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ORIGINAL RESEARCH

Comparative study of risk factors among coronary artery disease patients from urban and rural areas of central India: A Cross Sectional Hospital-Based Study

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Abstract

Background: The incidence of CAD is likely to increase further because of rapid urbanization and its accompanying lifestyle changes, as well as an increase in the prevalence of DM, So, the present study was conducted with an aim to make comparison of coronary artery disease risk factors in rural patients and urban patients.

Methods: This Cross-Sectional Clinical Study was conducted among 124 patients with coronary artery disease attending the medicine and cardiology OPD and had admitted in medicine ICCU and wards in medical college and hospital during October 2014 to October 2015. Patient found suitable for the study were subjected for clinical, haematological, ECG and ECHO investigations. The data were entered in Microsoft Excel sheet. The data was analysed using SPSS package and appropriate tests like chi-square, 't'-test and ANOVA were applied.

Results: Out of 124 patients,44.4% (55/124) were from rural area and 55.6% (69/124) were from urban area. In our study, both in rural and urban subjects, chest pain (94.5% and 97.1% respectively) was predominant symptom. In rural subjects only smoking risk factor was statistically significant among CAD patients (p=0.006). HDL levels were significantly (p=0.028) decreased in rural subjects (36.7±9.2 mg/dL) as compared to urban subjects (39.9±6.9 mg/dL)

Conclusion: Conventional risk factors such as smoking, low HDL levels and abdominal obesity play a major role in the causation of premature coronary artery disease among the rural. Lack of awareness, combined with urbanization of rural lifestyle could be responsible for increasing incidence of premature coronary artery disease in them.

Keywords: Urban, Rural, coronary artery disease, smoker, HDL

Introduction

Coronary artery disease (CAD) is one of the most common causes of mortality and morbidity in both developed and developing countries. It is a leading cause of death in India, and its contribution to mortality is rising: the number of deaths due to CAD in 1985 is expected to

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have doubled by 2015 [1]. According to reports from the National Commission on Macroeconomics and Health, 62 million people in India will have CAD by 2015, with 23 million of these below 40 years of age [2].

The prevalence of classic cardiovascular risk factors such as hypertension, dyslipidemia, obesity and diabetes, varies widely between different countries, and shows some important secular trends. The conventional risk factors for CAD can be divided into non-modifiable and modifiable risk factors. The former includes age, sex and family history, while the latter include diabetes mellitus (DM), smoking, dyslipidemia, hypertension and obesity. There is increasing incidence indicating that Asian Indians are at increased risk of CAD, which cannot be attributed to the common risk factors. Recently, a number of newer cardiovascular risk factors have been identified, which are of great interest as more than 60% of CAD in native Indians remains unexplained by conventional risk factors. Comparative studies on newer risk factors show that Indians have higher C-reactive protein, plasminogen activator inhibitor (PAI-1) and homocysteine levels [3].

The incidence of CAD is likely to increase further because of rapid urbanization and its accompanying lifestyle changes, including changes in diet, physical inactivity, drug and alcohol intake, as well as an increase in the prevalence of DM [4,5]. The prevalence of risk factors in a population determines the future burden on healthcare services and the loss of an individual's productive years. Risk factors constitute a health risk for the individual and impose an overall burden on the economy. So, the present study was conducted with an aim to study the various risk factors of coronary artery disease among enrolled subjects and to make comparison of coronary artery disease risk factors in rural patients and urban patients.

Materials and methods

This Cross-Sectional Clinical Study was conducted among all patients with coronary artery disease (defined as per WHO cardiovascular survey methods criteria) attending the medicine and cardiology OPD and had admitted in medicine ICCU and wards in NSCB medical college and hospital Jabalpur, during October 2014 to October 2015. So, during that defined duration a total of patients 124 subjects were included in the study using convenient sampling technique.

Patient found suitable for the study were subjected for clinical, haematological, ECG and ECHO investigations. Urban and Rural population were defined according to census of India data. Rural Patients: Patients belong from a cluster, which have population of <2500, according to the Census2011 and patients from places which were included as “Villages” in villages list of Jabalpur district, persons born in these villages and still living there. Patients not satisfying above criteria were considered to urban patients.

Blood pressure (BP) measurement was done after 10 minutes rest in supine position, with no tight clothes, mean of two measurements was registered and hypertension defined as per International Society of Hypertension Global Hypertension Practice Guidelines. Blood sugar was measured by glucose oxidase peroxidase method and diabetes defined according to Classification and Diagnosis of Diabetes: Standards of Medical Care in Diabetes. Anthropometric evaluation was carried out including height, weight, and Body mass index (BMI) was calculated by formula: body weight (in kilogram)/ height^2 (in meter)and overweight and obesity defined as BMI $\geq$25kg/m^2.

Serum cholesterol was measured by cholesterol oxidase peroxidase method. Serum triglycerides (TGs) was measured by glycerol phosphate oxidase peroxidase method. Serum high-density lipoprotein (HDL) was measured by cholesterol oxidase per oxidase method after precipitation. Serum low-density lipoprotein (LDL) was measured by Friedwald’s equation derangement in lipid profile defined by adult treatment panel (ATP) III guideline.

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Physical inactivity was defined among adults (≥18 years) as not achieving 150 min of moderate-to-vigorous-intensity physical activity per week or 75 min of vigorous-intensity physical activity per week or an equivalent combination of moderate and vigorous-intensity activity. Users of all types of tobacco products and present and past smokers have been included in smoker category. The diagnostic criteria for tobacco use as well as other coronary risk factors adopted were in accordance with American College of Cardiology clinical data standards. Socioeconomic status was defined on basis of Revised BG Prasad Scale, where the updated and modified value for BG Prasad socioeconomic classification calculated as per the new income value for May 2014.

Statistical analysis

The data were entered in Microsoft Excel sheet. The data was analysed using SPSS package and appropriate tests like chi-square,'t'-test and ANOVA were applied. In all the above test P value less than 0.05 were taken to be statistically significant.

Results

In our study, a total of 124 patients with CAD were enrolled. Out of 124 patients, 44.4% (55/124) were from ruralarea and 55.6% (69/124) were from urban area. In urban subjects most of the patients were seen in age group of 51-60 years (37.7%) and in rural subjects most of the patients were in the age group of 61-70 years (32.7%). Coronary artery disease was predominantly seen in male sex in both urban (68.1%) and rural (72.7%) population. In our study, both in urban and rural subjects, most of CAD patients belonged to lower middle and lower class (49.3% and 74.5% respectively) (Table 1).

Table1: Sociodemographic characteristics of the CAD subjects (Rural vs Urban) (N=124)

Variables	Number (%)		P value
	Urban (N=69)	Rural (N=55)	
Age group			
< 41 years	8 (11.6)	6 (10.9)	0.519
41-50 years	14 (20.3)	17 (30.9)	
51-60 years	26 (37.7)	11 (20.0)	
61-70 years	12 (17.4)	18 (32.7)	
>70 years	9 (13)	3 (5.5)	
Gender			
Male	47 (68.1)	40 (72.7)	0.577
Female	22 (31.9)	15 (27.3)	
Socioeconomic status*			
Upper class	24 (34.8)	3 (5.5)	<0.001
Upper middle and Middle class	11 (15.9)	11 (20.0)	
Lower middle and Lower Class	34 (49.3)	41 (74.5)	

*Revised BG Prasad SES Classification

In our study, both in rural and urban subjects, chest pain(94.5% and 97.1% respectively) was predominant symptom followed by sweating (85.5% and 75% respectively).History of CAD (20.3%), diabetes (26.1%), family history of CAD (13.0%) and alcoholism (26.1%) were predominant risk factors in urban subjects as compared torural subjects, where as history of hypertension (38.2%), smoking (63.6%), and tobacco chewing (36.4%) were predominant risk factors in ruralsubjects as compared to urban subjects, but in rural subjects only smoking risk factor was statistically significant among CAD patients(p=0.006)(Table 2).

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Table 2: Clinical history and presentation of CAD subjects (Rural vs Urban) (N=124)

Variables	Number (%)		P value
	Urban (N=69)	Rural (N=55)	
Presenting Symptoms			
Chest pain	67 (97.1)	52 (94.5)	0.472
Dyspnoea	23 (33.3)	23 (41.8)	0.311
Sweating	52 (75.4)	47 (85.5)	0.164
Palpitation	36 (52.2)	32 (58.2)	0.504
Clinical and family history			
History of CAD	14 (20.3)	6 (10.9)	0.158
History of Hypertension	21 (30.4)	21 (38.2)	0.365
History of Diabetes mellitus	18 (26.1)	8 (14.5)	0.116
Family history of CAD	9 (13.0)	5 (9.1)	0.489
History of smoking*	27 (39.1)	35 (63.6)	0.006
History of tobacco chewing	15 (21.7)	20 (36.4)	0.072
History of alcohol intake	18 (26.1)	8 (14.5)	0.116

*Statistically significant

Body mass index (BMI) was significantly higher in urban patients (24.9±2.7kg/m^2) as compared to rural patients (23.2±1.8 kg/m^2), with p value less than 0.001. Also, HDL levels were significantly (p=0.028) decreased in rural subjects (36.7±9.2 mg/dL) as compared to urban subjects (39.9±6.9 mg/dL) (Table 3).

Table 3: Anthropometric and lipid profile of CAD subjects (Rural vs Urban) (N=124)

Variables	Mean±SD		P value
	Urban (N=69)	Rural (N=55)	
Body Mass Index (kg/m^2)*	24.9±2.7	23.2±1.8	<0.001
Total cholesterol(mg/dL)	155.1±35.6	149.3±36.0	0.371
HDL(mg/dL)*	39.9±6.9	36.7±9.2	0.028
LDL(mg/dL)	107.4±29.4	102.9±34.5	0.434
Triglycerides(mg/dL)	124.5±47.7	116.8±32.5	0.308
VLDL(mg/dL)	23.6±9.2	23.3±7.8	0.847

*Statistically significant

Discussion

Higher rates of cardiovascular disease in urban India compared to rural India suggest important roles for nutritional and environmental factors, or nature.Singh et al., performed a population survey of coronary heart disease and risk factors in a rural and urban setting of Moradabad in and showed an overall prevalence of CHD as 9.0% and 3.3% in urban and rural population respectively [6]. In our study, coronary artery disease was predominantly seen in male sex in both urban (68.1%) and rural (72.7%) population.

Among traditional cardiovascular risk factors, most common risk factor was smoking present in 63.6% of rural patients, similar to observations in INTERHEART study, more so in rural Indians as noted by several studies [7,8,9,10].Auley et al., reported that the smoking rate was 62.35% in urban population whereas 18.07% in rural population. But addiction to tobacco was some extent higher in rural areas (16.6%) as compare to urban (7.05%) [11]. Alcohol consumption was noted in 26.1% of urban subjects and 14.5% rural subjects, similarly the consumption of alcohol by rural men was lower compared to urban men in other studies [7,12].

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Body mass index (BMI) was significantly higher in urban patients (24.9±2.7 kg/m^2) as compared to rural patients (23.2±1.8 kg/m^2).Our study results were consistent with Venkatramana et al., and Gupta et al., studies, in which prevalence of obesity were significantly greater in the urban patients [9,13]. Studies have shown thatincrease in BMI results in significant dyslipidemia and insulin resistance and a 3-fold increase in diabetes [14,15].

There were 26.1% diabetics in urban subjects and 14.5% diabetics in rural subjects; and 30.4% (urban) and 38.2% (rural) hypertensives. Our findings were similar to previous studies which showed that prevalence's obesity and diabetes mellitus were lower in the rural population whereas smoking and hypertension were common [7,10,12]. Also, Auley et al., showed tha tthe presence of hypertension and diabetes was found in 52.94% and 49.41% which was higher in urban population as compared to 35% and 17% in rural population respectively[11].

Lipid abnormalities are well known to increase the risk of CAD. The predominant form of dyslipidemia found in the rural population was low HDL cholesterol (36.7±9.2 mg/dL), high triglycerides (116.8±32.5 mg/dL), elevated LDL cholesterol (102.9±34.5 mg/dL) and elevated total cholesterol levels (149.3±36.0 mg/dL).Our findings were similar with those of Pais et al, and others who reported high triglycerides and low HDL cholesterol with normal LDL cholesterol in their cases [7,10,16]. The lower HDL-C and higher triglyceride levels were found prominently in Indians [17,18]. Low levels of HDL cholesterol have been shown to be a powerful risk factor for CAD [7,10].Serum LDL concentration was significantly ($p<0.001$) elevated in urban population in comparison with rural population[11].

In our study, the family history of coronary heart disease was found in 13.0% in urban subjects and 9.1% in rural subjects, which was much lower the Auley et al., findings where family history of coronary heart disease was found in 57.64% in urban population and 33.74% in rural [11].

In India, under diagnosis and underreporting of CVD is frequently seen among rural people [19]. Economically underprivileged patients with CVD less often receive evidence-based treatments. The distribution of the healthcare workforce, between rural and urban India is not uniform. The earlier notion that the rural population is less prone to CVD is slowly dwindling due to rapid urbanization of rural lifestyles.

Studies have shown that awareness and control of conventional risk factors are poor in rural regions in comparison with urban regions [20]. Improving the human resource capacity for the prevention and control of CVD should be a national priority, and efforts should be made to ensure equitable distribution of available resources in both rural and urban settings [21].

Conclusion

Conventional risk factors such as smoking, low HDL levels and abdominal obesity play a major role in the causation of premature coronary artery disease among the rural youth. Lack of awareness, combined with urbanization of rural lifestyle could be responsible for increasing incidence of premature coronary artery disease in them. A multifaceted strategy is the need of the hour. Various awareness programs highlighting the CV risk factors with focus on primary prevention are required. Aiming at bridging the urban-rural health services gap, by incorporating telemedicine services for immediate diagnosis and treatment are needed. It will also ensure early stabilization of patients and urgent referral of high-riskcases. Such services will play a key role in assisting the rural primary healthcare doctors and other frontline health workers in CVD risk management.

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