RELATIONSHIP BETWEEN THE DEMOGRAPHIC CHARACTERISTICS WITH LIPID PROFILE OF THE CARDIOVASCULAR PATIENTS IN DINAJPUR DISTRICT

A THESIS
BY

PHALGUNI CHAKRABORTTY
Registration No.: 1205083
Session: 2012-2013

MASTER OF SCIENCE (M.S.)
IN
BIOCHEMISTRY AND MOLECULAR BIOLOGY

DEPARTMENT OF BIOCHEMISTRY AND MOLECULAR BIOLOGY
HAJEE MOHAMMAD DANESH SCIENCE & TECHNOLOGY
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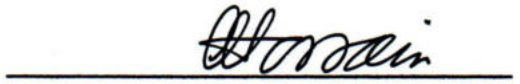

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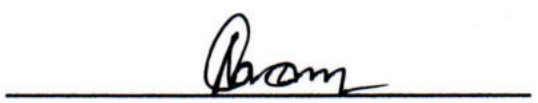

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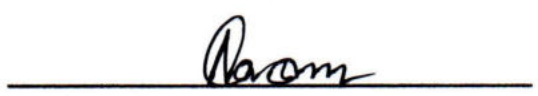

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JUNE, 2014

DEDICATED
TO MY
BELOVED PARENTS
AND
TEACHERS

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ABSTRACT

An investigation was conducted to establish a relationship between the demographic characteristics with lipid profile of the cardiovascular patients in Dinajpur district. Hundred cardiovascular (CVD) patients were selected randomly for this study from the patients admitted at the Dinajpur Medical College Hospital. Two types of data (i) demographic parameters (location, age, sex, weight, educational level, yearly income, occupation, physical activity, smoking behavior, alcohol consumption, dietary behavior, family history and types of CVD) (ii) Lipid parameters (TG, LDL, HDL and TC) were collected from each patient. All the demographic parameters had subcategories. Data related to demographic characteristics were collected by questionnaire and lipid parameters were analyzed by Evolution 3300 Semi Auto Biochemistry Analyzer. The frequencies and percentages of the subcategories of all the demographic parameters were calculated. Among the 100 cardiac patients , more patients were found in urban area (71%), age between 50-59 years (41%), male (70%), Weight 70-79 kg (48%), primary and lower educated people (58%), low income (38%), Farmers and labours (32%), Level of walking 1-3 day/week (44%), smokers (70%), alcohol consumption (54%), frequently taking of red meat and oily food (72%), positive family history of CVD (61%). From this study it can be concluded that among the four parameters of lipid profile most of the cardiac patients had upper level (borderline high + high) of LDL (48%+38%=86%) followed by TG (44%+37%=81%). On the other hand, 65% of cardiac patients had normal HDL and TC level. On the basis medical diagnosis three types of cardiovascular diseases were found. Such as Hypertension (43%), Myocardial Infarction (44%), Angina Pectoris (13%). The frequency of hypertension and MI was more among all CVDs. The relationship between demographic characteristic and clinical diagnosis was established. Statistically significant relationship was found between types of CVD with Location, Age, Weight, Educational status, Yearly income, Occupation, Physical activity and Food habit and not significant with Sex, Smoking behavior and Alcohol consumption. The relationship between the demographic parameters and lipid profile (TG, LDL, HDL and TC) was compared and statistically analyzed. The relationship of TG with all the demographic parameters was statistically significant except location and education. The relationship of LDL with age, weight, income, occupation, physical activity, alcohol consumption, food habit and family history were statistically significant, whereas with sex, location, smoking, educational status were insignificant. The relationship of HDL with all the demographic parameters was insignificant except weight and physical activity. The relationship between TC and the demographic parameters was insignificant except age. The correlation of age and weight with lipid profile was determined. Increasing age and weight causes increase in the lipid profile, which is found statistically significant. The results of this study might be used for strategic planning on cardiac care, prevention and control programs and it could also be used for planning preventive public health interventions to reduce CVD risk factors and thereby reduce CVD incidence and severity at Dinajpur district in Bangladesh.

CONTENTS

LIST OF TABLES

LIST OF PICTURES

ABREBEATIONS

MI- Myocardial Infarction

CVD- Cardiovascular Disease

CHD- Coronary Heart Disease

IHD- Ischemic Heart Disease

Hyperlipidmia- Increased plasma lipid profile

Normolipidaemia- Normal plasma lipid profile

Normotensive- Normal Blood pressure (120/80 mm of hg)

Hypotensive- Low blood pressure (<110/70 mm of hg)

Hypercholesterolaemia- Increased plasma total cholesterol level

Hyper LDL- Increased plasma LDL level

Hyper HDL- Increased plasma HDL level

Hypertriglyceridaemia-Increased plasma triglyceride level

HDL-High density lipoprotein

LDL-Low Density lipoprotein

TG- Triglyceride

TC-Total cholesterol

CHAPTER I
INTRODUCTION

CHAPTER I

INTRODUCTION

Cardiovascular disease (CVD) is the most frequent cause of adult death in the world. Due to CVD, One third of men and one-quarter of women is died in every year. Though the incidence of CVD has been decreasing in developed countries but it is increasing in Europe and the Indian subcontinent. Therefore, the CVD will soon become the leading cause of death in the subcontinent.

Prompt recognition of the development of heart disease is limited by two key factors. Firstly, it is very latent i.e., disease of the coronary arteries can proceed to an advanced stage before the patient notices any symptoms and secondly, it appears with many different pathological conditions.

Bangladesh has undergone a remarkable demographic transition over the last three decades. Striking changes have also been observed in the lifestyle and food habits. Lifestyle modification and health awareness are considered for the reduction of long term morbidity and mortality in patients with CHD. CHD is the leading cause of morbidity and mortality in industrialized countries, and it is emerging as a prominent public health problem in developing countries. As agro-based Bangladesh is turning to industry-based setting, CHD is also appearing in young to middle aged groups.

In the past three decades, attention has been focused on both blood lipids and the lipoproteins those have strong association with CHD.

The incidence of stroke and heart attack in the developing region of the world has been increasing steadily over the past several decades and calls for steps to be taken towards the prevention of CHD.

The decrease in plasma cholesterol concentration results in the reduction of incidence of CHD. There are strong rations between the concentration of Total Cholesterol (TC) and Low Density Lipoprotein (LDL) for CHD. The ration between TC and High Density Lipoprotein (HDL) is an important predictor of cardiac event. Increased TG also plays an important role in the causation of CHD. It is reported that serum TG, TC and LDL are directly associated with CHD whereas HDL is inversely associated with CHD (Devidson's Medicine Text Book, 2006).

Fatty diet and physical inactivity are responsible for increased TG, TC, and LDL. Exercise and fibrous diet is responsible for increased HDL. Moreover, low HDL as an independent predictor of CHD in non-diabetic patient. While Bangladesh is turning from rural to urbanization, CHD in middle aged and young group is also increasing. The prevalence of CHD was 14 per 1000 in Bangladesh (WHO, 2009).

The residents of Dinajpur have undergone significant changes in their lifestyle that are parallel to the development of the country. The adult and middle aged residents of Dinajpur are also suffering from variable types of CVD. So, the present study is to evaluate demographic characteristics and their association to lipid profiles with a view to explore the predictive risk of CHD among the urban and rural adult and middle-aged persons of different socioeconomic groups living at Dinajpur district of Bangladesh.

Objectives:

1. To collect the demographic data of cardiovascular patients.

2. To analyze the lipid profile of the patients having coronary heart disease.

3. To correlate between the demographic data and lipid profile of cardiovascular patients.

CHAPTER II

REVIEW OF LITERATURE

CHAPTER II

REVIEW OF LITERATURE

Cardiovascular disease (CVD) as well as Coronary heart disease (CHD) is a major global health problem with the majority of burden observed increasing in the developing countries. One of the major causes of CHD is high cholesterol level.

2.1 High cholesterol level

If one has high cholesterol, it may affect heart and blood vessels and increase risk of developing cardiovascular disease. High cholesterol causes fatty deposits (known as plaques) to build up inside blood vessels. In time, the blood vessels supplying heart may become so narrow they can't deliver enough oxygen to heart muscle, particularly when exerting. This can cause chest pain (angina). If a fatty plaque breaks off, it may cause a blood clot that can block blood flow to heart (heart attack), or if the same process occurs in brain it may cause a stroke (Devidson's Medicine Text Book, 2006).

2.2 Types of cholesterol

Cholesterol is transported around body attached to a protein in blood. This combination of fat and protein is called a lipoprotein. There are different types of lipoprotein, depending on how much fat there is in relation to protein (Devidson's Medicine Text Book, 2006).

2.3 High density lipoprotein

A small amount of body's cholesterol is transported as High Density Lipoprotein, which is mostly protein and not much fat. HDL transports excess cholesterol from tissues (including the walls of arteries) to liver for

disposal. As HDL helps prevent cholesterol building up in blood vessels, have a reduced risk of heart disease if have high levels of this type. This is why HDL is often referred to as 'good' cholesterol.

2.4 Low density lipoprotein

Most of body's cholesterol is transported as Low-Density Lipoprotein (LDL). It consists mainly of fat, with not much protein. LDL transports cholesterol from liver to cells. High levels of LDL increase risk of cardiovascular disease because LDL causes cholesterol to build up in blood vessels. LDL is often called 'bad' cholesterol.

2.5 Triglycerides

Triglycerides (TG) are another type of lipid that mostly comes from fats in food. Energy from food that is not used immediately is converted into triglycerides and transported to fat cells for storage. This provides with an important source of stored energy. Although most triglycerides are stored as fat, low levels are also found in blood. Having a raised level of blood triglycerides together with high LDL can increase risk of heart disease, particularly if have diabetes, high blood pressure or smoke.

2.6 Total cholesterol

High total cholesterol (TC) level is a risk factor for health problems, such as cardiovascular disease. But the ratio of HDL to total cholesterol is important. This is called TC: HDL. One should aim for a high level of HDL cholesterol and a low level of LDL.

2.7 Symptoms of high cholesterol

One may only find out that have high cholesterol if have a cholesterol test as part of a health checkup, or if develop symptoms of heart disease.

Sometimes, yellow patches (called xanthomas) may develop around eyes or elsewhere on skin – these are cholesterol deposits and may show that he or she has high cholesterol.

2.8 Complications of high cholesterol

If one has high cholesterol, it increases risk of heart disease and stroke. It may also affect arteries elsewhere in body such as legs – this is known as peripheral arterial disease.

2.9 Causes of high cholesterol

There are several factors that may contribute to having high cholesterol. These include:

- Having a diet high in saturated fat
- A lack of exercise
- Being obese (body mass index of 30 or more)
- Drinking excess amount of alcohol (this Increases the level of triglycerides in blood)
- Smoking
- Age and gender.

If a man younger than 55 are more likely to have high cholesterol than a woman. If a woman over 55 and past the menopause, her cholesterol levels are likely to increase.

Besides, poorly controlled diabetes, certain kidney and liver diseases and underactive thyroid (hypothyroidism) may also cause levels of cholesterol or triglycerides to be high. Some medicines such as the oral

contraceptive pill, beta-blockers, steroids or thiazides (a type of diuretic) may also affect blood lipid levels.

2.10 Diagnosis of high cholesterol

Cholesterol level is measured with a blood test. Usually one will be asked not to eat for 12 hours before the test so that the food is completely digested and doesn't affect the result. A blood sample is taken using either a needle and syringe, or a finger prick. Home-testing kits for cholesterol are also available but may not be very accurate.

There is no recommended target level of cholesterol, unless one already has cardiovascular disease or is at high risk. In these instances, the cholesterol levels should ideally be:

- under 4mmol/L for TC
- under 2mmol/L for LDL
- above 1mmol/L for HDL
- under 1.7mmol/L for TG

The levels of cholesterol in blood can vary from day to day, so doctor may take a series of different readings before recommending any treatment.

If one at high risk of cardiovascular disease or have a family history of high cholesterol, he or she should have cholesterol levels checked. Speak to doctor about how often it should be tested. Doctor should check the cholesterol levels every year if one has cardiovascular disease (Devidson's Medicine Text Book, 2006).

2.11 Clinical Features of Cardiovascular Disease

Pain is the cardinal symptom of CVD; but breathlessness, vomiting and collapse or Syncope are common features. The pain occurs in the same sites as angina but is usually more severe and lasts longer. It is often described as the tightness, heaviness or constriction in the chest. At its worst, the pain is one of the most severe which can be experienced and the patient's expression and pallor may vividly convey the seriousness of the situation. Most patients are breathless and in some case this in the only symptom (Devidson's Medicine Text Book, 2006).

Table 1. Symptoms and physical signs of Coronary Heart Disease

Symptoms
* Prolonged cardiac pain in chest, throat, arms, epigastria or back
* Anxiety and fear of impending death.
* Nausea and vomiting
* Breathlessness
* Collapse/Syncope

Physical Signs
* Pallor, sweating, tachycardia
* Vomiting, bradycardia
* Hypotension, oliguria, cold peripheries, narrow pulse, pressure, raised jugular venous pressure, third heart sound.
* Signs of tissue damage fever.
* Mitral regurgitation, pericarditis

Devidson's Medicine Text Book, 2006

Table 2. Risk factors of Myocardial Infarction

Major	Minor
Non modifiable:	* Obesity
* Age > 40	* Physical inactivity
* Male sex	* Stress
* Family history (+) ve	* Homocystine
* Genetic abnormality	* Postmenopausal estrogen deficiency
Modifiable:	* High carbohydrate intake
* Cigarette smoking	* Unsaturated fat intake hardened.
* Hypertension	* Lipoprotein
* Diabetic	* Alcohol
* Hyperlipidaemia	* Insulin resistance.

Devidson's Medicine Text Book, 2006

2.12 Prevalence of Cardiovascular Disease

Prevalence of CVD in a defined population at a certain time is the number of persons suffering from CVD per 100 persons at the given time.

$$\text{Prevalence} = \frac{\text{Number of affected persons x100}}{\text{Total no of population}}$$

$$\text{Prevalence increased/Changed} = \frac{(\text{Present prevalence} - \text{Previous prevalence}) \text{x100}}{\text{Previous prevalence}}$$

A research conducted by the American Heart Association in 2012 that people who consume fast food even once a week increase their risk of dying from coronary heart disease by twenty percent in comparison to people who avoid fast foods. People who eat fast-food two to three times per week, the risk of CVD increases by fifty percent, and the risk could be approximately eighty percent for people who consume fast foods four times or more per week (Andrew O. *et. al.*, 2012).

According to Mark Pereira (2009), the new research provides an important perspective on global health and the nutrition transfer when cultures developing in different parts of the world start moving away from their traditional diet and mode of exercise.

Gururajan *et.al.* (2010) reported that elevated lipid profile and reduced antioxidants accelerated the formation of atherosclerosis. Oxidative stress evaluation is now considered as an index for the assessment of development of CHD. TC, LDL cholesterol, HDL cholesterol, and TG were analyzed along with no enzymatic antioxidants such as vitamin C, vitamin E, reduced glutathione and protein thiol in controls and patients with CHD. The levels of total cholesterol and LDL cholesterol were significantly raised in patients when compared to controls in contrast to lowering of HDL-cholesterol levels in patients than controls. Oxidative stress and lipid profile should be included as important markers in the early detection of acute coronary syndrome.

Can. and Cardiol (2012) determined the impact of dietary changes and dietary supplements on lipid profile. With a growing number of dietary interventions that claim to improve lipid profile, it is important to ensure that these claims are evidence based. He identified 22 different dietary interventions and reviewed 136 studies. The consumption of nuts, protein,

green tea, red wine, as well as the supplementation with policosanol and red yeast rice extract, can be considered for improvement of the lipid profile, while the supplements of guggulipid, garlic, chromium, vitamin C, magnesium-pyridoxal-phosphate-glutamate, tocotrienols and absorbitol cannot be recommended.

In case of obese, medicating them with a medicine (Orlistat) and a hypocaloric diet, it was proved that their body weight and serum lipid profile has been changed (American Society for Clinical Nutrition, 2004).

The improvement in TC, LDL, HDL and LDL: HDL were also decrease the rate of CVD (Brian Hutton and Dean Fergusson, 2004).

Well Point Pharmacy Management (1993) revealed that, cardiovascular diseases are the leading cause of death in the United States. Researchers are still learning about different modifiable factors that may influence cardiovascular diseases. Socioeconomic status may provide a new focus. The principal measures of socioeconomic status have been education, occupation, and income or combinations of these. Education has been the most frequent measure because it does not usually change after young adulthood, information about education can be obtained easily and it is unlikely that poor health in adulthood influences level of education.

Curr Med Res Opin (2008) conducted a research about the serum lipid profiles and their relationship to cardiovascular disease. He found that, lipid abnormalities are frequent in the elderly and are associated with the presence of CVD. Low HDL and abnormal TG levels, when added to abnormal LDL, are associated with a higher prevalence of CVD, suggesting the advisability of a comprehensive lipid evaluation and treatment earlier in life.

Bryony (2007) published a study that, dyslipidemia is a major cause of coronary heart disease (CHD)—the most-common cause of death in the Western world—and is characterized by increased levels of TC, LDL, and TG, decreased levels of HDL, modified function of lipid molecules or a combination of some or all of these factors. Although mortality rates from CVD have reduced substantially over the past few decades, owing largely to the use of LDL-lowering statins, further strategies for reducing CVD risk are still urgently needed.

Mohamad *et.al.* (2011) reveled that although high levels of HDL seem to be protective against clinical events from atherosclerosis, assessing the composition and function of HDL is a more accurate approach to determine cardiovascular risk. The atheroprotective effects of HDL, have been attributed to its anti-inflammatory properties and role in cholesterol efflux.

Benoit *et.al.* (2011) found that the benefits of lowering LDL-cholesterol levels to prevent clinical events are well-recognized. However, other parameters of the lipoprotein–lipid profile are likely to contribute to cardiovascular risk and should be used in addition to the traditional lipid profile for improved assessment of cardiovascular risk.

Ariel Brautbar *et.al.* (2011) published the relationship between an elevated level of LDL-C and increased risk of cardiovascular disease is well established.

Byron J. (2012) conducted observational studies over many decades have shown a close, direct relationship between dyslipidemia and coronary heart disease risk.

2.13 Global scenario of cardiovascular risks and Bangladesh perspective

Age-Standardized Mortality Rates (ASMR) varies widely among European populations. World Health Organization (WHO) indicated that the cardiovascular disease mortality rate is six-fold higher among men and women in the Russian Federation compared with people in France. In 1996, the ASMR for coronary heart disease (CHD) among males in the Russian Federation was 390/100000 compared with 60/100000 among males in France. CVD mortality rates are much lower among women compared with men, which is similar for all countries. Eastern European countries such as the Ukraine, the Russian Federation, Hungary, and the Czech Republic have among the highest and increasing CVD rates in the world, where as the most economically stable European countries declines in CVD mortality rates over the past 30 years (WHO, 1998).

A study of WHO from rural Bangladesh demonstrated a dramatic increase in (CVD) from 1986–2006. The age-standardized CVD mortality rates increased by 30-fold (from 16 deaths per 100,000 to 483 deaths per 100,000) among males and 47-fold (from 7 deaths per 100,000 to 330 deaths per 100,000) in females. The prevalence and mortality from heart disease among Bangladeshis greatly exceeds that of Euripides. A study in New York City showed that Bangladeshis had more extensive and severe heart disease with 53% having triple-vessel disease compared to 26% among whites. This occurred despite the fact that Bangladeshis were younger and had lower body mass index and smoking rates with no difference in other risk factors including diabetes compared to whites (J. Moris, 2009).

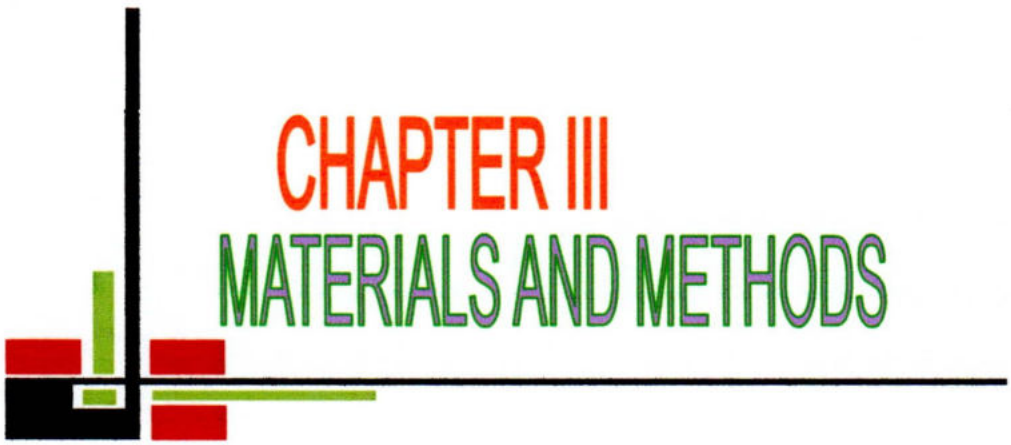
Moreover, in the UK, Bangladeshis also have the highest CVD mortality-higher than Pakistanis and Indians. Coronary artery disease mortality among Bangladeshis, compared to Euripides, was 50% higher before 20 years and has now increased to 100%. The death rates from stroke have also increased and are now three times higher than whites, despite similar access to health care (Beckles *et.al.* 1986).

In the UK, the high CVD mortality rates is accompanied by a correspondingly high prevalence of traditional risk factors, particularly smoking in men (57%), triglycerides (180 mg/dL), high blood glucose levels (119 mg/dL), and the lowest levels of HDL or good cholesterol (38 mg/dL). The blood pressure, however, was the lowest. Shortness of height is associated with a higher risk of heart attack and Bangladeshis were the shortest. Among South Asians in the UK, Bangladeshis were the most disadvantaged in terms of coronary risk factors and have the highest rate of smoking of all ethnic groups. They also had the highest rates of diabetes (27%), which was three to four times more common in Bangladeshis than in Europeans. The prevalence of diabetes in Bangladesh ranges from 8% to 11% with lower rates in rural regions but is increasing in both regions. Diabetes occurs at a much lower BMI than observed in Euripides (Bhopal *et.al.*1999).

Total number of patients who die due to ischemic heart disease (IHD) every year worldwide is almost 76 million. But 40% death can be prevented by controlling risk factors and life expectancy can be increased by 10 years globally. Bangladesh is one of the developing countries whose both incidence and prevalence of Ischemic heart disease has been increasing gradually and unless concerted efforts are made and national policy of prevention of risk factors are undertaken, it is feared that by next 10-15 years' time the number of patients will increase dramatically. This will

obviously put a serious stress on the health services resources and a big burden on health service providers. The improvement in clinical and interventional cardiology has been progressing at a galloping speed all over the world but at a very high cost and it has become difficult for a country like Bangladesh to transfer those technologies due to limited number of specialists in the field and the high cost of technology. The infra structural development in cardiology both in government and private sector has been progressing at a snail's space. Therefore we are at this stage is quite unprepared to face the large number of patients who will be seeking medical help and treatment facilities. Already a large number of patients are going abroad for cardiovascular treatment and which will increase in future. It is therefore very essential that we do put more emphasis on preventive measures in the overall challenges in management of IHD in Bangladesh (BBS, 2007)

The risk factors of IHD are now well established all over the world and its prevalence in Bangladesh's perspective has been evaluated over the last 15-20 years. The mortality of IHD is also higher in Bangladesh. Adequate approach in prevention of IHD has not made any head way in Bangladesh yet (BBS, 2007).



CHAPTER III
MATERIALS AND METHODS

CHAPTER III

MATERIALS AND METHODS

The present study was conducted in order to correlate between the demographic parameters and the lipid profile of the cardiac patients of Dinajpur district.

3.1 Location

The present study was conducted at the cardiac unit of Dinajpur medical college, Dinajpur, Bangladesh during the period of July-2013 to May-2014.

3.2 Sampling

Hundred cardiac patients were intervied randomly. The patients were interviewed and analyzed on the basis of their availability. All the patients were 40-75 years old. Persons those were taking lipid lowering drugs and those were suffering from liver disease, renal disease, and thyroid disorder excluded from the study.

3.3 Data collection

Two types of data were collected:

(i) Demographic and

(ii) Biochemical parameters (lipid profile)

3.3.1 Demographic data

Each subject was interviewed by a questionnaire after taking informed consent. Following demographic data were collected from the patients:

Location: According to the location the study subjects were categorized into two groups as Urban and Rural area.

Age group: According to the age of the respondents study subjects were categorized into four groups as 40 – 49 years, 50 – 59 years, 60-69 years and 70-80 years.

Sex Group: Male and female.

Weight: According to the weight of the respondents study subjects were categorized into four groups (50-59, 60-69, 70-79, 80-89) in kg.

Education status: According to the education status of the patients they were categorized into four groups as primary and lower educated, SSC/HSC and bachelor/ graduate.

Yearly income in taka: According to the yearly income of the patients they were categorized into four groups as (<50,000) (50,000- 1,00,000) (1,00,000-1,50,000) and (1,50,000-2,00,000/ above) tk

Occupation: According to the occupation of the patients they were categorized into four groups as businessman, service holder (office), housewife, farmer and labor.

Physical activity (walking): According to the walking level of the patients they were categorized into four groups as everyday, 4-6 days/week, 1-3 days/week and no walk.

Smoking behavior : According to the smoking behavior of the patients they were categorized into two groups as current/ex-smoker and never smoking.

Alcohol consumption: Sometimes consume and never consume.

Dietary behavior: According to the yearly income of the patients they were categorized into four groups as red meat and oily food, normal food and vegetarian.

Family history: According to the family history of the patients they were categorized into two groups as positive and negative.

Diagnosis (types of CVD): According to the diagnosis of the patients they were categorized into three groups as hypertension, myocardial infarction and angina pectoris.

3.3.2 Biochemical data

For the investigation of lipid profile following biochemical parameters were analyzed.

Total cholesterol (TC in mg/dl)

Low density lipoprotein (LDL in mg/dl)

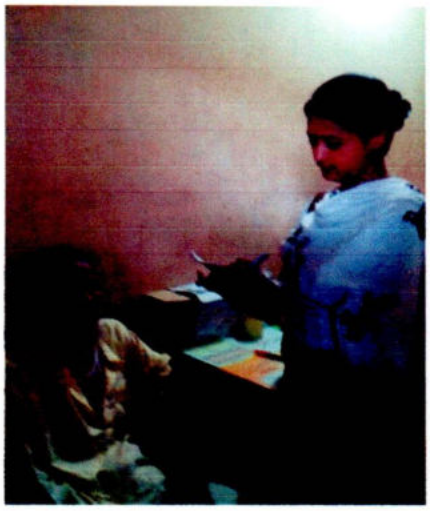
High density lipoprotein (HDL in mg/dl)

Triglyceride (TG in mg/dl)

The biochemical analyses were conducted at the department of Biochemistry and Molecular Biology, Hajee Mohammad Danesh Science and Technology University, Dinajpur and Medipoint diagnostic center, Dinajpur at fasting in the following day for biochemical test.

3.4 Procedure to analyze lipid profile

To analyze lipid profile, blood sample was collected from each patient at overnight fasting. TC, TG, HDL and LDL were estimated by enzymatic method. "Evolution 3300 Semi Auto Biochemistry Analyzer" was used for this and the reagent was "Randox Diagnostic 1 tali".



(a) (b)

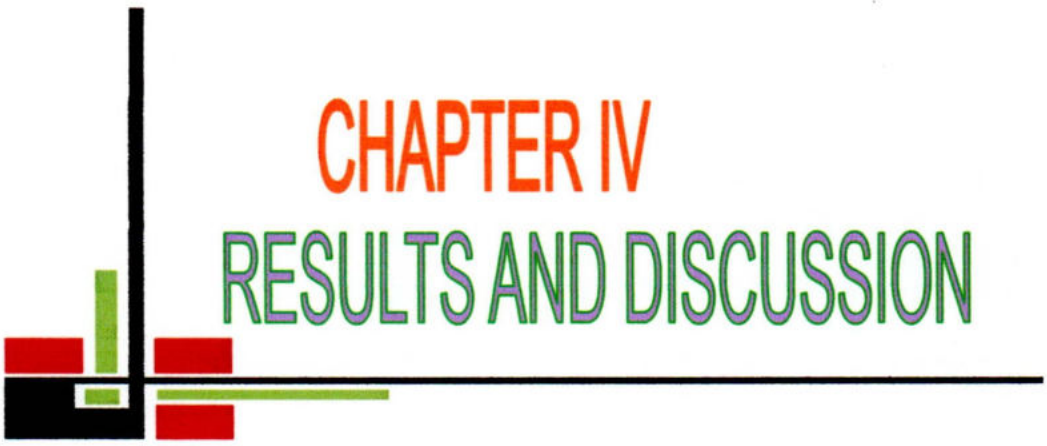
Fig-1: Interviewing Cardiac patients for collecting demographic data (a) Recording of Blood pressure (b) Data collection by questionnaire

Biochemistry Analyzer Analysis of blood sample

Fig-2: Analysis of biochemical parameters by Biochemistry Analyzer (Evaluation 3300 Semi Auto Biochemistry Analyzer).

3.5 Statistical analysis

To compare the demographic data with lipid profile statistical analysis was conducted. Descriptive statistics were calculated and completed by chi-square test. Correlation between the demographic parameters and lipid profile was calculated. Data were analyzed by using SSPC-16 statistical software.



CHAPTER IV
RESULTS AND DISCUSSION

CHAPTER IV

RESULTS AND DISCUSSION

The present study was conducted in order to correlate between the demographic parameters and the lipid profile of the cardiac patients of Dinajpur district. Hundred cardiac patients were randomly selected for interview. The demographic data were collected to determine their relation with lipid profile and their effects on cardiovascular patients. Thirteen demographic factors were considered to identify possible determinates of CVD at Dinajpur district.

4.1 Frequencies and percentages of the demographic parameters

The percentages of the subcategories of all the demographic and biochemical parameters were calculated. The results are shown in table 4.

Table 3. Frequencies and percentages of demographic characteristics of Cardiac patients with subcategories.

Demographic Characteristics	Subcategory	Frequency	Percentage
Location	Urban	71	71.0
	Rural	29	29.0
Age (Years)	40-49	16	16.0
	50-59	41	41.0
	60-69	36	36.0
	70-79	7	7.0
Sex	Male	70	70.0
	Female	30	30.0

Demographic Characteristics	Subcategory	Frequency	Percentage
Weight (Kg)	50-59	7	7.0
	60-69	31	31.0
	70-79	48	48.0
	80-89	14	14.0
Educational status	Primary and lower	58	58.0
	SSC / HSC	20	20.0
	Bachelor and higher	22	22.0
Yearly income (Tk)	<50000	38	38.0
	50000-100000	25	25.0
	100000-150000	21	21.0
	150000-200000	16	16.0
Occupation	Businessman	29	29.0
	Service holder (Office)	14	14.0
	Housewife	25	25.0
	Farmer and labor	32	32.0
Physical activity (walking)	Everyday	14	14.0
	4-6 Days/week	16	16.0
	1-3 Days/week	44	44.0
	No walk	26	26.0
Smoking behavior	Current/Ex-smoker	70	70.0
	Never smoke	30	30.0

Demographic Characteristics	Subcategory	Frequency	Percentage
Alcohol consumption	Sometimes	54	54.0
	Never	46	46.0
Food habit	Red meat and oily food	72	72.0
	Normal food	19	19.0
	Vegetarian	9	9.0
Family history	Positive	61	61.0
	Negative	39	39.0
Types of CVD	Hypertension	43	43.0
	Myocardial Infarction-MI	44	44.0
	Angina pectoris	13	13.0

4.1.1 Location

Among the studied patients, 71% was lived in urban area and 29% was from rural area (Table 3). In this study, it is showed that urbanization leads to develop more cardiac diseases probably due to less physical activity and dietary changes. World Health Organization (2011) reported that Bangladesh has been experiencing rapid urbanization for the past several decades and has created an environment that is unsafe for physical activity. It is also reported that hypertension were higher in urban areas (22.2% prevalence) than rural areas (14.3% prevalence) (WHO, 2011). Increased rapid urbanization also causes increased access to and popularity of fast food taking which may also contribute to poorer diet quality, particularly among the city's affluent class and Bangladeshis had the lowest prevalence for daily intake of fruits and vegetables (8.6%), WHO (2011).

4.1.2 Age

All the patients of this study were 40-79 years old (Table 3) and the mean age was 57.92 $\pm$ 8.008 (Appendix 49). Among them, 50-59 years old patients were more susceptible (41%) to CVD followed by 60-69 years (32%). The maximum number of CVD patients (41%) were found in the age range of 50-59 years.

4.1.3 Sex

In this study, male CVD patients (70%) were more than the female (30%) patients (Table 3). Male sex is alone a non-modifiable risk factor for coronary heart disease (Davidson, 2006). Smoking and alcohol drinking behavior are also risk factors for CVD and in this study these are found prominent among the male patients. There also found that adult males were more likely to be overweight or obese than adult females (Vos and Begg, 2007).

4. 1.4 Weight

The weight range of all the patients were 51-92 kg and the mean weight was 71.32 $\pm$ 7.894 (Appendix 49). This results indicated that most of the patients (48%) were obese (70-79) kg and the second highest group (31%) was overweight (60-69) kg. Only 7% patients were of normal weight (50-59) kg (Table 3). According to WHO (2011), the abdominal obesity among the Bangladeshis are 43.3% and the prevalence of overweight and obesity since 1995 has increased by 12%. Adult males were more likely to be overweight or obese than adult females, (Vos and Begg, 2007). Excess weight, especially obesity, is a major risk factor for cardiovascular disease, Type 2 diabetes, some musculoskeletal conditions and some cancers. In addition, being overweight can hamper the ability to control or manage chronic disorders (National Physical Activity Survey, 2000). A loss of just 5 to 10

percent of one's current weight can lower the risk of CHD adviced by National Heart, Lung and Blood Institute, Australia.

4. 1.5 Educational status

This study revealed that most of the CVD patients (58%) were primary or lower primary educated followed by Bachelor (22%) and the lowest group (20%) was SSC/HSC (Table 3). Primary educated or non-educated people were more sufferers to CVD probably due to lack of health knowledge and unhealthy diet. A 25 years long investigation on 50-year-old Swedish men by Lena Kilander *et al.* (2001) showed that low education was associated with a higher rate of mortality from cardiovascular disease compared to high educational attainment. On the other hand, graduate people suffer the second highest due to their office job, which is designed to less physical activity.

4. 1.6 Yearly income

Out of 100 patients, about 38% patients had yearly income <50,000 Tk, followed by 25% of yearly income 50000-100000 Tk, 21% of 100000-150000 Tk and 16% of 1, 50,000-2, 50,000 Tk. So, it is found that most of the subjects were low and middle class group (63%) (Table 3).

4. 1.7 Occupation

It was found that 32% patients were farmer and labor followed by businessman (29%) and housewives (25%). The lowest was service holders (office) (14%) (Table 3). Service holders are fewer sufferers probably due to education and knowledge. On the other hand, the farmers and labors are more suceptable to CVD probably due to lack of knowledge of food habits, health educations and low income.

4. 1.8 Physical activity

In this study it was noticed that patients (14%) who walked everyday suffered less from CVD followed by patients (16%) who walked 4-6 days per week and the most sufferers (70%) were patients who walked 1-3 days per week or less (Table 3). According to WHO study on 2011, Bangladeshis had the lowest prevalence for regular physical activity (1.3%) which is the leading cause of NCDs. For major health benefits, adults should do at least 150 minutes (2.5 hours) of moderate-intensity aerobic activity or 75 minutes (1 hour and 15 minutes) of vigorous-intensity aerobic activity each week. National Heart, Lung and Blood Institute (Vos and Begg, 2007).

4. 1.9 Smoking behavior

This study shows that all the female patients were non-smokers and all the male patients were current or ex-smokers (Table 3). Saquib *et al.* (2012) conducted a study and he found that 63% of men and less than 3% of women in Bangladesh are daily smokers. WHO (2011) reported that the Bangladeshis had the highest prevalence of CVD risk factors due to current and former smoking behavior (59.9%). One in six Australians aged 15 years and over smoked daily. Vos and Begg (2007). In 1998, an estimated 19,019 people died in Australia as a result of tobacco smoking and around 13% of deaths from cardiovascular disease are due to smoking tobacco.

4. 1.10 Alcohol consumption

This study shows that all the female patients were nonalcoholic (Table 3). Among the 70 male patients 54 patients drunk mild amount of alcohol and other male patients were nonalcoholic. Martin (1999) conducted a study and found that both heavy drinking and irregular drinking has been an important factor in the high rates of cardiovascular death experienced in Eastern Europian countries. Excessive alcohol consumption is a major risk factor for

morbidity and mortality in Australia. It was estimated that the harm caused by excessive alcohol consumption accounted for 4.9% of the total burden of disease in 1996 (Australian Institute of health and welfare, 2013). Another study said that Low to moderate alcohol consumption has been found to have a protective effect against hypertension, ischemic heart disease, stroke and gallstones for some subgroups of the population. The cardiovascular health benefit of low to moderate alcohol consumption relates mainly to men over 40 years of age and post-menopausal women (National Nutrition Survey, Australia 2000).

4. 1.11 Dietary behavior

Table 3 revealed that most of the CVD patients (72%) ate red meat and oil based food. The lowest groups of patients (9%) were vegetarian. Increased rapid urbanization also causes increased access to and popularity of fast food taking which may also contribute to poorer diet quality, particularly among the city's affluent class and Bangladeshis had the lowest prevalence for daily intake of fruits and vegetables (8.6%), WHO (2011). M. Dehghan *et al.* (2011) found that a higher-quality diet was associated with a lower risk of recurrent CVD events among people ≥55 years of age with CVD or diabetes mellitus. Saturated fats are found in some meats, dairy products, chocolate, baked goods, and deep-fried and processed foods. Tran's fats are found in some fried and processed foods. Both types of fat raise the low-density lipoprotein (LDL), or "bad," cholesterol level in our blood. High fat found in fish and olive oil, which are rich in omega-3 fatty acids. Omega-3 fatty acids lower the risk of heart attack, in part by helping prevent blood clots. Fiber is found in whole grains, fruits, and vegetables. A fiber-rich diet not only helps lower the LDL cholesterol level, but also provides nutrients that may help protect against CHD (National Heart, Lung and Blood Institute, Australia, 1998).

4.1.12 Family history

Table 3 shows that family history was 60% positive and 40% negative for CVD. Positive family history for most of the subjects would be due to genetic link and environmental factors. In this study it is found that presence of CHD in the history of family has a strong association for future CHD. In a study conducted by *M Abu Sayeed* (2012) on the prevalence of CHD in Bangladeshis in compare to other Asian population found that four factors were related to CHD. Positive family history of CHD, age over 45 years and who had hyperglycemia with higher lipid profile proved to be the independent predictors of CHD.

4.1.13 Types of Cardiovascular Disease

Among the CVD patients, 43% patients were found hypertensive, 44% were found Myocardial infarction patient and 13% patients were found suffering from Angina pectoris (Table 3). So, it can be said that the frequency of hypertension and MI is more among all CVDs. In a study on 'National Non Communicable Disease Risk Factor Survey' by Prof. Shah H M (2010) found that the prevalence of hypertension in normal population was 9.80% in male and 15.60% in female. A survey on CVD carried out in Bangladesh conducted by Dr. Ahmed M N (2011) showed prevalence of hypertension in adult population about 20-25%.

4.2: Descriptive statistics of the biochemical parameters

For biochemical informations parameters related to lipid profile were analyzed. Four parameters such as Triglyceride (TG in mg/dl), Low density lipoprotein (LDL in mg/dl), High density lipoprotein (HDL in mg/dl), Total cholesterol (TC in mg/dl) were measered (Table 4).

Table 4. Biochemical parameters of Cardiac patients with their frequencies and percentages.

Biochemical parameters (Lipid profile)	Subcategory	Frequency	Percentage
TG (mg/dl)	Normal (upto 150 mg/dl)	19	19.0
	Borderline High (150-200 mg/dl)	44	44.0
	High (>200 mg/dl)	37	37.0
LDL (mg/dl)	Normal (upto 150 mg/dl)	14	14.0
	Borderline High (150-200 mg/dl)	48	48.0
	High (>200 mg/dl)	38	38.0
HDL (mg/dl)	Normal (=>30 mg/dl)	65	65.0
	Average (20-29 mg/dl)	23	23.0
	Bad (<20 mg/dl)	12	12.0
TC (mg/dl)	Normal (upto 150 mg/dl)	65	65.0
	Borderline High (150-200 mg/dl)	33	33.0
	High (>200 mg/dl)	2	2.0

Triglyceride (TG)

This study predicted that 19% patients had normal TG level (upto150 mg/dl), 37% had high risk of hypertriglyceridemia (>200 mg/dl) and 44% had borderline hypertriglyceridemia (150-200 mg/dl). The mean value of TG was 189.59 $\pm$ 34.642 (Appendix 49).

Low Density Lipoprotein (LDL)

This study predicted that 14% patients had normal LDL (up to 150 mg/dl), 38% patients had high risk (>200 mg/dl) of hyper LDL and 48% had borderline high LDL (150-200 mg/dl). The mean value of LDL was 186.23 $\pm$ 31.778 (Appendix 49).

High Density Lipoprotein (HDL)

This study predicted that 65% patients had normal (=>30 mg/dl) HDL level, 23% had Average (20-29 mg/dl) HDL and 12% had lower (<20 mg/dl) level of HDL. The mean value of HDL was 32.88 $\pm$ 12.128 (Appendix 49).

Total Cholesterol (TC)

This study predicted that 65% patients had normal (up to 150 mg/dl) TC level, 33% had borderline high (150-200 mg/dl) and 2% had high (>200 mg/dl) TC level. The mean value of TC was 185.29 $\pm$ 31.020 (Appendix 49).

From the above study it is found that among the four peremeters of lipid profile most of the cardiac patients had upper level (borderline high + high) of LDL (48%+38%=86%) followed by TG (44%+37%=81%). On the other hand, 65% of cardiac patients had normal HDL and TC lebel.

4.3 Relationship between demographic parameters and types of CVD

The relationship between the demographic parameters and diagnosis of patients (Types of CVD) were determined by statistical analysis and it is showed in table 5 with discussion.

Table 5. Relationship between the demographic characteristics and types of CVD

Demographic Characteristics	Subcategory		Types of CVD			Total	Chi-square value
			Hyper tension	Myocardial Infarction-MI	Angina pectoris		
Location	Rural	Count	25	0	4	29	**35.724
		%	86.2%	0%	13.8%	100%	
	Urban	Count	18	44	9	71	
		%	25.4%	620%	12.7%	100%	
Age (years)	40-49	Count	16	0	0	16	**56.734
		%	100%	0%	0%	100%	
	50-59	Count	7	21	13	41	
		%	17.1%	51.2%	31.7%	100%	
	60-69	Count	13	23	0	36	
		%	36.1%	63.9%	0%	100%	
	70-79	Count	7	0	0	7	
		%	100%	0%	0%	100%	
Sex	Male	Count	29	32	9	70	NS.294
		%	41.4%	45.7%	12.9%	100%	
	Female	Count	14	12	4	30	
		%	46.7%	400%	13.3%	100%	
Weight (KG)	50-59	Count	7	0	0	7	**16.869
		%	100%	0%	0%	100%	
	60-69	Count	13	14	4	31	
		%	41.9%	45.2%	12.9%	100%	
	70-79	Count	21	19	8	48	
		%	43.8%	39.6%	16.7%	100%	

Demographic Characteristics	Subcategory		Types of CVD			Total	Chi-square value
			Hyper tension	Myocardial Infarction-MI	Angina pectoris		
	80-89	Count	2	11	1	14	
		%	14.3%	78.6%	7.1%	100%	
Educational status	Primary and lower	Count	30	15	13	58	**26.651
		%	51.7%	25.9%	22.4%	100%	
	SSC / HSC	Count	3	17	0	20	
		%	150%	850%	0%	100%	
	Bachelor and higher	Count	10	12	0	22	
		%	45.5%	54.5%	0%	100%	
Yearly income (Tk)	<50000	Count	20	16	2	38	**85.351
		%	52.6%	42.1%	5.3%	100%	
	50000-100000	Count	0	25	0	25	
		%	0%	100%	0%	100%	
	100000-150000	Count	7	3	11	21	
		%	33.3%	14.3%	52.4%	100%	
	150000-250000	Count	16	0	0	16	
		%	100%	0%	0%	100%	
Occupation	Business man	Count	10	13	6	29	*13.126
		%	34.5%	44.8%	20.7%	100%	
	Service holder	Count	11	3	0	14	
		%	78.6%	21.4%	0%	100%	
	House wife	Count	12	9	4	25	
		%	480%	360%	160%	100%	
	Farmer and labor	Count	10	19	3	32	
		%	31.2%	59.4%	9.4%	100%	

Demographic Characteristics	Subcategory		Types of CVD			Total	Chi-square value
			Hyper tension	Myocardial Infarction-MI	Angina pectoris		
Physical activity (walking)	Everyday walk	Count	9	2	3	14	**17.513
		%	64.3%	14.3%	21.4%	100%	
	4-6 Days/ week walk	Count	5	8	3	16	
		%	31.2%	500%	18.8%	100%	
	1-3 Days/ week walk	Count	24	15	5	44	
		%	54.5%	34.1%	11.4%	100%	
	No walk	Count	5	19	2	26	
		%	19.2%	73.1%	7.7%	100%	
Smoking behavior	Current/ Ex-smoker	Count	29	32	9	70	NS.294
		%	41.4%	45.7%	12.9%	100%	
	Never smoke	Count	14	12	4	30	
		%	46.7%	400%	13.3%	100%	
Alcohol consumption	Some times	Count	20	25	9	54	NS2.325
		%	370%	46.3%	16.7%	100%	
	Never	Count	23	19	4	46	
		%	500%	41.3%	8.7%	100%	
Food habit	Red meat and oily food	Count	23	42	7	72	**14.473
		%	31.9%	58.3%	9.7%	100%	
	Normal food	Count	12	1	6	19	
		%	63.2%	5.3%	31.6%	100%	
	Vegetarian	Count	8	1	0	0	
		%	88.9%	11.1%	0%	0%	
Total			43	44	13	100	
			430%	440%	130%	100%	

* = Significant at p≤0.05, ** = Significant at p≤0.01, NS=Not Significant

Statistically significant ($P<0.01$) relation was found between the CVD with location, age, weight, educational status, yearly income, physical activity and food habit (Table 5). Among the CVDs, Hypertension was more at 40-49 years age group; MI was more at 60-69 years age group and Angina pectoris was more at 50-59 years age group patients. The urban patients were found more sufferers from MI and Angina Pectoris than rural patients. The low and middle classes patients were found more susciptible to MI and Angina Pectoris and the high class dwellers were found more prone to hypertension. The patients who did not walk or walk 1-3 days/week were found more sufferers from all the three types of CVD. The patients who were smokers and alcoholic are found more susciptible to cardiac diseases but it is statistically insignificant. Primary and lower educated patients were found more sufferers from cardiac diseases. Red meat and oily food taking behavior showed more sufferers from all the three types of CVDs than normal food taking and vegetarians.

4.4 Relationship between demographic parameters and Lipid parameters

To findout the relationship between each of the demographic characteristics with lipid parameters, these two types of data were statisticslly analyzed by chi-square test (Table 6).

Table 6. Relationship between the demographic parameters with the biochemical characteristics (lipid profile) of the CVD patients

Demographic Characteristics	(Chi-square value)			
	TG (g/dl)	LDL (mg/dl)	HDL (mg/dl)	TC (mg/dl)
Age	**33.655	** 27.742	^{NS}11.065	*12.229
Weight (kg)	**39.012	*13.359	**19.423	^{NS}4.006
Sex	*9.259	^{NS}22.212	^{NS}1.544	^{NS}.401
Location	^{NS}4.155	^{NS}.252	^{NS}.287	^{NS}3.155
Yearly income (tk)	**25.920	**27.554	^{NS}5.525	^{NS}9.840
Occupation	**24.811	**23.408	^{NS}2.713	^{NS}6.839
Physical Activity (walking)	**55.292	**33.604	**15.595	^{NS}7.295
Smoking	**9.259	^{NS}2.212	^{NS}1.544	^{NS}.401
Alcohol consumption	**19.406	*8.172	^{NS}1.975	^{NS}3.186
Educational status	^{NS}4.204	^{NS}4.130	^{NS}6.810	^{NS}7.481
Food habit	**24.861	**17.589	^{NS}4.042	^{NS}2.551
Family history	**15.277	**7.928	^{NS}1.165	^{NS}1.037

* = Significant at $p \leq 0.05$, ** = Significant at $p \leq 0.01$, NS=Not Significant

Table 6 depicts the lipid profile status with the demographic parameters of the study subjects. From the above table it can be concluded that the relationship of TG with all the demographic parameters were statistically significant except location and education. The relationship of LDL with age, weight, income, occupation, physical activity, alcohol consumption, food habit and family history were statistically significant, where as with sex, location, smoking, educational status were insignificant. The relationship of HDL with all the demographic parameters was insignificant except weight and physical activity. The relationship between TC and the demographic parameters was insignificant except age.

Among the lipid parameters it is noticed that TG is strongly regulated by demographic parameters followed by LDL and among the demographic parameters age, weight and physical activity are strongly associated with lipid profile.

4.5 Correlation between age and weight with Lipid parameters

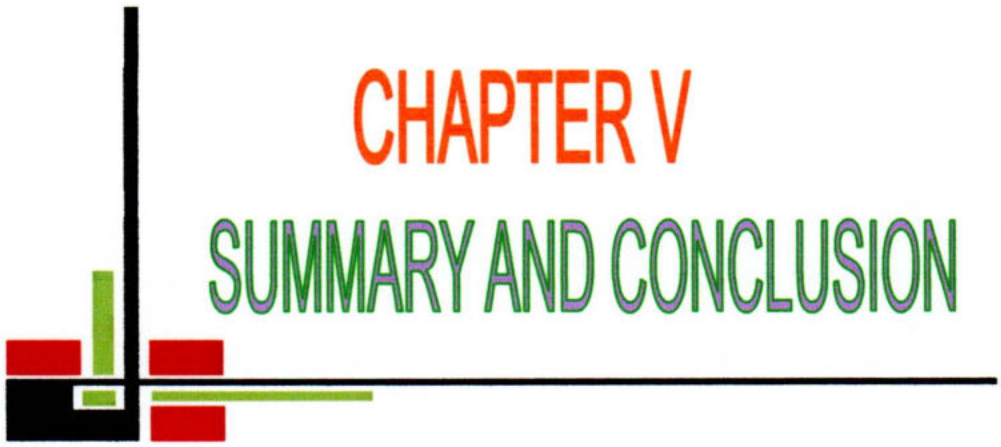
The correlation between age and weight with each of the lipid parameters were determined (Table 7) and discussed below.

Table 7. Correlation between age and weight with lipid profiles

	Age (year)	Weight (kg)	Lipid profile (TG mg/dl)	Lipid profile (LDL mg/dl)	Lipid profile (HDL mg/dl)	Lipid profile (TC mg/dl)
Age (year)	1	.054	.326**	.275**	-.183	.435**
		.595	.001	.006	.068	.000
	100	100	100	100	100	100
Weight (kg)		1	.493**	.373**	-.490**	.283**
	-		.000	.000	.000	.004
		100	100	100	100	100
Lipid profile (TG mg/dl)			1	.698**	-.660**	.640**
	-	-		.000	.000	.000
			100	100	100	100
Lipid profile (LDL mg/dl)				1	-.585**	.577**
	-	-	-		.000	.000
				100	100	100
Lipid profile (HDL mg/dl)					1	-.513**
	-	-	-	-		.000
					100	100
Lipid profile (TC mg/dl)						1
	-	-	-	-	-	
						100

** Correlation is significant at the 0.01 level (2-tailed).

From the correlation table it can be concluded that increasing age and weight of the patients causes increase in the TG, LDL and TC with decreasing HDL in blood which is found statistically significant ($p< 0.01$). It is also found that increase TG causes increase LDL, TC and decrease HDL in blood which is found statistically significant ($p< 0.01$). Increase LDL also causes decrease HDL which is found statistically significant ($p< 0.01$).



CHAPTER V

SUMMARY AND CONCLUSION

CHAPTER V

SUMMARY AND CONCLUSION

The present research work was conducted at the department of Biochemistry and Molecular Biology, Hajee Mohammad Danesh Science and Technology University, Dinajpur from July-2013 to May-2014. Hundred cardiac patients were interviewed randomly at cardiac unit of Dinajpur Medical College, Dinajpur, Bangladesh.

The demographic and biochemical data were collected from each patient. The demographic data such as age, sex, weight, location, educational status, yearly income, occupation, level of walk, smoking behavior, alcohol consumption, dietary behavior, family history and types of CVD were collected through questionnaire. Among the biochemical data, lipid profile such as Triglyceride, Low Density Lipoprotein, High Density Lipoprotein and Total Cholesterol level were measured by "Evolution 3300 Semi Auto Biochemistry Analyzer".

The percentages of the subcategories of all the demographic and biochemical parameters were calculated. Among the studied patients, 71% was lived in urban area and 29% was from rural area. All the patients of this study were 40-79 years old and among them, 50-59 years old patients were more susceptible (41%) to CVD followed by 60-69 years (32%). The maximum numbers of CVD patients (41%) were found in the age range of 50-59 years. In this study, male CVD patients (70%) were more than the female (30%) patients. The weight range of all the patients were 51-92 kg and this study revealed that most of the patients (48%) were obese (70-79) kg and the second highest group (31%) was overweight (60-69) kg. Only 7% patients were of normal weight (50-59) kg. This study revealed that most of the CVD patients (58%) were primary or lower primary educated

followed by Bachelor (22%) and the lowest group (20%) was SSC/HSC. Out of 100 patients, about 38% patients had yearly income <50,000 Tk, followed by 25% of yearly income 50000-100000 Tk, 21% of 100000-150000Tk and 16% of 1, 50,000-2, 50,000 Tk. So, it is found that most of the subjects were low and middle class group (63%). It was found that 32% patients were farmer and labor followed by businessman (29%) and housewives (25%). The lowest was service holders (office) (14%). So, from this study it can be concluded that lower educated and lower class peoples were suffering more from CVD. In this study it was noticed that patients (14%) who walked everyday suffered less from CVD followed by patients (16%) who walked 4-6 days per week and the most sufferers (70%) were patients who walked 1-3 days per week or less. It was also found that all the female patients were non-smokers and all the male patients were current or ex-smokers and prevalence of CVD among the smokers were more. All the female patients were also nonalcoholic and among the 70 male patients 54 patients drunk mild amount of alcohol and other male patients were nonalcoholic. It was found that most of the CVD patients (72%) ate red meat and oil based food. The lowest groups of patients (9%) were vegetarian. From the family history it was found that family history was 60% positive and 40% negative for CVD. Positive family history for most of the subjects would be due to genetic link and environmental factors. In this study it was found that presence of CHD in the history of family has a strong association for future CHD. Among the patients 43% patients were found hypertensive, 44% were found Myocardial infarction and 13% patients were found suffering from Angina pectoris.

For biochemical information's parameters related to lipid profile were analyzed. Four parameters such as Triglyceride (TG in mg/dl), Low density lipoprotein (LDL in mg/dl), High density lipoprotein (HDL in mg/dl), Total

cholesterol (TC in mg/dl) were measered. This study predicted that 19% patients had normal TG level (upto150 mg/dl), 37% had high risk of hypertriglyceridemia (>200 mg/dl) and 44% had borderline hypertriglyceridemia (150-200 mg/dl). This study also predicted that 14% patients had normal LDL (up to 150 mg/dl), 38% patients had high risk (>200 mg/dl) of hyper LDL and 48% had borderline high LDL (150-200 mg/dl). It was also found that 65% patients had normal (=>30 mg/dl) HDL level, 23% had Average (20-29 mg/dl) HDL and 12% had lower (<20 mg/dl) level of HDL and 65% patients had normal (up to 150 mg/dl) TC level, 33% had borderline high (150-200 mg/dl) and 2% had high (>200 mg/dl) TC level. From the above study it can be concluded that among the four peremeters of lipid profile most of the cardiac patients had upper level (borderline high + high) of LDL (48%+38%=86%) followed by TG (44%+37%=81%). On the other hand, 65% of cardiac patients had normal HDL and TC lebel.

The relationship between the demographic parameters and diagnosis of patients (Types of CVD) were determined by statistical analysis and Statistically significant ($P<0.01$) relation was found between the CVD with location, age, weight, educational status, yearly income, physical activity and food habit. Among the CVDs, Hypertension was more at 40-49 years age group; MI was more at 60-69 years age group and Angina pectoris was more at 50-59 years age group patients. The urban patients were found more sufferers from MI and Angina Pectoris than rural patients. The low and middle classes patients were found more susciptible to MI and Angina Pectoris and the high class dwellers were found more prone to hypertension. The patients who did not walk or walk 1-3 days/week were found more sufferers from all the three types of CVD. The patients who were smokers and alcoholic are found more susciptible to cardiac diseases but it is

statistically insignificant. Primary and lower educated patients were found more sufferers from cardiac diseases. Red meat and oily food taking behavior showed more sufferers from all the three types of CVDs than normal food taking and vegetarians.

To findout the relationship between each of the demographic characteristics with lipid parameters, these two types of data were statisticslly analyzed by chi-square test and it can be concluded that the relationship of TG with all the demographic parameters were statistically significant except location and education. The relationship of LDL with age, weight, income, occupation, physical activity, alcohol consumption, food habit and family history were statistically significant, whereas with sex, location, smoking, educational status were insignificant. The relationship of HDL with all the demographic parameters was insignificant except weight and physical activity. The relationship between TC and the demographic parameters was insignificant except age. Among the lipid parameters it is noticed that TG is strongly regulated by demographic parameters followed by LDL and among the demographic parameters age, weight and physical activity are strongly associated with lipid profile.

The correlation between age and weight with each of the lipid parameters were determined and concluded that increasing age and weight of the patients causes increase in the TG, LDL and TC with decreasing HDL in blood which is found statistically significant ($p< 0.01$). It is also found that increase TG causes increase LDL, TC and decrease HDL in blood which is found statistically significant ($p< 0.01$). Increase LDL also causes decrease HDL which is found statistically significant ($p< 0.01$).

From this study there is significant relationship were found between age, weight, yearly income, occupation, physical activity, smoking, alcohol

consumption, food habit and family history with lipid profile. There were no significant relation between sex, location and educational status with lipid profile. The results of this study might be used for strategic planning on cardiac care, prevention and control programs and it could also be used for planning preventive public health interventions to reduce CVD risk factors, life style modification and thereby reduce CVD incidence and severity at Dinajpur district in Bangladesh.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APPENDICES

APPENDICES

1. Relation between Age and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Age (years)	40-49	Count	10	1	5	16
		%	62.5%	6.2%	31.2%	100.0%
	50-59	Count	9	16	16	41
		%	22.0%	39.0%	39.0%	100.0%
	60-69	Count	0	22	14	36
		%	.0%	61.1%	38.9%	100.0%
	70-79	Count	0	5	2	7
		%	.0%	71.4%	28.6%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

2. Relation between Age and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Age level of patients (years)	40-49	Count	8	4	4	16
		%	50.0%	25.0%	25.0%	100.0%
	50-59	Count	6	16	19	41
		%	14.6%	39.0%	46.3%	100.0%
	60-69	Count	0	24	12	36
		%	.0%	66.7%	33.3%	100.0%
	70-79	Count	0	4	3	7
		%	.0%	57.1%	42.9%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

3. Relation between Age and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Age level of patients (years)	40-49	Count	12	4	0	16
		%	75.0%	25.0%	.0%	100.0%
	50-59	Count	27	6	8	41
		%	65.9%	14.6%	19.5%	100.0%
	60-69	Count	20	13	3	36
		%	55.6%	36.1%	8.3%	100.0%
	70-79	Count	6	0	1	7
		%	85.7%	.0%	14.3%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

4. Relation between Age and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Age level of patients (years)	40-49	Count	15	1	0	16
		%	93.8%	6.2%	.0%	100.0%
	50-59	Count	28	12	1	41
		%	68.3%	29.3%	2.4%	100.0%
	60-69	Count	20	15	1	36
		%	55.6%	41.7%	2.8%	100.0%
	70-79	Count	2	5	0	7
		%	28.6%	71.4%	.0%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

5. Relation between Weight and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Weight level of patients (KG)	50-59	Count	5	0	2	7
		%	71.4%	.0%	28.6%	100.0%
	60-69	Count	7	19	5	31
		%	22.6%	61.3%	16.1%	100.0%
	70-79	Count	7	24	17	48
		%)	14.6%	50.0%	35.4%	100.0%
	80-89	Count	0	1	13	14
		%	.0%	7.1%	92.9%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

6. Relation between Weight and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Weight level of patients (KG)	50-59	Count	2	4	1	7
		%	28.6%	57.1%	14.3%	100.0%
	60-69	Count	5	20	6	31
		%	16.1%	64.5%	19.4%	100.0%
	70-79	Count	7	19	22	48
		%	14.6%	39.6%	45.8%	100.0%
	80-89	Count	0	5	9	14
		%	.0%	35.7%	64.3%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

7. Relation between Weight and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Weight level of patients (KG)	50-59	Count	7	0	0	7
		%	100.0%	.0%	.0%	100.0%
	60-69	Count	26	4	1	31
		%	83.9%	12.9%	3.2%	100.0%
	70-79	Count	27	15	6	48
		%	56.2%	31.2%	12.5%	100.0%
	80-89	Count	5	4	5	14
		%	35.7%	28.6%	35.7%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

8. Relation between Weight and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Weight level of patients (KG)	50-59	Count	6	1	0	7
		%	85.7%	14.3%	.0%	100.0%
	60-69	Count	21	10	0	31
		%	67.7%	32.3%	.0%	100.0%
	70-79	Count	30	16	2	48
		%	62.5%	33.3%	4.2%	100.0%
	80-89	Count	8	6	0	14
		%	57.1%	42.9%	.0%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

9. Relation between Sex and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Sex of patient	Male	Count	9	37	24	70
		%	12.9%	52.9%	34.3%	100.0%
	Female	Count	10	7	13	30
		%	33.3%	23.3%	43.3%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

10. Relation between Sex and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Sex of patient	Male	Count	9	37	24	70
		%	12.9%	52.9%	34.3%	100.0%
	Female	Count	5	11	14	30
		%	16.7%	36.7%	46.7%	100.0%
Total		Count	Count	48	38	100
		%	%	48.0%	38.0%	100.0%

11. Relation between Sex and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Sex of patient	Male	Count	45	18	7	70
		%	64.3%	25.7%	10.0%	100.0%
	Female	Count	20	5	5	30
		%	66.7%	16.7%	16.7%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

12. Relation between Sex and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Sex of patient	Male	Count	46	23	1	70
		%	65.7%	32.9%	1.4%	100.0%
	Female	Count	19	10	1	30
		%	63.3%	33.3%	3.3%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

13. Relation between Location and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Location of patient	Rural	Count	9	12	8	29
		%	31.0%	41.4%	27.6%	100.0%
	Urban	Count	10	32	29	71
		%	14.1%	45.1%	40.8%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

14. Relation between Location and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Location of patient	Rural	Count	4	15	10	29
		%	13.8%	51.7%	34.5%	100.0%
	Urban	Count	10	33	28	71
		%	14.1%	46.5%	39.4%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

15. Relation between Location and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Location of patient	Rural	Count	20	6	3	29
		%	69.0%	20.7%	10.3%	100.0%
	Urban	Count	45	17	9	71
		%	63.4%	23.9%	12.7%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

16. Relation between Location and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Location of patient	Rural	Count	16	13	0	29
		%	55.2%	44.8%	.0%	100.0%
	Urban	Count	49	20	2	71
		%	69.0%	28.2%	2.8%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

17. Relation between Yearly income and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Yearly income of patient (Tk)	<50000 TK	Count	1	20	17	38
		%	2.6%	52.6%	44.7%	100.0%
	50000-100000 TK	Count	2	14	9	25
		%	8.0%	56.0%	36.0%	100.0%
	100000-150000TK	Count	8	8	5	21
		%	38.1%	38.1%	23.8%	100.0%
	150000-250000TK	Count	8	2	6	16
		%	50.0%	12.5%	37.5%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

18. Relation between Yearly income and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Yearly income of patient (Tk)	<50000 TK	Count	1	18	19	38
		%	2.6%	47.4%	50.0%	100.0%
	50000-100000 TK	Count	2	15	8	25
		%	8.0%	60.0%	32.0%	100.0%
	100000-150000TK	Count	3	13	5	21
		%	14.3%	61.9%	23.8%	100.0%
	150000-250000TK	Count	8	2	6	16
		%	50.0%	12.5%	37.5%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

19. Relation between Yearly income and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Yearly income of patient (Tk)	<50000 TK	Count	24	9	5	38
		%	63.2%	23.7%	13.2%	100.0%
	50000-100000 TK	Count	15	7	3	25
		%	60.0%	28.0%	12.0%	100.0%
	100000-150000TK	Count	15	2	4	21
		%	71.4%	9.5%	19.0%	100.0%
	150000-250000TK	Count	11	5	0	16
		%	68.8%	31.2%	.0%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

20. Relation between Yearly income and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Yearly income of patient (Tk)	<50000 TK	Count	18	19	1	38
		%	47.4%	50.0%	2.6%	100.0%
	50000-100000 TK	Count	18	6	1	25
		%	72.0%	24.0%	4.0%	100.0%
	100000-150000TK	Count	16	5	0	21
		%	76.2%	23.8%	.0%	100.0%
	150000-250000TK	Count	13	3	0	16
		%	81.2%	18.8%	.0%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

21. Relation between Occupation and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Occupation of patient	Businessman	Count	4	16	9	29
		%	13.8%	55.2%	31.0%	100.0%
	Service holder	Count	7	2	5	14
		%	50.0%	14.3%	35.7%	100.0%
	Housewife	Count	8	6	11	25
		%	32.0%	24.0%	44.0%	100.0%
	Farmer & labor	Count	0	20	12	32
		%	.0%	62.5%	37.5%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

22. Relation between Occupation and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Occupation of patient	Businessman	Count	4	17	8	29
		%	13.8%	58.6%	27.6%	100.0%
	Service holder	Count	7	2	5	14
		%	50.0%	14.3%	35.7%	100.0%
	Housewife	Count	3	11	11	25
		%	12.0%	44.0%	44.0%	100.0%
	Farmer & labor	Count	0	18	14	32
		%	.0%	56.2%	43.8%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

23. Relation between Occupation and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Occupation of patient	Businessman	Count	19	6	4	29
		%	65.5%	20.7%	13.8%	100.0%
	Service holder	Count	10	3	1	14
		%	71.4%	21.4%	7.1%	100.0%
	Housewife	Count	17	4	4	25
		%	68.0%	16.0%	16.0%	100.0%
	Farmer & labor	Count	19	10	3	32
		%	59.4%	31.2%	9.4%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

24. Relation between Occupation and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Occupation of patient	Businessman	Count	18	11	0	29
		%	62.1%	37.9%	.0%	100.0%
	Service holder	Count	13	1	0	14
		%	92.9%	7.1%	.0%	100.0%
	Housewife	Count	15	9	1	25
		%	60.0%	36.0%	4.0%	100.0%
	Farmer & labor	Count	19	12	1	32
		%	59.4%	37.5%	3.1%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

25. Relation between Physical activity (walking) and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Physical activity (walking) of patient	Everyday walk	Count	8	5	1	14
		%	57.1%	35.7%	7.1%	100.0%
	4-6 Days/week walk	Count	8	7	1	16
		%	50.0%	43.8%	6.2%	100.0%
	1-3 Days/week walk	Count	3	27	14	44
		%	6.8%	61.4%	31.8%	100.0%
	No walk	Count	0	5	21	26
		%	.0%	19.2%	80.8%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

26. Relation between Physical activity (walking) and Lipid profile (LDL mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Physical activity (walking) of patient	Everyday walk	Count	4	9	1	14
		%	28.6%	64.3%	7.1%	100.0%
	4-6 Days/week walk	Count	8	6	2	16
		%	50.0%	37.5%	12.5%	100.0%
	1-3 Days/week walk	Count	2	21	21	44
		%	4.5%	47.7%	47.7%	100.0%
	No walk	Count	0	12	14	26
		%	.0%	46.2%	53.8%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

27. Relation between Physical activity (walking) and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Physical activity (walking) of patient	Everyday walk	Count	13	0	1	14
		%	92.9%	.0%	7.1%	100.0%
	4-6 Days/week walk	Count	13	2	1	16
		%	81.2%	12.5%	6.2%	100.0%
	1-3 Days/week walk	Count	29	11	4	44
		%	65.9%	25.0%	9.1%	100.0%
	No walk	Count	10	10	6	26
		%	38.5%	38.5%	23.1%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

28. Relation between Physical activity (walking) and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Physical activity (walking) of patient	Everyday walk	Count	12	2	0	14
		%	85.7%	14.3%	.0%	100.0%
	4-6 Days/week walk	Count	13	3	0	16
		%	81.2%	18.8%	.0%	100.0%
	1-3 Days/week walk	Count	24	19	1	44
		%	54.5%	43.2%	2.3%	100.0%
	No walk	Count	16	9	1	26
		%	61.5%	34.6%	3.8%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

29. Relation between Smoking behavior and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Smoking behaviour of patient	Current/Ex-smoker	Count	9	37	24	70
		%	12.9%	52.9%	34.3%	100.0%
	Never smoke	Count	10	7	13	30
		%	33.3%	23.3%	43.3%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

30. Relation between Smoking behavior and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Smoking behaviour of patient	Current/Ex-smoker	Count	9	37	24	70
		%	12.9%	52.9%	34.3%	100.0%
	Never smoke	Count	5	11	14	30
		%	16.7%	36.7%	46.7%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

31. Relation between Smoking behavior and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Smoking behaviour of patient	Current/Ex-smoker	Count	45	18	7	70
		%	64.3%	25.7%	10.0%	100.0%
	Never smoke	Count	20	5	5	30
		%	66.7%	16.7%	16.7%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

32. Relation between Smoking behavior and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Smoking behaviour of patient	Current/Ex-smoker	Count	46	23	1	70
		%	65.7%	32.9%	1.4%	100.0%
	Never smoke	Count	19	10	1	30
		%	63.3%	33.3%	3.3%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

33. Relation between Alcohol consumption and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Alcohol consumption of patient	Sometimes	Count	3	33	18	54
		%	5.6%	61.1%	33.3%	100.0%
	Never	Count	16	11	19	46
		%	34.8%	23.9%	41.3%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

34. Relation between Alcohol consumption and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Alcohol consumption of patient	Sometimes	Count	3	31	20	54
		%	5.6%	57.4%	37.0%	100.0%
	Never	Count	11	17	18	46
		%	23.9%	37.0%	39.1%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

35. Relation between Alcohol consumption and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Alcohol consumption of patient	Sometimes	Count	34	15	5	54
		%	63.0%	27.8%	9.3%	100.0%
	Never	Count	31	8	7	46
		%	67.4%	17.4%	15.2%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

36. Relation between Alcohol consumption and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Alcohol consumption of patient	Sometimes	Count	31	22	1	54
		%	57.4%	40.7%	1.9%	100.0%
	Never	Count	34	11	1	46
		%	73.9%	23.9%	2.2%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

37. Relation between Educational status and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Educational status of patient	Primary & lower	Count	11	28	19	58
		%	19.0%	48.3%	32.8%	100.0%
	SSC / HSC	Count	2	10	8	20
		%	10.0%	50.0%	40.0%	100.0%
	Bachelor and higher	Count	6	6	10	22
		%	27.3%	27.3%	45.5%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

38. Relation between Educational status and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Educational status of patient	Primary & lower	Count	6	29	23	58
		%	10.3%	50.0%	39.7%	100.0%
	SSC / HSC	Count	2	10	8	20
		%	10.0%	50.0%	40.0%	100.0%
	Bachelor and higher	Count	6	9	7	22
		%	27.3%	40.9%	31.8%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

39. Relation between Educational status and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Educational status of patient	Primary & lower	Count	38	10	10	58
		%	65.5%	17.2%	17.2%	100.0%
	SSC / HSC	Count	11	7	2	20
		%	55.0%	35.0%	10.0%	100.0%
	Bachelor and higher	Count	16	6	0	22
		%	72.7%	27.3%	.0%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

40. Relation between Educational status and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Educational status of patient	Primary & lower	Count	32	25	1	58
		%	55.2%	43.1%	1.7%	100.0%
	SSC / HSC	Count	16	4	0	20
		%	80.0%	20.0%	.0%	100.0%
	Bachelor and higher	Count	17	4	1	22
		%	77.3%	18.2%	4.5%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

41. Relation between Food habit and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Food habit of patient	Red meat & oily food	Count	5	37	30	72
		%	6.9%	51.4%	41.7%	100.0%
	Normal food	Count	10	5	4	19
		%	52.6%	26.3%	21.1%	100.0%
	Vegetarian	Count	4	2	3	9
		%	44.4%	22.2%	33.3%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

42. Relation between Food habit and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Food habit of patient	Red meat & oily food	Count	5	38	29	72
		%	6.9%	52.8%	40.3%	100.0%
	Normal food	Count	5	10	4	19
		%	26.3%	52.6%	21.1%	100.0%
	Vegetarian	Count	4	0	5	9
		%	44.4%	.0%	55.6%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

43. Relation between Food habit and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Food habit of patient	Red meat & oily food	Count	44	17	11	72
		%	61.1%	23.6%	15.3%	100.0%
	Normal food	Count	15	3	1	19
		%	78.9%	15.8%	5.3%	100.0%
	Vegetarian	Count	6	3	0	9
		%	66.7%	33.3%	.0%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

44. Relation between Food habit and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Food habit of patient	Red meat & oily food	Count	44	26	2	72
		%	61.1%	36.1%	2.8%	100.0%
	Normal food	Count	15	4	0	19
		%	78.9%	21.1%	.0%	100.0%
	Vegetarian	Count	6	3	0	9
		%	66.7%	33.3%	.0%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

45. Relation between Family history of cardiac disease and Lipid profile (TG in mg/dl)

			Lipid profile of patient (TG in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Family history of cardiac disease	Positive	Count	17	18	26	61
		%	27.9%	29.5%	42.6%	100.0%
	Negative	Count	2	26	11	39
		%	5.1%	66.7%	28.2%	100.0%
Total		Count	19	44	37	100
		%	19.0%	44.0%	37.0%	100.0%

46. Relation between Family history of cardiac disease and Lipid profile (LDL in mg/dl)

			Lipid profile of patient (LDL in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Family history of cardiac disease	Positive	Count	12	23	26	61
		%	19.7%	37.7%	42.6%	100.0%
	Negative	Count	2	25	12	39
		%	5.1%	64.1%	30.8%	100.0%
Total		Count	14	48	38	100
		%	14.0%	48.0%	38.0%	100.0%

47. Relation between Family history of cardiac disease and Lipid profile (HDL in mg/dl)

			Lipid profile of patients (HDL in mg/dl)			
			Normal (=>30 mg/dl)	Average (20-29 mg/dl)	Bad (<20 mg/dl)	Total
Family history of cardiac disease	Positive	Count	38	14	9	61
		%	62.3%	23.0%	14.8%	100.0%
	Negative	Count	27	9	3	39
		%	69.2%	23.1%	7.7%	100.0%
Total		Count	65	23	12	100
		%	65.0%	23.0%	12.0%	100.0%

48. Relation between Family history of cardiac disease and Lipid profile (TC in mg/dl)

			Lipid profile of patient (TC in mg/dl)			
			Normal (upto 150 mg/dl)	Borderline High (150-200 mg/dl)	High (>200 mg/dl)	Total
Family history of cardiac disease	Positive	Count	42	18	1	61
		%	68.9%	29.5%	1.6%	100.0%
	Negative	Count	23	15	1	39
		%	59.0%	38.5%	2.6%	100.0%
Total		Count	65	33	2	100
		%	65.0%	33.0%	2.0%	100.0%

Questionnaire

Name:

Age:

Sex:

Weight (kg):

Location:

Yearly income (TK):

Family history of CVD:

Occupation:

Physical activity (walking):

Smoking behavior:

Alcohol consumption:

Educational status:

Diagnosis:

Blood pressure:

Food habit:

Lipid profile (mg/dl):

TG: HDL:

LDL: TC:

Signature of patient