Hailemichael Desalegn, Sintayehu Fekadu, Amare Deribew. *Ethiop Med J, 2017, Vol. 55, No. 1*

**ORIGINAL ARTICLE**

# CLINICAL ASSESSMENT OF CARDIOVASCULAR DISEASE ASSOCIATED RISK FACTORS IN JIMMA TOWN, SOUTHWEST ETHIOPIA: COMMUNITY-BASED CROSS- SECTIONAL STUDY

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## ABSTRACT

***Introduction:*** *Cardiovascular disease has been identified as emerging epidemic in developing world and Sub-saharan Africa. The prevalence of risk factors associated with cardiovascular disease is not clearly established in our country. We conducted this study to determine the prevalence of cardiovascular disease associated risk factors in Jimma town.*

***Methods:*** *A cross-sectional study was conducted in sampled adults in Jimma town. Multi-stage sampling was used by combining simple random sampling to select kebeles of Jimma town and then systematic random sampling to select the house hold .An individual was selected with a lottery method if there were more than one adult in the house hold who fulfills inclusion criteria. Data were collected using the World Health Organization standardized structured questionnaire on cardiovascular risk assessment for developing countries. The study variables included anthropometric measurements, demographic information and behavioral risk factors. The data variables were computed using SPSS version 20.*

***Results:*** *Majority (70.9%) of the respondents have one or more of the seven cardiovascular disease risk factors assessed. Nearly one forth (23.8%) of the study participants were hypertensive, 6.2% were known diabetes and the prevalence of smoking was 11.8% among males 2% among females. The prevalence of overweight/obesity was 26.8 %.*

***Conclusion:*** *Majority were found to have at least one of the risk factors for cardiovascular disease. Hypertension and diabetes mellitus were the most common. Screening programs, health education and awareness creation are recommended to prevent the development of the disease. Large scale prospective study with laboratory data will help to further analyze and strengthen the results for policy makers.*

***Keywords:- cardiovascular, risk factors, prevalence, Jimma, Ethiopia***

## INTRODUCTION

Cardiovascular disease (CVD) is now the most common cause of death worldwide. As a diagnostic category it includes four major areas; Coronary heart disease (CHD) manifested by myocardial infarction (MI), angina pectoris, heart failure (HF), and coronary death, Cerebrovascular disease manifested by stroke and transient ischemic attack, Peripheral arterial disease manifested by intermittent claudication Aortic atherosclerosis and thoracic or abdominal aortic aneurysm(1).

Ischemic heart disease and cerebrovascular disease are among the top ten causes of death in all low- and middle income regions (2)**.** A small number of risks account for large contributions to the global loss of healthy life (3). Effective prevention and control of CVD needs understanding of their contribution to the overall disease burden, and adequate information on the distribution of risk factors in different geographic and socioeconomic groups of the population. Today CVD accounts for about 30% of deaths worldwide, including nearly 40% in high-income countries and about 28% in low- and middle-income countries (1).

No other life-threatening disease is as prevalent or expensive to society, and persons with CVD are likely to die from their disease. The number of CVD

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deaths remains high, even in countries with the best health care systems (4).

In the worldwide INTERHEART study of patients from 52 countries, nine potentially modifiable factors accounted for over 90 percent of the population attributable risk of a first MI. The commonest of which include smoking, dyslipidemia, hypertension, diabetes, abdominal obesity, regular alcohol consumption, and lack of physical activity (5).

The magnitude of the difference in risk was illustrated in a study that reviewed data from 366,559 subjects aged 18 to 59 who were entered into two large prospective studies, the Multiple Risk Factor Intervention Trial (MRFIT), and the Chicago Heart Association Project in Industry (6). Patients at low risk, defined as serum cholesterol <200 mg/dL, blood pressure ≤ 120/80 mmHg, and no current cigarette smoking, comprised 6.9 percent of the cohort. After an average follow-up of 16 years for the MRFIT study and 22 years for the Chicago trial, the low risk patients had a significantly lower CHD mortality (0.2 to 8.8 versus 1.5 to 38 percent for those with ≥ 1 risk factor) and lower all cardiovascular disease mortality (0.3 to 15.8 versus 2.1 to 53 percent) compared to higher risk patients. Estimated greater life expectancy for low risk men and women was 9.5 and 5.8 years, respectively (6)

It has been observed that there are a number of studies on risk factors in patients of Coronary Artery Disease but comparatively few studies are available on risk factors in healthy community members in Africa(7). We can't deny the high mortality rates due to HIV/AIDS, tuberculosis, and other infectious diseases in Ethiopia. In time, however, CAD is projected to attain epidemic proportions in developing countries surpassing the infectious diseases of today. The wealth of available evidence demonstrating the pervasive effects of CAD in developed countries, and proven effective methods of primary and secondary prevention at the individual and population level, are needed to combat CAD in developing countries.

## PATIENTS AND METHODS

The study was conducted in Jimma town which is the largest town in southwestern Ethiopia. It is located in Oromia Region 335 kms south-west of Addis Ababa. Based on figures from the Central Statistical Agency (CSA) in 2005, it has an estimated population of 159,009 of whom 80,897 were males and 78,112 were females. The town is divided administratively into three "keftegnas" & 13 kebele's. All houses have been numbered by the kebeles to support administrative activities. From CSA report, adult population whose age is 40 years and above constitutes 12.5% of the urban population of Oromia region which gives an estimate of 18,941.

Ethical clearance was enquired and secured from the ethical review board of Jimma University. Verbal permission obtained from each Kebele after a formal letter of support was written from Jimma University office of research and graduate studies. The study was undertaken after written informed consent was signed.

A cross - sectional study was undertaken to assess the prevalence of cardio vascular disease risk factors from July 1 to Nov. 30 2010. All adults in Jimma town within age range of 25-65 years and who fulfilled the inclusion criteria were included in the study. Sample size was determined using the formula for estimating sample size for single population proportion. Since, no previous similar studies the p value was taken as 0.5, margin of error 0.05 and non-response rate of 20% were used. After design effect of 1.5, extrapolated from WHO estimate for risk factor assessment studies, we get sample size of 576.

Multi-stage sampling technique was utilized. Initially 3 Kebeles were selected from the 13 Kebele of the town by simple random sampling, then the total sample size of 576 were distributed to the three 'Kebele's employing proportional to size allocation to the Kebeles. A systematic sampling technique was undertaken to identify the study households from each 'Kebele'. The sample sizes were divided proportionally to the respective Kebeles. An individual from the household was then chosen with a lottery method.

The data were analyzed using SPSS software version 20. CVD risk factor scores were computed by assigning a score of +1 to each of the following seven Variables: current daily smoking, regular khat chewing, binge drinking, overweight/obesity, abdominal obesity, Butter/Ghee usage, History of diagnosed Diabetes Mellitus and high blood pressure. Statistical significance was set at $P < 0.05$.

***Operational Definitions***:-
***Hypertension***- Systolic blood pressure ≥ 140 mmHg or those with diastolic blood pressure ≥ 90 mmHg.
***Diabetes mellitus*** - Individuals for whom the diagnosis of diabetes had been established by a physician in the past or those who were under treatment with

antidiabetic drugs or measured FBS ≥ 126 mg/dl

***Abdominal obesity***- waist circumference >102cm (40 in) for men and 88 cm (35in) for women or waist to hip ratio of >0.9 in women and >1.0 in men

***Body mass index***

- Underweight - BMI < 18.5 kg/m2
- Normal weight - BMI ≥ 18.5 to 24.9 kg/m2
- Overweight - BMI ≥ 25.0 to 29.9 kg/m2
- Obesity - BMI of 30.0 to 34.9 kg/m2

***Current smoker***–an individual who was smoking at least half pack during the last one year of study period

***Regular Khat chewing*** – an individual who was chewing khat daily in the last one month of study period

## RESULTS

From the 526 study participants 241(45.8%) were male, 22.6% were illiterate, 62.7% had BMI within the normal range and individual age ranges between 25-65 years (Table 1).

Overall, 70.9% of the study participants have one or more of the seven CVD risk factors included in the assessment, the prevalence of hypertension was 23.8%, 13.7% had history of measurement of their blood pressure before the study. This implies that 10.1% of the study participants had undiagnosed hypertension.

Thirty three (6.2%) of the participants have history of diabetes mellitus and only 5.5 % of the individuals have measured blood cholesterol level. Overweight/ obesity was present in 11.4 % in males and higher in females. Inadequate intake of fruits and vegetables was almost universal (Table 2).

Elevated Blood pressure was significantly associated in male sex, regular khat use and with increased body weight (Table 3). History of known Diabetes mellitus was significantly associated with Age, Education, Ghee/butter usage and body mass index causing increased risk (P< 0.05) (Table 4).

Table1. Baseline Characteristics of Participants in Cardiovascular Disease Associated Risk Factors Study, Jimma town, South-west Ethiopia, Nov.2010 (n=526)

| Characteristics | Number | Percent |
|---|---|---|
| **Sex** | | |
| Male | 241 | 45.8 |
| Female | 285 | 54.2 |
| **Age** | | |
| 25–34 | 136 | 25.9 |
| 35–44 | 199 | 37.8 |
| 45–54 | 105 | 20.0 |
| 55–65 | 86 | 16.3 |
| **Education** | | |
| Illiterate | 119 | 22.6 |
| Read &write only | 54 | 10.3 |
| Elementary | 124 | 23.6 |
| High school | 143 | 27.2 |
| Higher education | 86 | 16.3 |
| **Ethnicity** | | |
| Oromo | 223 | 42.4 |
| Amhara | 110 | 20.9 |
| Yem | 80 | 15.2 |
| Gurage | 48 | 9.1 |
| Others[1] | 65 | 12.4 |

Table 2.Distribution of Risk Factors among Adult participants in Cardiovascular Disease Associated Risk Factors Study, Jimma town, South west Ethiopia, Nov.2010

| Variables | Male Number(%) | | Female Number(%) | | Total Number |
|---|---|---|---|---|---|
| Current smoker | 62 | 84.9 | 11 | 15.1 | 73 |
| Alcohol intake (Binge Drinking) | 101 | 68.2 | 47 | 31.8 | 148 |
| Physical inactivity (sedentary) | 6 | 54.5 | 5 | 45.5 | 11 |
| Hypertension | 67 | 53.6 | 58 | 46.4 | 125 |
| History of DM | 17 | 51.5 | 16 | 48.5 | 33 |
| Inadequate intake of fruit & Vegetables | 237 | 45.8 | 280 | 54.2 | 517 |
| Overweight | 60 | 42.5 | 81 | 57.5 | 141 |
| Abdominal obesity | 20 | 28.5 | 50 | 71.5 | 70 |
| Obese | 13 | 29.5 | 31 | 70.5 | 44 |
| Regular Khat chewing | 115 | 65.7 | 60 | 34.3 | 175 |
| Butter/ghee usage | 132 | 45.1 | 161 | 54.9 | 293 |

Table 3. Hypertension Cases by Socio-demographic, Anthropometric and Behavioral variables among Participants in Cardiovascular Disease Associated Risk Factors, Jimma town South-west Ethiopia, Nov.2010

| Socio-demographic variables (n=526) | Blood pressure | | P value |
|---|---|---|---|
| | Normal No. (%) | Hypertension No. (%) | |
| Age | 33(55.9) | 26(44.1) | |
| 25-34 | 51(58.0) | 37(42.0) | 0.002 |
| 35-44 | 16(34.8) | 30(65.2) | |
| 45-54 | 14(30.4) | 32(69.6) | |
| 55-65 | | | |
| Sex | | | |
| Male | 35(34.3) | 67(65.7) | 0.045 |
| Female | 79(57.7) | 58(42.3) | |
| Regular khat use | 31(37.8) | 51(62.2) | 0.027 |
| Yes | 83(52.9) | 74(47.1) | |
| NO | | | |
| Current smoking | | | |
| Yes | 49(67.1) | 24(32.9) | |
| No | 351(77.7) | 101(22.3) | 0.050 |
| Waist: Hip | 87(72.5) | 33(27.5) | 0.789 |
| Normal | 52(74.3) | 18(25.7) | |
| Central obese | | | |
| BMI Range | | | |
| Under weight | 18(60) | 12(40.0) | 0.000 |
| Normal | 77(57.0) | 58(43.0) | |
| Overweight/obese | 19(25.7) | 55(74.3) | |

Table 4. Diabetes Mellitus Cases by Socio-demographic, Anthropometric Variables, for Participants in Cardiovascular Disease Associated risk Factors in Jimma town Southwest Ethiopia, Nov.2010

| Socio-demographic variables (n=526) | Known Diabetes History | | P value |
|---|---|---|---|
| | Yes | No | |
| **Age** | | | |
| 25-34 | 1(1.4) | 69(98.6) | 0.008 |
| 35-44 | 12(11.4) | 93(88.6) | |
| 45-54 | 11(18.3) | 49(81.7) | |
| 55-65 | 9(18.4) | 40(81.6) | |
| **Sex** | | | 0.356 |
| Male | 17(13.6) | 108(86.4) | |
| Female | 16(10.1) | 143(89.9) | |
| **Butter/Ghee usage** | | | 0.065 |
| Yes | 20(15.5) | 109(84.5) | |
| NO | 13(8.4) | 141(91.6) | |
| **Educational status** | | | 0.035 |
| Illiterate | 8(9.9) | 73(90.1) | |
| Read & write only | 7(26.9) | 19(73.1) | |
| Elementary | 7(9.2) | 69(90.8) | |
| Secondary and above | 11(25.1) | 90(74.9) | |
| **Occupation** | | | 0.105 |
| Farmer | 1(14.3) | 6(85.7) | |
| Merchant | 1(2.8) | 35(97.2) | |
| House wife | 13(12.7) | 89(87.3) | |
| Gov. Employee | 9(20.5) | 41(79.5) | |
| Un-employed | 2(8.0) | 47(92.0) | |
| Other[1] | 7(17.5) | 93(82.5) | |
| **Waist to Hip ratio** | | | |
| Normal | 23(9.3) | 222(90.7) | 0.041 |
| Central obese | 10(20.4) | 39(79.6) | |
| **BMI** | 1(5.3) | 18(94.7) | 0.000 |
| Under-weight | 9(5.4) | 158(94.6) | |
| Normal | 23(23.5) | 75(76.5) | |
| Overweight/obese | | | |

## DISCUSSION

Coronary heart disease has been neglected in Africa as more infectious disease and mortality due to infections has been observed. Non-communicable diseases (NCDs) are also increasingly observed in developing countries. Such developing countries are not able to overcome double burden of both infectious and NCDs. An increasing prevalence of cardiovascular diseases can only be reduced with preventive measures (7-9).

In the present study hypertension was found to be the most prevalent risk factor identified for cardiovascular disease. The prevalence of hypertension was 23.8% in this study. Studies done among hospital inpatients and at community level in Addis Ababa have showed hypertension as important risk factor of cardiovascular disease (10-12). Different reports have

revealed that hypertension is a significant risk factor for acute myocardial infarction. In Ethiopia, hospital-based study has revealed that hypertension was the most common risk for stroke and myocardial infarction (11). Community based study done in Addis Ababa revealed higher prevalence compared with current study which is about 30% in urban city (Addis Ababa) but lower values for rural town Butajira (8%) (12).This difference could be due to lower sample size in our study.

Our study has also shown that from patients who are having high blood pressure measurement, i.e from 23.8% only 13.7% had history of measurement of their blood pressure before the study. This implies that 10.1 % of the study participants had undiagnosed hypertension. This study had also identified that elevated blood pressure was significantly associated in male sex, regular khat use and with increased body weight and we need to advise life style modification of decreasing weight and to refrain from regular khat chewing habits.

When computing for obesity, the prevalence in urban Tanzania was 17%, in urban Cameroon 19.5% and in black South Africans 30% (13). The prevalence in our study was lower compared to what has been reported from these African countries. Wide variations have been observed in different studies on prevalence of smoking-in Tripoli 27.3%, Tanzania 0.4% in females and 7.3% males (18). Among adults in SSA, smoking prevalence varied between 1% in Lesotho to 44% in Guinea. Prevalence is highest in Kenya (67%), followed by Namibia (65%), Guinea (60%), and Uganda (52%) (15). In a cross sectional survey among college students in Addis Ababa, a prevalence of 9.5% in males and 3.4% in females has been identified (21).

The prevalence of khat use in our study (33.3%) was lower from a report by a similar study done in Butajira, where 75% of males and 41% of females reported to chew compared to 2% females in Addis Ababa (12). Though further studies on clear health impact of Khat chewing are required, this study has shown that it is consumed in at least one third of the study samples. Habitual consumption of Catha edulis has been shown to have adverse coronary events including acute myocardial infarction, further studies and evidence are recommended (22, 23 ).

The prevalence of diabetes mellitus based on history obtained from participants was 6.2%. In Tripoli, the prevalence was found to be higher (21.3%). Diabetes was diagnosed in 6.9% of patients on discharge from hospitals in Nairobi (15) and a Tanzanian study revealed a 4% prevalence (19,20) Our study might have shown a higher prevalence if laboratory based assessment was done. With the study prevalence, based on history of diabetes, we have found strong association with increasing age, education level, regular butter/ghee usage and increasing body mass index. These have shown that the modern education has not changed the attitude to care or prevent from Diabetes mellitus. The increased risk in these groups might also relate to the increased stress and responsibility they might shoulder. Advising on healthy life style and dietary management and increasing weight could decrease the incidence of diabetes in these group of populations.

The assessment of dyslipidemia is recommended for adults age>25 years by the Adult Treatment Panel III (ATP III) guidelines and National Cholesterol Education Program (24). In our series, only 2.2 % of the participants had history of blood cholesterol measurement which calls for awareness creation initiatives in our set up.

***Conclusion:*** The present study has shown that conventional risk factors associated with CVD are prevalent in Jimma town. Hypertension was most prevalent. Negligible numbers of participants have lipid profile measurements. Behavioral risk factors such as cigarette smoking, binge drinking of alcohol, and habitual chewing of khat appear to be emerging problems, particularly among males. Abdominal obesity, overweight/obese, butter/ghee usage is more common in females. About 70.9% of adults have one or more of the CVD risk factors assessed in this study, excluding inadequate intake of fruit or vegetables, which is common among the study participants.

***Recommendation:*** Strategies that proved to be effective in other parts of the world, such as increased taxation, bans on advertising, the introduction of smoke-free public environments, and smoking cessation programs could have an impact in decreasing the burden. Public awareness on the impact of high blood pressure, diabetes mellitus and other modifiable cardiovascular risk factors in the population and its significance to health and national development has to be promoted. Large population based prospective studies including laboratory parameters are recommended to clearly understand the overall impact.

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