Research Article

Prevalence of risk factors for cardiovascular disease among adults older than 30 years in a rural area in central Kerala, India

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Abstract

Back ground: In both developed and underdeveloped countries, the prevalence of chronic noncommunicable diseases is gaining more significance among the adult population. The majority of the risk factors of cardiovascular disease (CVD) and stroke are behavioral in nature and, thus, preventable.

Objective: To find out the prevalence of risk factors of CVD in a rural area in Kottayam, Kerala, India.

Materials and Methods: A cross-sectional study was carried out in wards 5 and 6 of Arpookara Panchayat. The sample size of the study was 328. The data were collected using a semi-structured interview schedule regarding various lifestyle risk factors. Analysis was done using the software SPSS, version 16.0. For testing association, χ^2-test was used; *P* value for level of significance was <0.05.

Result: Total number of subjects in the study was 331. Of the total population, the prevalence of current smokers was 17.2% and ex-smokers 9.1%. The prevalence of current alcoholics, ex-alcoholics, and social consumption of alcohol were 41.4%, 13.1%, and 24.1% of the men, respectively. Of the total study population, 18.4% was diabetic patients, and 77.3% of the population were not doing any kind of exercise other than their daily routine. The waist–hip ratio was unfavourable in 23.2% of the population, and 23.6% of population revealed a waist circumference that put them at-risk for CVD. Overweight and obesity were seen in 24.2% and 7.3% of the population, respectively.

Conclusion: The prevalence of risk factors of CVD is unacceptably high among even the rural population.

KEY WORDS: Cardiovascular disease, risk factors, rural, Kerala

Introduction

In both developed and underdeveloped countries, the prevalence of chronic noncommunicable diseases is gaining more significance among the adult population. Globally, deaths of many people yearly are caused by cardiovascular diseases (CVDs) than any other causes, thereby CVD being the number one causative factor.[1] In 2008, death from CVDs was estimated to be 17.3 million people, which represented 30% of all global deaths.[1] Of these deaths, estimated deaths caused by coronary heart disease (CHD) and by stroke were 7.3 million and 6.2 million, respectively.[2] More than 80% of deaths owing to CVD occur in low- and middle-income countries, and the incidence is almost equal in both the genders.[1] The number of people who die from CVDs, mainly from heart disease and stroke, will increase to reach 23.3 million by 2030.[1,3] CVDs are estimated to persist as the major leading cause of death for years to come.[3]

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Most of the risk factors of CVD and stroke are behavioral in nature. They include unhealthy diet, physical inactivity, tobacco use, and harmful use of alcohol. About 80% of CHD and cerebrovascular disease occur owing to behavioral risk factors.[1]

People in low- and middle-income countries are more exposed to risk factors such as tobacco, leading to CVDs and other noncommunicable diseases. At the same time, they often do not have the benefit of prevention programs compared with people in high-income countries.[2]

People in low- and middle-income countries who suffer from CVDs and other noncommunicable diseases have less access to efficient and reasonable health-care services, which respond to their needs (including early detection services).

The effects of unhealthy diet and physical inactivity may show up in individuals such as elevated blood pressure, increased blood glucose, raised blood lipids, and overweight and obesity. These "intermediate risks factors" can be measured in Primary-care facilities can provide monitoring of these "intermediate risk factors," which can aid in an identifying elevated risk of developing a heart attack, stroke, heart failure, and other complications.

Cessation of tobacco use, reduction of salt in the diet, consuming fruits and vegetables, regular physical activity and avoiding harmful use of alcohol have been shown to reduce The risks of CVD can be decreased by discontinuing tobacco use, low level of salt in diet, eating more fruits and vegetables, regular exercises, and avoiding consumption of alcohol. The cardiovascular risk can also be reduced by preventing or treating hypertension, diabetes, and raised blood lipids.

The precautionary measures of chronic diseases are grounded on the awareness that they are multifactorial in action; hence, their inhibition warrants a complex mix of interventions. Previously, only tertiary prevention seemed possible to prevent or delay the development of further disability or the occurrence of premature death. But now, with the identification of risk factors, health promotion activities aimed at primary prevention are being increasingly applied in the control of chronic diseases.

To go for cessation activities of risk factors of CVDs, we should first find out the prevalence of these risk factors in the relevant area. Once these are found out, strategies can be made by the health authorities to reduce them, which will go a long way in preventing further CVDs and its complications in the area.

CVDs and its risk factors were expected to be more in urban areas than in rural areas.[4] But, owing to urbanization and globalization, the prevalence of CVD and its risk factors seems to be increasing in rural areas also. This study attempts to find out the prevalence of risk factors of CVD among adults aged older than 30 years in a rural setting.

Materials and Methods

The study was cross sectional in nature. The study setting was Arpookara panchayath wards 5 and 6.

Sample size

Sample size was calculated by the formula $Z\alpha 2pq/L2$, and taking p as 16.3%, which is the least prevalent cardiovascular risk factor from a study conducted by Raman Kutty et al.[5] in Thiruvananthapuram, Kerala and L (desired precision) as 4%. The calculated sample size was 328. All the available population older than 30 years at the time of data collection was included in the study. To avoid missing out on working population, the data collection was preferably done from morning 7.30 a.m. to 10 a.m. and 5 p.m. to 6.30 p.m. Those who were terminally ill and not willing for the study were excluded. After getting consent from the informants and the authorities, the data were collected using a semi-structured interview schedule.

Various parameters such as pulse rate, blood pressure, weight, and hip and waist circumferences were measured. Their food habits, exercise habits, and other habits such as smoking, alcoholism and pan chewing were assessed.

Height was measured using a measuring tape calibrated to the nearest half centimeter taking precautions that the shoes are off, feet flat on the ground, back against the wall with the person looking straight ahead, and using a flat ruler on top of the head to project the level on to the measuring tape fixed on the wall. Weight was measured using weighing machine of sensitivity 500 g. Waist and hip circumferences were measured using an inelastic measuring tape of sensitivity 0.1 cm, and the former measured by taking a circumference that gives the narrowest measurement between the ribcage and the iliac crest, and the latter taken by measuring at a level that gives the maximal measurement of the hip over the buttocks.

The data were entered in Microsoft excel, and further analysis was done using the software SPSS, version 16.0. For explaining the frequencies, percentages were used. For testing associations, χ^2-test was used. The *P* value for level of significance was <0.05, and high significance was *P* value <0.01.

Results

The total number of study subjects was 331. The age group distribution was as follows: 24% in 30–39 years, 27% in 40–49 years, 21.5% in 50–59 years, and 27.5% in aged 60 years and older groups. The sex ratio of the study population was 1,200 women/1,000 men [Figure 1].

Of the total study population, 55.3% were Hindus, 43.5% Christians, and 1.2% Muslims. The level of education of the study population is as follows: 2.4% were illiterate; 18.1% completed lower primary education; 20.5% completed upper primary education; 34.4% completed high school education; 10.9% completed plus-two education, 10.9% were graduates; and only 2.5% were postgraduates. Of the total study population, 52.6% were unemployed, 13.6% unskilled workers, 9.7% semi-skilled workers, 6.9% skilled workers, 10% clerical, shop owners, or farmers, 5.4% semi-professionals, and 1.8% professionals.

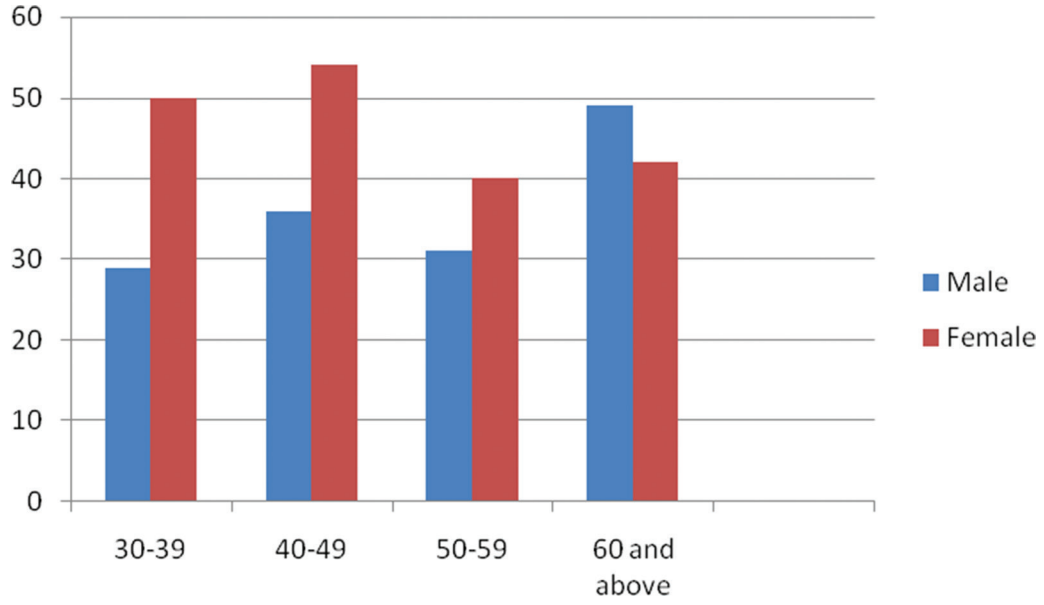

Figure 1: Multiple bar diagram representing the distribution of study population based on age and gender.

Furthermore, 92.7% were married, 0.9% unmarried, and 6.3% widowed.

Risk Factors of Cardiovascular Disease

On the basis of the smoking status, the study population was categorized as current smoker (17.2%), ex-smoker (9.1%), and nonsmoker (73.7%). Current smoker was taken as the one who started smoking and was continuing it during the study period. An ex-smoker was taken as the one who had started smoking but had stopped smoking during the study period. A nonsmoker was taken as the one who has never smoked.

The study population was categorized according to the alcohol consumption as current alcoholic, ex-alcoholic, social consumption, and never consumed. Current alcoholic was taken as the one who has started alcohol consumption and was continuing it during the study period. Ex-alcoholic was taken as the one who had the habit of alcohol consumption but had stopped it during the study period. Social consumption includes those who consume alcohol only on social occasions. Never consumed includes those who have never consumed alcohol. Of the men population, 41.4% were current alcoholics, 13.1% were ex-alcoholics, 24.1% showed social consumption, and 21.4% have never consumed alcohol. Among women, 0.5% were ex-alcoholic, 0.5% showed social consumption, and the rest (98.9%) have never consumed alcohol.

Diabetic patients accounted for 18.4% of the study population, with 17.2% of men and 19.4% of women. Of the 22.4% of those who do exercise, 11.8% preferred brisk walking, 2.4% running, and only 0.9% cycling. Other strenuous physical labor was seen in 7.6% of them, and 77.3% of the population were not doing any kind of exercise other than their daily routine.

As per Figure 2, five (29.2%) people were taking green leafy vegetables at least >3 times/week. But, 32.6% were taking green leafy vegetables monthly or rarely. It was good to know that 90.4% of the population were taking fish >3 times/week; 23.2% of the population were taking red meat regularly (>3times/week). However, 64.4% were taking it monthly/rarely, which was also a good sign. As far as the white meat consumption was concerned, only 20.5% were taking it regularly, which was again a good sign. However, 40.3% of the people studied were taking fried foods regularly, which can be considered unhealthy. In spite of being a rural population, quite a few were taking junk food regularly (15.35%).

An unfavorable waist–hip ratio in 23.2% of the population, with 29.6% among women and 15.9% among men. The waist–hip ration was considered to be unfavorable when it is >0.9 in men and >0.85 in women.[6]

About 23.6% of the population revealed a waist circumference that put them at-risk of CVD (men > 102 cm and women > 88 cm).[6] Among men, it was only 10.3%, but among women, the proportion was extremely high at 33.9%.

Of the total 331 study population, 12.4% were underweight, 56.1% normal, 24.2% overweight, and 7.3% obese as per the Asian classification of obesity by WHO. Overweight and obesity were much higher among women compared with men (28.1% and 10.3% against 19.3% and 3.4%, respectively).

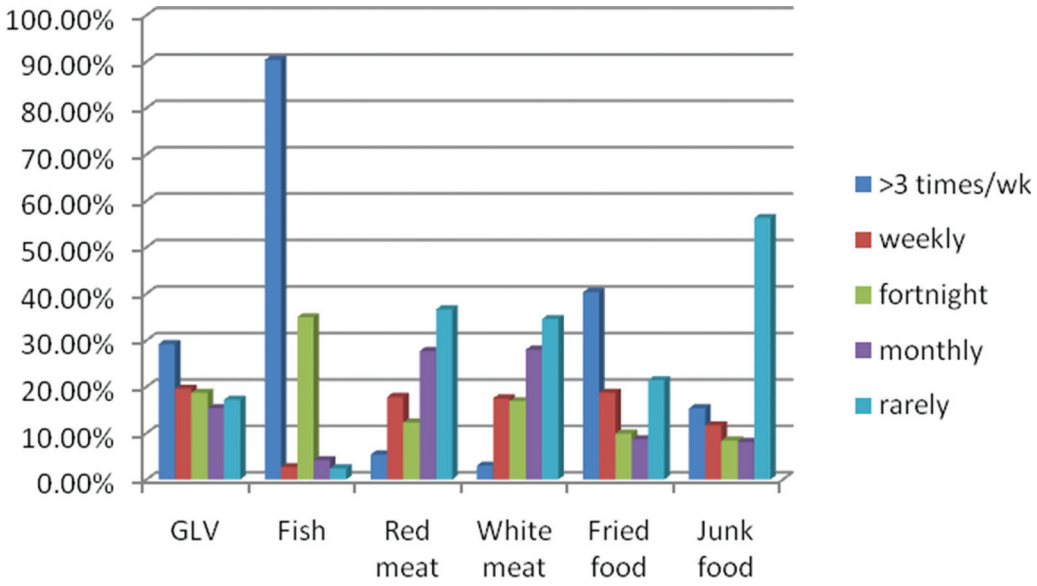

Figure 2: Dietary patterns of the study population.

Discussion

As per Figure 1, both men and women were adequately represented in the study sample in all the age groups. The sex ratio of the study population was 1,200 women/1,000 men. This is comparable with the sex ratio of Kerala (1,058 women/1,000 men).[7] It can also be seen from Figure 1 that all the age groups were adequately represented in the study sample, which adds validity to the study. As per Table 1, the prevalence of current smokers in the study was 17.2%. This was lower than that what was reported by Thankappan and Thresia[8] in their study in Thiruvananthapuram, which showed the prevalence above 18 years to be 28%. In the noncommunicable disease risk factors survey done by the integrated disease surveillance project, the prevalence of smoking among male subjects in Kerala was found to be 27%.[9] It has been calculated that, in countries where smoking habit prevalence is extensive, it is responsible for 25% of CHD deaths under 65 years of age in men. Cigarettes seem to be particularly important in causing sudden death from CHD especially in men aged younger than 50 years. It can also be noted that risk of death from CHD decreases on cessation of smoking.[10]

As per this study, the proportion of current alcoholics among men was 41.4%, which is much higher than the integrated disease surveillance data from Kerala, which showed the prevalence to be 23.6% [Table 2].[9].The high prevalence of current alcoholics is extremely disturbing coupled with the fact that 24.1% were social drinkers who could become current alcoholics any day. Drinking too much alcohol can raise the levels of triglycerides in the blood. Drinking alcohol can lead to high blood pressure, heart failure, and an increased calorie intake, which may lead to obesity and a higher risk of stroke.[11]

Table 1: The smoking status of the study population

Smoking status	Frequency	Percentage
Current smoker	57	17.2
Ex-smoker	30	9.1
Nonsmoker	244	73.7
Total	331	100

Table 2: Alcohol consumption in the study population

Alcohol consumption	Gender		Total
	Male	Female	
Current alcoholic			
Number	60	0	60
% within alcohol consumption	100	0	100
% within gender	41.40	0	18.10
Ex-alcoholic			
Number	19	1	20
% within alcohol consumption	95	5	100
% within gender	13.10	0.50	6
Social consumption			
Count	35	1	36
% within alcohol consumption	97.20	2.80	100
% within gender	24.10	0.50	10.90
Never consumed			
Number	31	184	215
% within alcohol consumption	14.40	85.60	100
% within gender	21.40	98.90	65
Total			
Number	145	186	331
% within alcohol consumption	43.80	56.20	100
% within gender	100	100	100

Diabetes is inarguably one of the most important factors in development of CVD. Its prevalence in this study was 18.4% [Table 3]. This is slightly higher than the prevalence obtained in the study from Thiruvananthapuram by Raman Kutty et al.[5] but lower than the study from Neyyattinkara taluk by Jose et al.,[12] which was 28.4%. As per World Heart Federation, "If you have diabetes you are two to four times more likely to develop cardiovascular disease than people without diabetes." CVD is the major cause of death for people with diabetes. The presence of diabetes increases the risk of CVD for a number of reasons. All the risk factors, hypertension, abnormal blood lipids, and obesity, in their own right for CVD, prevail more regularly in people with diabetes.[13]

Another important factor leading to CVD is sedentary lifestyle or lack of exercise. In this study, 77.3% showed no additional exercise other than their daily chores. This is comparable with the integrated disease surveillance data from Kerala, which showed the proportion of people with low physical activity to be 75.8%.[9] This is an alarming figure when we notice the prevalence of alcohol consumption to be 41.4% among men [Table 4]. High calorie intake coupled with low physical exercise could be one of the important risk factors for CVD in the area.

Dietary patterns play an important role in CVD causation. In the current population, the factors relevant were one-third of the study population were taking green leafy vegetables monthly or rarely. Green leafy vegetables, when taken regularly, are protective of CVD. This has been proven in many studies such as the one conducted by Joshipura et al.,[14] which showed that increased intake of green leafy vegetables are protective against CVD (RR, 0.77; CI: 0.64–0.93). Another important risk factor that was seen was the intake of fried foods and junk foods, which were taken at a higher prevalence of 40.3% and 15.35% taking them more than thrice weekly. However, a good thing from the population was their high consumption of fish at 90.4% taking them more than thrice weekly, which is a protective factor. Regular intake of fish has a cardioprotective effect because of high omega-3 fatty acids.[15]

Two important indicators of CVD in a population are waist circumference and waist–hip ratio [Tables 5 and 6]. Of the two, it is considered that waist circumference is a more important indicator than waist–hip ratio in predicting CVD.[6] In this study, one in four revealed either a unfavorable waist–hip ratio or an increased waist circumference, which put them to a high risk of CVD. Among men, this was comparatively low, but among women, it was extremely high at 33.9% (waist circumference) and 29.6% (waist–hip ratio). High prevalence of abnormal waist circumference was also found in the IDSP study in Kerala, where it was 42.7% among the study population and 59.9% among women.[9]

Overweight and obesity are another important risk factors of CVD [Table 7]. The prevalence of combined overweight and obesity in the study population was 22.7% among men but it was unacceptably high at 38.9% among women. This high prevalence of overweight and central obesity is also seen in noncommunicable disease risk factors survey report (2007–2008), which revealed the combined prevalence of

Table 3: The prevalence of diabetes in the study population based on gender

Diabetes mellitus	Gender		Total
	Male	Female	
Diabetic			
Number	25	36	61
% within diabetes mellitus	41	59	100
% within gender	17.20	19.40	18.40
Nondiabetic			
Number	120	150	270
% within diabetes mellitus	44.40	55.60	100
% within gender	82.80	80.60	81.60
Total			
Number	145	186	331
% within diabetes mellitus	43.80	56.20	100
% within gender	100	100	100

Table 4: The exercise pattern of the study population

Type of exercise	Number	Percentage
Running	8	2.4
Brisk walking	39	11.8
Cycling	3	0.9
Others	25	7.6
No exercise	256	77.3
Total	331	100

Table 5: The waist–hip ratio of the study population

Waist–hip ratio	Gender		Total
	Male	Female	
Normal	122	131	254
	84.10%	70.4%	39.60%
Unfavorable	23	55	77
	15.90%	29.6%	60.40%
Total	145	186	331
	100%	100%	100%

Table 6: Waist circumference among the study population

Waist circumference	Gender		Total
	Male	Female	
Unfavorable	15	63	78
	10.30%	33.90%	23.60%
Normal	130	123	253
	89.70%	66.10%	76.40%
Total	145	186	331
	100%	100%	100%

Table 7: Overweight and obesity among the study population

BMI category	Gender		Total
	Male	Female	
Underweight	20	21	41
	13.80%	11.40%	12.40%
Normal	92	93	185
	63.40%	50.30%	56.10%
Overweight	28	52	80
	19.30%	28.10%	24.20%
Obese	5	19	24
	3.40%	10.30%	7.30%
Total	145	185	330
	100%	100%	100%

overweight and obesity at 27.2% and prevalence in women at 31.2%.[9] Thus, all the three physical indicators of CVD was much higher among women compared with men. This along with low physical activity among the population could pose a synergistic effect on risk of CVD.

Conclusions

The general concept that risk factors of CVD are lower in rural areas when compared with urban areas has been found to be wrong as per this study. The risk factors of CVD such as smoking, alcoholism, decreased physical activity, and unfavorable waist circumference and waist–hip ratio were found to be unacceptably high in a rural area analysed in this study.

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