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RESEARCH ARTICLE

Lifestyle risk factors for coronary artery disease among young male patients of urban and rural Dakshina Kannada - A cross-sectional study

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ABSTRACT

Background: There has been an increase in morbidity and mortality due to coronary artery disease (CAD) in developing countries due to multiple risk factors. India's concern is not only the high burden of CAD but also its impact on the productive workforce aged 25-55 years in both rural and urban population. **Aims and Objective:** To study the demographic profile and lifestyle determinants among young male patients with CAD. **Materials and Methods:** A cross-sectional study was conducted in urban and rural field practice area of a private medical college in Dakshina Kannada. One hundred male CAD patients in the age group 25-55 years were asked to answer a pretested validated questionnaire to assess their demographic and lifestyle risk factors leading to CAD. **Results:** Out of 100 patients, 55 were rural and 45 were from urban area. Significant numbers of urban CAD patients were graduates lived in independent house and used Liquefied Petroleum Gas as cooking fuel, while most rural patients were less literate. No significant difference was seen in physical activity. The source of drinking water in significant majority of urban CAD patients is from the tap in the house. Rural CAD patients used significantly more tobacco products. Most urban patients consumed nonvegetarian and fast food and had higher total caloric intake. **Conclusion:** The lifestyle differences seen between rural and urban population have drastically decreased in the recent time because of urbanization and globalization. Health education regarding appropriate lifestyle changes required to reduce the burden of CAD in India is the need of the hour.

KEY WORDS: Alcohol; Coronary Artery Disease; Demographic Profile; Diet; Lifestyle; Smoking

INTRODUCTION

Coronary artery disease (CAD) occurs when the arteries of the heart that normally provide blood and oxygen to the heart are narrowed or even completely blocked. In contrast to developed countries, where mortality from CAD is rapidly declining, it is increasing in developing countries. CAD is an epidemic in India characterized by the premature onset and high mortality. The World Health Organization and Global Burden of Disease Study also have highlighted increasing trends in years of life lost and disability-adjusted life years from CAD in India.[1] It is estimated that by the year 2020, CAD will be the largest cause of disability and deaths in India. Overall, cardiovascular disease (CVD) accounted for around 25% in 2008 and 29% of all deaths in 2013.[1,2] CAD in India would be taking a heavy toll on Indian youth and economy to the tune of approximately 1.6 trillion during 2015-2030.[3,4]

In India, an urban and rural difference in the prevalence of CAD is consistently reported. The prevalence was estimated to be 8-10% in urban and 3-4% in rural areas according to the population-based cross-sectional survey.[5]

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A substantial proportion of the population in India is exhibiting increasing prevalence of cardiovascular disease and associated risk factors.[6] It is axiomatic in the control of a disease that the first step is to identify those at high and those at low risk. The characteristics of these two groups often point to methods of preventing and even curing the disease. Factors of risk for the premature CAD in Indian individuals could be multiple ranging from social, economic, psychological, and lifestyle.[7,8]

CAD has been noted to be the most important lifestyle diseases and is the leading cause of the morbidity and mortality worldwide.[3] Studies indicate that regular moderate alcohol consumption during middle-age probably does reduce vascular risk, but heavy drinkers have a high incidence of developing CAD.[9] People consuming diet with high glycemic index with low fruit and vegetables intake are at a higher risk for developing CAD.[8]

India's concern is not only the high burden of CAD but also its impact on the productive workforce aged 25-55 years in both rural and urban population. Precious life is snatched away when one is in his most productive stage of life and when the social and family responsibilities are the greatest leading to devastating consequences for an individual, their family and society at large. Strategies to prevent CAD before their onset will be productive than providing interventions at a later stage when the disease is well-established. By studying the impact of lifestyle determinants of young patients of Dakshina Kannada, Karnataka, India, with CAD and incorporating appropriate lifestyle modifications, it is possible to decrease or prevent the onset of CAD and thus reduce the disease burden on the nation. Hence, the present study was designed to study the demographic profile (rural/urban) and lifestyle determinants among the participants with CAD and analyze the above parameters with the occurrence of CAD.

MATERIALS AND METHODS

This cross-sectional study was conducted in urban and rural field practice area of a private medical college in Dakshina Kannada, for the duration of June 2015-September 2015. Ethics Committee approval was obtained before starting the recruitment of participants. Purposive convenient sampling to include hundred male patients in the age group 25-55 years having acute Ischemic Heart Disease (IHD) (IHD with ST-segment elevated myocardial infarction; non-ST-segment elevated myocardial infarction, unstable angina) and chronic IHD based on ECG findings, troponin T and medical records were done. Out of them, 55 were from rural area and 45 from urban area. Patients with heart failure were excluded from the study. The participants were explained in detail about study protocol and written informed consent was obtained from them.

A pre-tested and duly validated questionnaire was administered to the patients, and their responses were recorded. This questionnaire consists of an assessment of demographic status (rural/urban) and lifestyle determinants. The details of their living conditions were elicited with questions such as educational status, type of house they live in, type of cooking fuel used, and source of drinking water.

They were asked about physical activity (vehicle use, practice of yoga/exercise). Smoking history was taken in all the participants. Smoking history included tobacco use in any form (smoked or chewed on a daily basis in the past 6 months) and history of regular consumption of alcohol (on ≥10 days a month in the past 6 months).[10] A dietary history eliciting the nonvegetarian food intake, type of meat consumption and frequency, frequency of intake of fruits, fast food, and soft drink consumption along with average total calorie consumption per day was calculated.

Statistical Analysis

Parameters among the study group were analyzed using the statistical software SPSS version 16.0 and MS Excel. Chi-square test was used to compare education, living conditions, physical activity, tobacco use, alcohol consumption, and diet parameters between rural and urban CAD patients. The quantitative data, age, and total calorie intake per day between rural and urban CAD patients were analyzed using Student unpaired *t*-test. All tests are two-tailed and $P < 0.05$ was considered as significant.

RESULTS

The mean age of rural CAD patients was 47.64 ± 8.7 years and 47.71 ± 7.8 years of urban CAD patients. The rural and urban CAD patients were age matched, and there was no statistically significant difference between their ages (Table 1). A significant number of urban CAD patients were graduates and while most rural patients had studied 1-9 standard. Majority of urban CAD patients lived in independent house. A significant number of CAD patients in rural area used firewood for cooking and in urban Liquefied Petroleum Gas (LPG). The source of drinking water in significant majority of urban CAD patients is from tap in the house (Table 2). No statistically significant difference was seen between the use of vehicles between rural and urban CAD patients, but majority used vehicles. Rural CAD patients used significantly more tobacco products that urban CAD patients (Table 3). The frequency of patients having nonvegetarian diet is high in both rural and urban patients. Patients who had nonvegetarian food daily were significantly more in urban areas. A significant majority of patients in both rural and urban areas did not consume soft drinks. Urban CAD patients consume fast food, and it was found to be statistically significantly more than rural patients. A significant number

Table 1: Comparison of age between rural and urban CAD patients

Age (years)	Rural	Urban	*P*
	47.64±8.7	47.71±7.8	0.965

Values are expressed as mean±SD, Student's unpaired *t*-test.
CAD: Coronary artery disease, SD: Standard deviation

Table 2: Comparison of education and living conditions in rural and urban CAD patients

Items	Rural	Urban	*P*
	Frequency *n*1=55 (%)	Frequency *n*2=45 (%)	
Educational status			<0.0001
Graduate	2 (3.6)	13 (28.9)	
HSC	12 (21.8)	10 (22.2)	
Illiterate	5 (9.1)	0 (0)	
Professional	1 (1.8)	0 (0)	
School 6 9 standard	16 (29.1)	12 (11.1)	
School 1-5 standard	18 (32.7)	5 (26.7)	
Technical	0 (0)	2 (4.4)	
Undergraduate	1 (1.8)	3 (6.7)	
Type of house			<0.0001
Apartment	0 (0)	2 (8.9)	
Independent house	27 (49.1)	43 (86.7)	
Pucca	22 (40.0)	2 (4.4)	
Semi pucca	4 (7.3)	0 (0)	
Type of cooking fuel			<0.0001
Firewood	30 (54.5)	0 (0)	
Kerosene	1 (1.8)	0 (0)	
LPG	23 (41.8)	42 (93.3)	
LPG and firewood	1 (1.8)	3 (6.7)	
Source of drinking water			<0.0001
Common tap	5 (9.1)	0 (0)	
Hand pump	23 (41.8)	0 (0)	
Tank	2 (3.6)	0 (0)	
Tap in house	8 (14.5)	33 (73.3)	
Well	17 (30.9)	12 (26.7)	

Values are expressed as frequency and percentage, Chi-square test.
LPG: Liquefied Petroleum Gas, CAD: Coronary artery disease

Table 3: Comparison of physical activity and personal habits between rural and urban CAD patients

Items	Rural	Urban	*P*
	Frequency *n*1=55 (%)	Frequency *n*2=45 (%)	
Vehicle use			0.4
No	11 (20.0)	13 (28.9)	
Yes	44 (80.0)	32 (71.1)	
Exercise/yoga			0.2
No	35 (63.6)	34 (75.6)	
Yes	20 (36.4)	11 (24.4)	
Tobacco use			0.01
No	25 (45.5)	32 (71.1)	
Yes	30 (54.5)	13 (28.9)	
Alcohol consumption			0.2
No	26 (47.3)	28 (62.2)	
Yes	29 (52.7)	17 (37.8)	

Values are expressed as frequency and percentage, Chi-square test.
CAD: Coronary artery disease

of CAD patients in urban area consumed meat (Table 4). The total caloric intake was significantly more in urban patients than rural patients (Figure 1).

DISCUSSION

Developing countries like India is undergoing rapid health transition with rising burden of CAD. CAD has already reached epidemic proportions in India. Demographic and nutritional transitions driven by socioeconomic changes including urbanization and globalization are major contributors to the increase of CAD. Heart diseases are rising in Asian Indians 5-10 years earlier than in other populations around the world. The trend witnessed in western countries suggests that it is inevitable for the initial increase of CAD-related risks in upper class of society too soon permeate all class barriers.[11] It is high time for developing countries to review and reset their health priorities, especially of the health issues pertaining to a particular region. Atherosclerosis starts at a very early age. It manifests as CAD at a comparatively early age because of faulty lifestyle. Gupta et al. reported that there are large disparities in CVD mortality in different Indian states.[12]

In our study, we compared the lifestyle risk factors in age-matched young rural and urban CAD patients. We found that significant number of rural CAD patients were less literate when compared to urban CAD patients. A similar result as ours was also reported by Roopa et al. who studied CAD patients in Bagalkot (rural area), Karnataka, India.[13] Illiteracy and low-literacy status is rampant in developing countries. Being illiterate is found to be an independent risk factor for CAD. Illiterate low socioeconomic individual's affordability for acute care managements and long-term secondary prevention practices are found to be lacking.[14]

Interestingly, our results showed living in an apartment and using LPG as significant risk factors for urban CAD patients. In contrast, Dutta et al. reported that cooking with biomass when compared to LPG exacerbates systemic inflammation and oxidative stress as found in 635 rural Indian women cooking with biomass fuel predisposing them to increased risk of CAD.[15] This difference could be because of lesser sample size in our study when compared to theirs, also in recent times, majority of urban people use only LPG as cooking fuel.

Table 4: Comparison of dietary parameters between rural and urban CAD patients

Items	Rural	Urban	*P*
	Frequency *n*1=55 (%)	Frequency *n*2=45 (%)	
DIET			0.02
Nonvegetarian	45 (81.8)	44 (97.8)	
Vegetarian	10 (18.2)	1 (2.2)	
Frequency of fruits			0.2
Daily	25 (45.5)	12 (26.7)	
Monthly	14 (25.5)	16 (35.6)	
Weekly	16 (29.1)	17 (37.8)	
Fast food			<0.01
No	43 (78.2)	22 (48.9)	
Yes	12 (21.8)	23 (51.1)	
Soft drinks			0.6
No	36 (65.5)	27 (60.0)	
Yes	19 (34.5)	18 (40.0)	
Meat			0.02
No	14 (25.5)	3 (6.7)	
Yes	41 (74.5)	42 (93.3)	
Meat frequency			0.2
Daily	10 (18.2)	16 (35.6)	
Monthly	12 (21.8)	14 (31.1)	
Weekly	19 (34.5)	12 (26.7)	
Type of meat			0.2
Red	26 (47.3)	25 (55.6)	
Red and white	1 (1.8)	5 (11.1)	
White	14 (25.5)	12 (26.7)	

Values are expressed as frequency and percentage, Chi-square test.
CAD: Coronary artery disease

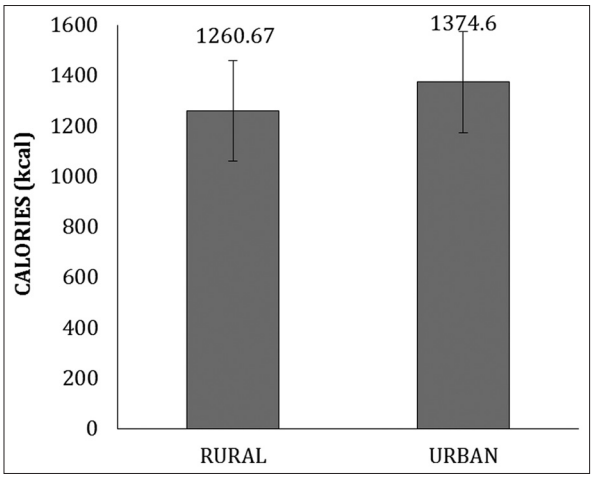

Figure 1: Comparison of total calorie intake between rural and urban CAD patients *($P< 0.05$)

Urban CAD patients have tap water as their source of drinking water. A link between CVD mortality and the hardness of drinking water was reported by Sauvant and Pepin, who reviewed case–control studies and cohort studies, published between 1960 and 2000 worldwide.[16] This could be because of the role played by inorganic elements known as drinking water contaminants such as arsenic and lead. The water used by urban people in Dakshina Kannada should be tested for the hardness of water and could be one of the links for CAD.

Even though the majority of patients were using vehicles, we did not find any statistically significant difference between rural and urban CAD patients. The scenario has changed considerably since the 1970's when people in rural India were involved in more physical activity and strenuous work with lower incidence of CAD. Our results enforce the fact that epidemic of sedentariness has penetrated the rural household with rapidly increasing the use of technologies and increased the use of vehicles for commuting.[17] More number of rural CAD patients use tobacco (smoking and nonsmoked tobacco products) when compared to urban patients. This recent trend of rise in the use of tobacco products in rural and less literate population while declining in urban more educated population was also reported by Gupta et al.[18] Kinra et al. reported that risk factors like tobacco use were more prevalent in rural population of south Indians compared with north Indians.[10]

Urban nonvegetarians consuming red meat and fast food were significantly more than rural CAD patients. A study by Mejia et al. reported that lifestyle modification in the form of vegan diet may reverse CAD in patients.[19] Dietary habits have undergone a sea of change with greater consumption of saturated fats and processed foods. Micha et al. findings suggested that unprocessed red and processed meat consumption are not good for cardiometabolic health. This could be because of differences in sodium content (up to 400% higher) in processed meat along with nitrates/nitrites and partly because of contents of heme iron and dietary cholesterol in meat.[20] Increased availability of processed meat in urban area makes the people consuming it more at risk of developing CAD. In addition, calorie-rich Indian and Western-style fast foods are easily accessible and are being consumed widely in urban area thus increasing the risk of developing CAD.[21]

Urban patients also consumed significantly more calorie per day when compared to rural patients. Evidence suggests that not only quality but also the quantity of diet is one of the major modifiable risk factors for developing CAD.[22] Judicious use of low glycemic index food reduces CAD risk.[23] The results of our study merits further evaluation with a larger sample size which forms the future scope of the study.

CONCLUSION

In the present study, the risk factors for developing CAD in rural patients were mainly low literacy and tobacco use. Urban patients having an independent house, using LPG as cooking

fuel, tap water as the source of drinking water, consuming nonvegetarian diet with meat and increased total calorie intake were significantly at risk of developing CAD. Active lifestyle and less use of tobacco products which previously existed in rural when compared to urban population have drastically changed in the recent time because of urbanization and globalization. Urbanization and globalization though required for the overall development of the population, it should go hand in hand with adequate health education which will lead to a healthy and productive life.

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