

An Epidemiological Study on the Assessment of Cardiovascular Health Status among Adults in an Urban Area of Teliamura Municipality Area, Khowai, Tripura

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Abstract

Background: In India, cardiovascular disease (CVD) is the largest cause of mortality and morbidity in all regions of the country. Now, to reduce the burden of CVD in our country, we first need to assess cardiovascular health status of the adult population. **Objective:** The aim of this study is to assess cardiovascular health status among adults and to find the influence of sociodemographic factors on it. **Methodology:** In a cross-sectional study, cardiovascular health status of 100 sampled adult population of urban area of Teliamura Municipality area, Tripura, was assessed using a pre-designed and pre-tested semi-structured schedule from July 2017 to August 2017. Samples were taken from the adult population by simple random sampling. Collected data were compiled and analyzed using the Statistical Package for the Social Sciences (SPSS 16.0.). The Chi-square and Fisher's exact test were applied to find association. **Results:** The mean age of the study participants was 44.89 (± 13.76) years, comprised 52.0% males and 48% females. Hypertension was seen among 58% of the study population and 77% had ideal (<100 mg/dl) level of fasting blood sugar (FBS). The present study showed obesity, hypertension, high level of total cholesterol, high level of FBS was mostly prevalent among 42–61 years age group. Married people were more obese, hypertensive compared to unmarried. **Conclusion:** Middle age group population were worst affected by high blood pressure, high blood sugar, poor body mass index, and poor level of cholesterol. Healthy lifestyle measures might reduce the burden of CVD which could be evaluated in future research.

Keywords: Adult, cardiovascular health, cross-sectional study, healthy life style, obesity, prevalence

INTRODUCTION

Noncommunicable diseases (NCDs) are now a major public health problem in the world. NCDs, such as hypertension, diabetes, cancer, depression, and heart disease, are rapidly replacing infectious diseases and malnutrition as the leading causes of disability and premature death. About 80% of total deaths due to NCDs occur in low-income countries. Men and women are equally affected. Cancer, cardiovascular diseases (CVDs), and diabetes are becoming of serious concern, accounting for 52% of deaths and 38% of disease burden in the WHO southeast Asia Region.^[1] The incidence of morbidity and mortality associated with CVDs is increasing day by day. It has been estimated that a 2% reduction in chronic diseases death rates per year globally could result in preventing about 36 million premature deaths by the year 2015.^[2] The Global Burden of Diseases study reported the estimated mortality from coronary heart disease (CHD) in

India is 1.6 million in the year 2000.^[3] The INTERHEART study by Yusuf *et al.* reported that standard risk factors such as smoking, abnormal lipids, hypertension, diabetes, high waist-hip ratio, sedentary lifestyle, psychosocial stress, and a lack of consumption of fruit and vegetables explained $>90\%$ of acute CHD events in South Asians.^[4]

CHD is more prevalent in Indian urban populations, and there is a clear declining gradient in its prevalence from semi-urban to rural populations. Epidemiological studies show a sizeable

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burden of CHD in urban adult populations is 7%–10%, whereas in adult rural population, it is only 3%–5%. In India, about 50% of CHD-related deaths occur in people younger than 70 years compared with only 22% in the West. Extrapolation of these numbers estimates the burden of CHD in India to be >32 million patients.^[5]

In India, CVD is the largest cause of mortality and morbidity in all regions of the country. Nearly two-thirds of the burden of NCD mortality in India is contributed by CVD-related condition.^[6] PROLIFE Study in Kerala by Soman *et al.* also showed 40% death were due to CVD. CHD was the leading cause of death in men (31.1%) and women (17.6%).^[7] There is huge drainage of money, workforce and time to treat and cure CVD. Now to reduce the burden of CVD in our country, we first need to assess cardiovascular health status of adult population.

Tripura is the second-most populous state in the North Eastern Region with a population of only over 3 million. The social composition of the population of Tripura is diverse. Around one-third of the population belongs to the Scheduled Tribes. The state's population is 36.74 lakh, and sex ratio is 960.^[8]

In this context, the present study was conducted in Teliamura area of Khowai district with the objectives to assess cardiovascular health status among adults and to find the influence of sociodemographic factors on cardiovascular health status.

METHODOLOGY

A cross-sectional study was carried out among the adult population of urban area of Teliamura Municipality area, Khowai District, Tripura. The study was conducted during the period from July 2017 to August 2017. Assuming 50% of adults having ideal cardiovascular health status, using the formula of $4pq/l^2$ (where p [prevalence] = 50%, $q = 1 - p$, l [allowable error] = 10%), the sample size was found to be 100. Out of 15 wards in Teliamura Municipality area, 1 ward was selected by simple random sampling. Now from the selected ward, line listing of all adult population was done with the help of family register, collected from Teliamura Municipal council office. Then, samples were taken from the adult population by simple random sampling till required sample size was achieved. All the adult population residing in the specified area permanently for 2 years or more were included in the study. Persons who were seriously ill, absent despite 3 home visits, pregnant and lactating mothers were excluded from this study. A predesigned and pretested semi-structured schedule was developed with the help of Ideal Cardiovascular Health criteria given by the American Heart association^[9] and core behavioural and biological NCD risk factor indicators recommended by the WHO for NCD.^[10] The schedule contains two parts, first part consists of sociodemographic variables and second part consists of variables to assess cardiovascular health status of sampled population such as anthropometric parameters (height, weight, and waist circumference), blood pressure, dietary habits, amount of salt intake, personal and behavioral characteristics (history of

smoking, physical activity), blood parameters (total cholesterol, fasting blood sugar [FBS]), presence of diabetes mellitus and CVD (including CHD, stroke, heart failure, etc.). Data collection was done by house-to-house visit by researcher. Anthropometric measurements and blood pressure were recorded of selected adult population by standard techniques. Selected people in this study were requested to come at the Teliamura Rural Hospital for the collection of blood samples by skilled staff nurse and collected blood sample was transported to the Department of Biochemistry, Tripura Medical College under aseptic condition for required biochemical analysis. Collected data were compiled and analyzed using the Statistical Package for the Social Sciences (SPSS – Inc., SPSS for Windows, version 16.0. Chicago). The Chi-square and Fisher's exact test were applied to find the association of few sociodemographic factors with cardiovascular health. Value of $P < 0.05$ was considered as statistically significant. The study was done after getting approval from the Institutional Ethics Committee and written consent was obtained from every study participants.

Operational definitions

- Ideal cardiovascular health defined as: (1) the simultaneous presence of four favorable health behaviors (abstinence from smoking within the last year, ideal body mass index [BMI], physical activity at goal, and consumption of a dietary pattern that promotes cardiovascular health); (2) the simultaneous presence of four favorable health factors (abstinence from smoking within the last year, untreated total cholesterol <200 mg/dL, untreated blood pressure <120/<80 mm Hg, and absence of diabetes mellitus); and (3) the absence of clinical CVD (including CHD, stroke, heart failure, etc.).^[9]
- Current smokers: adults who have smoked 100 cigarettes in their lifetime and currently smoke cigarettes every day (daily) or some days (nondaily)^[11]
- Hypertension: adults are defined as having high blood pressure/hypertension if they either: (a) have a measurement of mean systolic blood pressure (SBP) ≥ 140 mm Hg or (b) mean diastolic blood pressure (DBP) ≥ 90 mm Hg, or (c) report they are taking high blood pressure medicine^[12]
- Regular physical activity: morning walk >5 times/week of at least 30 min duration^[9]
- FBS level: Ideal (<100 mg/dl), intermediate (100–125 mg/dl), poor (≥ 126 mg/dl)^[9]
- Total cholesterol: ideal (<200 mg/dl) and poor (≥ 200 mg/dl)^[9]
- BMI: Ideal (<25 kg/m²), Intermediate (25–29.99 kg/m²), and poor (≥ 30 kg/m²)^[13]
- Waist circumference: male (≥ 100 cm - poor) and female (≥ 90 cm - poor).

RESULTS

Profile of sample population

Among the participants, majority of them were in the age group of 42–61 years (47.0%). The mean age of the study participants was 44.89 (± 13.76) years. The study sample comprised 52.0%

males and 48% females. Majority of the participants were Hindu (89%) and belongs to General category (51%) followed by Schedule caste (38%) and OBC (9%). Most of them were married (91%) and from nuclear family (69%). Majority of them earn their livelihood from business 31% followed by service 29%. The study population comprises people from different levels of socioeconomic status, highest (36%) being from upper socioeconomic status and lowest (9%) from lower socioeconomic status according to modified B. G. Prasad scale May 2016.^[14]

Personal and behavioral characteristics, co-morbid condition of study participants

Most of the study participants were nonvegetarian (84%) and 51% of study population did not perform physical activity regularly, i.e., morning walk <150 min/week. Regarding addiction history, 24% of the study population gave a history of smoking and 20% used to tobacco chewing. Alcohol consumption was seen among 27% of the study population and 50% used to take extra salt. It was seen that, 18% and 6% of the study population had a history of diabetes mellitus and CVD, respectively.

Cardiovascular health status of the study participants

The present study showed that 58% of the study population had high blood pressure, i.e., hypertension either systolic or diastolic or both. Regarding FBS level, 77% had ideal (<100 mg/dl) and 7% had poor level of FBS. Poor level of cholesterol was seen among 41% adult population. Mean BMI of the participants was 28.95 (\pm 7.44) kg/m². Poor BMI was seen among 38% of the study population. Regarding the assessment of obesity, 52.1% females had waist circumference \geq 90 cm and only 3.84% males had waist circumference \geq 100 cm which will increase their chances of getting CVD in future [Table 1]. The study participant's mean, median and standard deviation of waist circumference, blood pressure, and biochemical parameters such as FBS and total cholesterol (TC) are shown in Table 2.

Table 1: Cardiovascular health status of study participants

Cardiovascular health status	Frequency (n=100)
Hypertension	
Yes	58
No	42
FBS level	
Ideal (<100 mg/dl)	77
Intermediate (100-125 mg/dl)	16
Poor (\geq 126 mg/dl)	7
TC	
Ideal (<200 mg/dl)	59
Poor (\geq 200 mg/dl)	41
Obesity category (BMI)	
Ideal (<25 kg/m ²)	31
Intermediate (25-29.99 kg/m ²)	31
Poor (\geq 30 kg/m ²)	38

BMI: Body mass index, FBS: Fasting blood sugar, TC: Total cholesterol

Association of few sociodemographic factors with cardiovascular health status of the study participants

Among male participants, 28.8% had poor BMI (\geq 30 kg/m²), whereas 47.9% female had poor BMI. Males were more hypertensive (63.5%) compared to females (52.1%). More proportion of females (60.4%) had ideal total cholesterol level (<200 mg/dl) compared males (57.7%). Among different age group, poor level of FBS (10.6%), hypertension (70.2%), poor level of total cholesterol (46.8%), and poor BMI (46.8%) was seen the highest among 42–61 years age group. Among Muslim population, 83.3% were hypertensive and 33.3% have poor BMI. Married people were more obese (40.7%) and hypertensive (59.3%) compared unmarried. The present study showed that 88.9% of unmarried and 75.8% of married people had ideal FBS (<100 mg/dl) level [Table 3].

DISCUSSION

The present study in urban area of Teliamura, Khowai, Tripura, revealed that cardiovascular health status of adult was very poor among adult population. More than half of the population did not perform physical activity regularly and half of them used to take extra salt. Velasquez-Melendez *et al.*, in Brazil, found only 23.6% population has ideal physical activity (>150 min/week of moderate physical activity or >75 min of vigorous intensity).^[15]

Zhao *et al.* in Northwest China found very high proportion of population (85.1%) having ideal physical activity.^[16] The present study showed 76% of the study population had ideal cardiovascular health in respect of smoking habit which was higher than study done by Zhao *et al.*^[16] (68%) but lower than study done by Velasquez-Melendez *et al.*^[15] in Brazil (85.7%). Tobacco chewing was seen among 20% of the study population which is similar to the study findings of Giovino *et al.* that showed more than one-third of adults in India (35%) use tobacco, with prevalence rates varying from 9% in Goa to 67% in the Northeastern state of Mizoram.^[17]

In the present study, only 16% of adults were found to be vegetarian. The rate of consumption of fruit and vegetables is low in India; this is contrary to the perception that Indians, being predominantly vegetarians, would consume adequate quantities of fruit and vegetables.^[18]

The present study showed 58% of the study population had high blood pressure, i.e., hypertension either systolic or diastolic or both which is higher than prevalence of hypertension among Indian adults (30%).^[19] This might be due to measurement of blood pressure from a single visit usually overestimates hypertension prevalence.^[20] The prevalence of hypertension has increased in both urban and rural subjects and presently is 25%–40% in urban adults and 10%–15% among rural adults.^[21] The prevalence of having seven ideal cardiovascular health metrics is very low globally, ranging from 0.3% to 15% and varies by geographical location, age, sex, ethnicity, and education level.^[22] In India, the prevalence of smoking is greater in rural men, whereas all other risk

Table 2: Distribution of study participant's waist circumference, systolic blood pressure, diastolic blood pressure, fasting blood sugar and total cholesterol (n=100)

Statistics	WC (cm)	SBP (mm of Hg)	DBP (mm of Hg)	FBS (mg/dl)	TC (mg/dl)
Mean	85.26	127.04	78.79	93.16	199.66
Median	85.00	126.00	80.00	90.00	184.00
SD	10.47	14.16	7.27	19.56	53.93
Minimum	37.00	90.00	60.00	60.00	140.00
Maximum	110.00	200.00	100.00	157.00	422.00

WC: Waist circumference, SBP: Systolic blood pressure, DBP: Diastolic blood pressure, FBS: fasting blood sugar, TC: Total cholesterol, SD: Standard deviation

Table 3: Association of few socio demographic factors with cardiovascular health status of study participants (n=100)

Socio demographic factors	FBS, n (%)			Hypertension, n (%)		TC, n (%)		Obesity (BMI), n (%)		
	Ideal	Intermediate	Poor	Yes	No	Ideal	Poor	Ideal	Intermediate	Poor
Gender										
Male	39 (75.0)	10 (19.2)	3 (5.8)	33 (63.5)	19 (36.5)	30 (57.7)	22 (42.3)	18 (34.6)	19 (36.5)	15 (28.8)
Female	38 (79.2)	6 (12.5)	4 (8.3)	25 (52.1)	23 (47.9)	29 (60.4)	19 (39.6)	13 (27.1)	12 (25.0)	23 (47.9)
P		0.720			0.249		0.782		0.141	
Age group (years)										
22-41	38 (86.4)	4 (9.1)	2 (4.5)	21 (47.7)	23 (52.3)	28 (63.6)	16 (36.4)	14 (31.8)	17 (38.6)	13 (29.5)
42-61	31 (66.0)	11 (23.4)	5 (10.6)	33 (70.2)	14 (29.8)	25 (53.2)	22 (46.8)	15 (31.9)	10 (21.3)	22 (46.8)
≥62	8 (88.9)	1 (11.1)	0 (0.0)	4 (44.4)	5 (55.6)	6 (66.7)	3 (33.3)	2 (22.2)	4 (44.4)	3 (33.3)
P		0.150			0.065		0.531		0.340	
Religion										
Hindu	69 (77.5)	14 (15.7)	6 (6.7)	51 (57.3)	38 (42.7)	51 (57.3)	38 (42.7)	27 (30.3)	28 (31.5)	34 (38.2)
Muslim	4 (66.6)	1 (16.7)	1 (16.7)	5 (83.3)	1 (16.7)	5 (83.3)	1 (16.7)	2 (33.3)	2 (33.3)	2 (33.3)
Others	4 (80.0)	1 (20.0)	0 (0.0)	2 (40.0)	3 (60.0)	3 (60.0)	2 (40.0)	2 (40.0)	1 (20.0)	2 (40.0)
P		0.730			0.410		0.530		1.000	
Marital status										
Married	69 (75.8)	15 (16.5)	7 (7.7)	54 (59.3)	37 (40.7)	54 (59.3)	37 (40.7)	27 (29.7)	27 (29.7)	37 (40.7)
Unmarried	8 (88.9)	1 (11.1)	0 (0.0)	4 (44.4)	5 (55.6)	5 (55.6)	4 (44.4)	4 (44.4)	4 (44.4)	1 (11.1)
P		1.000			0.388		0.826		0.160	

FBS: Fasting blood sugar, TC: Total cholesterol, BMI: Body mass index

factors such as sedentary lifestyle, obesity, central obesity, hypercholesterolemia, diabetes, and metabolic syndrome are more prevalent in urban men and women.^[21]

The present study showed obesity, hypertension, high level of total cholesterol, and high level of FBS was mostly prevalent among 42–61 years age group. These shows 42–61 years age group people were the most vulnerable group to develop obesity, hypertension, high blood sugar, and total cholesterol and finally would give rise to a syndrome complex named as metabolic syndrome or syndrome X. This might be due to increased stress, sedentary lifestyle, and unhealthy food behavior of the adult population.

Healthy lifestyle practices such as yoga, meditation, morning walk of at least 30 min duration per day; eating fresh fruits and vegetables daily, avoiding fried food, good amount of uninterrupted sleep of at least 8 h duration might alleviate stress in life and reduce the burden of CVD.

The study has certain limitations. First, concerning data quality, although most health parameters were measured

reliably and objectively, the physical activity data in the study population may be subject to reporting bias. Second, as it was a cross-sectional study, all measurements of health behaviors and health factors were obtained from a single visit on the examination day; thus, there is a possibility of misclassification. However, measurements from a single visit are often used in epidemiologic studies for operational feasibility. Third, recall bias may be another limitation in measurement of diet, smoking habit, and physical activity obtained from schedule. Fourth, ideal cardiovascular health status of the population could not be measured due to operational infeasibility.

CONCLUSION

The present study showed that cardiovascular health status of the adult population of urban area of Teliamura, Tripura was very poor. Large proportion of the study participants of middle age group were suffering from high blood pressure, high blood sugar, poor BMI, and poor level of cholesterol. Males were more hypertensive, but females were more obese compared to males. Married people were more obese, hypertensive

compared to unmarried. Healthy lifestyle measures such as physical activity, healthy diet, meditation, and good amount of sleep in the prevention of CVD could be further evaluated in future research.

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Conflicts of interest

There are no conflicts of interest.

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