Assessment of Major Cardiovascular Risk Factors among Hypertensive Patients, El shabarga Health Center, Gezira state, Sudan (2013)

By
Huda Hassan Alawad Alkhadir
MB.BS, University of Khartoum 2009

A Dissertation
Submitted For Partial Fulfillment of the Requirements
For the Degree of Master of Science

in
Family Medicine

Department of Community and Family Medicine
Faculty of Medicine
University of Gezira

August, 2013
Dedication

To my father and mother

To my sister and brothers

To my husband

To my daughter Talah
Acknowledgment

Great thanks for all members of Community & Family medicine Department; University of Gexira, for their efforts & advices which helped me in conducting this study.

Great thanks for El shabarga health center staff & all my patients there.
Assessment of Major Cardiovascular Risk Factors Among Hypertensive Patients, 
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M.Sc. Degree in Family Medicine(22/5/2013)

Abstract

This was a cross-sectional descriptive facility based study, conducted to assess major cardiovascular risk factors among hypertensive patients in Elshabarga health center during April 2013; aiming at calculating percentage of each cardiovascular risk factor in hypertensive patients and to classify them to: low, moderate and high risk groups. Data was collected using a modified international checklist and filled by the researcher during follow-up visits of hypertensive patients during the study period. The study included 158 patients: 68.4% were females and 31.6% were males, the results of the study showed that: 38% were obese and 29.7% were diabetic, 26.6% had dyslipidemia, 10.8% had family history of heart disease, 8.9% had heart disease themselves, 8.2% had symptoms and signs of heart disease and only 8.2% were physically active, 4.4% had Cerebrovascular accidents and only 1.9% were smokers. Over all result showed that 36% of patients were in the high risk group. Diabetes mellitus, Hypercholesterolemia and obesity are approaching international ranges. Physical inactivity is highly prevalent, but smoking is not. It is recommended that; Adherence to guidelines in management of Hypertension and Diabetes mellitus to achieve optimal results in control of these chronic diseases, and to reduce occurrence of their complications. Screening for hidden risk factors to prevent worsening of patients' scores and help in its improvement. Control of other modifiable risk factors.
تقييم عوامل الخطر الرئيسية لأمراض القلب والشرايين في مرضى إرتفاع ضغط الدم بمركز صحي الشبارقة خلال شهر أبريل للعام 2013م

إعداد
هدى حسن العوض

لمعالج درجة الماجستير في طب الأسرة (3/2013)

ملخص الدراسة

هذه دراسة مقطعية وصفية لتقييم عوامل الخطورة الرئيسية لأمراض القلب والشرايين في مرضى إرتفاع ضغط الدم بمركز صحي الشبارقة خلال شهر أبريل للعام 2013. تهدف هذه الدراسة إلى تقييم وتقييم مرضى إرتفاع ضغط الدم إلى مجموعة ذات: خطورة عالية، متوسطة ومنخفضة. وحساب نسبة حدوث كل عامل خطورة كل على حدة في مرضى إرتفاع ضغط الدم الذين حضروا إلى مركز صحي الشبارقة للمتابعة في شهر أبريل للعام 2013. تم تصميم قائمة ضبط بواسطة الباحث اعتمادا على المعايير العالمية لتقييم عوامل الخطورة لأمراض القلب والشرايين. تم استخدام قائمة الضبط لجمع المعلومات من المرضى بواسطة الباحث. تم البحث في مرضى إرتفاع ضغط الدم للحالات المشخصة سابقا وتم استبعاد حالات إرتفاع ضغط الدم مع الحمل. بعد تحويل هذه المعلومات خصقت الدراسة إلى النتائج التالية: عدد المرضى الكلي 158 مريض، 82.4% نساء و31.6% رجال. في كل من شملتهم الدراسة تبين أن نسبة حدوث السمنة هي 32.6%، السكري 29.7%، ارتفاع دهون الدم 27.6% و إيجابية التاريخ الأسري لأمراض القلب 10.8%. 1.1% يعانون من أمراض القلب و8.2% لديهم أعراض وعلامات لأمراض القلب، بينما 84.4% منهم فقط يمارسون الرياضة و14.9% منهم مدخنين. خصقت الدراسة أنها 36% من المرضى يحملون تصنيف درجة الخطورة العالية. بعض متغيرات الدراسة متواضعة مع نسب الحدوث العالمية وهي مرض السكري، نقص النشاط البدني وزيادة دهون الدم. أكثر عوامل الخطورة وجودا هو عدم ممارسة التمارين الرياضية كما يعتبر التدخين أقل عوامل الخطورة وجودا. اقترحت الدراسة تطبيق المعايير العالمية لعلاج ارتفاع ضغط الدم والسكري وذلك للحصول على النتيجة المقبولة والتقليل من مضاعفاتها وبالتالي انخفاض معدل الخطورة، عمل مسح صحي لاكتشاف عوامل الخطر المخفية وعلاجها والتحكم المبكر في عوامل الخطر التي يمكن تغييرها.
<table>
<thead>
<tr>
<th>Content</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dedication</td>
<td>III</td>
</tr>
<tr>
<td>Acknowledgment</td>
<td>IV</td>
</tr>
<tr>
<td>Table of Contents</td>
<td>V</td>
</tr>
<tr>
<td>List of Tables</td>
<td>VI</td>
</tr>
<tr>
<td>Abstract in English</td>
<td>VII</td>
</tr>
<tr>
<td>Abstract in Arabic</td>
<td>VIII</td>
</tr>
<tr>
<td>Abbreviations</td>
<td>IX</td>
</tr>
<tr>
<td><strong>Chapter One</strong></td>
<td>1</td>
</tr>
<tr>
<td>Introduction and background</td>
<td>1</td>
</tr>
<tr>
<td>Justification</td>
<td>5</td>
</tr>
<tr>
<td>Objectives</td>
<td>7</td>
</tr>
<tr>
<td><strong>Chapter Two</strong></td>
<td>8</td>
</tr>
<tr>
<td>Literature review</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter Three</strong></td>
<td>13</td>
</tr>
<tr>
<td>Materials and methods</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter four</strong></td>
<td>19</td>
</tr>
<tr>
<td>Results</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter five</strong></td>
<td>25</td>
</tr>
<tr>
<td>Discussion</td>
<td></td>
</tr>
<tr>
<td><strong>Chapter six</strong></td>
<td>28</td>
</tr>
<tr>
<td>Conclusion and recommendations</td>
<td></td>
</tr>
<tr>
<td><strong>References</strong></td>
<td>30</td>
</tr>
</tbody>
</table>
# List of tables

<table>
<thead>
<tr>
<th>Table title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Table 1:</strong> Sex distribution in hypertensive patients in Elshabarga HC.</td>
<td>19</td>
</tr>
<tr>
<td><strong>Table 2:</strong> Age distribution of hypertensive patients in Elshabarga HC.</td>
<td>19</td>
</tr>
<tr>
<td><strong>Table 3:</strong> Distribution of FH of HD in hypertensive patients in Elshabarga HC.</td>
<td>20</td>
</tr>
<tr>
<td><strong>Table 4:</strong> Distribution of smoking in hypertensive patients in Elshabarga HC.</td>
<td>20</td>
</tr>
<tr>
<td><strong>Table 5:</strong> Prevalence of DM in hypertensive patients in Elshabarga HC.</td>
<td>21</td>
</tr>
<tr>
<td><strong>Table 6:</strong> Occurrence of obesity in hypertensive patients in Elshabarga HC.</td>
<td>21</td>
</tr>
<tr>
<td><strong>Table 7:</strong> Presence of activity in hypertensive patients in Elshabarga HC.</td>
<td>22</td>
</tr>
<tr>
<td><strong>Table 8:</strong> Occurrence of HD in hypertensive patients in Elshabarga HC.</td>
<td>22</td>
</tr>
<tr>
<td><strong>Table 9:</strong> Occurrence of CVA in hypertensive patients in Elshabarga HC.</td>
<td>23</td>
</tr>
<tr>
<td><strong>Table 10:</strong> Presence of dyslipidemia in hypertensive patients in Elshabarga HC.</td>
<td>23</td>
</tr>
<tr>
<td><strong>Table 11:</strong> Presence of symptoms and signs of HD in hypertensive patients in Elshabarga HC.</td>
<td>24</td>
</tr>
<tr>
<td><strong>Table 12:</strong> Presence of physical activity according to age and sex in hypertensive patients in Elshabarga HC.</td>
<td>24</td>
</tr>
</tbody>
</table>
Abbreviations

AHA: American Heart Association.
BMI: Body Mass Index.
BP: Blood Pressure.
CHD: Coronary Heart Disease.
CVA: Cerebrovascular Accident.
CVD: Cardiovascular Disease.
Daly: Disability-adjusted life year.
DBP: Diastolic Blood Pressure.
DM: Diabetes Mellitus.
FH: Family History.
HC: Health Center.
HDL: High Density Lipoprotein.
HTN: Hypertension.
LDL: Low Density Lipoprotein.
MI: Myocardial Infarction.
OPD: Obstructive Pulmonary Disease.
SBP: Systolic Blood Pressure.
SPSS: Statistical Packages for Social Science.
Chapter One

Introduction and background

High blood pressure is defined as a repeatedly elevated systolic pressure of 140 or higher OR a diastolic pressure of 90 or higher. Hypertension is the most common non-communicable disease and risk factor for heart failure, stroke, chronic kidney disease and ischemic heart disease in sub-Saharan Africa (1,2). It affects approximately 50 million individuals in the United States and approximately 1 billion worldwide. As the population ages, the prevalence of hypertension will increase even further unless broad and effective preventive measures are implemented.

Cardiovascular disease (CVD) is a critical public health issue, nationally and internationally. It was responsible for less than 10% of all global deaths at the beginning of the 20th century, but in 2005 that number was 30%. About 80% of these deaths were in low- and middle-income countries. Arab countries like Jordan has mortality rate as high as 38.2% associated with CVD (7).

The relationship between blood pressure (BP) and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors(3). Atherosclerotic CVD is the leading cause of death for both men and women in the United States. It is estimated that if all forms of major CVD were eliminated, life expectancy would rise by almost 7 years (4).

Coronary heart disease (CHD) has a long asymptomatic latent period, which provides an opportunity for early preventive interventions (4).
Major CV Risk Factors include Hypertension, Cigarette smoking, Obesity; (body mass index $\geq 30$ kg/m2), Physical inactivity, Dyslipidemia, Diabetes mellitus, Age (older than: 55 for men, 65 for women) and Family history of premature cardiovascular disease (men under age 55 or women under age 65).

The majority of cardiovascular disease (CVD) is caused by risk factors that can be controlled, treated or modified, such as high blood pressure, cholesterol, overweight/obesity, tobacco use, lack of physical activity and diabetes. However, there are also some major CVD risk factors that cannot be controlled.

**Modifiable risk factors:**

**Hypertension** (high blood pressure): Globally, nearly one billion people have high blood pressure (hypertension); of these, two thirds are in developing countries. Hypertension is one of the most important causes of premature death worldwide and the problem is growing; in 2025, an estimated 1.56 billion adults will be living with hypertension. It is the leading cause of CVD worldwide.

**Tobacco use**: Smoking is estimated to cause nearly 10 per cent of all CVD. The risk of developing CVD is higher in female smokers, young men, and heavy smokers. There are currently about 1 billion smokers in the world today. Within two years of quitting, the risk of coronary heart disease is substantially reduced, and within 15 years the risk of CVD returns to that of a non-smoker.
Raised blood glucose (diabetes): Diabetes is defined as having a fasting plasma glucose value of 7.0 mmol/l (126 mg/dl) or higher.

In 2008, the global prevalence of diabetes was estimated to be 10 per cent and it was responsible for 1.3 million deaths globally. CVD accounts for about 60 per cent of all mortality in people with diabetes.

The risk of cardiovascular events is from two to three times higher in people with type 1 or type 2 diabetes and it is disproportionately higher in women, the risk increases with raised glucose values. Primary care access to measurement of blood glucose and cardiovascular risk assessment as well as essential medicines including insulin can improve health outcomes of people with diabetes.

Physical inactivity: Insufficient physical activity can be defined as less than five times 30 minutes of moderate activity per week, or less than three times 20 minutes of vigorous activity per week.

People who are insufficiently physically active have a 20 to 30 per cent increased risk of all cause mortality compared to those who engage in at least 30 minutes of moderate intensity physical activity most days of the week.

Cholesterol/lipids: Raised blood cholesterol increases the risk of heart disease and stroke.

Globally, one third of ischemic heart disease is attributable to high cholesterol. Lowering raised blood cholesterol reduces the risk of heart disease.
**Overweight and obesity:** Obesity is strongly related to major cardiovascular risk factors such as raised blood pressure, glucose intolerance, type 2 diabetes and dyslipidemia. To achieve optimal health, the median BMI for adult populations should be in the range of 21–23 kg/m², while the goal for individuals should be to maintain a BMI in the range of 18.5–24.9 kg/m². The prevalence of raised BMI increases with income level of countries.

**Non-modifiable risk factors:**

In addition to the modifiable risk factors, there are some risk factors that cannot be changed. However, people in these high-risk categories should receive regular check-ups.

**Age:** CVD becomes increasingly common with advancing age. As a person gets older, the heart undergoes subtle physiologic changes, even in the absence of disease. The heart muscle of the aged heart may relax less completely between beats, and as a result, the pumping chambers become stiffer and may work less efficiently. When a condition like CVD affects the heart, these age-related changes may compound the problem or its treatment.

**Sex:** A man is at greater risk of heart disease than a pre-menopausal woman. Once past the menopause, a woman’s risk is similar to a man’s. Risk of stroke, however, is similar for men and women.

**Family history:** A family’s history of CVD indicates a person’s risk. If a first-degree blood relative has had coronary heart disease or stroke before the age of 55 years (for a male relative) or 65 years (for a female relative), the risk increases(5).
**Justification**

Hypertension is one of the main killers in both developed and developing countries. High blood pressure is called the “silent killer” because it often has no warning signs or symptoms, many people do not realize that they have it and 30 per cent are still unaware they have hypertension; that is why it's important to get blood pressure checked regularly(3).

There is high risk of development of Heart disease (HD) among hypertensive patients. Few studies were done locally to assess the link between HTN and CVDs.

Current recommendations on the prevention of CV and coronary heart disease in clinical practice stress the need to base intervention on an assessment of the individual's total burden of risk rather than on the level of any particular risk factor. This is because most people who develop atherosclerotic cardiovascular disease have several risk factors which interact to produce their total risk (5). Many risk factors have been proposed as predictors of CHD(4), and the presence of each additional risk factor compounds the risk from hypertension(3).

Elevated blood pressure is at all ages a major risk factor for all clinical manifestations of atherosclerosis including CHD, brain infarction, peripheral artery disease, and heart failure. Hypertension increases the rate of atherosclerotic vascular disease two- to threefold.

Because the average blood pressure, blood lipid, and glucose levels at which most coronary events occur is rather modest, multivariable risk assessment to target a high-risk subset is required.
There is a clear and pressing need for clinicians to be able to estimate total risk of cardiovascular disease. Prevention of CHD by controlling CVD risk factors that accompany elevated blood pressure deserves a high priority because the risk of CVD in general, and of CHD (its most common hazard) is greatly influenced by the burden of associated risk factors(6).

Because CVD risk increases incrementally with the blood pressure (even within the high-normal range) and the fact that moderate blood pressure elevation is so much more prevalent than severe hypertension, a large fraction of the CVD attributable to hypertension derives from seemingly innocuous levels of blood pressure elevation. Its high prevalence, powerful impact and controllability give it a high priority for detection, risk stratification, and treatment(6).
Objectives of the study

General objective:
To assess cardiovascular disease risk factors among hypertensive patients in El shabarga H.C during April 2013.

Specific objectives:
- To calculate percentage of each CVD risk factor associated with hypertension.
- To classify patients to: low, moderate and high risk groups according to guidelines.
Chapter Two

Literature review

The relationship between blood pressure (BP) and risk of cardiovascular disease (CVD) events is continuous, consistent, and independent of other risk factors. The higher the BP, the greater is the chance of heart attack, heart failure, stroke, and kidney disease(3). Atherosclerotic CVD is the leading cause of death for both men and women in the United States. It is estimated that if all forms of major CVD were eliminated, life expectancy would rise by almost 7 years (4).

A group of doctors conducted a study in Miskolc, Hungary in 2005 for assessment of cardiovascular risk factors and their correlation in 28,000 Hungarians, aimed at assessing the prevalence and inter-relations of systolic hypertension, hypercholesterolemia and hyperglycemia.

They reported that; the occurrence of any of the investigated cardiovascular risk factors increased the likelihood of the other risk factors. A particularly high degree of comorbidity was found between hypertension and hyperglycemia.

Since these results were based on a large percentage of the population, this study provides an important message for practicing doctors: if they find any of these three risk factors in a patient, it is highly recommended that they should search for the others (7).
Larson, M. G., Conducted another study for assessment of cardiovascular risk factors in the elderly in 1995 showed the following results:

In elderly Framingham men and women, systolic blood pressure and cigarette smoking status, as well as a subject's age and sex, strongly influenced the risk of developing cardiovascular disease during ten years of follow-up. Systolic pressure measured ten years earlier also contributed to CVD risk, even after accounting for current level. Smoking was associated with a 64 per cent elevation in risk, male sex with a 51 per cent increase, and each 5 years increment in age with a 22 per cent increase. Body mass index measured 10 years ago had a modest association, but current body mass index did not. Among diabetic subjects, total serum cholesterol had an asymmetrical risk function, diabetes per se, however, was not significant in the final model. In non-diabetic subjects, there was little change in CVD risk up to the median cholesterol values and a modest increase thereafter(8).

In terms of attributable deaths, the leading CVD risk factor is raised blood pressure (to which 13 per cent of global deaths is attributed), followed by tobacco use (9 per cent), raised blood glucose (6 per cent), physical inactivity (6 per cent) and overweight and obesity (5 per cent)(5).

In 2008, the global prevalence of raised total cholesterol among adults was 39 per cent (37 per cent for males and 40 per cent for females), 34 per cent of adults over the age of 20 were overweight and 9.8 per cent of men and 13.8 per cent of women were obese, compared to 4.8 per cent for men and 7.9 per cent for women in 1980(5).

The prevalence of raised total cholesterol noticeably increases according to the income level of the country. In low-income countries,
around 25 per cent of adults have raised total cholesterol, while in high-income countries; over 50 per cent of adults have raised total cholesterol.

Insufficient physical activity is the fourth leading risk factor for mortality. Approximately 3.2 million deaths and 32.1 million disability-adjusted life year is a measure of overall disease burden expressed as the number of years lost due to ill-health, disability or early death (DALYs) representing about 2.1 per cent of global DALYs – each year) are attributable to insufficient physical activity.

Worldwide, at least 2.8 million people die each year as a result of being overweight or obese, and an estimated 35.8 million (2.3 per cent) of global (DALYs) are caused by overweight or obesity.

Overall, raised cholesterol is estimated to cause 2.6 million deaths (4.5 per cent of total) and 29.7 million DALYS, or 2 per cent of total DALYS globally (5).

It has also become clear that many CVDs with ultimate outcomes in adulthood actually have their origins during childhood, these include unhealthy behaviors (dietary imbalance, physical inactivity, smoking) and unhealthy risk factors (adverse blood lipids, high blood pressure, diabetes, obesity)(5).

A third study for assessment of Cardiovascular Risk in Seven Latin American Cities conducted by group of doctors in 2008 to assess the prevalence of cardiovascular risk factors in individuals living in major cities in 7 Latin American countries; Said that the overall prevalence rates (ranges across cities) were as follows: Hypertension: 18%, Hypercholesterolemia:14%, Diabetes: 7%, Obesity: 23% and Smoking: 30%(9).
American Heart Association (AHA) was charged with defining a new concept, *cardiovascular health*, and determining the metrics needed to monitor it over time. Ideal cardiovascular health, a concept well supported in the literature, is defined by the presence of both ideal *health behaviors* (nonsmoking, body mass index < 25 kg/m2 and physical activity at goal levels) and ideal *health factors* (untreated total cholesterol <200 mg/dl, untreated blood pressure < 120/80mmHg, and fasting blood glucose<100 mg/dl) (10).

A study for assessment of cardiovascular disease in the elderly done by Kannel, W. B. in 1992 reported that; the major risk factors apply in the elderly as well as the young, including hypertension, dyslipidemia, impaired glucose tolerance, physical indolence and cigarette smoking. These risk factors are highly prevalent in the elderly and are not inevitable consequences of aging and genetic makeup. With aging, there is a longer exposure to risk factors and diminished capacity to cope with them, resulting in a doubled incidence of cardiovascular sequelae at any level of risk factors compared with younger candidates for cardiovascular disease. The predisposing modifiable risk factors for coronary disease, stroke, cardiac failure, and peripheral arterial disease are virtually the same in younger and older candidates for cardiovascular disease. Multivariate cardiovascular risk profiles predict cardiovascular disease as efficiently in the elderly as in the young, there is also evidence that recurrent cardiovascular events are influenced by the same risk factors that predispose to initial events(11).

Another study about Prevalence, detection, and management of cardiovascular risk factors in different ethnic groups in south London was conducted to assess the prevalence of cardiovascular risk factors and their
level of detection and management in three ethnic groups as Population based survey during 1994 to 1996.

Its main outcome measures Age adjusted prevalence of hypertension, diabetes, obesity, raised serum cholesterol, and smoking, and it reported that ethnic minorities of both sexes had raised prevalence rates of hypertension and diabetes compared to white people.

Age and sex standardized prevalence ratios for hypertension was 2.6 % in people of African descent. For diabetes, the ratio was 2.7 % in people of African descent. Hypertension and diabetes were equally common among Caribbeans’s and West Africans. Prevalence of severe obesity was high overall, but particularly among women of African descent 40%. In contrast, raised serum cholesterol and smoking rates were higher among white people.

Hypertensive subjects of African descent appeared more likely to have been detected but less likely to be adequately managed.

Conclusion of this study told that: Hypertension and diabetes are raised two- to threefold in South Asians, Caribbeans’s, and West Africans in Britain. Detection, management, and control of hypertension have improved, but there are still differences between ethnic groups. Obesity is above the Health of the Nation targets in all ethnic groups, particularly in women of African descent(12).

The number of people at high risk from cardiovascular disease is increasing; recent cohort studies suggest that only 2%-7% of the general population have no risk factors at all, and >70% of at-risk individuals have multiple risk factors(3).
Chapter Three
Materials and Methods

Study design
This is a cross-sectional descriptive facility based study.

Study area
Catchment area of our health center includes Elshabarga, hillat Fadlalla and Eljemaiaab villages; Elshabarga village is 31 Kilometers east to Madani city.

Population of the catchment area are about 10,000 with only 315 registered as known hypertensive; a number which is far away from truth, this discrepancy could be due to either not all hypertensive patients are registered, some patients conduct follow-up outside the health center or even some are not discovered to be hypertensive yet.

Target group
This study targeted hypertensive patients; 18 years and older attended for follow-up at El shabarga H.C during April 2013.

Inclusion criteria:
Adult males and females with essential hypertension, those reside in El shabarga H.C catchment area and conduct follow-up in El shabarga H.C.

Exclusion criteria:
Pregnant ladies with hypertension.
Sample size

A comprehensive sample including all hypertensive patients attended to our H.C during April 2013.

Instruments and tools

A modified international checklist was used by the researcher with a scoring system (modified from ACSM’s Guidelines for Exercise Testing and Prescription. 6th Ed 2000)(13).

Data collection method

Data was collected over a period of one month: April 2013, during follow-up visits of hypertensive patients.

Patients were interviewed using a modified international checklist after their informed consent to take part in this study.

The checklist was filled by the researcher through using a clear Arabic Language, data was entered to checklist using English Language.

Variables in the checklist are:

- Demographic information: name, age, sex ….
- Family history of cardiovascular diseases: MI, coronary revascularization, or sudden death in an immediate relative; father, mother, sister or brother (male <55 years or female <65 years).
- Cigarette Smoking: Current smoker or those who quit within the past 6 months.
- Dyslipidemia: Total cholesterol >200 mg/dl, or any patient on lipid-lowering medication.
- Diabetes: Fasting blood glucose ≥ 126 mgs/dl or on treatment of diabetes.
- Obesity: BMI ≥ 30 kg/m2.
- Physical inactivity: Persons not participating in a regular exercise program or accumulating 30 minutes or more of moderate physical activity on most days of the week.

**Physical tests done**

- Blood pressure SBP (systolic blood pressure) and DBP (diastolic blood pressure) obtained with the subjects in the sitting position using mercury Sphygmomanometer.
- Body Mass Index (BMI): person's weight in kilograms divided by height in meters squared (BMI=kg/m2). Height was measured with shoes removed, using a stadiometer. Weight was measured with participants wearing light clothing without shoes. Subjects were considered to be of normal weight if their BMI was < 25 kg/m2, overweight if their BMI was 25-29.9 kg/m2 and obese if their BMI was 30 kg/m2 or over.

**The following lab tests** were done:

Blood samples were taken for fasting participants (not to eat or drink, except water, for at least 8 hours).

- Fasting blood glucose: normal <126 mg/dl. In Elshabarga H.C laboratory.
- Total cholesterol: normal <240mg/dl. In Elshaheed Elzubair centre.
Data analysis

Collected data from 158 participants was entered to the computer and Statistical Packages for Social Science (SPSS) was used to analyze data.

The study aimed at estimation of total cardiovascular risk rather than risk of coronary heart disease. By calculating total cardiovascular risk, we try to give a better estimate of risk and a better reflection of the health service implications of cardiovascular risk factors.

## Modified risk factors list:

<table>
<thead>
<tr>
<th>Risk Factors</th>
<th>Defining Criteria</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family history</td>
<td>MI, coronary revascularization, or sudden death in an immediate relative (male &lt;55 years or female &lt;65 years).</td>
<td>+1</td>
</tr>
<tr>
<td>Cigarette Smoking</td>
<td>Current smoker or those who quit within the past 6 months.</td>
<td>+1</td>
</tr>
<tr>
<td>Hypertension</td>
<td>SBP ≥140 mmHg or DBP ≥90 mmHg confirmed by measurements on at least two separate occasions, or on antihypertensive medication.</td>
<td>+1</td>
</tr>
<tr>
<td>Dyslipidemia</td>
<td>Total &gt;200 mg/dl or HDL &lt;40 mg/dl or LDL &gt;130 mg/dl; if LDL &gt;130 mg/dl, use LDL rather than total &gt;200 mg/dl.</td>
<td>+1</td>
</tr>
<tr>
<td>Diabetes</td>
<td>Fasting blood glucose ≥ 126 mg/dl confirmed on two separate occasions.</td>
<td>+1</td>
</tr>
<tr>
<td>Obesity</td>
<td>BMI ≥ 30.</td>
<td>+1</td>
</tr>
<tr>
<td>Physical inactivity</td>
<td>Persons not participating in a regular exercise program or accumulating 30 minutes or more of moderate physical activity on most days of the week.</td>
<td>+1</td>
</tr>
</tbody>
</table>

### Initial ACSM Risk Stratification:

- **Low Risk (younger):**
  - Men <45 years of age AND no more than one positive risk factor.
  - Women <55 years of age AND no more than one positive risk factor.

- **Moderate Risk (older):**
  - Men 45 or older.
  - Women 55 or older.
  - Those who meet the threshold for two or more positive risk factors.
High Risk:
- Cardiac, peripheral vascular or cerebrovascular disease.
- Chronic OPD, asthma, interstitial lung disease, or cystic fibrosis.
- Diabetes mellitus type 1 or 2, thyroid disorders, renal, or liver disease.

Those with one or more of the following signs or symptoms:
- Angina.
- Shortness of breath at rest or with mild exertion.
- Dizziness or syncope.
- Orthopnea or paroxysmal nocturnal dyspnea.
- Unusual fatigue or shortness of breath with usual activities.
- Ankle edema.
- Palpitations or tachycardia.
- Intermittent claudication.
- Known heart murmur(14).
Chapter Four

RESULTS

Table 1:
Shows sex distribution of hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Sex</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>108</td>
<td>68.4</td>
</tr>
<tr>
<td>Males</td>
<td>50</td>
<td>31.6</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 2:
Shows age distribution of hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Age</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male&lt;45 yrs</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>Males≥45 yrs</td>
<td>48</td>
<td>30.4</td>
</tr>
<tr>
<td>Females&lt;55yrs</td>
<td>29</td>
<td>18.4</td>
</tr>
<tr>
<td>Females≥55yrs</td>
<td>78</td>
<td>49.4</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 3:
Shows distribution of FH of HD in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>FH of HD</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>141</td>
<td>89.2</td>
</tr>
<tr>
<td>Yes</td>
<td>17</td>
<td>10.8</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 4:
Shows distribution of smoking in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Smoking</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>155</td>
<td>98.1</td>
</tr>
<tr>
<td>Yes</td>
<td>3</td>
<td>1.9</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 5:

Shows prevalence of DM in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>DM</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>111</td>
<td>70.3</td>
</tr>
<tr>
<td>Yes</td>
<td>47</td>
<td>29.7</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 6:

Shows occurrence of obesity in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Obesity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>98</td>
<td>62.0</td>
</tr>
<tr>
<td>Yes</td>
<td>60</td>
<td>38.0</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 7:

Shows presence of activity in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>145</td>
<td>91.8</td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>8.2</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 8:

Shows occurrence of HD in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>HD</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>144</td>
<td>91.1</td>
</tr>
<tr>
<td>Yes</td>
<td>14</td>
<td>8.9</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 9:
Shows occurrence of CVA in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>CVA</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>151</td>
<td>95.6</td>
</tr>
<tr>
<td>Yes</td>
<td>7</td>
<td>4.4</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 10:
Shows presence of dyslipidemia in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Dyslipidemia</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>116</td>
<td>73.4</td>
</tr>
<tr>
<td>Yes</td>
<td>42</td>
<td>26.6</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>
Table 11:

Shows presence of symptoms and signs of HD in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Symptoms and Signs</th>
<th>Frequency</th>
<th>Percent</th>
</tr>
</thead>
<tbody>
<tr>
<td>No</td>
<td>145</td>
<td>91.8</td>
</tr>
<tr>
<td>Yes</td>
<td>13</td>
<td>8.2</td>
</tr>
<tr>
<td>Total</td>
<td>158</td>
<td>100.0</td>
</tr>
</tbody>
</table>

Table 12:

Shows presence of physical activity according to age and sex in hypertensive patients in Elshabarga HC:

<table>
<thead>
<tr>
<th>Age</th>
<th>Activity</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>absence</td>
<td>presence</td>
</tr>
<tr>
<td>Male&lt;45 yrs</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Males≥45 yrs</td>
<td>36</td>
<td>12</td>
</tr>
<tr>
<td>Females&lt;55yrs</td>
<td>29</td>
<td>0</td>
</tr>
<tr>
<td>Females≥55yrs</td>
<td>77</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>145</td>
<td>13</td>
</tr>
</tbody>
</table>
Chapter Five

Discussion

The majority of participants in this study are females (table: 1) as they form the greater part of the population worldwide and not only in Sudan. Most males are > 45 years old and most females are >55 years old (table: 2), a result which puts the majority of patients in moderate or high risk groups.

This classification of patients to these risk groups is supported by (table: 12) which tells that all males who are < 45 years old and all females who are < 55 years old are physically inactive according to the criteria of advised physical activity, so instead of being in the low risk group according to their ages; they are physically inactive, adding other risk factor to hypertension and moving to the moderate risk group. Physical inactivity is an important contributor to coronary heart disease. Cardiovascular benefits of regular physical activity include reduced blood pressure and less likelihood of obesity, which help to reduce the risk of developing CHD(15).

Obesity is highly prevalent, mimicking that of developed countries and rings a bell for an emerging significant CVD risk factor, associated with and implemented in most serious complications of HTN (table: 6). It was found to be 20% among population in a study conducted for assessment of Cardiovascular Risk in Seven Latin American Cities (9). Obesity was observed in 41.3% of the population and in 57.7% of the females in a study for assessment of Cardiovascular Risk Factors in a Rural Community in the Brazilian State of Bahia(12).

Being overweight increases the chance of having a heart attack. This is in part because obese individuals are more likely to have high blood
pressure, diabetes and high blood fats. Less fat and sugar in the diet is helpful for weight control. In order to achieve a healthy body weight it is also important to build regular, moderate exercise into a daily routine(15).

**Dyslipidemia** is an important hidden risk factor which is present in a wonderful manner among study group( table: 10), while in the same former study hypercholesterolemia was 18%(9); 20% of the individuals had cholesterol levels >240 mg/dl in the Brazilian study(11), results which are not far from that of our study population.

This can be due to our new way of urban life pattern like preferring quick meals and more sedentary life with less walking and more vehicles use.

**DM** is present in more than one quarter of patients, which alone puts the patient in high risk group.

Having diabetes puts people with the condition at a much higher risk of CHD. People with diabetes have a two to five fold risk of developing heart disease and have the same risk of developing heart disease as a person who has had a heart attack but who doesn’t have diabetes(15).

Any patient with history of HD, CVA or Symptoms and signs of CVD will be classified as a high risk patient; they are not that prevalent as other CVD risk factors, (table: 8, 9, and 11). But this is against the real situation as the picture of risk factors among study population suggests the presence of higher percentages of complications, this disproportion can be explained by the fact that most patients with complications conduct follow-up in hospitals with secondary or tertiary levels and some do that in private clinics.

**Smoking** appears as the least risk factor among study group, which adds to their health a good protective behavior.
Cigarette smoking, even a few a day, increases the risk of heart disease; it can also cause cancer of the lungs and other organs, lung failure, stroke and gangrene. There are thus many health benefits from being a non-smoker. Even after having smoked for many years, stopping smoking now will reduce CHD risk(15).

FH of HD added to the risk score of some patients represented a small but noticeable percent of study group (table: 3).

Patients at high risk group are 57 patients forming 36% of study population and the remaining 101 patients represent 64% who are in the moderate risk group, so no patient in this study group is of low risk, an alarming results reflecting the need to develop urgent and effective methods for screening, reduction and management of modifiable CVD risk factors, with HTN in the top of the list.

A study for assessment of Cardiovascular Risk Factors in a Rural Community in the Brazilian State of Bahia reported that: 39.7% had a high-risk score(11), this result ensures that we are approaching international ranges of CVD risk factors despite our far economic levels and abilities to cope with cost of management and complications.
Chapter Six

Conclusion

- 36% of patients in this study are in high risk group.
- 64% of patients in this study are in moderate risk group.
- No patient in this study fulfills criteria of low risk group.
- Females form two thirds of the study population.
- DM is present in more than one quarter of patients, carrying it's all risks and complications even when considered separately from HTN.
- Prevalence of Hypercholesterolemia and Obesity approaches that of international ranges.
- Patient’s history of CVA, HD or symptoms and signs of CVD is not that prevalent, a questionable result.
- Smoking is the least of all CVD risk factors; adding good protective behavior to nonsmokers.
- Physical inactivity in the other hand made a lot of patients to be in the worse risk group, as all patients are hypertensive and any additional risk factor will move them easily from low to moderate or from moderate to high risk group.
  It is difficult but important for all patients to have regular exercise program starting and building up gradually.
- FH of HD participated to change the score of some patients; modifying their classification from better group to worse one.
**Recommendations**

1. Patients in high risk group need vigorous efforts to control their modifiable risk factors, prevent occurrence of complications if they haven’t occurred yet and management of them if present; aiming at moving patients from this risk group to better ones whenever it is possible.

2. Patients in moderate risk group need the same efforts to be screened for hidden risk factors, to prevent worsening of their scores and help in its improvement.

3. Adherence to guidelines in management of HTN and DM to achieve optimal results in control of these chronic diseases, and to reduce occurrence of their complications.

4. Patient education about the nature of the disease, importance of good compliance to treatment, and complications that can occur as a result of poor compliance or ignorance of the disease.

5. Patient education about importance of lifestyle modification by joining regular exercise program as described and having healthy diet.

6. Obese patients have to reduce their weights gradually by different methods as regular exercise and healthy diet.

7. Smokers should be advised to quit smoking; giving them the hope of returning as non smokers after a defined period of quitting smoking.
References:


14- ACSM-CAD-Risk-Factor-Chart_2.pdf.