Abstract

Background: Cardiovascular Disease (CVD) is the leading cause of mortality globally. Over 75% of CVD deaths occur in low- and middle-income countries. Objectives: To assess the 10-year CVD risk among adults aged 30 years and above attending the outpatient department at a Taluk Hospital, Bangalore Urban District, Karnataka. Methods: A cross-sectional study was conducted among 217 subjects above 30 years of age attending the hospital. They were selected by consecutive sampling and administered a face-validated interview schedule. WHO/ISH CVD risk assessment tool was used to categorize them into four categories of CVD risk. Additional risk factors like alcohol use and smoking were also assessed. Results: The mean age of the subjects was 55.7 ± 12.3 years. About 65% of the study population had low risk (<10%), 21.2% had mild risk (10%–20%), 9.7% had moderate risk (20%–30%) and 4.1% had high risk (>30%) according to the World Health Organization/International Society of Hypertension (WHO/ISH) CVD risk assessment tool. In the study population, 4.6% were abusing alcohol as per the CAGE questionnaire. Conclusion: The burden of CVD risk among the adults interviewed was high. The WHO/ISH chart is an inexpensive tool that can be used for screening in a regular OPD.

Keywords: Cardiovascular disease, risk assessment, WHO/ISH chart

Introduction

Cardiovascular disease (CVD) is the leading cause of death and disability worldwide. CVDs are responsible for 17.9 million deaths annually which is estimated to be 31% of all deaths worldwide. More than three quarters of these deaths happen in low- and middle-income countries.[1] It is expected that by 2020, CVD would prevail as the leading cause of death and disability over infectious diseases globally.[2]

Cardiovascular disease encompasses atherosclerotic vascular diseases like coronary heart disease (CHD), cerebrovascular disease, rheumatic heart disease, and peripheral arterial diseases. India alone is burdened with approximately 25% of cardiovascular-related deaths and would serve as a home to more than 50% of the patients with heart ailments worldwide within the next 15 years.[3] The seriousness of the current scenario could be gauged by the fact that most CVD sufferers in India happen to be in their productive age which may impose huge socioeconomic burden and devastating consequences over the coming years.

The greatest public health challenge for developing countries is to control the epidemic of non-communicable diseases, specifically CVD, CHD, diabetes and stroke which has doubled the mortality rates than other communicable diseases in India.[4] The “Asian Indian Phenotype” refers to an amalgamation of clinical (larger waist-to-hip and waist-to-height ratios signalling excess visceral adiposity).
biochemical (insulin resistance, lower adiponectin, and higher C-reactive protein levels) and metabolic abnormalities (raised triglycerides, low high-density lipoprotein (HDL) cholesterol) that are more prevalent in individuals of South Asian origin and predispose this group to developing diabetes and premature CVD. Over the last 30 years, the rate of CHD-related incidence has increased from 2% to 6% in the rural population and from 4% to 12% in the urban population.

The UN Sustainable Development Goals aim to reduce premature mortality from non-communicable diseases by one-third. To support cardiovascular disease prevention and control, the WHO has developed tools and guidance, including risk prediction charts. The World Health Organization/International Society of Hypertension (WHO/ISH) risk prediction charts indicate a 10-year risk of developing a fatal or non-fatal major cardiovascular event, according to age, sex, blood pressure, smoking status, total blood cholesterol, and presence or absence of diabetes mellitus for 14 WHO epidemiological sub-regions.

The prediction of CVD risk among adults is a preventive strategy that can be adopted in OPDs and there is a paucity of literature on CVD risk assessment in rural areas.

The objective of this study was to assess the 10-year CVD risk among adults aged 30 years and above at Anekal Taluk Hospital, Bangalore Urban District.

**Materials and Methods**

Across-sectional study was conducted at the non-communicable disease (NCD) clinic of a taluk hospital in Bangalore Urban District, for a period of 2 months, from September to October 2018 using a structured questionnaire. Sample size was calculated as 217, with 5% fixed precision and 95% confidence interval, based on a previous study done in Pondicherry where 17% of the adults had moderate-to-high-risk of CVD. Consecutive sampling was done. The study included any adult aged 30 years and above availing services at the NCD clinic and excluded people with history of previous CVD (patients with established angina pectoris, coronary heart disease, myocardial infarction, transient ischemic attacks, stroke, or peripheral vascular disease), BP >180/110 mmHg or currently presenting with CVA symptoms.

Written informed consent was taken from the participants, and a face-validated interview schedule was administered, which included the sociodemographic details, history of smoking, alcohol consumption, amount of physical activity done and details of the diet.

Physical activity was assessed using questions such as number of days of physical activity in a week and number of minutes per day. Brisk walking, jogging, running for at least five days a week and 30 minutes per day was considered to be good as per National Program for Control of Cancer, Diabetes, Cardiovascular Disease and Stroke (NPCDCS guidelines). Diet was assessed by asking the number of meals per day, servings of fruits and vegetables per day by showing a serving bowl of 80 grams. Alcohol abuse was assessed using the CAGE questionnaire. Smoking history was asked and they were categorized into current smoker and non-smoker. All those who had smoked 100 cigarettes in their lifetime, were still smoking, and those who quit smoking less than a year before the assessment were considered as current smokers for assessing cardiovascular risk.

Anthropometric measurements including height, weight, body mass index (BMI), waist/hip ratio were measured. Blood pressure was recorded using a sphygmomanometer and blood glucose levels using a glucometer. WHO/ISH

**Table 1: Sociodemographic details of the study population**

| Age group (in years) | Frequency (%) |
|----------------------|---------------|
| Age distribution     |               |
| 30-39                | 13 (6%)       |
| 40-49                | 64 (29.5%)    |
| 50-59                | 47 (21.7%)    |
| ≥60                  | 93 (42.8%)    |
| Sex distribution     |               |
| Females              | 119 (54.8%)   |
| Males                | 98 (45.2%)    |
| Socioeconomic class: Modified BG Prasad scale | |
| I                    | 28 (12.9%)    |
| II                   | 69 (31.8%)    |
| III                  | 74 (34.1%)    |
| IV                   | 38 (17.5%)    |
| V                    | 8 (3.7%)      |

**Table 2: Association between risk factors and CVD risk (n=217)**

| Factors                      | Low (<10%) | Mild (10%-20%) | Moderate (20%-30%) | Severe(>30%) | P    |
|------------------------------|------------|----------------|--------------------|--------------|------|
| Current smokers              |            |                |                    |              |      |
| Yes                          | 9          | 10             | 2                  | 3            | 0.004*|
| No                           | 132        | 36             | 19                 | 6            |      |
| Random blood sugars          |            |                |                    |              |      |
| <199                         | 115        | 37             | 14                 | 3            | 0.009*|
| ≥200                         | 26         | 9              | 7                  | 6            |      |

(*Fisher’s exact test. P<0.05 is significant)
CVD risk prediction charts (SEAR D) were used to calculate the CVD risk for each participant. These are colour-coded charts that help to calculate the 10-year risk of a major CVD according to age, gender, blood pressure, smoking status, and the presence of diabetes mellitus. The scores were informed to the patients and a quick health education of “Healthy 5, Healthy you” including adherence to medication, diet, physical activity, addictions and stress management was given to all the participants. Data was entered in Microsoft excel and normality assessed using standard statistical software. Data followed a normal distribution; descriptive variables were expressed as frequencies, percentages, mean and standard deviation. Associations were determined using Fisher’s exact test.

**Results**

The study population (n = 217) was between the age group of 32 and 90 years, and the mean age of study subjects was 55.79 ± 12.3 years. Males comprised of 119 (54.8%) and majority of them (88, 40.1%) had completed primary school education. Most of the study subjects (89, 41%) were unemployed. The mean per capita income was Rs 2,365 ± 1,786 [Table 1].

CVD risk pattern revealed 141 (65%) having low risk (<10%), 46 (21.2%) having mild risk (10%–20%), 9.7% having moderate risk (20%–30%), and 4.1% having high risk (>40%), with male having more risk than females.

In the study population, 88 (40.5%) had diabetes mellitus and 79 (36.4%) had hypertension. A majority of 171 (79%) had no regular physical activity. Most of the subjects 146 (67.3%) reported to have three meals per day. The entire study population was consuming less than five servings of fruits and/or vegetables per day. Very few subjects (9, 4.1%) were consuming saturated fats. Among the study subjects, 24 (11%) were current smokers and 28 (13%) were consuming alcohol. Out of the 28 (12.9%) alcohol users, 10 (35.8%) were found to be alcoholic according to the CAGE questionnaire.

**Anthropometry**

Median weight of the study population was 60 with IQR 54–70. BMI was calculated and classified using the Asia–Pacific BMI guidelines, which is applicable to the Indian population. Regarding the BMI distribution, a majority of 133 (61.3%) fell under the normal BMI range of 18.5–22.9, with only 67 (30.9%) being overweight (23–24.9) and 16 (7.4%) being obese (25 and above).

**Blood pressure and blood sugar levels**

In terms of systolic blood pressure, 171 subjects (78.8%) had systolic BP less than 130 mmHg, 40 subjects (18.4%) were in the range of 140–159 mmHg (Stage 1 hypertension), and 6 participants (2.8%) had readings above 160 mmHg (Stage 2 hypertension). Regarding random blood sugar (RBS) levels, 169 (77.9%) study subjects had RBS <199 mg/dl and 48 (22.1%) had RBS >200 mg/dl with signs and symptoms of diabetes mellitus.

On measuring the association between sociodemographic factors and other risk factors with the categories of CVD risk, it was found that a significant association was present between education, smoking status, and random blood sugars with the risk of CVD. Those with higher educational status were found to have lower risk of CVD (P = 0.001), those who were smokers (P = 0.004) and with higher blood sugar levels (P = 0.009) were found to have higher risk of CVD. P < 0.05 using the Fisher’s exact test was considered to be significant [Table 2].

**Discussion**

Multifactorial causation of CVD and its fatality has been brought out in multiple literatures. Cardiovascular risk evaluation in a primary care setting is limited and thus it is the need of the hour to increase awareness regarding the same. The current study shows that out of 217 participants, 30 (14%) had moderate-to-high risk (>20%) of CVD. Similar findings were found in the study done by Ghorpade AG et al. in Pondicherry where the moderate-to-high risk was 17% in the study population. Study done in the three middle income countries in Asia showed that a high CVD risk of >20% was present in 6%, 2.3%, and 1.3% in Mongolia, Malaysia, and Cambodia respectively. This difference could be due to the difference in the prevention strategies adopted by these countries or the sociodemographic differences in the population under study.

The inclusion of the NCD clinic of a single institution could be a major limitation of this study. A feasible multicentric study would be more appropriate in improving the external validity of the study.

**Conclusion and Recommendations**

The burden of CVD risk among the adults interviewed was high. The WHO/ISH chart is an easy and inexpensive tool that can be used for screening in a regular OPD. The burden of NCD can only be brought down by adopting primary prevention methods like regular physical activity to normalize BMI and by avoiding habit forming substances like smoking and alcohol. Educating the community regarding these behavioral changes will be the golden step in CVD risk prevention.

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**Conflicts of interest**

There are no conflicts of interest.

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