Deanship of Graduate Studies

Al-Quds university

RISK FACTORS OF CORONARY ARTERY DISEASE IN PATIENTS UNDERGOING CARDIAC CATHETERIZATION IN GAZA GOVERNORATES: CASE-CONTROL STUDY

Mohammed N. Mushtaha

M.P.H Thesis

Gaza Strip-Palestine

1431/2010

RISK FACTORS OF CORONARY ARTERY DISEASE IN PATIENTS UNDERGOING CARDIAC CATHETERIZATION IN GAZA GOVERNORATES: CASE-CONTROL STUDY

Prepared by:

Mohammed Naeem Mushtaha
B.S.N Islamic University- Palestine

Supervisor: Dr. Ashraf Y. Eljedi
Assist. Prof. in International Public Health

A thesis Submitted in Partial Fulfillment of Requirement for the Degree of Master of Public Health- School of Public Health- Al-Quds University

1431/2010

Al Quds University
Deanship of Graduate Studies
School of Public Health

Thesis Approval

RISK FACTORS OF CORONARY ARTERY DISEASE IN PATIENTS UNDERGOING CARDIAC CATHETERIZATION IN GAZA GOVERNORATES: CASE-CONTROL STUDY

Prepared By: Mohammed Naeem Mushtaha
Registration No.: 20714181

Supervisor: Assist. Prof. Dr. Ashraf Eljedi

Master thesis submitted and accepted: Date: 9/01/2010
The names and signatures of the examining committee members are as follows:

1-Head of Committee: Dr. Ashraf Eljedi Signature .....
2-Internal Examiner : Dr. Yehia Abed Signature .....
3-External Examiner: Dr. Mohammed Habib Signature .....

Jerusalem- Palestine

1431 / 2010

Dedication

To my mother and my father who taught us how to give… to the martyr wajeeh…..

To my wife who supported me on the front line wholeheartedly…..

To my kids Roaa, Baraa, Naeim, and myar who taught us patience and love…..

To my brothers who spared no effort to help…

To my uncle Ahmed and his wife…. To "Nedal, Abass, Mahmoud" and all my friends …..

To all of them I dedicate this work

Mohammed Naeem Mushtaha

Declaration:

I certify that this thesis submitted for the degree of master, is the result of my own research, except where otherwise acknowledged, and that this study (or any part of the same) hasn't been submitted for a higher degree to any other university or institution.

Signed:----------

Mohammed N. Mushtaha

Date:24/1/2010

Acknowledgments

Many individuals contribute to the completion of a successful work, including the creation of this dissertation. Different members brought different gifts, experiences, and expertise to the work completion of this study.

I wish to thank all who made this work possible. The list of individuals who have provided support, advice, and time and impressive. Although I am not able to adequately recognize all on that list, I would like to acknowledge few of these individuals.

I would like to express my gratitude to my supervisor Assist. Prof. Dr. Ashraf Eljedi, Prof. Dr yehia Abed, , Dr. Bassam Abu Hamad, al Quds university teams and Mr. Atta Elgazzar, Mr. Haroon Bhar for their support, patience, special insights and encouragement throughout my research. It is not often that one finds advisors who always find the time for listening to the little problem and roadblocks that unavoidably crop up in the course of performing research.

I am very much thankful to the officials of the Palestinian Ministry of Health, General directorates of human resources and development, al-Quds company for human resources and development, directorates of European-Gaza hospital, directorate of Julis center, directorates of Eldorra hospital for their cooperation and assistance in data collection, and special thanks for team of pediatric intensive care unit for their support and patience.

To all of these individuals and institutions I owe many thanks for their insights and unlimited support

Abstract

Globally, Coronary Artery Diseases (CAD) represent the number one cause of death among adults; more people die annually from CAD than from any other cause. In Palestine, death from CAD is the leading cause of mortality among adults.

This study aims to identify risk factors that may lead to CAD in Gaza Governorates, which in turn may contribute to the preparation of preventive programs to decrease mortality and morbidity from CAD. The design of the study is analytical case-control one, which is a practical and economical design for studying risk factors. The researcher interviewed randomly selected 200 participants (100 cases and 100 controls) from the two Cardiac Catheterization Centers available in Gaza. Subjects of this study were distributed among the five Gaza Governorates, taking into account the sex. The entire selected subjects had positively responded (100% response rate).

The study found that there are statistically significant differences between cases and controls (at 0.05% significance level) concluding that, age above 50 years, lack of physical activity, diabetes mellitus, hypertension, high Low Density Lipoprotein, low High Density Lipoprotein (the result was taken from the patients files), and smoking are risky factors for developing CAD. Similarly, the presence of family history, number of pregnancies regardless of its success or failure, living in extended families for long periods are also risky for CAD. In contrary, marriage twice, was a preventive factor for CAD. On the other hand, Body Mass Index, level of education and income did not show statistically significant differences between cases and controls.

Results highlighted some serious issues that need intensive programs such as public encouragement to exercise and to clarify its benefits through awareness programs at various levels. The development of programs to reduce smoking, and encouraging the use of family planning is essential. Clients with the identified risk factors need more attentions and follow up to reduce the chance of the development of CAD.

Table of Contents

List of Tables

List of Figures

List of Appendices

Abbreviation	Full Name
BMI	Body Mass Index
CAD	Coronary Artery Disease
CDC	Central of Disease Control and Prevention
CHD	Coronary Heart Disease
CI	Confidence Interval
CTCA	Computed Tomography Coronary Angiography
CVD	Cardiovascular Disease
EGH	European Gaza Hospital
EU	European Union
GAR	Global Assessment Risk
GNP	Gross National Product
HDL	High Density Lipoprotein
IHD	Ischemic Heart Disease
LDL	Low Density Lipoprotein
MOH	Ministry of Health
MONICA	Multinational MONItoring of trends and determinants in CArdiovascular disease
OR	Odds Ratio
RFs	Risk factors
SD	Standard deviation
SCORE	Systematic Coronary Risk Evaluation
SPSS	Statistical package for social science program
WHO	World Health Organization

Chapter I

Introduction

Cardiovascular disease (CVD) is considered the first leading cause of death in the world. Yet, CVD now accounts for nearly 30% of deaths globally (Anderson, 2007).

CVDs are the number one cause of death globally; more people die annually from CVDs than from any other cause. According to world health organization (WHO), about 17.5 million people died from CVDs in 2005, representing 30% of all global deaths. Of these deaths, an estimated 7.6 million were due to coronary heart disease and 5.7 million were due to stroke. Over 80% of CVDs deaths take place in low- and middle-income countries and occur almost equally in men and women. By 2015, almost 20 million people will die from CVDs, mainly from heart disease and stroke. These are projected to remain the single leading causes of death (WHO, 2004).

According to National Health and Nutrition Examination Survey (NHANES), final 2004 statistics for the United States show that coronary heart disease (CHD) is the single leading cause of death in America. Mortality: 451,326 deaths in the United States in 2004 (one of every five deaths), Prevalence: 16,000,000 victims of angina pectoris, heart attack and other forms of CHD are still living (8,700,000 males and 7,300,000 females), Incidence: 1,200,000 new and recurrent coronary attacks per year. About 38 percent of people who experience a coronary attack in a given year die from it (NHANES, 1999-2004).

In Palestine, CVDs, principally heart disease, is the first leading cause of death among Palestinians in 2005. According to the Ministry of Health (MOH), about 3.799 persons died from CVD (1.956 males and 1.843 females), with proportion of 36.7% of total deaths,

with a rate of 101/100,000 population. Mortality among males was higher than females (51.5% in males Vs 48.5% in females) (Palestine, MOH, 2005).

Leeder et al, (2004), highlights the economic impact of CVD in developing economies, which arises largely because working-age adults account for a high proportion of the CVD burden. Conservative estimates in Brazil, China, India, Mexico, and South Africa indicate that each year at least 21 million years of future productive life are lost because of CVD. In South Africa, for example, costs for the direct treatment of CVD were equivalent to 2 to 3 percent of gross domestic product, or roughly 25 percent of all health care expenditures (Pestana, et al, 1996).

Current expenditures in developed countries are indicators of possible future expenditure in developing countries. For example, (Hodgson et al., 2001) estimated that in 2003 the direct and indirect costs of CVD in the United States would amount to US$350 billion. They also estimated that in 1998 Americans spent US$109 billion on hypertension, equivalent to about 13 percent of the health care budget.

Murray and Lopez, (1996) predicted that CVD will be the leading cause of death and disability worldwide by 2020 mainly because it will increase in low- and middle-income countries.

By 2001, CVD had become the leading cause of death in the developing world, as it has been in the developed world since the mid 1900s. Nearly 50 percent of all deaths in high-income countries and about 28 percent of deaths in low- and middle-income countries are the result of CVD (Mathers et al, 2001).

Because of limited study conducted to investigate risk factors of coronary artery disease (CAD) in Gaza strip we hope that this study will be considered as a motivation to promote evidence-based diagnosis and management guideline of CAD suitable for local situation

which will help to decrease in mortality and morbidity and to help primary and secondary health care providers in the early detection of CAD.

1.1 Purpose of the study

The overall purpose of the study is to investigate the common risk factors that related to development of CAD among adults in Gaza strip, that help in developing primary health program to prevent most modifiable risk factors, then decreasing the mortality and morbidity.

1.2 Objectives

2 To study the relationship between CAD and hypertension, diabetes, obesity, smoking, and low physical activity.

3 To investigate the relationship between low density lipoprotein (LDL), high density lipoprotein (HDL) and CAD.

4 To investigate the relationship between CAD and some demographic factors as residential area, low income, diet lifestyle, family conflict, early marriage, educational level, and number of pregnancies.

5 To provide recommendations that help to decrease the risk factors and thus decrease mortality and morbidity of CAD.

1.3 Problem statement

Worldwide, CVD become the first leading cause of death. CAD is the first leading cause of death among Palestinians in 2005, many risk factors of CVD can be modifiable if known and detected. In addition to known risk factors of CVD, we will explore other risk factors

of CVD that distinguishes Gaza Strip from other country and we hope the result of this study will help directly or indirectly in decreasing of mortality rate of CVDs.

1.4 Justification of the problem

Many studies conducted searching about risk factors of coronary heart disease concentrating about modifiable and non modifiable risk factors, but only one of them was conducted in Gaza strip in 2000. This study was not followed by any other studies to confirm or even to follow up these results.

In addition to that, there are some risk factors for many health problems distinguishing Gaza strip from other country as (bad housing, low income, bad nutrition, psychological stress, relative deaths from Israeli aggression, unemployment, residential area, arrest, family conflict, early marriage, and multiple pregnancies).

1.5 Background of the study

1.5.1 Demography and Population of Palestine:

The total area is 6,257 sq. Km. (UNEP, 2003) with total population living in is 3,762,005 individuals in 2005 with capita per sq Km 625 (Palestine, MOH, 2005).

Gaza strip is a narrow piece of land lying on the coast of the Mediterranean Sea. Its position on the crossroads from Africa to Asia made it a target for occupiers and conquerors over the centuries. The last of these was Israel who occupied the Gaza strip from Egyptians in 1967. Gaza Strip is very crowded place with area 378 sq. Km.(UNEP, 2003). and constitutes 6.1% of total area of Palestinian territory land. In mid year of 2005 the population number is to be 1,389,789 mainly concentrated in the cities, small village, and eight refugee camps that contain two thirds of the population of Gaza Strip. In Gaza Strip, the population density is 3,808 inhabitants/km (Palestine, MOH, 2005).

1.5.2 Palestinian economy:

The World Bank stated that the Gross National Product (GNP) in Palestine has been subjected to high fluctuations during the last five years. GNP was 5,454 million US$ in 1999 and decreased to 4,169 million US$ in 2005. Gross Domestic Production (GDP) was 4,517 million US$ in 1999 and decreased to 3,832 million US$ in 2005. Gross National production per capita (GNP/capita) was 1,806 US$ in 1999 and decreased to 1,039 US$ in 2005. Gross Domestic Production per capita (GDP/capita) was 1,496 US$ in 1999 and decreased to 955 US$ in 2005.

The number of workers in Israel decreased from 135,000 in 1999 to 36,000 in 2005. The workers in Palestine also decreased from 453,000 in 1999 to 135,000 in 2005. The World Bank reported that the unemployment rate was 32%. This revealed sharply increasing of unemployment rate from11.8% in 1999 to 32% and the poverty rate in Palestine was 44% in 2005. This situation is a result of Israeli enforced restriction on Palestinian movement, military operations, land confiscation and leveling and the construction of Barrier in addition to other escalating activities imposed on Palestinian people (Palestine, MOH, 2005).

1.5.3. Health services:

Three main health providers offer health service in Gaza strip, UNRWA, NGOs/private and the Ministry of Health. MOH bears the heaviest burden, as it takes over the responsibility in Gaza strip for 36 primary health care centers, 11 hospitals and one rehabilitation center.

1.5.3.1. European- Gaza hospital:

European Gaza Hospital (EGH) is considered one of the advanced medical Centers in the Palestine, located In Khan younis Governorate at the southern. The hospital project contains facilities for a full range of secondary, primary and planned tertiary patient care services for both inpatients and outpatients. The services of the 240 bed Center are at a high level of professional standards. EGH includes within its large margins, medical, surgical, orthopedic, cardiology, urology, cardiac catheterization, pediatrics, radiology, occupational health, pediatrics oncology, pediatrics hematology, adult oncology, ENT & Audiometric Surgery, Anesthesia and ICU (adult & pediatrics). Some patients may refer from khan younis to other hospital to receive medical and surgical care that don't provided in there (MOH, 2009).

1.5.3.2.Julis center for cardiac catheterization:

Jules Center is a private institution, the first one emerged in the Gaza Strip, which provides cardiac catheterization services, located in the north of Gaza City - Al-Nasr street, the Center contains 8 beds including two intensive care, the Center holds a license from the Palestinian Ministry of Health and receive cases transferred from it and others .The center started in 2004 until now.

1.6 Operational definitions

Risk factor: A risk factor is a variable associated with an increased risk of disease. Risk factors are correlational and not necessarily causal, because correlation does not imply causation . Risk factors in this study are smoking, hypertension, diabetes, LDL, HDL, low income, residential area, low level of education, low physical activity, and psychological stress.

A smoker: a smoker can be defined as someone who, at the time of survey, smokes any type of tobacco product daily or occasionally .

Physical inactivity: physical inactivity could be defined as, no reported exercise, recreation, or physical activities(other than regular job duties) during the previous 2 month-prior cardiac catheterization .

Obesity: WHO defined obesity as body mass index {BMI=weight (kg)/height (m2)} equal to and greater than 30kg/m2 .

Cardiac Catheterization: Cardiac catheterization a procedure done for many purpose, one of them to check coronary artery blood flow.

Coronary artery disease: any patients done cardiac catheterization for intervention and done cardiac catheterization then referred to do CABG, all of these are reported by cardiologist in the hospital patients files.

Physical activity: reported exercise, recreation, or physical activities(other than regular job duties) during the previous 2 month-prior cardiac catheterization .

Family history: the participant in the study had one or more first degree coronary artery disease for female <55 years and for male<65years.

Hypertension: the participant in the study take one or more type of hypertension drug prior cardiac catheterization.

Extended family: mother and or father – father and or mother – sharing with one lounge and one kitchen.

Low level of education: Is the level participating in the study so that the level of no more than high school.

High level of education: : Is the level participating in the study so that the level of more than bachelor degree.

Medium level of education: : Is the level participating in the study so that the level of more high school and less than or equal bachelor degree.

Diabetes mellitus: the participant in the study take one or more type of diabetes drug prior cardiac catheterization.

Early marriage: according to many of literatures for females or males who marriage under 19 years.

Multiple pregnancy: the definition which the researcher adopted that any female prior cardiac catheterization had number of pregnancies regardless of success or failure

Low density lipoprotein(LDL): test done prior cardiac catheterization and recorded in the patients files, more than 120mg/dl suggested high LDL

High density lipoprotein(HDL): test done prior cardiac catheterization and recorded in the patients files, less than 35mg/dl suggested low HDL

Chapter II

Literature Review

Because this study is the first one to investigate CAD risk factors in patients undergoing cardiac catheterization in Gaza strip, this chapter review the available literature about CAD including, CAD definition, nature of the problem, magnitude of the problem (Globally, Eastern Mediterranean, and locally), prevalence of risk factors, risk factors, and prevention.

Figure 1: Conceptual Framework

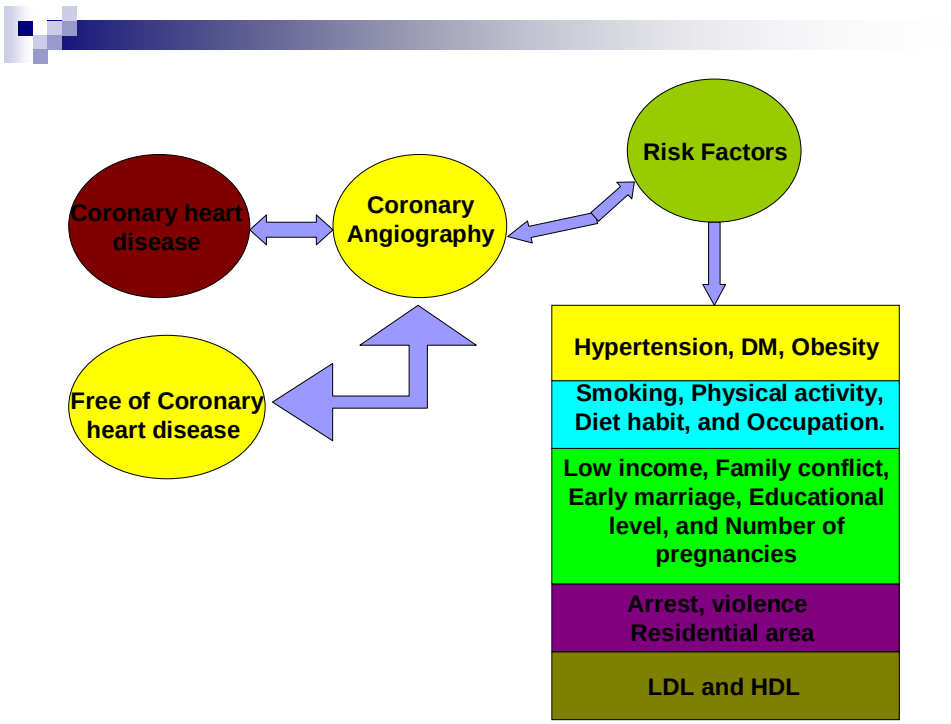


Figure 1: Conceptual Framework

2.1 Conceptual Framework

The theoretical framework for this study was developed by the researcher as described above in figure 1. When the patient goes to do coronary angiography, the patient was referred by a cardiologist based on the clinical evaluation or the presence of one or more risk factors in the patient. After referring the patient to Julis center cardiac catheterization, or to the EGH to do diagnostic cardiac catheterization, the results may actually had CAD or may be free of CAD (normal Angiography), according to the final medical diagnoses in the patient file. The researcher was looking forward to some risk factors as explained in the above figure 1. The main risk factors were history of disease as hypertension, and DM. The second section of risk factors which the investigator investigated were patient lifestyle including smoking, physical activity, diet habit, and occupation. The third section is some of demographic factors as low income, family conflict, early marriage, educational level, and number of pregnancies. The last section was political one which concentrate on if there is risk factors that maybe related to CAD as arrest by Israeli occupation army, residential area faced recurrent invasion by Israeli occupation army and stress in general caused by Israeli occupation army.

2.2 Coronary artery disease definition

Coronary artery disease is a narrowing or blockage of the arteries and vessels that provide oxygen and nutrients to the heart. It is caused by atherosclerosis, an accumulation of fatty materials on the inner linings of arteries. The resulting blockage restricts blood flow to the heart. When the blood flow is completely cut off, the result is a heart attack. Heart disease is a broad term that includes several more specific heart conditions. The most common heart condition in the United States is coronary heart disease (CHD), which can lead to heart attack and other serious conditions. CAD also called CHD is the most common type

of heart disease. CAD occurs when the coronary arteries, that supply blood to the heart muscle, become hardened and narrowed due to the plaque buildup. The plaque buildup and the narrowing and hardening of the arteries is called atherosclerosis. Plaques are a mixture of fatty substances including cholesterol and other lipids. Blood flow and oxygen supply to the heart can be reduced or even fully blocked with a growing plaque. Plaques may also rupture and cause blood clots that block arteries (CDC, 2009).

2.3 Nature of the problem

CHD can lead to a heart attack. Angina can also occur. Angina is chest pain or discomfort that occurs when the heart muscle is not getting enough blood. Over time, CHD can weaken the heart muscle and lead to heart failure, a serious problem where the heart cannot pump blood the way that it should. Also, irregular heart beats, called arrhythmias, can develop. The most common symptom of CHD is angina. In some people the first sign of CHD is a heart attack. Doctors can assess a patient's risk status by checking several factors, including blood pressure, blood cholesterol and glucose, history of heart disease, and other factors. Doctors can perform several tests to assess CHD in patients who are at high risk or have symptoms. These may include one or more of these tests:

- ECG or EKG (electrocardiogram), which measures the electrical function and the rate and regularity of your heartbeat.
- Echocardiogram, which creates a picture of the heart.
- Exercise stress test, to measure how well the heart pumps at greater than usual workloads when it needs more oxygen.
- Chest x–ray, a picture of the organs and structures inside the chest.
- Cardiac catheterization, a thin, flexible tube is passed through an artery in the groin or arm to reach the coronary arteries. The tube lets your doctor check the inside the

arteries to see if there is any blockage. The doctor also can measure the pressure and blood flow in the heart's chambers, collect blood samples from the heart, and examine the arteries of the heart by x–ray.

Coronary angiography is usually performed along with cardiac catheterization. A dye is injected through the catheter into the coronary arteries. The doctor can then take an x–ray to see the flow of blood through the heart and check for blockages (CDC, 2009).

2.4 Magnitude of the problem

Worldwide, CAD killed more than 7.6 million people in 2005 (WHO, 2008). In 2003, approximately 37% of adults reported having two or more of six risk factors for heart disease and stroke (high blood pressure, high cholesterol, diabetes, current smoking, physical inactivity, and obesity)(Hayes et al, 2005). Percentage of persons aged 20 years and older with hypertension or taking hypertension medications: 32.1% Percentage of persons aged 20 years and older with high blood cholesterol: 16.9% Percentage of persons aged 20 years and older with physician-diagnosed diabetes: 10.0% Percentage of persons aged 20 years and older who are obese: 32.0% Percentage of adults aged 18 years and older who are current cigarette smokers (2004-2006): 18.4% Percentage of adults aged 18 years and older who engage in no leisure-time physical activity . In 2009, heart disease is projected to cost more than $304.6 billion, including health care services, medications, and lost productivity (American Heart Association, 2009).

2.5 Economic impact

Heart disease and stroke – cardiovascular disease – are expensive for the world. In 2003, CVD cost the European Union €169 billion (Leal et al, 2006).

The most up to date data from the United States of America shows that CVD costs nearly €310.23 billion in direct and indirect annual costs. By comparison, the estimated cost of all cancers is €146.19 billion and HIV infections, €22.24 billion (Haase et al, 2006).

The economic burden of heart disease is no longer confined to the affluent, industrialized world. With the exception of sub-Saharan Africa, CVD is the leading cause of death in the developing world. Its rise is linked to the increase in prevalence of risk factors such as tobacco use and relative lack of access to interventions to managing the ensuing disease. The economic impact is felt both as a cost to the country's health system as well as the loss of income and production of those affected either directly by the disease or as caregivers to those with cardiovascular disease, who cease to work. This is exacerbated in the developing world where CVD affects a high proportion of working-age adults. In China, annual direct costs are estimated at €30.76 billion or 4% percent of gross national income (Gaziano, 2007). In South Africa, 25% of the country's health care spending is devoted to CVD. This has led researchers to claim that if the global epidemic of heart disease continues it will have an impact on the viability of a number of countries' economies. Already, researchers estimate that between the developing economies of Brazil, India, China, South Africa, and Mexico, 21 million years of future productive life are lost each year because of CVD (The Center for Global Health and Economic Development, 2004).

2.6 Globally (International Cardiovascular Disease Statistics)

According to World Health Organization (WHO) fact sheet in 2007, CVDs are the number one cause of death **globally**: more people die annually from CVDs than from any other cause; An estimated 17.5 million people died from CVDs in 2005, representing 30% of all global deaths. Of these deaths, an estimated 7.6 million were due to CAD and 5.7 million were due to stroke. Over 80% of CVD deaths take place in low- and middle-income

countries and occur almost equally in men and women; By 2015, almost 20 million people will die from CVDs, mainly from heart disease and stroke. These are projected to remain the single leading causes of death. (WHO, 2007). CVDs affect many people in middle age, very often severely limiting the income and savings of affected individuals and their families. Lost earnings and out of pocket health care payments undermine the socioeconomic development of communities and nations. CVDs place a heavy burden on the economies of countries. For example, it is estimated that over the next 10 years (2006-2015), China will lose $558 billion in foregone national income due to the combination of heart disease, stroke and diabetes. Lower socioeconomic groups in high income countries generally have a greater prevalence of risks factors, diseases and mortality,. A similar pattern is emerging as the CVD epidemic evolves in low and middle income countries (WHO, 2007). CVD accounted for almost 198,000 deaths in the **United Kingdom** (UK) in 2006. Thirty-five percent of deaths were from CVD; 30 percent of premature deaths in men and 22 percent in women were from CVD. Each year CVD causes over 4.3 million deaths in Europe and over 2 million deaths in the **European Union** (EU). CVD causes 48 percent of all deaths in Europe and in the EU (42 percent) (British Heart Foundation., 2008) . Every 7 minutes in **Canada**, someone dies from heart disease or stroke. Cardiovascular disease (heart disease, diseases of the blood vessels and stroke) accounts for the death of more Canadians than any other disease. In 2005 CVD accounted for: 31% of all deaths in Canada (71,338 deaths – or more than 71,000) , 30% of all male deaths, 31% of all female deaths (Heart and Stroke Foundation of Canada , 2009).

Estimates for the year 2006 are that 80,000,000 people in the **United States** have one or more forms of cardiovascular disease. Coronary heart disease caused 445,687 deaths in 2005 and is the single leading cause of death in **America** today. In 2005, coronary heart disease death rates per 100,000 people were 187.7 for white males and 213.9 for black

males; and 110.0 for white females and 140.9 for black females (Death rates are per 100,000 population. The rates use the year 2000 standard population for age adjustment) (American Heart Association, 2009).

The latest available data from the WHO- MONICA (Multinational MONItoring of trends and determinants in CArdiovascular disease) Project indicate that the coronary event rate (per 100,000) in men was highest in Finland (North Karelia, 835) and lowest in China (Beijing, 81). For women the highest event rate was in the United Kingdom (UK) (Glasgow, Scotland, 265) and the lowest in Spain (Catalonia, 35) and China (Beijing, 35).

These data represent results from 35 MONICA Project populations collected during the mid-1980s until the mid-1990s (WHO, 2002).

2.7 Eastern Mediterranean (Bahrain, Cyprus, Egypt, Iran, Iraq, Jordan, Kuwait, Oman, Qatar and the United Arab Emirates).

CVD are emerging as a major health problem in the Eastern Mediterranean Region. The proportion of deaths from CVD ranges from 25 to 45%. Coronary heart disease seems to be the predominant type of cardiomyopathy encountered in many countries, and hospital data indicate rising trends. Several countries have experienced rapid socioeconomic changes over the last two decades. Daily caloric intake has increased. Among many Saudi Arabians aged 18 to 74 years, 51.5% of males and 65.4% of females were obese. A high prevalence of smoking (>70%) has been reported among patients having acute myocardial infarction. Hypertension is found in 22-47% of cases and diabetes in over 30%. High blood pressure (160/95) has been reported to have prevalence rates between 10% and over 17% of the adult population. The prevalence of hypertension appears to be increased (Heart Encyclopedia, 1990).

2.8 Locally

In Palestine, CVDs principally heart disease, is the first leading cause of death among Palestinians in 2005. According to the Ministry of Health (MOH), about 3.799 persons died from cardiovascular disease (1.956 males and 1.843 females), with proportion of 36.7% of total deaths, with a rate of 101/100,000 population. Mortality among males was higher than females (51.5% in males Vs 48.5% in females) (Palestine, MOH, 2005).

2.9 Prevalence of Risk Factors

International:

A study conducted to determine whether atherosclerosis risk factor prevalence and treatment would demonstrate comparable patterns in many countries around the world. The result shown that A therothrombotic patients throughout the world had similar risk factor profiles: a high proportion with hypertension (81.8%), hypercholesterolemia (72.4%), and diabetes (44.3%). The prevalence of overweight (39.8%), obesity (26.6%), and morbid obesity (3.6%) were similar in most geographic locales, but was highest in North America (overweight: 37.1%, obese: 36.5%, and morbidly obese: 5.8%; $P<.001$ vs. other regions). Patients were generally under treated with statins (69.4% overall; range: 56.4% for cerebrovascular disease to 76.2% for CAD), antiplatelet agents (78.6% overall; range: 53.9% for ≥3 risk factors to 85.6% for CAD), and other evidence-based risk reduction therapies. Current tobacco use in patients with established vascular disease was substantial (14.4%). Under treated hypertension (50.0% with elevated blood pressure at baseline), undiagnosed hyperglycemia (4.9%), and impaired fasting glucose (36.5% in those not

known to be diabetic) were common. Among those with symptomatic atherothrombosis, 15.9% had symptomatic polyvascular disease (Deepak, et al, 2006).

Turkey:

A study was designed to analyze and compare the major coronary risk factors of female and male patients with premature CAD aged ≤ 45 years. The researcher evaluate numbers of patients who underwent coronary angiography at his institution, he found that the most common risk factor was cigarette smoking in young men (70.3%). However, the major coronary risk factor was hypercholesterolemia in young women (67.5%). When we compared two groups with respect to major coronary risk factors, we found that the prevalence of diabetes mellitus and hypertension were significantly higher in young women than in young men (diabetes mellitus: 27.7% vs. 12.3%, respectively, $P < 0.001$, hypertension: 56.6% vs. 23.4%, respectively, $P < 0.001$). However, cigarette smoking was found to be significantly higher in men than in women (Yasar et al, 2008).

Thailand:

In 1991 a cross-sectional ECG survey conducted in a multistage random sample of the Thai population, aged ≥30. All major cardiovascular risk factors were measured. Standard supine 12-lead ECG data were collected; amplitudes and intervals were measured manually and entered into a computer. Abnormal tracings were verified by five cardiologists, and agreement among at least three of them was accepted as final. The total sample included 3822 men and 4967 women aged ≥30 years. The age- standardized prevalence rate of CuD was 9.9/1000 (men 9.2/1000, women 10.7/1000). The age-standardized level of major cardiovascular risk factors among men and women respectively were: total cholesterol 4.8 mmol/l (187.3 mg/dl), 5.1 mmol/l (197.7 mg/dl); hypercholesterolaemia (≥6.2 mmol/l)

12.2%, 16.9%; systolic blood pressure (mmHg) 117.8, 117.7; diastolic blood pressure (mmHg) 76.9, 75.8; body mass index (kg/m^2) 21.7, 22.8; fasting blood sugar 4.8 mmol/l (87.9 mg/dl), 5.0 mmol/l (90.3 mg/dl); hypertension (≥160/95 ± on antihypertensive drugs) 6.3%, 8.1%; smoking 65.1%, 8.5%; diabetes mellitus (≥7.8 mmol/l) 2.4%, 3.7%; obesity (≥ 25 kg/m^2) 15.2%, 27.2%. (Pyatat, et al, 1997).

China:

This study examined the prevalence of CVD risk factor clustering among Chinese adults aged 35 to 74 years with data from the International Collaborative Study of Cardiovascular Disease in Asia (InterAsia), a cross-sectional survey of a nationally representative sample (n=14 690) conducted during 2000 to 2001 and compared these data with those of US adults from the National Health and Nutrition Examination Survey of 1999 to 2000. Overall, 80.5%, 45.9%, and 17.2% of Chinese adults had ≥1, ≥2, and ≥3 modifiable CVD risk factors (dyslipidemia, hypertension, diabetes, cigarette smoking, and overweight), respectively. By comparison, 93.1%, 73.0%, and 35.9% of US adults had ≥1, ≥2, and ≥3 of these risk factors, respectively. In a multivariate model including age, sex, and area of residence, the odds ratio (95% confidence interval [CI]) of having ≥1, ≥2, and ≥3 CVD risk factors versus none of the studied risk factors was 2.61 (95% CI, 2.09 to 3.27), 3.55 (95% CI, 2.77 to 4.54), and 4.97 (95% CI, 3.67 to 6.74), respectively, for Chinese adults 65 to 74 years old versus 35 to 44 years old; 3.65 (95% CI, 3.21 to 4.15), 4.67 (95% CI, 4.06 to 5.38), and 5.60 (95% CI, 4.70 to 6.67), respectively, for men compared with women; 1.18 (95% CI, 1.07 to 1.30), 1.34 (95% CI, 1.21 to 1.50), and 1.84 (95% CI, 1.60 to 2.12), respectively, for urban compared with rural residents; and 1.98 (95% CI, 1.76 to 2.22), 2.75 (95% CI, 2.42 to 3.13), and 4.36 (95% CI, 3.68 to 5.18), respectively, for residents of northern compared with southern China (Dongfeng, et al, 2005).

Oman:

Al Riyami, & Afifi, in 2003 conducted astudy to determine the distribution and correlates of clustering of CVD risk factors, data from the Oman National Health Survey, 2000 were analyzed. Based on demographic data (blood pressure, fasting blood glucose, serum cholesterol, weight, height, waist and hip measurements), 5660 subjects were grouped according to how many of four CVD risk factors (hypertension, high cholesterol, diabetes, overweight/obesity) they had. We found that 72% of subjects had less than one risk factor and 2% had all four. Older age exacerbated risk, while living in rural areas or being single was protective. Metabolic cardiovascular syndrome is a public health problem in Oman. Increasing awareness in healthcare providers and the wider population by comprehensive dissemination of the survey results is crucial (Al Riyami, and Afifi, 2003).

Middle East:

The aim of this study conducted by Motlagh, et al, (2009) was to determine the prevalence of key cardiovascular risk factors in the Middle East region. The researchers conducted a systematic review of the literature through searches in the MEDLINE/PubMed and PARLINE databases between January 1980 and April 2005. Cohort studies published from 1980, in English, which included at least 1000 participants that reported the prevalence of at least one of the following; diabetes mellitus, obesity (body mass index $\geq$30 kg/m^2), hypertension, hyperlipidemia, and smoking in the Middle East region. Data were abstracted using standardized data abstraction forms. Studies were combined using random-effect models. In total, 51 studies (267 537 participants) were included. On the basis of a random-effect model, the overall prevalence of obesity was 24.5% [95% confidence interval (CI): 21.8-27.5; I^2: 99.3%; 24 studies], diabetes mellitus was 10.5% (95% CI: 8.6-12.7%; I^2: 99.4%; 24 studies), hypertension was 21.7% (95% CI: 18.7-24.9;

I^2: 99.5%; 24 studies), smoking was 15.6% (95% CI: 12.3-19.6%; I^2: 99.7%; 21 studies) (Motlagh, et al, 2009).

United Arab Emirates:

A cross-sectional community based study on established cardiovascular risk factors carried out between February 2004 and February 2005 in Al-Ain City, UAE. Subjects were interviewed, blood pressure, weight, height, fasting blood sugar, and lipid profile measured. Framingham risk scores were used for risk assessment. The result shown that eight hundred seventeen subjects (403 males and 414 females) completed the survey, of these 28.4% had (a Framingham risk) assessment score of more than 20%, 23.3% had diabetes mellitus, 20.8% hypertension, 37.3% obesity, 22.7% metabolic syndrome, and 19.6% of male smoked. CHD was reported in 2.4%. Lipid profiles were abnormal in 64% of the males, and in 53.9% of the females, mostly due to low high-density lipoproteins or high triglycerides levels (Baynouna, et al, 2008).

Saudi Arabia:

a study of 264 cases of acute myocardial infarction in the Eastern Province of Saudi Arabia which showed that smoking was prevalent in 57%, prior CHD history in 41%, DM in 28% and hypertension in 27% (Al-Gindan, et al, 1990).

2.10 Risk factors

2.10.1 Hypertension

CAD is a leading cause of morbidity and mortality in hypertensive patients. However, the true prevalence of CAD in hypertensive patients is unknown. The aim of this study was to

investigate the relationship between CAD and hypertension in patients undergoing coronary computed tomography (CT) angiography. CAD was present in 103 (82%) hypertensive and 164 (72%) normotensive patients (P < 0.0001) (Zeina, et al , 2009).

Another study talks that hypertensives have significantly higher coronary calcifications; sensitivity and specificity are comparably high as in normotensive. The prevalence of CAD is higher in hypertensives and brings about a trend towards a lower negative predictive value (NPV) and a higher positive predictive value (PPV),. Eighty-five consecutive patients with suspected CAD underwent CTCA, calcium-scoring and conventional coronary angiography, and were grouped as hypertensive (28 women, 31 men, mean age 65 +/- 9 years, age range 49-82 years) or normotensive patients (10 women, 16 men, mean age 62 +/- 11 years, age range 39-77 years). On an intention-to-diagnose-basis, no coronary segment was excluded and non-evaluative segments were rated as false positive. The result shown that Per-patient sensitivity, specificity PPV, and NPV in the hypertensive group were 91.4, 83.3, 88.9, and 86.9%, while the respective values in the normotensive group were 100, 78.9, 63.6, and 100% (P = 0.42, 0.71, 0.05, and 0.15). In the hypertensive group the prevalence of CAD was 59% and the mean calcium-score was 256; respective values in the normotensive group were 27% and 69, (P < 0.01, and < 0.05 vs. hypertensives) (Husmann et al, 2008).

2.10.2 Diabetes, Obesity, physical activity and diet lifestyle

China suffering from dramatic development, it is also experiencing major societal changes, including an emerging obesity epidemic, with the prevalence of overweight and obesity doubling in the past decade. However, the implications of a high glycemic index (GI) and glycemic load (GL) traditional Chinese diet are adversely changing in modern times, as a high-glycemic diet is becoming a greater contributor to diabetes and cardiovascular risks in

a population with rising obesity and decreasing physical activity. Specifically, a high GI diet adversely impacts metabolism and appetite control regulation, and notably confers substantially greater risk of weight gain, type 2 diabetes, cardiovascular disease, and certain cancers among overweight and obese individuals (P<0.05 for all); leading to an emerging vicious cycle of compounding adverse health risks. Notably, while no elevated risk of cardiovascular disease and type 2 diabetes were observed with higher GL intake among normal weight individuals, among overweight individuals, higher GL was strongly associated with higher risk of coronary heart disease (RR=2.00, 95%CI: 1.31-2.96), stroke (RR=2.13, 1.28-3.53), and type 2 diabetes (RR=1.52, 1.22-1.89 among Chinese). Additionally, the influx of Western-diets rich in saturated fats and high-glycemic sugar-sweetened beverages also threaten the health of the population **(**Ding, and Malik, 2008).

Study cohorts included 26,643 hypertensive Finnish men and women who were aged 25 to 64 years and free of coronary heart disease, stroke, and Type 1 diabetes. During a mean follow-up of 19.9 years (range, 6.6 to 31.7 years), 3743 subjects died because of cardiovascular disease. The multivariate-adjusted (age, study year, education, alcohol consumption, smoking, body mass index, systolic blood pressure, total cholesterol, use of antihypertensive drugs, and diabetes at baseline or during follow-up, and the other two kinds of physical activity) hazard ratios of cardiovascular mortality associated with low, moderate, and high occupational physical activity were 1.00, 0.84, and 0.86 (*P* for trend = .006), respectively, for hypertensive men, and 1.00, 0.85, and 0.84 (*P* for trend = .014), respectively, for hypertensive women. The multivariate-adjusted hazard ratios of cardiovascular mortality associated with low, moderate, and high leisure-time physical activity were 1.00, 0.84, and 0.73 (*P* for trend < .001), respectively, for hypertensive men, and 1.00, 0.78, and 0.76 (*P* for trend < .001), respectively, for hypertensive women. Active

commuting to and from work was significantly associated with reduced cardiovascular mortality in hypertensive women. (Gang, et al, 2007).

The coming study induced prospectively included 920 consecutive individuals with no history of CAD who underwent computed tomography coronary angiography (CTCA). Risk estimation of fatal and non-fatal CVE was assessed using Global Assessment Risk (GAR) and Systematic Coronary Risk Evaluation (SCORE), respectively. Logistic regression was used to assess the association of risk factors (RFs) with the prevalence of CAP. CAP were found in 459 (49.9%) individuals. Older age, higher BMI, male gender, diabetes, hypertension and dyslipidemia all increased the likelihood of CAP burden at univariable analysis ($p<0.001$). At the multivariable analysis older age, male gender, hypertension, and diabetes independently increased the likelihood of CAP burden ($p<0.001$). An increase in likelihood of CAP was observed in presence of 1,2 and 3 or more RFs and with an increasing value of GAR and SCORE. Notably, about 18% of subjects with CAP did not report any traditional RFs and among individuals without CAPs, 12% had 3 or more RFs (Faletra, et al, 2009).

Obesity has become an epidemic problem worldwide, and in the Eastern Mediterranean Region the status of overweight has reached an alarming level. A prevalence of 3%–9% overweight and obesity has been recorded among preschool children, while that among schoolchildren was 12%–25%. A marked increase in obesity generally has been noted among adolescents, ranging from 15% to 45%. In adulthood, women showed a higher prevalence of obesity (35%–75%) than men (30%–60%). Several factors, such as change in dietary habits, socioeconomic factors, inactivity and multiparity (among women) determine obesity in this Region. There is an urgent need for national programmes to prevent and control obesity in the countries of the Region (Musaiger, 2004).

A systematic review of epidemiological studies and publications was identified in two ways: i) conducting a PUBMED search from its inception in 1966 until January 2001; and ii) scrutinizing the reference sections of identified papers. Ten studies relating physical activity and two relating cardiorespiratory fitness in older people to CHD met the inclusion criteria. Of the eleven studies that presented data on older men, eight reported an inverse relation between physical activity or cardiorespiratory fitness and CHD, and statistical significance was seen in five of these. **(**G. David Batty, 2002).

Further analysis of the cross-sectional Scottish Health Survey 1998 data. Five thousand four hundred and sixty adults 16-74 years of age. After controlling for some confounding factors, obesity was significantly associated with higher odds ratio (OR) for elevated cholesterol, CRP, systolic blood pressure, non-HDL-C and lower HDL-C (P<0.001), and with greater predicted CHD risk compared to BMI <25 kg/m(2). Regular self-reported physical activity was associated with smaller OR of lower HDL-C and higher CRP, and average predicted 10-year CHD risk in obese subjects, but did not eliminate the higher risk of the measured CVD risk factors in this group. The OR of these two risk factors were still high 4.39 and 2.67, respectively, when compared with those who were inactive with BMI <25 kg/m(2) (P<0.001). (Akbartabartoori, et al, 2008).

The purpose of this study was to use cluster analysis to examine diet patterns and to examine the association between diet patterns and the presence of major cardiovascular disease risk factors. Data from the cross-sectional National Health and Nutrition Examination Survey (NHANES) 2001-2002 were used. The following major CVD risk factors were examined: being overweight or obese (body mass index >24.9), having elevated systolic blood pressure (>120 mm Hg), and having low levels of high-density lipoprotein cholesterol (<50 mg/dL [<1.30 mmol/L]). Dietary patterns were derived by

cluster analysis using data from a 24-hour dietary recall. Cluster analysis generated six nonoverlapping diet patterns labeled: Pasta and Yellow Vegetables; Sweets; Beef, Starches, Fruits, and Milk; Frozen Meals, Burritos, and Pizza; Meat Dishes; and Soft Drinks and Poultry. The majority of the women were grouped in the Sweets diet pattern. Factors associated with adequate levels of high-density lipoprotein cholesterol included being non-Hispanic African American (OR 0.59, 95% CI 0.44 to 0.81; P<0.0001), alcohol consumption (OR 0.76, 95% CI 0.69 to 0.84; P<0.0001), and being assigned to the Sweets diet pattern (OR 0.27, 95% CI 0.14 to 0.50; P<0.0001) or Meat dishes diet pattern (OR 0.94, 95% CI 0.54 to 1.65; P<0.0075). The Sweets pattern was also associated with having normal systolic blood pressure levels (OR 0.51, 95% CI 0.34 to 0.76; P<0.0001). Individuals grouped in the Beef, Starches, and Milk diet pattern were more likely to have an adequate body mass index (OR 0.42, 95% CI 0.23 to 0.77; P<0.0032). Significant associations between dietary patterns and major CVD risk factors were observed (López, et al, 2008).

2.10.3 High density and low density lipoprotein cholesterol

High high-density lipoprotein (HDL) levels protect against CAD development. The researchers hypothesized in this study that patients with CAD and high HDL levels would have higher prevalence of other CAD risk factors compared with patients with CAD and normal HDL. The researchers identified 41,982 patients from a single center with normal levels (40 to 60 mg/dl in men, 50 to 70 mg/dl in women) or high HDL levels (> or =70 mg/dl in men, > or =80 mg/dl in women) when last measured between January 2000 and April 2004. From this overall population, The researchers characterized a cohort of 1,610 patients with CAD, including 98 patients with high HDL levels. The researchers measured prevalence of traditional CAD risk factors by comparing these 98 patients with patients

with CAD and normal HDL levels (n = 1,512). The researchers performed manual chart review in patients (n = 196) matched 1:1 by age, gender, and HDL level to obtain further detail with regard to differences in family history and lifestyle factors. In patients with CAD, those with high HDL levels (98 of 1,610, 6.1%) were of similar age (71.1 vs 69.6 years, p = 0.23), had similar prevalence of hypertension (78.6% vs 88.7%, p = 0.30), lower levels of low-density lipoprotein (85.3 vs 90.9 mg/dl, p = 0.04) and triglycerides (87.1 vs 141.2 mg/dl, p <0.01), and a lower prevalence of diabetes (28.6% vs 38.4%, p = 0.05) compared with patients with normal HDL levels (DeFaria, 2007).

A case-control study was conducted to estimate lipid-cholesterol fractions in patients with coronary heart disease and compared them with population-based controls. A total of 635 newly diagnosed patients with CHD (518 males and 117 females) and 632 subjects (346 males and 286 females) obtained from an ongoing urban coronary heart disease risk factor epidemiological study were evaluated. Age-specific lipid values (total cholesterol, low-density lipoprotein, high-density lipoprotein, triglycerides, and total: high-density lipoprotein cholesterol ratio) were compared using the t-test. In all the age groups, and in both males and females, levels of total and low-density lipoprotein cholesterol were not significantly different. In males, the high-density lipoprotein cholesterol (mg/dl) was significantly lower in patients with CHD as compared to controls in the age groups 30-39 years (35.1+/-11 v. 43.7+/-9), 40-49 years (39.0+/-10 v. 47.1+/-8), 50-59 years (38.9+/-11 v. 43.8+/-9) and 60-69 years (38.6+/-11, v. 42.8+/-7) (p<0.05). In females, HDL was less in the age groups 30-39 years (30.2+/-9 v. 40.7+/-9), 50-59 years (39.7+/-12 v. 44.7+/-8) and 60-69 years (35.6+/-11 v. 42.2+/-9). The level of triglycerides was significantly higher in male patients in the age groups 40-49 years (195.3+/-96 v. 152.8+/-78), 50-59 years (176.7+/-76 v. 162.9+/-97), 60-69 years (175.5+/-93 v. 148.1+/-65) and >70 years (159.8+/-62 v. 100.0+/-22); and in female patients in the age group 30-39 years (170.8+/-

20 v. 149.9+/-9) ($p<0.05$). The total: HDL cholesterol ratio was significantly higher in all age groups in male as well as female patients with CHD ($p<0.05$) (Gupta et al, 2001).

2.10.4 Family conflict and psychological distress

Treatment of psychological distress that aims to reduce CVD risk should primarily focus on health behavior change, this is the conclusion of the coming study. In a prospective study of 6,576 healthy men and women (ages 50.9 +/- 13.1 years), we measured psychological distress (using the 12-item version of the General Health Questionnaire >or=4) and behavioral (smoking, alcohol, physical activity) and pathophysiological (C-reactive protein, fibrinogen, total and high-density lipoprotein cholesterol, obesity, hypertension) risk factors at baseline. The main outcome was CVD events (hospitalization for nonfatal myocardial infarction, coronary artery bypass, angioplasty, stroke, heart failure, and CVD-related mortality). The result shown that Cigarette smoking, physical activity, alcohol intake, C-reactive protein, and hypertension were independently associated with psychological distress. There were 223 incident CVD events (63 fatal) over an average follow-up of 7.2 years. The risk of CVD increased in relation to presence of psychological distress in age- and sex-adjusted models (hazard ratio: 1.54, 95% confidence interval: 1.09 to 2.18, $p = 0.013$). In models that were adjusted for potential mediators, behavioral factors explained the largest proportion of variance (approximately 65%), whereas pathophysiological factors accounted for a modest amount (C-reactive protein approximately 5.5%, hypertension, approximately 13%) (Hamer et al, 2008).

2.10.5 Smoking

The researchers collected data from 5460 adults who participated in the cross-sectional Scottish Health Survey 1998 were analysed. In multivariable analysis body mass index and

smoking were the most important risk factors for cardiovascular disease. Smoking was independently associated with higher C-reactive protein and fibrinogen concentrations in both sexes, and lower HDL cholesterol and higher non-HDL cholesterol in females (P<0.001). Overweight or obesity (body mass index 25-30 or > or = 30 kg/m) were independently associated with higher C-reactive protein, total cholesterol, non-HDL-cholesterol and lower HDL-cholesterol in both sexes, and higher fibrinogen in females (P<0.001). Overweight or obese current smokers had higher C-reactive protein and fibrinogen and lower HDL-cholesterol concentrations than the reference group of never-smokers with body mass index below 25 kg/m (P<0.001). Obese current smokers had the highest mean value and odds ratio (OR) for the risk factors across the categories, particularly for lower HDL cholesterol (OR=11) and elevated C-reactive protein (OR=9) (P<0.001). (Akbartabartoori, et al, 2008).

2.10.6 Low income and educational level

Health behaviour data derived from nationwide Finnish health behaviour surveys from the years 1979 to 2001. The analyses included 29 065 men and 31 543 women of whom 4263 died. CVD, CHD**,** stroke and all-cause mortality was studied. Health behaviors explained 54% of the relative difference between primary and higher educational level in CVD mortality among in men and 22% among in women (Mikko et al, 2008).

Men who had low social class or low household income in adult life had increased rates of coronary heart disease. (Barker et al, 2001).

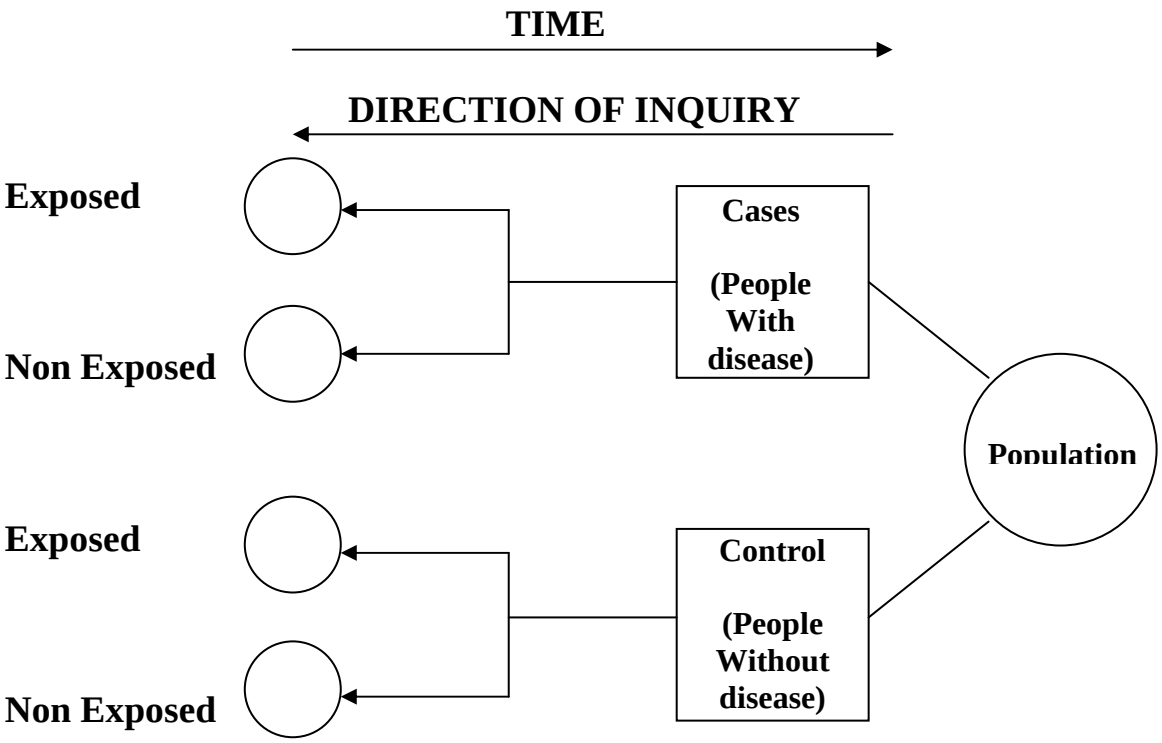
Chapter III

Methodology

3.1 Study design

This study is a case-control study. Case control studies give the researcher the chance to compare the history of past exposure to a factor or the presence of a characteristic among cases and controls. The investigator looks backward from the disease to a possible cause (Figure 1). If there is a difference when comparing the proportion of the exposed among cases and that among controls, then an association between the factor and the disease might exist. Case control study is relatively simple, inexpensive, with short study period and it studies several risk factors for a single disease (Lilienfeld, 1994).

Figure 2: Design of case control study



Design of case control study

3.2 Period of the study

The study was started at the end of June/2009; this time takes preparation of questionnaire and determination of total population then sampling done. Then the researcher started seeking ethical approval and setting up the administrative procedures and so on. Actual data collection was started at 1 Aug/2009 and continued to 1 Sep/2009 after the pilot study was conducted in the first few day of August. Data entry, analysis, reviewing the literatures and writing the report continued till the mid of Oct/2009.

3.3 Study population

The target population is all CAD patients who are 25 years old or more, live in Gaza Strip and still alive. All referred patients to European cardiac catheterization center and Julis cardiac catheterization center in 2008 are the population of the study.

3.4 Sample and sampling techniques

The actual sample size was 200 subjects divided into 100 cases and 100 controls. Unrespondents, traveled, or died cases replaced by other ones. Only 3 subjects were died from the cases and 1 refused and 3 were traveled out side Gaza Strip. There are no unrespondents among controls, so the response rate, 100%.

All people in 2008 who have coronary angiography were collected from cardiac catheterization patients' files in European cardiac catheterization center and Julis cardiac

catheterization center. Then they were divided into two group (cases and control). According to the test result, sampling frame was prepared, sample size decided according to Epi. info program at 95% confidence interval and 80% power, on assumption risk was 20% among non diseased and 40% among diseased, the sample size was 91 for cases and the same number 91 for control. But the investigator decided to take 100 cases and 100 controls. After the sample size was determined from the total population (400) for cases , the investigator selected sample subjects using probability (Systematic Random) sample, and was taken the number one randomly the divided the total number of population by the sample size 400/100= 4, so the investigator was taken the participants every 4th number,. controls selected and matched with cases by gender .

3.5 Inclusion criteria

Subject who eligible to participate in the study are those who meet the following criteria:

Cases:

- 25 years and above
- Both gender (male and females will be included).
- Referred to either European cardiac catheterization center or Julis cardiac catheterization center in 2008.
- Underwent cardiac catheterization, coronary artery diseased, and still alive.

Controls:

-25 years and above

- Both gender (male and females will be included).
- judged to be free of coronary artery disease (normal coronary angiography).

3.6 Data collection procedure

Questionnaire, which was developed by the researcher and judged by 7 experts in the field of public health and 3 cardiologists, has been the basis for collecting data from the participants in the study. After we select a random sample that participated in the study randomly from population study, home addresses taken and phone numbers of participants from Julis Center and European Gaza Hospital, contacted them and set a date for an interview after the definition of them for the researcher and the objectives of the study undertaken by that participation in this study is optional, two participant refused and replaced by another's, and one participant shown that was died so the investigator also replaced him by another one. data collection journey was very difficult shown in difficult address , difficulty of transportation ,and the high costs of access to the participants in the study. Sometimes a researcher goes to many of the participants to their homes and he did not find them, so the researcher replayed another contact to participant which increases time and money. But after this difficult trip and pains taking the researcher was able to gather data required for the study through a personal interview for all cases and controls. Patients' files was used as sources to gather some demographic and health information.

3.6.1 Indirect method

It was designed to be face to face interviewed questionnaire (annex 5) and the following main areas were included:

- Personal and demographic data: which include gender, age, marital status, weight, height, BMI, residential area, education level, number of kids in home, number of room, and income.
- Medical history of the subject (diabetes, and hypertension).

- Smoking history (type, years of smoking, amount, and number of smokers in home to measure passive smoking).
- Diet lifestyle (type of food, number of meals a day and eating in night).
- LDL, and HDL result were taken from the patients files.
- Physical activity (type, time, and if the participants were x-sport).
- Occupation (type, duration, and stress).
- Political stress (arrest, lost a relevant one, shooting home, and bulldozed agriculture by Israeli occupation army).

3.6.2 Direct method:

The direct method include weight and height measurements by using same meter numbered by centimeter for all subjects, and weight scale after standardization it before measurement for every subjects.

3.7 Weight and height measurement:

The main variable where the result of the measurements used was the relative weight, most often expressed by Body Mass Index (BMI, calculated as weight (kg) divided by the square of height by meter. Briefly weight and height were measured with the participant in standing position without shoes and heavy garments. Weight was recorded to the nearest Kilogram, and height to the nearest full cm.

3.8 Standardization of the weight and height measurement

Removal of clothes: all participants were asked to remove shoes and heavy garments before the measurements of weight and height.

Type of scale: only accurate balance scales was used. Testing with standard weight was done and is considered with particular importance.

Accuracy of weight measurement: accuracy of recording the body weight to full kg.

Accuracy of height measurement: recording the body height to the nearest centimeter.

The *scale* was checked at least once at the start using standard weights.

The zero level was checked every day before starting measurements and immediately afterwards.

3.9 Validity and reliability of the instrument

Content of the instrument was discussed with expert cardiovascular epidemiologist in addition to other three expert cardiologist and four experts of public health to ensure that content is highly valid and reliable. Also face validity and standardization of measurement was done.

3.10 Pilot testing

A pilot study was conducted before starting the real data collection, to make pre-test for the questionnaire. 20 participants included in pilot study, 10 cases and 10 controls. Some slight changes were done on questionnaire in cooperation with the academic supervisors.

3.11 Instruments

- Demographic information sheet (Annex 5).

- Personal interviewed questionnaire (Annex 5).

- Personal weight scale

- Meter

3.12 Ethical considerations

1. Permission from ministry of health **(MOH)** (Annex 3).
2. Approval from **Helsinki** Committee (Annex 1).
3. Informed consent (Annex 4).
4. Approval from Julis cardiac catheterization center (Annex 2).
5. Approval from health sectors for field study administration.

3.13 Limitations

1. Limited statistical data
2. Lack of previous studies and researches
3. Limited Time, and money.
4. Full address of subjects not available.

3.14 Statistical Analysis

The researcher used statistical package for social science program (SPSS), version 0.13. Statistical analysis included coding, data entry, data cleaning, and data processing. For description of the study variables the researcher used frequency, percentage, and histogram charts or pie. In measuring of central tendency the researcher used mean, median, mode, and standard deviation. Cross tabulation to describe the relationships between two variable or more also used. Statistical testing was used in this study are:

- For continuous variable t-test used.
- For categorical variable (2 group) chi-square used.
- For categorical variable (more than 2 group) ANOVA used.

Finally because of the study is retrospective study the researcher also used odds ratio for measuring the risk.

Chapter IV

Results & Discussions

This chapter clarifies the main results that achieve the study objectives in a comparative way by using chi square, p value and t test, ANOVA test, odds ratio as statistical tools of measurement. Total study population was 200 subjects; 100 cases and 100 controls.

4 .1Characteristics of the study population

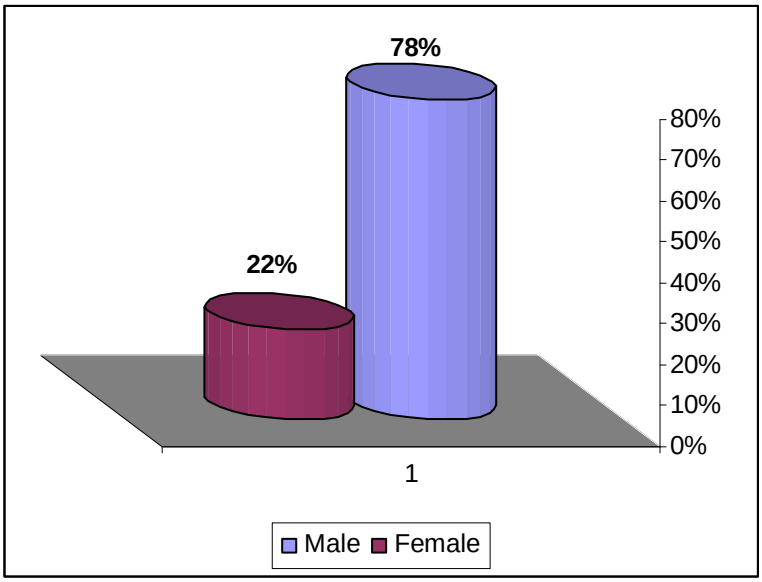
As shown in (table 01). The highest proportion of cases in the group age 60+, most of cases are male 78%, and most of cases lived in Gaza city 43% and the north of Gaza Strip 24%.

Table 01: Characteristic of the Study Population

		No (%) of subjects			
		Cases (*n*=100)		Controls (*n*=100)	
Age		*n*	%	*n*	%
	<40	3	3	9	9
	40-49	22	22	27	27
	50-59	36	36	31	31
	60+	39	39	33	33
Sex					
	Male	78	78	78	78
	Female	22	22	22	22
Address					
	North	24	24	29	29
	Gaza	43	43	24	24
	Mid zone	19	19	22	22
	Khanyounis	7	7	15	15
	Rafah	7	7	10	10
Education					
	Low	45	45	55	55
	Medium	25	25	16	16
	High	30	30	29	29
Occupation					
	Mentally	38	38	35	35
	Muscular	48	48	47	47
	Housewife	14	14	16	16

4.1.1 Gender

Figure 3: Percentage Distribution of Study Population By Gender



Percentage Distribution of Study Population By Gender

As shown in (Fig. 3) that, background of total population, female subjects represent 22%, while male subjects represent 78%. Prevalence among male is higher than female.

According to MOH, about 3.799 persons died from cardiovascular disease (1.956 males and 1.843 females), with proportion of 36.7% of total deaths, with a rate of 101/100,000 population. Mortality among males was higher than females (51.5% in males Vs 48.5% in females) (Palestine, MOH, 2005).

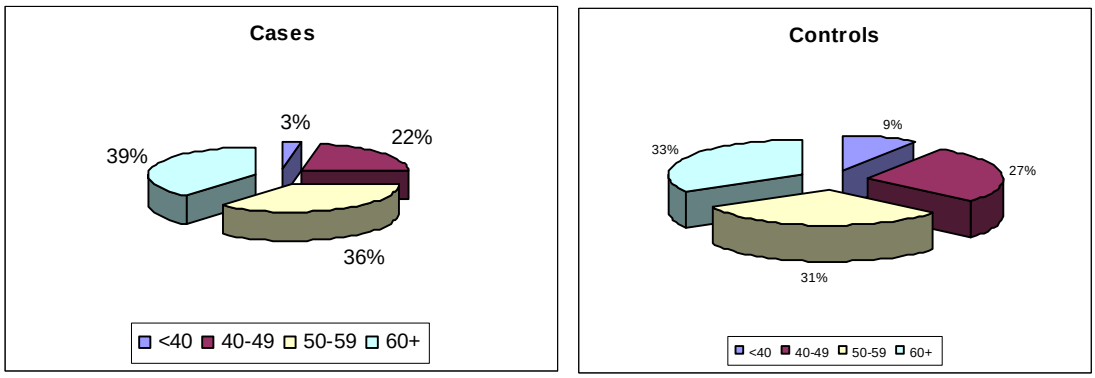
In 2005, coronary heart disease death rates per 100,000 people in America were 187.7 for white males and 213.9 for black males; and 110.0 for white females and 140.9 for black females (American heart association, 2009).

"Your gender is significant: as a man you are at greater risk of heart disease than a pre-menopausal woman. But once past the menopause, a woman's risk is similar to a man's. Risk of stroke is similar for men and women" (WHO, 2004).

4.1.2 Age

Mean ages of the population were 55.07 years (SD 10.11, range 39-79) for cases and 54.34 years (SD 10.30, range 35-3-76) for control.

Figure 4: Distribution of Cases and Controls By Age Group



Distribution of Cases and Controls by Age Group

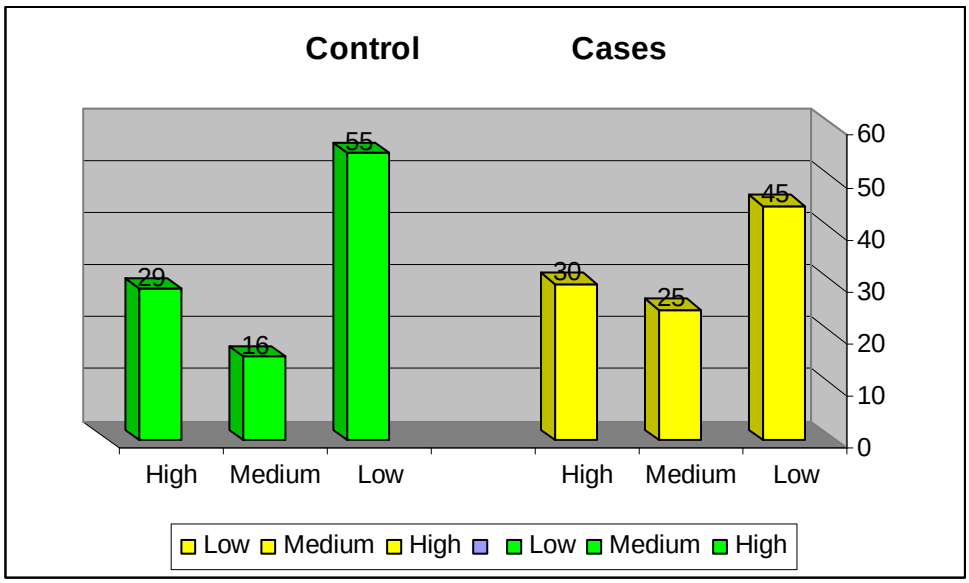
The highest percentage are shown in cases among the age group 60 and more Figure (4). Many of studies talked about strong relationship between age and CAD.

Age is a strong independent predictor of CHD risk (Idris et al, 2008).

Simply getting old is a risk factor for cardiovascular disease; risk of stroke doubles every decade after age 55 (WHO, 2004).

4.1.3 Level of education

Figure 5: Distribution of Educational Level among Cases and Controls



Distribution of Educational Level among Cases and Controls

There are no noticeable differences between cases and control level of education, Fig. (5) in the next table 2 shown that low educational level among cases (45%) was lower than among controls (55%), and nearly equal between two group in high level of education. According to our result there is mild differences between educational level means but the differences doesn't reach statistical significance by using one way ANOVA test (*p-value* >0.05). This difference may come by chance.

Table 02: Educational Level Cases and Controls

Variable	Mean differences	Sig.	95% CI	
			lower	Upper
Low				
Medium	**.160**	**.229**	-.07	.39
high	**.058**	**.776**	-.14	.26
Medium				
Low	**.160**	**.229**	-.39	.07
high	**.101**	**.610**	-.35	.15

*non−statistically significant

4.1.4 Income

By using t test to compare between means of income by the tow group (cases &controls), cases mean 1703.00 NIS/month and for control 1661.42 NIS/month and the difference means didn't reach statistically significant. Yet; many studies talks bout the increase of socioeconomic that reduce CHD mortality because of low socioeconomic status for Gaza citizens especially after closure and continuous Israeli aggression. Participants thought that any question about family income may want to provide assistance to the family, making them hide the fact monthly income, This is inconsistent with many studies linking low income and CHD.

The economic implications of cardiovascular disease are vast. In developing countries, heart disease has historically affected the more educated and higher socioeconomic groups, but this is changing. What researchers are finding is that in developing countries CVD disproportionately affects working-age adults from lower socioeconomic groups. Also, people from lower socioeconomic groups fare worse if they develop heart disease; their mortality after a heart attack is higher than someone from a high socioeconomic group (Mackay, 2004).

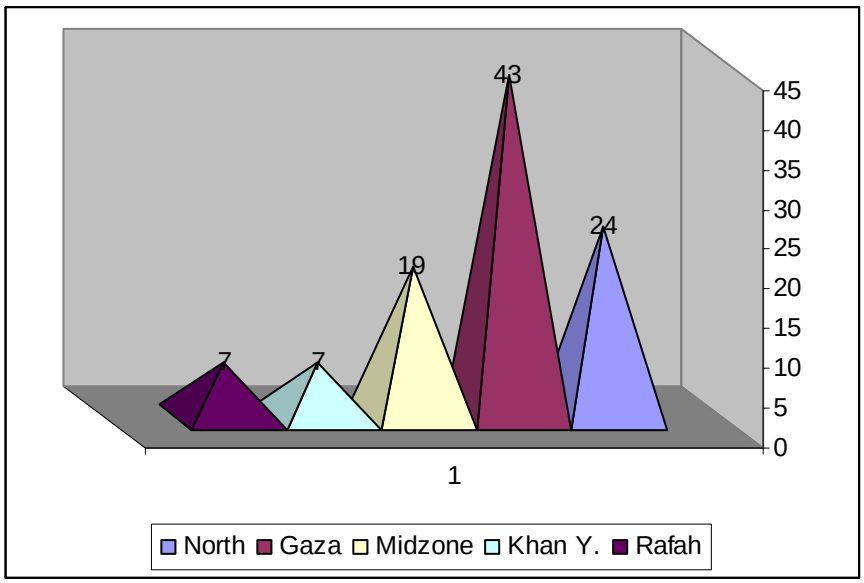
4.1.5 Early marriage

By using t test to compare between means of early marriage by the tow group (cases &controls), cases mean 21.71 years and for control 21.65 years and the difference between tow means didn't reach statistically significant. About this result we need to confirm our result by other studies.

4.1.6 Residential Area

The highest percent 43% is in Gaza city (Fig. 6). Being poor, no matter where in the globe, increases your risk of heart disease and stroke. A chronically stressful life, social isolation, anxiety and depression increase the risk of heart disease and stroke (WHO, 2004).

Figure 6: Percentage Distribution of Cases By Province

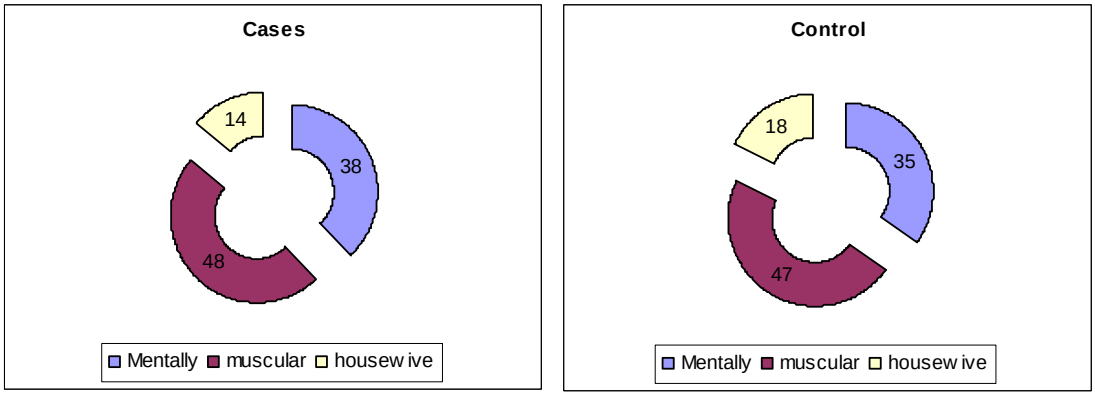


Percentage Distribution of Cases by Province

4.1.7 Occupation

Fig. (7) shown the percentage distribution of occupation among cases and controls, most of female were housewives, the percentage of cases depend on physical in work was higher than the percentage of cases depend on mental work, 48%, 38% respectively. There are no statistical differences between cases and control.

Figure 7: Distribution of Cases and Control by Occupation



Distribution of Cases and Control by Occupation

4.2. Risk Factors

The most common risk factors identified among cases were, smoking (37%), lack of physical activity (93%), hypertension (74%), diabetic mellitus (60%), family history (44%), high LDL (64.4%), low HDL (70.4%). Cases and controls were matched for sex, age and as possible as locality (Residency).

4.2.1 Physical inactivity

Table 03: Physical Activity among Cases and Controls

variable	Cases		Control		Total		*P value*
	No	%	No	%	No	%	
Non physically active	93	93%	77	77%	170	85%	0.002*
Physically active	7	7%	23	23%	30	15%	
Total	100	100%	100	100%	200	100%	

*statistically significant

The rise in CVDs reflects a significant change in diet habits, physical activity levels, and tobacco consumption worldwide as a result of industrialization, urbanization, economic development and food market globalization. People are consuming a more energy-dense, nutrient-poor diet and are less physically active. Imbalanced nutrition, reduced physical activity and increased tobacco consumption are the key lifestyle factors. High blood pressure, high blood cholesterol, overweight and obesity - and the chronic disease of type 2 diabetes - are among the major biological risk factors. Unhealthy dietary practices include the high consumption of saturated fats, salt and refined carbohydrates, as well as low consumption of fruit and vegetables. These risk factors tend to cluster (WHO, 2003). Habitually, physically active survivors of myocardial infarction are up to 25% less likely to die than their sedentary counterparts (Jolliffe, et al, 2001).

As shown in (table 03), non physically active subjects among cases (93%) were higher than among controls (77%) and the percentage of participants among controls who were physically active (23%) and higher physical activity (2%) .odds ratio was found to be 3.968 with 95% CI (1.616-9.745) wich mean that there is appositive association between physical activity and CAD, also this differences reach statistically significant (*p-value* <0.05). Physical inactivity mainly lead to overweight, in 2000, the total cost of overweight and obesity was estimated to be $117 billion (U.S GPO, 2001).

Physical activity is beneficial if done regularly and long term to prevent blood diseases, hypertension and to decrease cholesterol level that inhibit the risk for CHD.

In our study of patients with coronary angiographically defined we found association between physical activity pattern in adulthood and CHD. These results suggest that keeping up a physically active lifestyle in adulthood may be beneficial for preventing and reducing CHD in later life. Furthermore, these data provide evidence that changing from a sedentary to an active physical activity pattern, even if initiated at older age, may result in

a strong reduction of CHD risk. The benefits of vigorous physical activity on cardiovascular disease morbidity and mortality have been well documented, and accumulating evidence suggests that engaging in even moderate physical activity is beneficial in preventing CHD (NCCDP, 1996).

These effects are seen even with simple activities such as low intensity walking, which may lead to considerable reductions in mortality, and they have also been reported for older people (Hakim, et al, 1998). Many patients did not exercise because of co morbidities or perceived lack of time. Older patients thought that vigorous exercise was unnecessary. Most patients preferred walking but described barriers, such as lack of open outdoor spaces, cold weather, physical symptoms (eg, dizziness, breathlessness, or swollen feet), and feeling uncomfortable when walking alone. Some patients walked indoors, joined a gym, or started swimming (Astin, 2008).

Physical activity was associated with reduced risk of CVD among women in a dose-response fashion. Inactive women would benefit by even slightly increasing their physical activity (e.g., walking 1 hour per week or possibly less) and even more from additional physical activity. Moderate activity, such as brisk walking for 30 to 60 minutes a day most days of the week, is associated with significant reductions in the incidence and mortality of CV disease (Oguma, et al, 2004).

In conclusion, our results suggest that a more active physical activity pattern is clearly associated with a reduced risk of CHD.

4.2.2 Obesity

Table 04: Body Mass Index among Cases and Controls

variable	Mean differences	Sig.	95% CI	
			Lower	Upper
Normal weight				
Overweight	-.014	.990	-.26	.23
Obese	.072	.763	-.17	.31
Overweight				
Normal weight	.014	.100	-.23	.26
Obese	.086	.079	-.11	.28

*not statistically significant

According to WHO criteria, BMI less than 18.5kg/m2 means underweight, 18.5-24.9 kg/m2 means normal weight, 25-29.9 kg/m2 means overweight, and BMI more than 30kg/m2 means obesity. From the above table shown that the percentage of normal weight among controls is higher than among cases and the percentage of overweight and obesity is higher among controls, so the relationship does not reach statistically significant. Population of study was people who referred to cardiac catheterization center (European-Gaza and Julis) to do coronary angiography. when cardiologist think to referred one that mean he/she had one or more of CHD risk factors from cardiologist viewpoint. The referred patient may be hypertensive, diabetic, also may be obese. Also, controls were selected not from healthy people in the community but from the centers after conducting coronary angiography.

Our study defined that by using ANOVA test that there is no statistical differences between means of groups According to WHO criteria, BMI less than 18.5 kg/m2 means underweight, 18.5-25 kg/m2 means normal weight, 25-29.9 kg/m2 means overweight, and

BMI more than 30kg/m2 means obesity. Obesity is believed to be an independent risk factor for CHD (Gensini et al, 1998).

According to WHO report in 2003 the following strategies are effective in preventing CVD, and in helping manage the disease:

- Limit energy intake from total fats and shift fat consumption away from saturated fats to unsaturated fats and towards the elimination of trans-fatty acids;
- Increase consumption of omega-3 fatty acids from fish oil or plant sources;
- Consume a diet high in fruits vegetables, nuts and whole grains, and low in refined grains.
- Avoid excessively salty or sugary foods.
- At least 30 minutes of regular physical activity daily
- Avoid smoking
- Maintain a healthy weight.

In 2000, the total cost of overweight and obesity was estimated to be $117 billion (U.S GPO, 2001). Reaven GM. Banting lectures in 1988 said that "obesity is not a well-demonstrated risk factor for development of CHD in older adults, but weight gain and abdominal obesity continue to adversely influence other major CHD risk factors by promoting an insulin-resistant state" (Reaven GM, 1988) .

So obesity increase the risk of hypertension, diabetes, and increase blood cholesterol that elevated incidence risk of CHD, according to the previous rational our result was not supported by studies.

4.2.3 Hypertension

Table 05: Hypertension among Cases and Controls

variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
Suffering from hypertension	74	74%	50	51%	125	62.5%	0.001*
No hypertension	26	26%	50	49%	75	37.5%	
Total	100	100%	100	100%	200	100%	

*statistically significant

As seen in the above table the percentage of cases who had hypertension (74%) was higher than controls (51%), odds ratio was found to be 2.735 with 95% CI (1.509-4.955) which mean that there is appositive association between hypertension and CAD, also the differences between the tow group reaches highly statistically significance (*p-value* <0.05).

There are at least 970 million people worldwide who have elevated blood pressure (hypertension). In the developed world, about 330 million people have hypertension, as do around 640 million in the developing world. The WHO rates hypertension as one of the most important causes of premature death worldwide and the problem is growing.81 In 2025 it is estimated there will be 1.56 billion adults living with blood pressure (Kearney et al., 2005). Hypertension is the most prevalent CVD, and it is one of the most powerful contributors to cardiovascular morbidity and mortality (NCHS, 1990). There are many risk factors associated with CHD and stroke. The major risk factors, tobacco use, alcohol use, high blood pressure (hypertension), high cholesterol, obesity, physical inactivity, unhealthy diets, have a high prevalence across the world. Hypertension is the single biggest risk

factor for stroke. It also plays a significant role in heart attacks. It can be prevented and successfully treated but only if you have it diagnosed and stick to your recommended management plan (WHO, 2004). Smoking hypertension and diabetes were associated with coronary artery disease in decreasing order of prevalence (Achari and Thakur, 2004).

CAD is a leading cause of morbidity and mortality in hypertensive patients. However, the true prevalence of CAD in hypertensive patients is unknown (Zeina et al., 2009). Hypertension is a highly prevalent major contributor to atherosclerotic cardiovascular disease (Corrao et al., 1990). Data available from several Eastern Mediterranean countries indicate that hypertension is emerging as a considerable challenge to public health and an important cause of morbidity and mortality. Epidemiological surveys on hypertension report prevalence rates up to 20%-26% of the adult population (Alwan, 1996).

Furthermore, it has been found that the prevalence of other risk factors, such as obesity, hypercholesterolaemia, hypertriglyceridaemia, diabetes and smoking, are higher among hypertensive than non hypertensive people (Laurenzi et al., 1990). So our result was supported by many of studies that Cleary defined the positive association between hypertension and CAD.

4.2.4 Diabetes Mellitus

Table 06: Diabetes Mellitus among Cases and Controls

variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
Suffering from D.M	54	54%	35	35%	89	44.5%	
No D.M	46	46%	65	65%	111	55.5%	0.006*
Total	100	100%	100	100%	200	100%	

*statistically significant

The result shown that clarify highly statistically significant relationship between diabetes mellitus and CHD, 54% of cases had D.M and 35% of control had D.M. odds ratio was found to be 2.217 with 95% CI (1.247-3.941) which mean that there is appositive association between diabetes mellitus and CAD, The differences between the tow group reaches highly statistically significance (*p-value* <0.05) (table 06).

Cardiovascular disease (CVD) is the major cause of morbidity and mortality among the diabetic population and is substantially increased in the presence of hypertension (El-Atat, 2004).

If you have diabetes you are two to four times more likely to develop CVD than people without diabetes. CVD is the leading cause of mortality for people with diabetes. If you have diabetes your risk of CVD rises for a number of reasons. Hypertension, abnormal blood lipids and obesity, all risk factors in their own right for CVD, occur more frequently in people with diabetes (International Diabetes Federation, 2001). Physical inactivity increases the risk of heart disease and stroke by 50%. Obesity is a major risk for CVD and predisposes you to diabetes. Diabetes is a risk factor for CVD (WHO, 2004). Diabetes mellitus is a well-recognized risk-factor for coronary artery disease. It is known that diabetic patients have a two-to fourfold increased risk of mortality or morbidity for CVD compared with the general population. Further, many diabetic patients with coronary heart disease have severe diseased coronary arteries: multi-vessel disease and/or severe stenosed vessel(s).(Nakayama M, Ogawa H 2006). smoking hypertension and diabetes were associated with CAD in decreasing order of prevalence (Achari and Thakur , 2004).

If you control your blood glucose you can reduce your risk of a CVD event by 42% and the risk of heart attack, stroke, or death from CVD by 57% (Nathan, et al, 2005).

4.2.5. Family history

Table 07: Family History among Cases and Controls

Variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
Positive family history	44	44%	27	27%	71	35.5%	
Negative family history	56	56%	73	73%	129	64.5%	0.012*
Total	100	100%	100	100%	200	100%	

*statistically significant

The result shown that a statistical significance related family history and CHD, 44% among cases had positive family history compared with 27% among controls hadn't family history, 30% of first degree relatives who had positive family history were male <55 years, and 10% of them female and <55years, and 4% >60 years old (Male, Female), odds ratio was found to be 2.124with 95% CI (1.175-3.841) which mean that there is appositive association between family history and CAD, and the differences between the tow group reaches statistically significance (*p-value* <0.05) (table 07).

So, family history of CHD is one of the risk factors that play an important role in the incidence of CHD.

The results of our study were supported by many studies. Your family's history of cardiovascular disease indicates your 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) your risk increases (WHO, 2004).

If a first-degree male relative (e.g. father, brother) has suffered a heart attack before the age of 55, or if a first-degree female relative has suffered one before the age of 65, you are at greater risk of developing heart disease. If both parents have suffered from heart disease before the age of 55, your risk of developing heart disease can rise to 50% compared to the general population. However, you can protect yourself by taking care of your heart, as the development of cardiovascular disease involves many different factors, not just your family history (Reckless et al, 2007).

Studies have shown a genetic component for both hypertension and abnormal blood lipids, factors related to the development of CVD (Broeckel, et al, 2002).

Family history of CHD is one of the risk factors that play an important role in the incidence of CHD. CAD is a multifactorial disease, and family history is the best available tool to assess gene-environment interaction (Rao et al., 2009). The major coronary risk factors such as family history of CAD, hypercholesterolaemia, diabetes mellitus, hypertension and cigarette smoking were recorded (Yasar, 2008).

4.2.6 Low Density Lipoprotein and High Density Lipoprotein

Table 08: Low Density Lipoprotein among Cases and Controls

variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
≤120 mg/dl Normal	26	36.6%	42	54.5%	68	45.9%	
>120 mg/dl High	45	64.4%	35	45.5%	80	54.1%	0.029*
Total	71	100%	77	100%	148	100%	

*statistically significant

Table 09: High Density Lipoprotein among Cases and Controls

variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
High 35+mg/dl Normal	21	29.6%	50	64.1%	71	47.6%	
Low <35 mg/dl Low	50	70.4%	28	35.9%	78	52.3%	0.000*
Total	71	100%	78	100%	149	100%	

*statistically significant

Abnormal blood lipid levels that is high total cholesterol, high levels of triglycerides, high levels of LDL or low levels of HDL cholesterol all increase the risk of heart disease and stroke. Changing to a healthy diet, exercise and medication can modify your blood lipid profile (WHO, 2004).

The investigator doesn't draw blood sample from the participant, but the result of LDL and HDL test taken from patient file. 26% of the sample hadn't the test result; so investigator was done the test on the available data. From cases 64.4% having high LDL, but 45.5% of controls suffering from high LDL, odds ratio was found to be .481 with 95% CI (.249-.931) which mean that there is appositive association between high LDL and CAD, also the differences between the tow group reaches statistically significance (*p-value* <0.05). as shown in (table 08). From cases 70.4% having low HDL compared with 35.9% of controls had low HDL, odds ratio was found to be .235 with 95% CI (.118-.468) which mean that there is appositive association between low HDL and CAD, also the differences between the tow group reaches statistically significance (*p-value* <0.05). and the differences between the tow group reaches highly statistically significance (*p-value* <0.05) as shown in (table 09). High LDL and lower of HDL was a risk factors for CHD. The results also

supported with many studies. Low high-density lipoprotein and high low-density lipoprotein was an important risk factors of CAD, our study explain that an strong association between them and CHD that reach statistically significant, and many study support our result. Abnormal levels of lipids (fats) in the blood are risk factors for cardiovascular disease. Cholesterol is carried through our blood by particles called lipoproteins: LDL and HDL. High levels of LDL lead to atherosclerosis increasing the risk of heart attack and ischemic stroke. HDL reduces the risk of CVD as it carries cholesterol away from the blood stream. (Mackay et al, 2004). HDL appears to be beneficial in the prevention of CHD, the higher HDL levels the lower the potential risk for developing CVD (Mchenry, 1992).

An age-adjusted case-control comparison showed that the prevalence of hypertension, diabetes, high total cholesterol (> or =200 mg/dl) (males 48.8% v. 20.2%; females 59.8% v. 33.4%) and high low-density lipoprotein cholesterol (> or =130 mg/dl) (males 42.1% v. 15.0%; females 52.1% v. 31.0%) was significantly more in cases than in controls. The prevalence of low high-density lipoprotein cholesterol (<35 mg/dl) (males 39.6% v. 6.2%; females 39.3% iv 9.5%), high total: high-density lipoprotein ratio (> or = 5.0) and high triglycerides (> or =200 mg/ dl: males 39.6%, v. 10.2%; females 17.1% v. 11.9%) was also significantly higher in cases ($p<0.05$) (Gupta, et al, 2001).

4.2.7 Smoking

Table 10: Smoking Among Cases and Controls

Variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
Positive smoking history	37	37%	23	23%	60	30%	0.031*
Negative smoking history	63	63%	77	77%	140	70%	
Total	100	100%	100	100%	200	100%	

*statistically significant

We conclude that there was an association between smoking and CHD clearly observed from the (table 10). Among cases 37% had positive history of smoking while 23% among controls. odds ratio was found to be 1.966 with 95% CI (1.060-3.647) which mean that there is appositive association between smoking and CAD, also the differences between the tow group reaches statistically significance (*p-value* <0.05).

Many of studies support the result of our study. Smoking was significantly more common in subjects with CAD groups (30.97% vs. 12.72%) as compared to subjects without CAD (P < 0.0001) (Achari & Thakur, 2004). Tobacco use, whether it is smoking or chewing tobacco, increases risks of CVD. The risk is especially high if you started smoking when young, smoke heavily or are a woman. Passive smoking is also a risk factor for cardiovascular disease. Stopping tobacco use can reduce your risk of CVD significantly, no matter how long you have smoked (WHO, 2004).

A general approach to preventing CVD should include strategies to reduce the overall CHD risk by lifestyle modification and management of modifiable risk factors such as smoking, hypertension and diabetes (Isles et al., 2000).

Risk factors for CAD in old men and women include age, cigarette smoking, hypertension, diabetes mellitus, dyslipidemia, and obesity (Ness et al., 2000).

The evidence that tobacco use will kill you is incontrovertible. Since the 1940s it is known that smoking is linked to heart disease and cancer. Since then, tobacco has appeared on an increasing roll call of risk factors for a host of diseases that cause death and illness. And yet many people still do not link smoking to heart disease. Only 4% of Chinese know that smoking causes heart disease. In the USA, the majority of smokers do not believe they have a greater risk of heart disease than non smokers. If you smoke and started smoking while still a child, your risk of cardiovascular disease is much higher than someone who started as an adult. Although smoking causes a great deal of damage, quitting smoking effectively reduces cardiovascular risk to close to that of a person who has never smoked over a period of time. Smoking is a major cause of heart disease. It is estimated that smoking increases the risk of stroke, coronary heart disease and impotence by 100%. Smoking increases the risk of death from undiagnosed coronary heart disease by 300%. The good news is that a smoker who quits can reduce his/her risk of cardiovascular disease to almost that of someone who has never smoked (Mackay et al., 2004).

4.2.8 Residential Area

Table 11: Residential Area among Cases

Variable	Cases	
	No	**%**
North	24	24%
Gaza	43	43%
Mid zone	19	19%
Khanyounis	7	7%
Rafah	7	7%
Total	100	100%

The highest percent 43% is in Gaza city and the lowest percent 7% shown in Rafah and khanyounis city among cases . Gaza city and north had the highest percentage of cases that clearly explained both of them represented a risk factors area more than other area in Gaza governorate. Gaza was more crowded than other area in addition to stress, and north was faced daily recurrent invasion and attacks by Israeli occupation army. Living a stressful life can cause people to adopt poor habits like smoking and eating badly, which in turn are risk factors for cardiovascular disease (Bosma, et al, 1997). Our results were supported from other studies in order to distinguish Gaza city and the north of Gaza Strip from another residential area. North represented residential area and Gaza city represent crowded area, unstable area politically and socially and both of them related to CHD .

The stresses of life have long been thought to increase a person's risk of cardiovascular disease or a serious coronary or cerebral event. But it is not universally agreed which stress causes heart disease. But being stressed itself can alter the way the body behaves and this can bring about changes to the blood and nervous system, which can have negative effects on your heart health. Studies show that acute stress triggers reduced blood flow to the heart, promotes your heart to beat irregularly and increases the likelihood of your blood clotting. All of these can trigger the development of cardiovascular disease. If you already have atherosclerosis and become acutely stressed you may experience chest pains caused by the arteries to your heart contracting and reducing the blood flow. When experienced over an extended period of time, all these effects can cause damage to the lining of the blood vessels. This makes the blood vessels more susceptible to atherosclerosis (Rozanski, et al, 1999). In Australia, an expert group concluded that there is strong and consistent link between depression, social isolation and lack of quality social support and heart disease. These factors were as risky to heart health as abnormal blood lipid levels, smoking and high blood pressure (Bunker, et al, 2003). Elsewhere, other researchers have found a strong link between anxiety and heart disease. One study found a linear progression between self-reported psychological stress and damage to the carotid artery (Wolff et al., 2005). Research is continuing in this area to define more clearly which kinds of stress are more likely to trigger cardiovascular disease. Whatever the outcome may be, we already know that different types of stress tend to cluster together. When they do, the resultant risk for cardiac events is often substantially elevated (Rozanski et al, 1999). Changing your behavior, your circumstances and reduces stress, where possible, may help you reduce your risk of developing cardiovascular disease.

4.2.9 Number of Marriage

Table 12: Number of Marriage among Cases and Controls

variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
Number of marriage (1)	88	88%	75	75%	163	81.5%	
Number of marriage (More than 1)	12	12%	25	25%	37	18.5%	0.018*
Total	100	100%	100	100%	200	100%	

*statistically significant

The above table (12) shown that marriage from tow wives represented as preventive factor from CHD. 12% of cases married twice, but 25 % among controls. odds ratio was found to be 2.444 with 95% CI (1.150-5.196) which mean that there is appositive association between marriage from more than wives and reducing of CAD incidence, also the differences between the tow group reaches statistically significance (*p-value* <0.05).

In Gaza Strip, the man when need to marriage more than one wife for some reason, the study clearly explained that man in Gaza Strip able to marriage another wife, and it is preventive from CAD.

The median age of marriage in Gaza for male and female was 23.6, 18.5 years respectively (PCPS, 2007).

Because our result wasn't supported from other studies, we advice researchers to do further studies to follow-up this result .

4.2.10 Times of Pregnancy

Table 13: t test comparing the Means of Pregnancy Times among Cases and Controls

Variable	Subject	Number	Mean	SD	Lower CI	Upper CI	Sign.
Pregnancy times	Case Control	22 22	10.67 8.38	2.887 3.309	.349 .348	4.222 4.223	0.022*

*statistically significant

The above table (13) explains t test comparing the means of pregnancy times among cases and controls, shown that mean of cases (10.67) was higher than mean of control (8.38), and the differences between tow means reached statistically significant.

Cardiac disease complicates approximately 1% to 3% of pregnancies and is responsible for 10% to 15% of maternal mortality (Arafeh and Baird , 2006).

During pregnancy, the changes of cardiovascular physiology can impose additional load and risk on the cardiovascular system of women with heart disease (Koch KC, 2008).

It is estimated that 10% of pregnancies are affected by hypertension worldwide. Approximately one-half of all hypertensive pregnancy disorders are due to preeclampsia, a pregnancy-specific disorder, its distinctive feature being either sudden onset, or worsening of pre-existing proteinuria. It has become increasingly recognized that women with a history of preeclampsia are at increased risk for future cardiovascular disease (CVD), but the mechanisms of this increase in risk are unclear (Craici , 2008).

Previous results in table(13) confirm that women may be faced many of cardiac risk factors in pregnancy, we suggest that all of the previous study support our results which talked about risk factors of heart disease including CHD increases when the number of pregnancies times increase (regardless of the success or failure of pregnancy).

4.2.11 Living with Extended Family

Table 14: Living with Extended Family Among Cases and Controls

Variable	Cases		Control		Total		*P value*
	No	**%**	**No**	**%**	**No**	**%**	
Lived in extended family(From 10 year and less)	42	42%	58	58%	100	50%	0.019*
Lived in extended family(From 11 year and above)	58	58%	42	42%	100	50%	
Total	100	100%	100	100%	200	100%	

*statistically significant

In Gaza Strip living with extended family maybe represented a kind of social security but also full of distress because of closure, food shortages, unemployment, and so on, the previous table explain , percentage among cases who lived with extended family 11 years and above (58%), while among controls were (42%), were more than among controls, odds ratio was found to be .512 with 95% CI (.291-.899) which mean that there is appositive association between lived with extended family for more than 10 years and CAD, and this differences between tow group were reached statistically significance (*p-value* <0.05).

as shown in table(14).

Life with the extended family for a married person has its advantages and also has disadvantages in Gaza Strip. A lot of married couples are turning to live with their parents because of the difficult economic conditions in Gaza Strip. Advantages to live with extended family are the sense of food security somewhat as a result of high unemployment in Gaza Strip. As for many of disadvantages, are being exposed to tensions as a result of family conflict especially when have children , many demands of life and lack of space in which they live, putting them in psychological stress resulting many organic diseases,

including CVD. Married persons who live in extended family may practice some of bad habits as smoking, and alcohol intake as a result of family conflict to deflate stress as they think leading to increased risk factors of CHD. which explained by (Hamer , 2008). We invite researchers to in-depth study to clarify the relationship between CHD and living with extended family.

4.2.12 Diet Lifestyle

Among all cases included in the study only 17% eat regularly fruit and vegetable and 20% among controls. 14% among cases there meals depend on mainly animal meat, and 12% among controls. 55% among cases take there meals regardless his content (Miscellanies). We know that individuals who consume higher amount of fresh fruits and vegetables have lower rates of heart disease (Michael, 2001).

The result of our study was not supported by another study. According to the political, economic conditions, social and length of time that peoples spent in the Gaza Strip under Israeli occupation, all of these factors may be fertile ground for the emergence of many contradictions, so we may see some phenomena that conflict with other countries, that exclusive for peoples who lived under occupation.

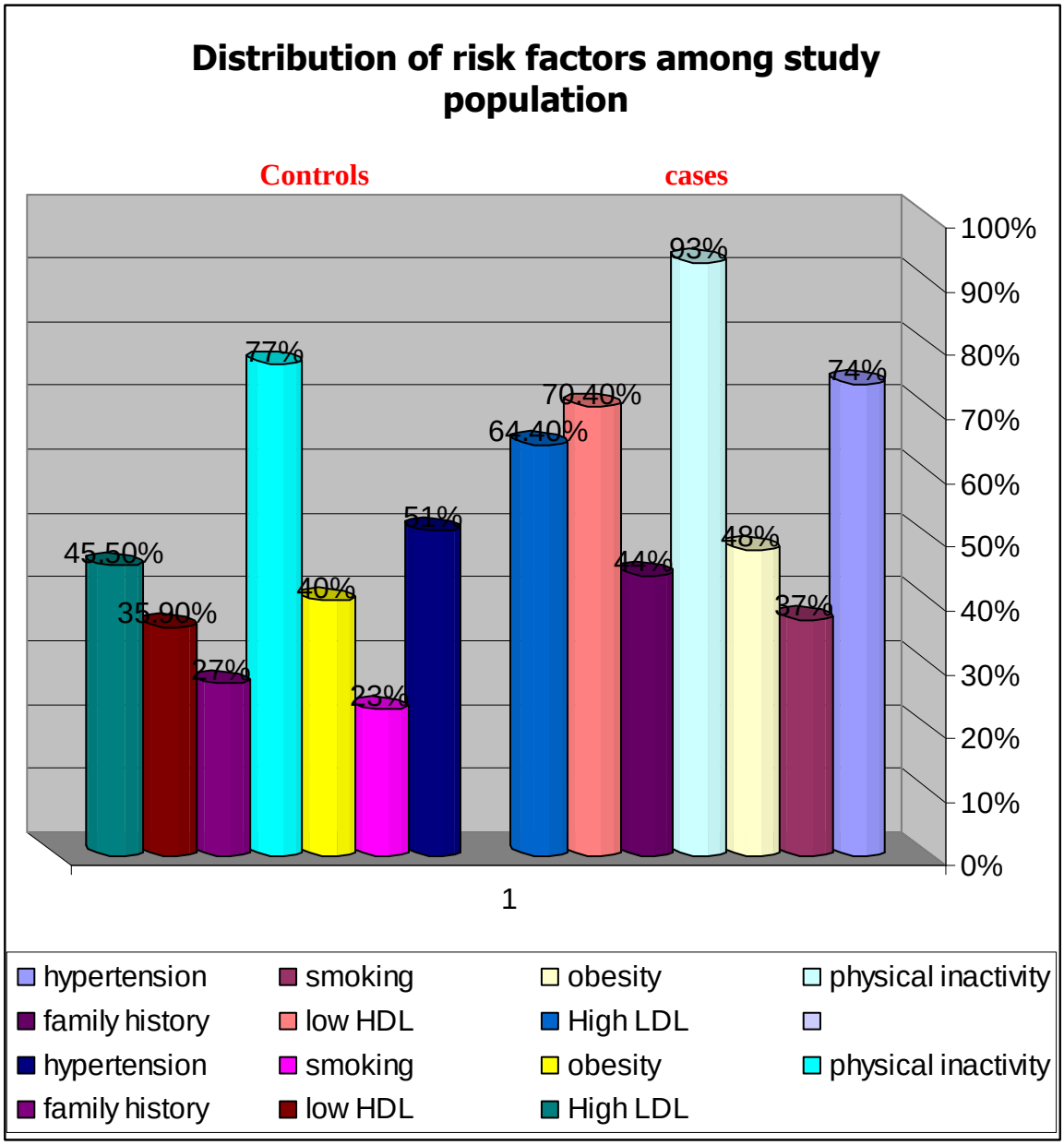
So there are no big observable differences in lifestyles between controls and cases to reach statistically significant. Few patients attributed CHD to poor diet. Many admitted they were overweight and needed to improve their diet but were unwilling to sacrifice taste for better health. Some patients consumed less fried foods and more low-fat dairy products. Some found it difficult to modify their diet when they visited others, and so they avoided visiting people (Astin, 2008).

The role of diet is crucial in the development and prevention of cardiovascular disease. Diet is one of the key things you can change that will impact all other cardiovascular risk

factors. Comparisons between a diet low in saturated fats, with plenty of fresh fruit and vegetables, and the typical diet of someone living in the developed world show that in the former there is a 73% reduction in the risk of new major cardiac events. Research makes it clear that abnormal blood lipid (fat) levels have a strong correlation with the risk of coronary artery disease, heart attack and coronary death. In turn, abnormal blood lipids are related to what you eat. A diet high in saturated fats (e.g. cheese) and trans fats (often used in cakes, cookies and fast food) leads to high levels of cholesterol. Saturated fats are found in animal products. Trans fats are oils that have been hydrogenated to turn them into semi-hard fats. Hydrogenated fat is found in processed food like shop-bought cakes, biscuits, stock cubes and a range of other products you buy every day. Saturated and trans fats raise cholesterol levels in the blood, which in turn can lead to atherosclerosis. Unsaturated fats, polyunsaturated and monounsaturated are beneficial for heart health. They are present in fish, nuts, seeds and vegetables. Eating a diet high in fresh fruits and vegetables protects your heart. Low fruit and vegetable intake accounts for about 20% of cardiovascular disease worldwide. Fruit and vegetables contain components that protect against heart disease and stroke. (Caterina met al, 2006).

4.3 Summary of the main findings:

Figure 8: Distribution of Risk Factors among Study Population



Distribution of Risk Factors among Study Population

It became clearly to us to observe the difference in the distribution of risk factors between cases and controls.

As shown in Fig. (8), the differences in the ratios between cases and controls are clear in all risk factors.

Chapter V

Conclusions and Recommendations

According to literatures review and our study result we conclude that cardiovascular disease can be preventable in many cases because most of risk factors are modifiable.

The primary purpose of the study was to identify the most common risk factors of CAD in adults undergoing cardiac catheterization in Gaza governorates that distinguishes Gaza Strip from other country.

The most common modifiable risk factors were physical inactivity, low HDL, high LDL, diabetes mellitus, smoking, having three wives, pregnancy times regardless failure or success, stress, and living with extended family respectively.

The most common non modifiable risk factors were age 50 and more, sex, and family history .So this study conclude some of recommendation that may help decreasing in morbidity and mortality, so the following recommendations are suggested:

1- Projects involve either primary or secondary prevention and focus on children, the community, or the workplace about cardiovascular disease risk factors.

2- Reduces stress, where possible, may help you reduce your risk of developing cardiovascular disease.

3- Consume a diet high in fruits vegetables, nuts and whole grains, and low in refined grains. Avoid excessively salty or sugary foods.

4- At least 30 minutes of regular physical activity daily

5- Avoid smoking.

6- Maintain a healthy weight.

7- Cholesterol screening programs especially in universities.

8- Research on tobacco control should be undertaken to estimate the prevalence of regular tobacco use in the community.

9- Research to estimate the prevalence of diabetes mellitus and hypertension in the community.

10- Research to control hypertension and diabetes mellitus in the community.

11- Screening programs to determine peoples at high risk for cardiovascular disease.

12- Cardiovascular disease family history screening programs especially in universities .

References

Achari V, Thakur AK, Achari V, Thakur AK. (2004): ***Association of major modifiable risk factors among patients with coronary artery disease--a retrospective analysis.*** J Assoc Physicians India. Feb;52:103-8, Heart Hospital, Kankarbagh, Patna.

Akbartabartoori M, Lean ME, Hankey CR.(2006): ***Smoking combined with overweight or obesity markedly elevates cardiovascular risk factors***. European Journal Cardiovascular Prevention and Rehabilitation. Dec;13(6):938-46, University of Glasgow, Glasgow Royal Infirmary, Glasgow, Scotland, UK.

Akbartabartoori, M et al. (2008): ***The associations between current recommendation for physical activity and cardiovascular risks associated with obesity*****:** European Journal of Clinical Nutrition. Jan;62(1):1-9. Yasuj University of Medical Sciences, Yasuj, Iran.

Al Riyami, A and Afifi, M . (2003): ***Clustering of cardiovascular risk factors among Omani adults.*** Eastern Mediterranean health journal, Sep-Nov; vol 9 (issue 5-6) : pp 893-903 , Department of Research and Studies, Ministry of Health, Oman.

Al-Gindan YM et al. (1990): ***Acute myocardial infarction in the Eastern Province of Saudi Arabia: retrospective analysis of 264 patients.*** Annals of Saudi medicine, , 10:129-36.

Alwan A. (1996): ***Prevention and management of hypertension.*** Alexandria, WHO Regional Office for the Eastern Mediterranean, (EMRO Technical Publications Series, No. 23).

American Heart Association. (2009): ***Heart Disease and Stroke Statistics-2009 Update.*** Dallas; AHA:. Statistics Committee and Stroke Statistics Subcommittee. Circulation. **2008**;156(6):1217-22.

Anderson GF, Chu E .Expanding priorities. (2007): ***confronting chronic Diseases in countries with low income.*** New England Journal of Medicine, Volume 356:209-211 January 18, 2007 Number 3

Arafeh JM, Baird SM. (2006): ***Cardiac disease in pregnancy:*** Critical Care Nursing Q. Jan-Mar;29(1):32-52, Stanford University, Palo Alto, CA 94304, USA.

A Rozanski, JA Blumenthal, J Kaplan. (1999): ***Impact of psychological factors on the pathogenesis of cardiovascular disease and implications for therapy.*** Circulation. Apr 27;99(16):2192-217.

Astin F. (2008): ***Many patients with coronary heart disease believed that stress and lifestyle factors caused their illness.*** Evidence-Based Nursing;11:127; doi:10.1136/ebn.11.4.127, University of Leeds, Leeds, UK.

Barker, D.J.P., Forsen, T., Uutela, A., Osmond, C. and Eriksson, J.G. (2001): ***Size at birth and resilience to effects of poor living conditions in adult life:*** longitudinal study. British Medical Journal,. 323, (7324), 1273-1276,UK.

Baynouna LM et al. (2008): ***High prevalence of the cardiovascular risk factors in Al-Ain, United Arab Emirates. An emerging health care priority*:** Saudi Med J. Aug;29(8):1173-8, Al-Ain, United Arab Emirates.

British Heart Foundation. (2008): ***European Cardiovascular Disease Statistics,. International Cardiovascular Disease Statistics, Statistical Fact Sheet — Populations,*** http://www.americanheart.org/downloadable/heart/1236204012112INTL.pdf

B Wolff, H J Grabe, H Völzke, J Lüdemann, C Kessler, J B Dahm, H J Freyberger, U John and S B Felix. (2005): ***Relation between psychological strain and carotid atherosclerosis in a general population. Heart***.;91:460-464.

Cardiovascular disease. (2007)***: Fact sheet N°317*** www.who.int/mediacentre/factsheets/fs317/en/print.html accessed on 2/8/2009

Cardiovascular Disease Statistics**.** American heart association. (2009)**.** http://www.americanheart.org/presenter.jhtml?identifier=4478 accessed on 2/8/2009.

Central of disease control and prevention. (2007): ***Health, United States, 2007 with chart book on trends in the health of Americans.*** Hyattsville; National Center for Health Statistics..

Central of disease control and prevention.(2009): ***About Heart Disease.*** http://www.cdc.gov/heartdisease/about.htm accessed on 30/7/2009.

CEMACH - Why mothers die; Confidential enquiry into maternal deaths in the UK Confidential Enquiry into Maternal and Child Health (CEMACH) - Executive Summary; (2000-2002).

Corrao JM et al. (1990): ***Coronary heart disease risk factors in women.*** Cardiology, 77(suppl. 2):8-24.

Craici I, Wagner S, Garovic VD . (2008): ***Preeclampsia and future cardiovascular risk: formal risk factor or failed stress test?.*** Ther Adv Cardiovasc Dis. Aug;2(4):249-59, Division of Nephrology and Hypertension, Department of Medicine, Mayo Clinic College of Medicine, Rochester, Minnesota 55905, USA.

Darr A, Astin F, Atkin K. (2008): ***Causal attributions, lifestyle change, and coronary heart disease: illness beliefs of patients of South Asian and European origin living in the United Kingdom.*** Heart Lung;37:91–104.

Deepak et al. (2006): ***International Prevalence, Recognition, and Treatment of Cardiovascular Risk Factors in Outpatients With Atherothrombosis*:** The journal of American association(JAMA): Vol. 295 No. 2, January 11.

DeFaria Yeh D. (2007): ***Risk factors for coronary artery disease in patients with elevated high-density lipoprotein cholesterol***. American Journal of Cardiology. Jan 1;99(1):1-4. Department of Medicine, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA.

Department of Health and Human Services. (1996): ***Physical activity and health: a report of the Surgeon General*. Atlanta,** GA 30341-3724. 1-888-CDC-4NRG or 1-888-232-4674.

Dongfeng Gu et al . (2005): ***Prevalence of Cardiovascular Disease Risk Factor Clustering Among the Adult Population of China:*** *Circulation.*;112:658-665. Chinese Academy of Medical Sciences and Peking Union Medial College, Beijing, China.

El-Atat F, McFarlane SI, Sowers JR. (2004): ***Diabetes, hypertension, and cardiovascular derangements: Pathophysiology and management.*** Curr Hypertens Rep;6:215-23.

El dabbakeh H,. (2000): ***Coronary Heart Disease Risk Factors Assessment Among Adult Population In Gaza Strip.*** Unpublished master's thesis, Alquds University. Palestine.

Eric L Ding and Vasanti S Malik. (2008): ***Convergence of obesity and high glycemic diet on compounding diabetes and cardiovascular risks in modernizing China: An emerging public health dilemma:*** *Globalization and Health*, Department of Nutrition, Harvard School of Public Health, Boston, Massachusetts, USA.

Faletra FF et al . (2009): ***Relationship between coronary atherosclerotic plaques and traditional risk factors in people with no history of cardiovascular disease undergoing multi-detector computed coronary angiography***. heart(British cardiac society) Apr 29. Cardiocentro Ticino, Switzerland.

Gang Hu et al **.** (2007): ***Occupational, Commuting, and Leisure-Time Physical Activity in Relation to Cardiovascular Mortality Among Finnish Subjects With Hypertension .*** American Journal of Hypertension, Volume 20, Issue 12. December, Pages 1242-1250, National Public Health Institute, Helsinki, Finland.

Garovic VD, Hayman SR. (2007): ***Hypertension in pregnancy: an emerging risk factor for cardiovascular disease***. National Clinical Practice of Nephrology Nov;3(11):613-22, Mayo Clinic College of Medicine, 200 First Street South West, Rochester, MN 55905, USA.

Gensini GF, Comeglio M, Colella A: (1998): ***Classical risk factors and emerging elements in the risk profile for coronary artery disease.*** Eur Heart J;19(suppl A):A53-A61.

Guo YH, Zhang WJ, Zhou YJ, Zhao D, Zhou ZM, Zhang H. (2005): ***Study of the relationship between cardiovascular risk factors and severity of coronary artery disease in patients underwent coronary angiography.*** Zhonghua Xin Xue Guan Bing Za Zhi. May;33(5):415-8, Capital University of Medical Science, Beijing 100029, China**.**

Gupta R, Kaul V, Prakash H, Sarna M, Singhal S, Gupta VP. (2001): ***Lipid abnormalities in coronary heart disease: a population-based case-control study:*** Indian Heart J. May-Jun;53(3):332-6. Department of Medicine and Pathology, Monilek Hospital and Research Centre, Jaipur.

G. David Batty ***Physical activity and*** *coronary heart disease* ***in older adults , A systematic review of epidemiological studies:*** European Journal of Public Health, Volume 12, Number 3 Pp. 171-176 , UK.

Hakim A A, Petrovitch H, Burchfiel C M. et al . (1998): ***Effects of walking on mortality among nonsmoking retired men.*** New England Journal of Medicine,33-894–99.

Hamer M, Molloy GJ, Stamatakis E. (2008): ***Psychological distress as a risk factor for cardiovascular events: pathophysiological and behavioral mechanisms.*** J Am Coll Cardiol. Dec 16;52(25):2156-62, Department of Epidemiology and Public Health, University College, London, United Kingdom .

Hayes DK, Greenlund KJ, Denny CH, Keenan NL, Croft JB. (2003): ***Disparities in multiple risk factors for heart disease and stroke,*** *MMWR*. 2005;54:113–116.

Heart Disease Health Center. (2007)***: cardiac-catheterization*** http://www.webmd.com/heart-disease/cardiac-catheterization. accessed on 14-3-09.

Heart encyclopedia web sit. (1990): ***Biostatistical Fact Sheet – Populations.***, , accessed from http://www.ipc-india.com/heart-encyclopedia/page/23.asp on 3/8/2009

Hodgson TA, and Cai L.. (2001): ***Medical Care Expenditures for Hypertension, its Complications, and its Comorbidities*** .*Medical Care*. 39: 6 599-615.

Husmann L et al . (2008): ***Impact of hypertension on the diagnostic accuracy of coronary angiography with computed tomography.*** Int J Cardiovasc Imaging. Oct;24(7):763-70. Epub 2008 Mar 28. Switzerland.

H Bosma, MG Marmot, H Hemingway, AG Nicholson, E Brunner, A Stansfeld. (1997): ***Low job control and risk of coronary heart disease in Whitehall II (prospective cohort) study.*** British Medical Journal.;314:558-65.

I. Idris, R. Deepa, D. Fernando, V. Mohan. ***Relation between age and coronary heart disease (CHD) risk in Asian Indian patients with diabetes: A cross-sectional and prospective cohort study***. Diabetes research and clinical practice ISSN 0168-8227, india.

International Diabetes Federation. (2001): ***Diabetes and Cardiovascular Disease: A Time to Act.***. IDF. Brussels, Belgium.

Isles CG, Paterson JR . (2000): ***Identifying patients at risk for coronary heart disease: implications from trials of lipid-lowering drug therapy***. QJM. Sep;93(9):567-74, Departments of Medicine and. Biochemistry, Dumfries and Galloway Royal Infirmary, Dumfries, UK.

Jain P, Jain P, Bhandari S, Siddhu A. (2008*): **A case-control study of risk factors for coronary heart disease in urban Indian middle-aged males.*** Indian Heart Journal. May-Jun;60(3):233-40, University of Delhi, Delhi, India.

J Leal, R Luengo-Fernandez, A Gray, et al. (2006): ***Economic burden of cardiovascular diseases in the enlarged European Union.*** European Heart J. Jul;27(13):1610-9.

J Mackay, G Mensah. (2004): ***Atlas of Heart Disease and Stroke.*** World Health Organization. Geneva.

Jolliffe JA, Rees K, Taylor RS, et al. (2000): ***Exercise-based rehabilitation for coronary heart disease.*** Cochrane Database Syst Rev; (4): CD001800. Update in: Cochrane Database Syst Rev 2001; (1): CD001800.

JPD Reckless, J Morrell. (2005): ***Lipid disorders: your questions answered.*** Elsevier Churchill Livingstone, Edinburgh.

Kannel WB, Thom TJ. (1984): ***Declining cardiovascular mortality***. Circulation, , 70(3):331-6.

Koch KC . (2008): ***Heart disease in pregnancy:*** Dtsch Med Wochenschr. Aug;133(33):1684-8. Medizinische Klinik I, Universitätsklinikum Aachen, RWTH Aachen. German.

Laurenzi M et al. On behalf of the Gubbio study group. (1990): ***Multiple risk factors in hypertension: results from the Gubbio study.*** Journal of hypertension, , 8:7-12.

Leeder, S., S. Raymond, H. Greenberg, H. Liu, and K. Esson. (2004): ***A Race against Time: The Challenge of Cardiovascular Disease in Developing Countries*** . *The* Lancet Neurology, Volume 3, Issue 7, Pages 391-393. New York: Trustees of Columbia University.

Lilienfeld DF, and stolly PD. (1994):***Observational studies: case control studies.*** Foundations of epidemiology 3ed;226-51 New Yourk.

Lu P, Sun N, Lu J, Lu M . (2002): ***Case control study on the association of coronary artery disease and cigarette smoking.*** Zhonghua Liu Xing Bing Xue Za Zhi. Aug;23(4):297-300, Peking University, Beijing 100044, China.

López EP, Rice C, Weddle DO, Rahill GJ . (2008): ***The relationship among cardiovascular risk factors, diet patterns, alcohol consumption, and ethnicity among women aged 50 years and older***. J Am Diet Assoc. Feb;108(2):248-56, Florida International University, Miami, FL, USA.

López EP et al . (2008): ***The relationship among cardiovascular risk factors, diet patterns, alcohol consumption, and ethnicity among women aged 50 years and older***. J Am Diet Assoc. Feb;108(2):248-56. Stempel School of Public Health, Dietetics and Nutrition Department, Florida International University, Miami, FL, USA.

Mathers, C. D., A. Lopez, C. Stein, D. Ma Fat, C. Rao, M. Inoue, and others. ***"Deaths and Disease Burden by Cause: Global Burden of Disease Estimates for 2001 by World Bank Country Groups."*** In *Disease Control Priorities Project Working Paper 18* . Bethesda, MD.

Mchenry L, salerno E. (1992***): Antihyperlipedemic drugs.*** Mosby's pharmacology in nursing, 18th Ed. Mosby:568-79.

Ministry of Health . (2005): ***Annual report*** . Palestine: MOH.

Ministery of Health, Palestinian National Authority Website. (2009)**: *The European Gaza hospital***. Gaza strip, Palestine. accessed on 30/7/2009. http://www.moh.gov.ps/newsite/en/index.php?action=view&page=hospitals&id=115

Michael J. (2001):***Primary and secondary prevention of coronary heart disease In: Heart disease.*** A text book of cardiovascular medicine, 6th edition W.B. Sounders CO.

Mikko Laaksonen et al **.** (2008): ***Health behaviours as explanations for*** *educational level* ***differences in cardiovascular*** *and* ***all-cause mortality: a follow-up of 60 000 men*** *and* ***women over 23 years.*** The European Journal of Public Health 18(1):38-43, Department of Public Health, University of Helsinki, Finland.

Motlagh, et al. (2009): ***Prevalence of cardiovascular risk factors in the Middle East: a systematic review:*** European Journal of Cardiovascular Prevention & Rehabilitation: June - Volume 16 - Issue 3 - pp 268-280.

Musaiger AO . (2004): ***Overweight and obesity in the Eastern Mediterranean Region: can we control it?*** Eastern Mediterranean, health journal Volume 10, No. 6, November, Pages 789 - 793 Bahrain Centre for Studies and Research, Manama, Bahrain.

Nakayama M, Ogawa H **. (**2006): ***Coronary heart disease in patients with diabetes mellitus****:* Nippon Rinsho. .Nov;64(11):2031-7. Graduate School of Sciences, Kumamoto University

National Health and Nutrition Examination Survey (NHANES, 1999-2004), ***National Center for Health Statistics and NHLBI.*** USA.

National Center for Health Statistics. (1990): ***Annual summary of births, marriages, divorces and deaths.*** United States, 1989. Monthly vital statistics report,:38 (13).

.

Ness J, Aronow WS, Ahn C . (2000): ***Risk factors for coronary artery disease in old persons in an academic hospital-based geriatrics practice***. Coronary Artery Disease. Jul;11(5):437-9, Department of Geriatrics and Adult Development, Mount Sinai School of Medicine, New York, NY, USA.

Oguma Y, Shinoda-Tagawa T. (2004): ***Physical activity decreases cardiovascular disease risk in women: review and meta-analysis.*** Am J Prev Med. Jun;26(5):407-18. Sports Medicine Research Center, Keio University, Yokohama, Kanagawa, Japan.

Palestinian central bureau of statistics . annual statistics. (2008): ***Median Age at First Marriage by Sex and Governorate***, Palestine.

Pestana A, Steyn K, Leiman A, and Hartzenberg GM.. (1996): ***The Direct and Indirect Costs of Cardiovascular Disease in South Africa in 1991***, Medical Journal 86: 6 679-84. South African.

PM Kearney, M Whelton, K Reynolds, P Muntner, PK Whelton, J He. (2005): ***Global burden of hypertension: analysis of worldwide data.*** Lancet; 365:217-223

Pyatat Tatsanavivat et al***. Prevalence of coronary heart disease and major cardiovascular risk factors in Thailand:*** international journal of epidemiology, Volume 27, Number 3 Pp. 405-409.

Rao VS, Khadrinarasimhaih NB, Kanjilal S, Mukerjee M, Kakkar VV. **(**2009): ***Genetic contribution to variation in atherothrombotic phenotypes in the Asian Indian population. The Indian Atherosclerosis Research Study***. Thromb Haemost. Aug;102(2):379-88, Tata Proteomics and Coagulation Unit, Thrombosis Research Institute, India.

RDe Caterina, A Zampolli, S Del Turco, R Madonna, M Massaro. (2006): ***Nutritional mechanisms that influence cardiovascular disease.*** American Journal Clinical Nutrition.; 83: 421S-426.

Reaven GM. Banting Lecture. (1988): ***Role of insulin resistance in human disease***. *Diabetes.*

;37:1595-1607.

Saraç F, Ozgen AG, Yilmaz C, Tüzün M. (2007): ***Cardiovascular risk factors in obese women and their first-degree relatives***. Anadolu Kardiyol Derg. Dec;7(4):371-7, Ege University, Izmir, Turkey.

SJ Bunker, DM Colquhoun, MD Esler, IB Hickie, D Hunt, VM Jelinek, BF Oldenburg, HG Peach, D Ruth, CC Tennant and AM Tonkin. (2003): ***Position Statement: "Stress" and coronary heart disease: psychosocial risk factors.*** Medical Journal of Australia; 178 (6):272-276.

Statistics Canada. (2005): ***Mortality Summary List of Causes . Released March 2009.*** heart and stroke foundation of Canada, accessed on 2/8/2009 http://www.heartandstroke.com/site/c.ikIQLcMWJtE/b.3483991/k.34A8/Statistics.htm..

TA. Gaziano. (2007): ***Reducing The Growing Burden Of Cardiovascular Disease In The Developing World.*** Health Affairs.;26(1):13-24.

Thakur. AK, and Achair.V. (2004): ***Association of major modifiable risk factors among patients with coronary artery disease--a retrospective analysis.*** Assoc physicians India Feb;52:103-8, Heart Hospital, Kankarbagh, patna**.**

The Center for Global Health and Economic Development. (2004): ***A Race Against Time: The Challenge of Cardiovascular Disease in Developing Economies.***. The Earth Institute at Columbia University, New York.

T T Haase et al. (2006): ***Heart disease and stroke statistics--2006 update: a report from the American Heart Association Statistics Committee and Stroke Statistics Subcommittee.*** Circulation.;113(6):e85-151.

U Broeckel, C Hengstenberg, B Mayer, et al. (2002): ***A comprehensive linkage analysis for myocardial infarction and its related risk factors.*** Nature Genetics;30;210–214.

United Nations Environment Programmes **.** (*2003): **UNEP Annual Report.*** UNEP.

U.S. Department of Health and Human Services. (2001): ***The Surgeon General's call to action to prevent and decrease overweight and obesity.*** Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, Office of the Surgeon General;.

Wikipedia. (2009): ***Concept in health and disease*****: Risk Factors**. accessed on 14-3-09. http://en.wikipedia.org/wiki/Risk_factor:

World Health Organization. (2008): ***The Global Burden of Disease:*** *2004 Update*. Geneva; WHO.

World Health Organization. (2007): ***World health report***.
http://www.who.int/whr/en/index.html

World Health Organization. (2004):.***World health report.***
http://www.who.int/whr/en/index.html

World Health Organization. (2003):***World health report***.
http://www.who.int/whr/en/index.html

World Health organization. (2002):***cardiovascular disease statistics***

http://www.who.int/whr/en/index.html

Yasar AS, and et al. (2008): ***Comparison of major coronary risk factors in female and male patients with premature coronary artery disease.*** Acta cardiol, Feb;63(1):19-25, Turkiye Yuksek Ihtisas Hospital, Department of Cardiology, Ankara, Turkey.

Zeina AR, Barmeir E, Zaid G, Odeh M. (2009): ***Coronary artery disease among hypertensive patients undergoing coronary computed tomography angiography.*** J Cardiovasc Med (Hagerstown). Mar;10(3):252-6, Department of Radiology and MAR Imaging Institute, Israel.

.

.

.

ANNEXES

ANNEX 1

Palestinian National Authority
Ministry of Health
Helsinki Committee

السلطة الوطنية الفلسطينية
وزارة الصحة
لجنة هلسنكي

التاريخ2009/6/3

Name:

الاسم: محمد نعيم وصفي مشتهى

I would like to inform you that the committee has discussed your application about:

نفيدكم علماً بأن اللجنة قد ناقشت مقترح دراستكم حول:-

Risk Factors of Coronary Artery Disease in Adults Undergoing Cardiac Catheterization in Gaza Strip: Case-Control Study

In its meeting on June 2009

و ذلك في جلستها المنعقدة لشهر 6 2009

and decided the Following:-

To approve the above mention research study.

و قد قررت ما يلي:-

الموافقة على البحث المذكور عاليه.

Signature
توقيع

Member
عضو

Member
عضو

Chairperson

Conditions:-

- Valid for 2 years from the date of approval to start.
- It is necessary to notify the committee in any change in the admitted study protocol.
- The committee appreciate receiving one copy of your final research when it is completed.

ANNEX 2

بسم الله الرحمن الرحيم

Al-Quds University
Jerusalem
School of Public Health

جامعة القدس
القدس
كلية الصحة العامة

التاريخ: ٢٠٠٩/٧/١٢

جضرة الاخ/ د. فايز شقليه المحترم
مدير مركز جولس لقسطرة القلب
تحية طيبة و بعد ،،،،

الموضوع: مساعدة الطالب/ محمد نعيم مشتهى

يقوم الطالب المذكور بعاليه باجراء بحث بعنوان :

Risk Factors of Coronary Artery Disease in Patients Undergoing Cardiac Catheterization in Gaza Governorates: Case-Control Study

كمتطلب للحصول على درجة الماجستير في الصحة العامة – مسار وبائيات وعليه نرجو التكرم بالايعاز لمن ترونه مناسب لتسهيل مهمة الطالب في جمع البيانات اللازمة من مركزكم الموقر
علما بان المعلومات ستكون لغرض البحث العلمي لدى الطالب و الجامعة فقط وسنطلعكم على النتائج في حينها.

شاكرين لكم حسن التعاون
و اقبلوا فائق الاحترام و التقدير

د. بسام أبو حمد
منسق عام برامج الصحة العامة

نسخة :
للملف

Jerusalem Branch/Telefax 02-2799234
Gaza Branch/Telefax 08-2884422-2884411
P.O. box 51000 Jerusalem

فرع القدس / تلفاكس 02-2799234
فرع غزة / تلفاكس 08-2884422- 2884411
ص.ب. ٥١٠٠٠ القدس

ANNEX 3

Palestinian National Authority
Ministry of Health
Gen.Dir.of Human Resources Development

السلطة الوطنية الفلسطينية
وزارة الصحة
الإدارة العامة لتنمية القوى البشرية

الرقم: ...581/ ...ح

التاريخ: 2009/07/13

الأخ الدكتور / عبد اللطيف الحاج المحترم ،،،
مدير مستشفى غزة الأوروبي

تحية طيبة وبعد،،،

الموضوع/تسهيل مهمة باحث

بالإشارة إلي الموضوع أعلاه، نرجو تسهيل مهمة الباحث محمد مشتهي في جمع المعلومات الخاصة ببحث التخرج لنيل شهادة الماجستير من كلية الصحة العامة بعنوان:

"Risk factor of coronary artery diseases in patients undergoing cardiac catheterization : Gaza governorates: case control study."

وتشمل الدراسة جمع معلومات من تذاكر المرضى الذين تم إجراء قسطرة قلبية لهم ما بين عام 2008 -2009 في نسم القسطرة القلبية في م. الأوروبي بحيث لا يتعارض مع مصلحة العمل وضمن ضوابط وأخلاقيات البحث الصحي.

وتفضلوا بقبول الاحترام والتقدير ،،،

مرفق طيه:
- صورة عن التعهد والالتزام

د. ناصر رأفت أبو شعبان
مدير عام تنمية القوى البشرية

وزارة الصحة
تنمية القوى البشرية
صادر: ...581/ ...ح
التاريخ: ...13/7/09 م

صورة لـ/
- مدير عام المستشفيات
- كلية صحة العامة
- الملف

Gaza – Al-Shifa Medical Complex
E-Mail : Gdhrd@MOH.gov.ps

Annex 4

Risk factors of coronary artery disease in patients undergoing cardiac catheterization in Gaza Strip

Cover Letter and Consent Form

Dear participant:

You are invited to be in the above mentioned research study. You have been selected as a participant because you meet the criteria for participation.

This study is conducted as apart of the requirement for master program in public health at alquds university school of public health, Palestine.

The purpose of this study is to identify risk factors associated with coronary artery disease (CAD) among adults population in Gaza Strip which in turn will help in developing abase line data that can help in developing a preventive health education and health promotion programs.

If you agree to be in this study, you need to answer the interview questions that will be filled immediately. Your weight, and height will be measured .

Record data from this study will be kept confidential. Report and/or publication will be not include any information that will make it possible to identify any participant individually.

It is your decision whether or not to participate in this research study.

Statement of consent

I have read/know the above information. I have asked questions and received answers. I understand that by answering the interviewer questions. I give consent for participant in the study.

Researcher

Mohammed Mushtaha

Annex 5

Questionnaire

Questionnaire No. :_____ case / control

Personal Information:

1. Gender: 1-Male 2- Female

2. Age: / year

3. Marital status: 1- Single 2- married 3-Divorced 4-Widowed

4. Weight: / kg

5. Height: / centimeter

6. Body mass index: (a special for researcher)

7. Residential area:1- North 2- Gaza 3- Mid zone 4- Khanyounis 5- Rafah

8. Number of years of education: / year

9. Number of individuals in the house (who participate in the lounge, kitchen and bathroom): /person

10. Number of rooms in the house: / room

11. Monthly income of the family: / NIS

For married couples:

12. How old were you when got married: / year

13. Number of years of living with extended family: / year

14. Have you suffered from persistent problems within the extended family home: 1-Yes 2- No

15. If you are married , how many times married: /time

16. How would you describe your relationship with husband /wife(s) five years ago, before making the cardiac catheter: 1- excellent 2- very good 3- good 4- acceptable 5-poor

17. How would you describe your relationship for five years before cardiac catheter with children: 1- excellent 2- very good 3-good 4-acceptable 5-poor

18. Number of years of living in a separate house: / year

19. **Question for Female** / How many times pregnant regardless of the success or failure of pregnancy: /time

Smoking:

20. Do you smoke now: 1-Yes 2-No

21. Are you an ex-smoker: 1-Yes 2-No

22. How many years you an ex-smoker: / year

23. Total years of smoking: / year

24. How old were you started smoking: / year

25. How many cigarettes per day (24hours): / cigarette

26. How many times have quit smoking and then I went back to it: / time

27. Do you smoke shesha only: 1-Yes 2-No

28. Do you smoke shesha and also smoke cigarettes: 1-Yes 2-No

29. How many years you smoke shesha: / year

30. How many smokers in your home (who participate in the lounge, kitchen and bathroom): / person

Physical activity

31. Are you physically active: 1-Yes 2-No

32. Do you physical activity regularly: 1-Yes 2-No

33. Do you play sports at this time: 1-Yes 2-No If yes, go to the following two questions

34. What is a sport practiced by: 1- walking 2- Running 3- others

35. A sport practiced by day: / hour

36. Did you play sports in the past and stopped them: 1-Yes 2-No If yes, go to the next question

37. What kind of sport: 1- walking 2- running 3-others

38. Are you driving a car: 1-Yes 2-No If the answer is yes

39. Since when driving: / year

Food:

40. How many meals that usually dealt with in the day: /time

41. Do you eat at night (after 10 pm): 1-Yes 2-No

42. your food Depend on (before cardiac catheterization) to: 1-vegetables 2- meat 3- fried oils4-natural oils 5-canned 6-micellanece

Disease History:

43. Do you suffer from hypertension: 1-Yes 2-No If yes, answer the three questions the next

44. Since when: / year(s)

45. Means of treatment: 1-diet 2-pills 3-both

46. Is hypertension regular with treatment: 1-Yes 2-No

47. Do you suffer from diabetes: 1-Yes 2-No If yes, answer the three questions coming

48. Since when: /year(s)

49. How to treat diabetes:, 1-diet 2-pills 3-insulin 4-diet and insulin

50. Do you regularly the diabetes with treatment: 1-Yes 2-No

51. Have you had prior of coronary heart disease: 1-Yes 2-No

52. How many times have you had a cardiac catheterization: / time

53. First-degree relatives diseased with coronary heart disease: 1-Yes 2-No

54. If the answer is yes : 1-Male 2-Female

55. And How old when attacked : /year

Occupation:

56. What is the nature of your occupation: 1-mental 2-muscular

57. How many years were you at work: / year

58. Is the nature of the clicks of your exposure to the contaminated environment: 1-Yes 2-No

59. Is your business exposed to continuous noise machine or voice: 1-Yes 2-No

60. Are you satisfied with your work: 1-Yes 2-No

61. Do you suffer or suffered from persistent problems in your work: 1-Yes 2-No

Politics:

62. Lost someone close to you first degree for 5 years until diagnosed: 1-Yes 2- No

63. Do you live in an area frequently exposed to the Israeli incursion: 1-Yes 2-No

64. your home to shelling or shooting by the Israeli occupation forces: 1-Yes 2-No

65. Have you been bulldozed agricultural land owned by you: 1-Yes 2-No

66. Do you have been arrested in the past: 1-Yes 2-No If yes, answer the three questions coming

67. How the duration of detention: /month(s)

68. Is subjected to torture in detention: 1-Yes 2-No

Laboratory analysis of the patient's file:

69. LDL_____ 1-High 2- normal (less than 120mg/dl)

70. HDL_____ 1-low 2- normal (more than 35mg/dl)

THE END .....

Researcher:

Muhammad Naeem Mushtaha

ملخص الدراسة

تهدف الدراسة الى تحديد عوامل الخطر التي تؤدي للإصابة بأمراض شرايين القلب التاجية في محافظات غزة والتي بدورها قد تساهم في إعداد برامج وقائية لمنع الإصابة بهذه الأمراض.

ملخص الدراسة:

أمراض الأوعية الدموية للقلب تشكل الرقم الأول بالنسبة للوفيات في العالم، وحسب منظمة الصحة العالمية فان حوالي 17.5 مليون شخص ماتوا في عام 2005م بسبب هذا المرض مما يشكل حوالي 30% من مجموع الوفيات من باقي الأمراض، أما في فلسطين عام 2005م فان أمراض القلب لا تزال تحتل المركز الأول المسبب في الوفيات بنسبة 36.7% من مجمل الوفيات العام.

ورغم قلة الدراسات حول هذا إلا أننا نجد بأن هناك دراسة واحدة فقط في قطاع غزة عام 2000م تطرقت الى دراسة عوامل الخطر وهي ما تحدثت عنها الدراسات في مختلف بلدان العالم مثل الضغط ، السكر، وقلة الرياضة، إلا أننا نعتقد بأن هناك العديد من عوامل الخطر التي تميز محافظات غزة عن باقي الدول المجاورة والأجنبية.

منهجية الدراسة:

هذه الدراسة هي دراسة تحليلية تدرس الحالات المرضية وتقارنها مع عينة(مجموعة) ضابطة.

عينة الدراسة:

عينة الدراسة من حالات مرضية تم اختيارها بطريقة عشوائية من الذين أجروا قسطرة قلبية في عام 2008م من المركزين الوحيدين للقسطرة القلبية في محافظات غزة (م. غزة الأوروبي ومركز جولس لقسطرة القلب) وعددها 100 حالة و 100 ضابطة موزعة على جميع محافظات غزة ، آخذا بالاعتبار الجنس.

جمع المعلومات:

جمع المعلومات عن طريق استبيان تم إعداده ليحقق أهداف الدراسة وأيضا تم تحكيمه من خلال خبراء في مجال الصحة العامة، أما جمع المعلومات فمن خلال مقابلة مع المشاركين، وأيضا تم الاستعانة بملفات المرضى.

أهداف الدراسة:

1- فحص العلاقة بين تسديد الأوعية القلبية التاجية وبين الضغط، السكر، السمنة، التدخين، وقلة الرياضة.
2- فحص العلاقة بين تسديد الأوعية القلبية التاجية بين و LDL, HDL
3- فحص العلاقة بين تسديد الأوعية القلبية التاجية وبعض العوامل الديموغرافية مثل المناطق الحدودية التي تتعرض الى اجتياح مستمر من قبل جيش الاحتلال، تعدد الزوجات في ظل الأوضاع المعيشية الصعبة، والصراع الأسري، وعدد مرات الحمل عند المرأة.

4- تزويد المجتمع وصناع القرار بنصائح مستخلصة من الدراسة تعمل على تقليل معدل الوفيات والإصابة بهذا المرض.

النتائج:

في هذه الدراسة تم التعرف على العديد من عوامل الاختطار التي من المعتقد أنها ذات تأثير مباشر في الإصابة بالمرض وهي كالتالي:

السكر 54%، الضغط 74%، قلة النشاط الجسماني 93%، تاريخ المرض في العائلة 44%، ارتفاع البروتين الدهني LDL 64.4 %، انخفاض البروتين الدهني HDL 70.4% و السمنة، لقد أوضحت الدراسة بأن هذه العوامل ترتبط ارتباطا وطيدا بالمرض .

إضافة الى العوامل الأخرى التي اعتقد الباحث بأن لها علاقة بالمرض فقد أظهرت الدراسة بأنها ذات علاقة وثيقة بالمرض منها المناطق الحدودية التي تتعرض الى اجتياح متكرر والى اضطرابات سياسية تفوق المناطق الأخرى مثل شمال قطاع غزة بنسبة 24% ومدينة غزة بنسبة 43%، عدد مرات الحمل أيضا له علاقة بالمرض حيث أظهرت الدراسة بأنه كلما زاد عدد مرات الحمل بغض النظر نجاحه من فشله لما يحدث فيه من توتر ومخاطر قد تتعرض إليها الحامل فان فرصة الإصابة بالمرض تزيد ، أما بالنسبة لعدد مرات الزواج فان الدراسة بينت أن الزواج من أكثر من زوجة هو عامل وقاية من المرض ، وبالنسبة للعيش مع العائلة الممتدة لفترة طويلة (أكثر من 10 سنوات) ربما تمثل عامل خطر للإصابة بالمرض وكل ما سبق ذكره من العوامل أكدت الدراسة أنه ذات دلالة احصائية.

التوصيات:

1- تشجيع الجمهور على ممارسة الرياضة وتوضيح أهميتها من خلال برامج توعية تبدأ في المدارس، الإعلام مرورا حتى في المساجد لما لها من أهمية في تقليل نسبة الإصابة بالمرض.
2- وضع القوانين الصارمة للحد من التدخين.
3- مراقبة الناس في الرعاية الأولية الذين يثبتون أنهم لديهم تاريخ المرض في العائلة.
4- وضع برامج مكثفة تنصح النساء بتنظيم الحمل.
5- القيام بدراسة ذات حجم عينة أكبر تدرس العلاقة بين المرض والزواج المبكر.
6- القيام بدراسة ذات حجم عينة أكبر تدرس العلاقة بين المرض والصراع العائلي.