

Prevalence of cardiovascular risk factors among adults in rural area of Mangalore

Animesh Gupta¹, Krutarth Brahmbhatt², Prasanna Kumar Sharma³, Shahul Hameed⁴, Nanjesh Kumar⁴

¹Department of Community Medicine, Srinivas Institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India, ²Department of Community Medicine, Gujarat Medical Education and Research Society Medical College, Junagadh, Gujarat, India, ³Department of Community Medicine, A J Institute of Medical Sciences and Research Centre, Mangalore, Karnataka, India, ⁴Department of Community Medicine, K S Hegde Medical Academy, Deralakatte, Mangalore, Karnataka, India

Correspondence to: Animesh Gupta, E-mail: animesh245@gmail.com

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ABSTRACT

Background: Cardiovascular disease (CVD) is now become a major public health problem and one of the leading causes of mortality in developing as well as developed countries. Several risk factors for CVDs have been discovered, which are broadly classified in modifiable and non-modifiable. **Objectives:** The objectives of this study were to assess the magnitude of CVD risk factors of among adults in rural population. **Materials and Methods:** A cross-sectional community-based study was conducted among adults at Panemangalore. Anthropometric measurement, general physical examination, and systematic examination were done. Fasting blood sample was taken for laboratory investigation. **Results:** Physical inactivity, obesity, non-vegetarian diet, hypertension, and high low-density lipoproteins level were more prevalent among adults, and it was major risk factors for CVD. **Conclusion:** The modifiable cardiovascular risk factors are quite alarming and widely prevalent among adults in rural areas with maximum prevalence of sedentary lifestyle, obesity, hypertension, and diabetes.

KEY WORDS: Cardiovascular Risk Factors; Modifiable Cardiovascular Disease Risk Factors; Prevalence


INTRODUCTION

Cardiovascular disease (CVD) is now become a major public health problem and one of the leading causes of mortality in developed as well as developing countries.^[1] Globally, around 17.7 million people died from CVD in 2015, representing 31% of all global deaths.^[2] The burden of CVD is expected to double in the next two decades in India, and it will be the first largest cause of mortality and the second largest cause of disability by 2020.^[3,4]

CVD risk factors are broadly classified into two broad categories - modifiable and non-modifiable. Modifiable risk factors are the factors which can be modified or if treated would reduce the CVD burden, whereas non-modifiable risk factors could not be modified.^[5,6] Some of the important CVD risk factors are diabetes, hypertension, obesity, dyslipidemia, tobacco consumption, physical inactivity, and diet which are high in saturated fats, trans-fatty acids, and sodium.^[7] Most of the projected rise in CVDs is preventable, particularly that due to tobacco consumption, obesity, and physical inactivity.

Screening of CVD risk factors, lifestyle modifications, and management of treatable conditions are some of the critical steps to reduce the burden of CVD.

Majority of CVD risk factor studies were carried out in urban population, and there is a paucity of data on the prevalence of CVD risk factors among rural population. Hence, the

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present study was aimed to assess the prevalence of certain cardiovascular risk factors among adults in rural area. In nutshell, today's risk factors will be tomorrow's disease. Therefore, primary and secondary prevention of CVD risk factors will provide the most cost-effective and sustainable approach to prevent and control of CVD.

MATERIALS AND METHODS

Study Settings

The present cross-sectional, community-based study was conducted among the adults residing at Panemangalore (Bantwal Taluk, Dakshina Kannada). The Panemangalore covered 15 areas with a population of 3961, of which six areas were chosen randomly by lottery method, and stratified random sampling was done to select the study participants.

Sample Size Estimation

The sample size was calculated to 708 by taking prevalence of hypertension and central obesity (which are considered as risk factors of CVD) as 36.1% in Vijayakumar G study with an allowable error of 10%.^[8] Ethical approval was obtained from the institutional ethics committee and informed written consent was taken from all participants.

Data Collection

The study was conducted for 1 year from July 2013 to June 2014. House-to-house visit was done and data were collected through personal interview method using pretested semi-structured questionnaire which includes sociodemographic characteristics (age, gender, religion, occupation, and socioeconomic status), dietary habits and practices, family history of CVD/hypertension/diabetes, and details of major cardiovascular risk factors such as tobacco consumption, alcohol intake, physical inactivity, salt intake, and saturated fat intake. Anthropometric measurements such as height, weight, waist circumference, and hip circumference were taken. General physical and systemic examination was done. Blood pressure was measured using standard operating procedure as per JNC 7 guidelines.^[9] Fasting intravenous blood was taken for laboratory investigations using universal safety precautions from all study participants on the next day morning of the first visit. Fasting blood sugar was analyzed using glucose oxidase phenol 4-aminophenazone (PAP) method, and fasting lipid profile was estimated using cholesterol oxidase-PAP method.^[10,11] As per standard guidelines, the cutoff value was taken for considering diabetes and dyslipidemia.^[10,11]

Statistical Tests

The data were entered and tabulated into Microsoft Excel sheet 2016, and it was subsequently analyzed using appropriate Statistical software. Tests of significance like

Table 1: Sociodemographic characteristics of study participants ($n=708$)

Variable	Categories	Total
		<i>n</i> (%)
Age (in years)	18–29	105 (14.8)
	30–39	158 (22.3)
	40–49	174 (24.6)
	50–59	271 (38.3)
Gender	Male	275 (38.8)
	Female	433 (61.2)
Religion	Hindu	424 (59.9)
	Muslim	267 (37.7)
	Christian	17 (2.4)
Marital status	Married	632 (89.3)
	Unmarried	42 (5.9)
	Widow/divorced/ separated	34 (4.8)
Education	Illiterate	171 (24.2)
	Primary	227 (32.0)
	Middle	150 (21.2)
	Higher	110 (15.5)
	PUC	17 (2.4)
	Graduate and above	33 (4.7)
Occupation ^[14]	Unemployed	30 (4.2)
	Professionals	7 (1.0)
	Associate professionals	20 (2.8)
	Clerks	13 (1.9)
	Service workers and shop and market sales workers	63 (8.9)
	Skilled agricultural and fishery workers	14 (2.0)
	Craft and related trades workers	31 (4.4)
	Plant and machine operators and assemblers	25 (3.5)
	Elementary occupations	224 (31.6)
	Housewife	281 (39.7)

Pearson's Chi-square test were used, with the statistical significance level of $P < 0.05$.

Operational Definitions

The following operational definitions were used in this study:

1. Obesity was defined as body mass index (BMI) ≥ 25 kg/m².^[12]
2. Waist circumference cutoff was fixed to 80 cm for female and 90 cm for male.^[13]
3. Current tobacco user was those who used any form (smoke or smokeless) of tobacco products at least once in the past 30 days. Alcohol user was those who consumed any type of alcohol in any amount in the past 30 days.

Table 2: Physical and biochemical characteristics of study participants (*n*=708)

Variables	Range	Mean±SD		
		Male (<i>n</i> =275)	Female (<i>n</i> =433)	Total (<i>n</i> =708)
BMI (kg/m ²)	11.70–37.18	23.6±3.95	23.8±4.4	23.7±4.3
Waist circumference (in cms)	63–130	87.6±10.7	86.4±11.8	-
Hip circumference (in cms)	58–129	93.7±9.87	93.1±11.3	93.4±10.8
Waist–hip ratio	0.74–1.20	0.92±0.05	0.92±0.59	-
SBP (mmHg)	90–188	126.1±15.6	125.2±14.2	125.6±14.7
DBP (mmHg)	62–108	81.3±9.3	81.2±9.0	81.1±9.2
FBS (mg/dl)	41–244	98.9±24.4	100.3±28.4	99.7±26.9
Cholesterol (mg/dl)	79–337	200.1±42.4	199.5±43.0	199.8±42.7
LDL (mg/dl)	67–293	133.7±45.1	136.7±44.8	135.6±44.9
HDL (mg/dl)	21–92	46.8±10.3	49.9±11.5	48.7±11.2
Triglycerides (mg/dl)	58–509	156.3±73.3	136.1±52.1	144.0±61.9

BMI: Body mass index, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, FBS: Fasting blood sugar, LDL: Low-density lipoproteins, HDL: High-density lipoproteins, SD: Standard deviation

Table 3: Prevalence of cardiovascular risk factors among study participants (*n*=708)

Risk factors	Male <i>n</i> =275 (%)	Female <i>n</i> =433 (%)	Total <i>n</i> =708 (%)	<i>P</i> value
Family history of CVDs	18 (6.5)	31 (7.2)	49 (6.9)	0.750
Tobacco consumption	59 (21.5)	22 (5.1)	81 (11.4)	0.000
Non-vegetarian diet	246 (89.5)	369 (85.2)	615 (86.9)	0.137
Trans-fatty acids consumption	147 (53.5)	241 (55.7)	388 (54.8)	0.554
Physical inactivity	141 (51.3)	210 (48.5)	351 (49.6)	0.720
Obesity (BMI>25)	96 (34.9)	173 (40.0)	269 (38.0)	0.155
Abdominal obesity	104 (37.8)	296 (68.4)	400 (56.5)	0.000
Hypertension (BP>140/90 mmHg)	119 (43.3)	191 (44.1)	310 (43.8)	0.815
Diabetes	54 (19.6)	94 (21.7)	148 (20.9)	0.503
High total cholesterol (> 240 mg/dl)	42 (15.3)	78 (18.0)	120 (16.9)	0.627
High triglycerides (> 200 mg/dl)	44 (16.0)	33 (7.6)	77 (10.9)	0.002
High LDL (>160 mg/dl)	47 (17.1)	94 (21.7)	141 (19.9)	0.320
Low HDL (<40 mg/dl)	68 (24.7)	73 (16.9)	141 (19.9)	0.001

CVDs: Cardiovascular disease, BP: Blood pressure, LDL: Low-density lipoprotein, HDL: High-density lipoprotein

4. Physical Exercise^[9]

- Regular exercise: Engagement in regular physical activity like brisk walking at least 30 min/day, for at least 5 days/week.
- Some exercise: Engagement in regular physical activity like brisk walking only on some days of the week.
- No exercise: No engagement in physical activity at all.

of 50–59 years (38.3%), followed by 40–49 years (24.6%). The study population consisted of 433 (61.2%) females and 275 (38.8%) males Table 1.

The mean BMI was 23.7 ± 4.3 kg/m² which reveals that majority of study population were overweight. The mean waist circumference for male was 87.6 ± 10.7 cm and female was 86.4 ± 11.8 cm, which reveals that majority of female had abdominal or truncal obesity Table 2.

5. Hypertension was defined as per JNC-7 guidelines for the detection and evaluation of BP.^[9]

In the study population, the mean diastolic pressure and mean systolic pressure were 81.1 ± 9.2 and 125.6 ± 14.7 mm of mercury (Hg), respectively Table 2.

RESULTS

The mean age of the study population was 43.34 ± 11.24 years and most of them belonged to the age group

The prevalence of family history of CVD was 49 (6.9%). Maximum study participant was non-vegetarians and 388 (54.6%) study participants were consuming trans-fatty acids. The prevalence of obesity, hypertension, and

diabetes was 270 (38.0%), 310 (43.4%), and 148 (20.8%), respectively. Among the study population, 120 (16.9%) subject had high cholesterol level, 77 (10.8%) subjects had high triglycerides level, 141 (19.9%) subjects had high low-density lipoproteins (LDLs) level, and 141 (19.9%) subjects had low high-density lipoproteins (HDLs) level Table 3.

DISCUSSION

Majority of study participants were female (61.2%) and belonged to the age group of 50–59 years (38.3%) in this study. Females (68.4%) had higher prevalence of abdominal obesity compared to males (37.8%), which was statistically significant. The prevalence of physical inactivity (no exercise) was 49.6%, which reveals that around half of the study participants were not doing any type of physical activity. Taking Asian cutoff values for obesity, the overall prevalence of obesity was 38% with male 34.9% and female 40%. The overall prevalence of hypertension and diabetes was 43.8% and 20.9%, respectively. The prevalence of high triglycerides and low HDL was higher in males compared to females, which was statistically significant.

In this study, the female participants were more because at the time of house visit, only females were present in most of the houses and similar finding was observed in Mohanan *et al.* study with 64% females and 36% males.^[15] The mean diastolic pressure of this study was comparable to the findings of 81.49 ± 11.12 mm of Hg in a study done by Norman *et al.* on rural population of India.^[16] Even the findings of mean cholesterol level, mean LDL levels, and mean HDL level of this study were similar and comparable to a study done by Achari and Thakur, who showed that the mean serum cholesterol, mean LDL, and mean HDL were 190.46 ± 37.65 , 122.66 ± 37.9 , and 42.50 ± 15.42 , respectively, among subjects without CAD.^[17] The prevalence of family history of CVD was less in this study, which was similar to Kaur *et al.* study in rural population of Tamil Nadu.^[18] With relation to physical activity, our study findings were almost similar to the findings of ICMR INDIAB study done by Anjana *et al.*, who showed that 50.0% of study subjects aged 20 years and above in rural population were physically inactive.^[19] The females had higher prevalence of obesity in this study, which was comparable with Chow *et al.* in rural Andhra Pradesh, who revealed that 32.4% male and 41.4% female were obese (BMI>25).^[20] The prevalence of obesity was high in this study, maybe because of majority of study participants were non-vegetarians and physically inactive. Bartwal *et al.* reported a prevalence of hypertension as 41.7% in rural Haldwani, which was similar to our study finding.^[21] Even the prevalence of diabetes of this study was comparable to the result reported by Madaan *et al.*^[22]

The strength of this study was inclusion of good sample size, clinical examination, and laboratory investigation (fasting blood sugar and lipid profile). The study also revealed

that CVD is now emerging public health problem in rural population. Information bias regarding tobacco consumption, unhealthy diet, and physical activity was some of the limitation of this study.

CONCLUSION

The CVD became one of the major public health problems, and it will be the first major cause of mortality and morbidity in coming years. Around, 69% of population of India residing in rural areas and they are also adopting the urban lifestyle which can lead to develop CVD. From this study, it is inferred that modifiable cardiovascular risk factors are quite alarming and widely prevalent among adults even in rural areas with maximum prevalence of sedentary lifestyle, obesity, hypertension, and diabetes.

Recommendations

Regular screening program for detecting cardiovascular risk factors, at the earliest should be carried out and inculcation of healthy lifestyles should be promoted to prevent from CVD. There is necessity of introducing lifestyle modification strategies, especially weight reduction and physical activity for women in rural areas.

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