ECG based (Silent CAD) (B)	Total (A+B)	Odds ratio
40–49	132(48.8)	6(4.5)	5(3.7)	11(8.3)	1
50–59	64(23.7)	5(10)	4(8)	9(18)	2.14
60–69	44(16.2)	5(11.3)	4(9)	9(20.4)	3.42
70–80	30(11.1)	6(20)	6(20)	12(40)	8.69
Total	270	26(9.6)	23(8.5)	49(18.1)	-

The overall prevalence of hypertension among the study population was 49 %. Among the patients with hypertension, the prevalence of Grade 2 hypertension (24.8) which was higher than Grade 1 (14.4%). Grade 3 hypertension was 6.6%, Grade 1 isolated systolic hypertension was 6.2%, and Grade 2 isolated systolic hypertension was 3.3% (Table 3).

Table 3: Distribution of study population according to their blood pressure

	Blood pressure	Frequency	Percentage (%)
Non-hypertensive	Normal	95	35.1
	High-normal	43	15.9
Hypertensive	Grade 1 hypertension	39	14.4
	Grade 2 hypertension	67	24.8
	Isolated systolic hypertension (Grade 1)	17	6.2
	Isolated systolic hypertension (Grade 2)	9	3.3
	Total	270	100.0

The prevalence of IHD among smokers was higher than among non-smokers (P<0.01) Table 4. Prevalence of IHD increases with the increase in blood pressure (P<0.01). The highest prevalence of IHD was found among the severe hypertensive population (33.3%) and the lowest prevalence was found in those patients with normal blood pressure (5.2%). The prevalence of IHD increased with higher BMI (P<0.05). The prevalence was 29.1% among patients with BMI ≥ 30 and 8.4% among patients with BMI 18.5-23.5.

Table 4: Distribution of the study population according to coronary risk factors and the presence of ischemic heart disease(n = 270)

Coronary risk factors	Ischemicheart disease		Total	OR	*P* value
	Yes	No			
Smokinghabit					
Yes	33(33.7)	75(76.5)	98(100)	4.29	0.0012
No	16(9.3)	156(90.6)	172(100)	1	
Hypertension					
Normal	5(5.2)	90(94.7)	95(100)	1	0.00008
Highnormal	4(9.3)	39(90.6)	43(100)	3.40	
Grade1hypertension	9(23.0)	31(79.4)	39(100)	8.11	
Grade2hypertension	17(25.4)	50 (77.5)	67 (100)	9.21	

Isolatedsystolichypertension(Grade1)	2(11.7)	15(88.2)	17(100)	3.22	
Isolatedsystolichypertension(Grade2)	2(22.2)	7(77.7)	9(100)	5.91	
BMI(kg/m^2)					
<18.5	6(12.5)	42(87.5)	48(100)	1	0.03
18.5-23.5	9(8.4)	97(91.5)	106(100)	0.76	
23.5-25	7(15.2)	39(84.7)	46(100)	1.38	
25-30	10(21.7)	36(78.2)	46(100)	3.31	
≥30	7(29.1)	17(70.8)	24(100)	4.30	

Discussion

Our study revealed that the prevalence of symptomatic IHD was 9.6% & asymptomatic IHD was 8.5%, overall 18.1% which is higher because this study was conducted in hospital settings among patients attending tertiary care hospital where they will come for some or other existing health problems. Age-adjusted prevalence of definite CAD was higher in men. However, any CAD prevalence in women was significantly higher than in men. It is well known that women commonly have ECG with nonspecific ST –T changes and angina with normal coronary arteries; this may have resulted in overestimation of any CAD prevalence in women. In our study the prevalence of RAQ angina and ST-T changes were significantly higher among women. Similar finding has been reported by Kumar R et al (2006),[19] Singh R B et al (1997)[20] and by Gupta R et al (1995)[21]. This Differences of CHD prevalence between men and women are pronounced, especially at younger ages. Women's risk of CHD rises quickly after menopause, resulting in a considerable narrowing of CHD risk between the sexes with age. These data, and other confirmatory data from observational studies, gave rise to the hypothesis that estrogen replacement after menopause would reduce risk in women[22]. Analysis of CHD risk prevalence data shows high prevalence of hypertension, obesity (BMI ≥ 25 kg/m^2), smoking, smokeless tobacco use, alcohol consumption, sedentary type of physical activity and low consumption of fruits and vegetables in the diet. Statistical analysis has confirmed the importance of classical coronary heart disease risk factors such as Age, hypertension, smoking and sedentary type of physical activity. Similar finding has been reported from various other Indian studies such as by Mandal S et al (2009) carried out a cross-sectional study on a random sample of population aged ≥40 years old in the Municipal Corporation area of Siliguri, found that the smoking, hypertension and BMI (≥25 Kg/m^2) were found to be significantly associated with CHD[23]. Sedentary physical activity were found in overall 13.1% which is less than that reported by Agrawal et al (18.5%); Gupta et al (85%) and Kaur et al (84%).People were having BMI more than or equal to 25 kg/m^2 were 25.1%. Similar finding was reported by Agrawal et al (23.1%), but Kaur et al found a higher prevalence of 43%[24,26]. Prevalence of truncal obesity was 23.2% (23.7% in males and 76.3% in females). Gupta et al observed that it was 57.4% in males and 68.4% in females.18 Both the studies agree that prevalence is higher among females, but Agrawal et al observed that it was 20.7% in males and 15.9% in females[24].In a recent large study from Kerala, Thankappan et al demonstrated a high prevalence of risk factors comparable to the Unites States[27]. The study provided valuable insights into the prevalence, awareness and control of various risk factors for chronic non- communicable diseases. A sample of 7449 men and women from rural, urban and slum background were included in the survey. Anthropometric and behavioural characteristics, blood pressure, serum lipid levels and fasting blood glucose were analyzed. The study underlined the alarmingly low level of awareness, treatment and control of hypertension and diabetes in the sample. Only a third of the individuals were aware of their hypertension and only a quarter were treated; of the treated, one-third had adequate control. Similar trends were noted in diabetes. The prevalence of smoking was 42% which was double that in the United States but lower than Indonesia[28] and Vietnam[29]. High blood pressure was observed in nearly 30% of individuals evaluated, comparable to[30] the prevalence in the United States; diabetes was 50% higher[31]. Mean cholesterol levels were similar but mean HDL levels were lower[32]. In terms of behavioural risk factors, a fifth of the sample used tobacco products, and a tenth consumed alcohol, and two-fifths consumed a diet low in fruit and vegetable; but physical inactivity was uncommon. Twenty five percent of the sample was overweight and 34% had abdominal obesity using the threshold used for developed countries.

Conclusion

Our study revealed that the prevalence of symptomatic IHD was 9.6% & asymptomatic IHD was 8.5% among study participants , overall prevalence was found around 18% which is higher because this study was conducted in hospital settings among patients attending tertiary care hospital where they will come for some or other existing health problems. Most risk factors of CAD were highly prevalent in our study participants .CAD among the study population is significantly associated with hypertension and smoking. Risk factors for coronary heart disease which were higher among males were Smoking, smokeless tobacco and alcohol consumption. Community level & individual level approaches are warranted to address the high level of CAD risk factors to reduce the increasing prevalence of CAD in this population. Hypertension, obesity, smoking, smokeless tobacco sedentary type of physical activity and age were significantly associated with coronary heart Disease. The incidence of CAD is likely to increase further because of rapid expansion and its accompanying lifestyle changes. Therefore, there is an immediate need to raise awareness among the general population about these risk factors, promote the correct diet and physical activity, and at the same time develop guidelines for screening and preventive therapeutic programmes to identify and manage individuals at high risk for future CAD.

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