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The effects of lifestyle on lipid profile and cardiac enzymes

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ABSTRACT

Lipid is the structural component cell membrane of living organism. It also supplies energy needed to survive our life. But excess amount of lipid is harmful for our body except HDL-cholesterol, so the maintenance of lipid profile is very important for keeping healthy and diseases free life. On the other hand Cardiac enzymes are protein needed for contraction and relaxation of heart muscle. If the lipid level of blood is very high a plaque is formed in the artery and thrombosis is occurred as a result the cardiac enzymes are run through blood from heart muscle and develop myocardial infarction. This study was performed in BIRDEM laboratory. Having 75 patients, moderate exercise and overweight but lifestyle was sedentary. They were aware about their diet but they did not follow the daily dietary requirement. We had taken those results directly as the level of mg/dl for HDL- Cholesterol, LDL-cholesterol, Triglyceride, Total Cholesterol, and U/L for creatinine phosphokinase (CPK), CK-MB & Lactate dehydrogenase (LDH). We found among the 75 excess weighted patients in different age group, HDL-Cholesterol level were decreased and LDL- Cholesterol level was increased with the age. The Triglyceride and Total Cholesterol level also was increased with the increase of age. So, with the increasing ages the risk of development of heart diseases also increases. It may be suggested that all types of fatty and cholesterol rich food and taking regular physical exercise is necessary to avoid the risk of heart and other cardiovascular diseases.

KEYWORDS

Cardiac enzymes;
Thrombosis;
Cardiovascular diseases.

INTRODUCTION

Excess weight was a common problem in the western countries but is now becoming in developing countries like Bangladesh. Excess weight people are commonly known as to have high serum Cholesterol, high triglycerides and low HDL-C and increase in LDL-C (harmful Cholesterol). People make them more susceptible to heart problem with taking excessive amount of saturated fats (desi ghee, fried foods a lot of sweets like khoya barfi, coconut sweets, chocolates, cakes, etc). Cholesterol is a white, waxy, chemical substance[1].

It is very important for the functioning of every cell in our body. Cholesterol also helps manufacture vitamin D, hormones like cortisol and our sex hormones etc[2]. Cholesterol is manufactured in the body and is also ingested through food like butter, egg yolk and meats. The liver makes most of the body's Cholesterol that helps to carry the digested fat from the liver to the whole body. The blood vessels act as highway. After fulfilling this function, cholesterol returns to the liver and repeats the process all over again[3,4]. When cholesterol in our body, goes up beyond desirable levels, it can put one at the risk of having a stroke, developing heart diseases or other cardiovascular diseases. After eaten of fat or fatty food, it goes through the stomach and is then digested and absorbed in the small intestine. After this, it is sent to the liver to be processed and shipped throughout the body. The liver loads the fat on to the VLDLs. These travel through the blood vessels, unloading fat throughout the body. The empty VLDLs then become LDLs. Some LDL (bad Cholesterol) pieces can get stuck along the blood vessel walls, thus narrowing the blood vessels. Cardiac enzymes are protein that is found in the heart muscle. They do not circulate in the bloodstream. When damage occurs to the heart muscle, such as during myocardial infarction (heart attack), cardiac enzymes leak into the bloodstream[5]. Thus, measuring cardiac enzymes in the blood helps to determine whether heart cell damage has occurred. The cardiac enzyme tests that are particularly helpful in this regard are Troponin-I, CK, and CK-MB etc.

The main objectives of the study are-

- To know the level of lipid profile and cardiac enzymes of the blood that is responsible for the heart attack and other cardiovascular diseases.
- To aware the people about the change of their lifestyle.
- Patients to take regular exercise to reduce their lipid profile and cardiac enzymes level of the blood.

MATERIALS & METHODS

This prospective study carried out in the department of Clinical Biochemistry in BIRDEM Hospital, Dhaka, Bangladesh. A total number of 75 human subjects of age ranging 30-50 years were included in this study. The study patients were over night fasting and collected blood sample in the department of clinical Biochemistry laboratory, BIRDEM.

METHODOLOGY

Under the study the effect of the Life style on the Lipid profile & the Cardiac Enzymes" We had taken blood samples of 75 excess weighted men and analyzed in the three automated analyzers named as 1. DADE BEHRING AUTO ANALYZER (Origin in USA), 2. HITACHI-912 AUTO ANALYZER (Origin in Japan) and 3. Vitros-250 AUTO ANALYZER (Origin in USA). The result was taken directly as the level of mg/dl of HDL, LDL, triglyceride, total cholesterol and U/L of CK, CK MB & LDH under the kinetic methods.

Cholesterol esterase (CE) catalyzes the hydrolysis of cholesterol esters to produce free cholesterol witch, along with preexisting free cholesterol, was oxidized in reaction catalyzed by cholesterol oxidase to form cholest-4-ene-3-one and hydrogen peroxidase. The absorbance due to oxidized DEA-HCL/AAP is directly proportional to the total cholesterol concentration and is measured using a polychromatin (452, 540, 700 nm) endpoint technique[6].

The triglycerides method was based on an enzymatic procedure in which a combination of enzymes was employed for the measurement of serum or plasma triglycerides. The change in absorbance due to the formation of quinoeimine was directly proportional to the total amount of glycerol and its precursors in the sample and is measured suing a bichromatin (510, 700 nm) endpoint technique[7,8].

Plasma lipoproteins were spherical particles of varying composition. The outer surface of these particles was made of phospholipids, free cholesterol and protein; the inner core contains mostly esterified cholesterol and triglyceride. Lipoproteins function to solubilize and transport cholesterol and triglycerides in the blood stream. The determination of serum HDL level is a useful tool identifying at-risk patients. The generated hydrogen peroxide then reacts with 4-amioantipyrine and sodium n-(2-hydroxy-3-sulfopropyl)-3, 5-dimethoxyaninine (HSDA) in the presence of peroxidase to form a colored dye that was measured using a bichromatic (600/700nm) endpoint technique. The color intensity of the dye was directly proportional to the serum HDL-C concentration[9,10].

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LDL-cholesterol measurements were used in the diagnosis and treatment of lipid disorders such as diabetes mellitus, atherosclerosis and various liver and renal diseases. LDL-cholesterol was measured using a bichromatic (540, 700 nm) endpoint technique. The color produced is directly proportional to the amount of LDL-cholesterol present in the sample[11].

In a coupled enzyme reaction, the creatinine kinase in patient sample catalyzes the transphosphorylation of phosphate from creatinine phosphotate to adenosine-diphosphate (ADP) producing adenosine-triphosphate (ATP). The rate of formation of NADPH is directly proportional to the CK actively in the sample and is measured bichromatically at 340 and 540 nm[12,13].

The lactate dehydrogenase (LDH) method uses as a substrate L-lactate bufferd at pH of 9.4. Lactate dehydrogenase oxidizes the substrate in the presence of NAD+ to yield pyruvate and NADH which absords at 340 nm. Lactate dehydrogenase actively concentration was measured as a rate reaction at 340/700 nm, proportional to the amount of lactate dehydrogenase in the sample[14,15].

Creatinine phospho kinase (CPK) is the dimeric enzyme occurring in four different forms: a mitochondrial isoenzyme and the cystolic isoenzymes CK-MM (muscle type), CK-BB (brain type) and CK-MB (myocardial type). The determination of CK-MB is an important element in the diagnosis of myocardial ischemia[16].

RESULT

The study was about the level of HDL, LDL, triglycerides, and total cholesterol of over weighted men (BMI above 25 to 30) of Dhaka city area, Dhaka, Bangladesh. The sample size was 75 men were taken in the following criteria i.e. moderate exercise, and overweight but lifestyle was sedentary. We had taken their blood and analyzed and observed their results directly as the level of mg/dl of HDL, LDL, triglyceride, total cholesterol, and the level of U/L of CPK CK-MB & LDH. The mean values showed markedly elevated age group 46-50 than 31-35 in total cholesterol, triglyceride, CPK, CK-MB & LDH. Thus, these observations were for (208±08 vs. 199±10), (227±18 vs. 207±34), (191±24 vs. 189±23), (19±02 vs. 18±01), (394±21 vs. 374±23), (TABLE 1).

TABLE 1 : Mean values of the biochemical parameters in lipid profile & cardiac enzymes ware presented mean ± SE.

Age group	Total Chol. mg/dl	HDL-chol. mg/dl	LDL-chol. mg/dl	Trig. mg/dl	CPK U/L	CK-MB U/L	LDH U/L
31-35	199±10	36±03	114±08	207±34	189±23	18±01	374±23
36-40	194±08	42±01	122±05	193±20	167±18	14±01	377±12
41-45	204±08	41±01	118±05	235±30	168±15	18±02	376±17
46-50	208±08	40±01	113±05	227±18	191±24	19±02	394±21

It was observed that total cholesterol level was increased over 240 mg/dl for the age group 46-50 years whereas it was at normal level (<240mg/dl) for the age group 31-35 years. HDL-cholesterol level was found to be increased at the age group 46-50 years and below the normal level, 40mg/dl for the age group 31-35 years. Triglycerides level was found to be normal, <150mg/dl at the age group 31-35 years and found to be high, >190mg/dl for the age group 46-50 years. It can also be noted that the other age group showed less significant results in the study for all the studied lipid parameters.

TABLE 2 : The results of the level of lipid profile.

04.	03.	02.	01.	Serial	
46-50	41-45	36-40	31-35	Age group	
20	20	20	15	Total sample	
4(20%)	8(40%)	11(55%)	9(60%)	Desirable <200 mg/dl	Total Cholesterol (mg/dl)
7(35%)	9(45%)	7(35%)	3(20%)	Borderline high 200-239 mg/dl	
9(45%)	3(15%)	2(10%)	3(20%)	High >240 mg/dl	
9(45%)	7(35%)	4(20%)	15(100%)	Low <40 mg/dl	HDL-Cholesterol (mg/dl)
11(55%)	13(65%)	16(80%)	---------	High >60 mg/dl	
6(30%)	3(15%)	4(20%)	6 (40%)	Optimal <100 mg/dl	LDL-Cholesterol (mg/dl)
4(20%)	1(5%)	5(25%)	2(13.33%)	Above optimal 100-129 mg/dl	
3(15%)	9 (45%)	5(25%)	3(20%)	Borderline high 130-159 mg/dl	
3(15%)	4(20%)	4(20%)	3(20%)	High 160-189 mg/dl	
4(20%)	3(15%)	2(10%)	1(6.66%)	Very high >190 mg/dl	
3(15%)	5(25%)	7(35%)	8(53.33%)	Normal <150 mg/dl	Triglycerides (mg/dl)
7(35%)	7(35%)	7(35%)	2(13.3%)	Borderline high 150-199 mg/dl	
2(10%)	3(15%)	3(15%)	3(20%)	High 200-499 mg/dl	
8(40%)	5(25%)	3(15%)	2(13.33%)	Very high & above 499 mg/dl	

The study subjects were grouped in ages, 31-35, 36-40, 41-45 and 46-50 years and cardiac enzymes, CK, CK-MB and LDH were measured. It was observed that for CK-MB, all the age groups showed normal level and the same results were found to be normal for all the other cardiac enzymes.

TABLE 3: The result of the level of cardiac enzymes.

Serial No.	Age group	Total sample	CPK (Creatinine phosphoKinase)		CK-MB		LDH (Lacted Dehydrogenase)	
			Normal <190 U/L	High 190 & above U/L	Normal up to 25 U/L	High above 25 U/L	Normal 225-450 U/L	High above 250 U/L
01.	31-35	15	12 (80%)	3(20%)	12 (80%)	3 (20%)	12 (80%)	3 (20%)
02.	36-40	20	17 (85%)	3 (15%)	20 (100%)	---	19 (95%)	1 (5%)
03.	41-45	20	16 (80%)	4 (20%)	17 (85%)	3 (15%)	17 (85%)	3 (15%)
04.	46-50	20	14 (70%)	6 (30%)	15 (75%)	5 (25%)	15 (75%)	5 (25%)

DISCUSSION

Cholesterol is a white, waxy, chemical substance[1]. The liver makes most of the body's cholesterol, which helps carry fat to different parts of the body that need fat to produce energy, or storage, such as the in the hip or belly. When cholesterol in our body, goes up beyond desirable levels, it can put one at the risk of having a stroke, developing heart diseases or other cardiovascular diseases. Cholesterol helps carry digested fat from the liver to the whole body. The blood vessels act as highway. After fulfilling this function, cholesterol returns to the liver and repeats the process all over again. After fat or food is eaten, it goes through the stomach and is then digested and absorbed in the small intestine. After this it is sent to the liver to be processed and shipped throughout the body[17]. The liver loads the fat on to the VLDLs. These travel through the blood vessels, unloading fat throughout the body. In our study we observed that 36-40 age group HDL-cholesterol & LDL-cholesterol was increased. The empty VLDLs then become LDLs. Some LDL (Bad Cholesterol) pieces can get stuck along the blood vessel walls, thus narrowing the blood vessels. The role of HDLs (Good Cholesterols) is to separate LDL pieces which are stuck to the blood vessel walls and ship them back to the liver. The LDL pieces are either recycled into new VLDLs or broken down and excreted. The new VLDLs restart the shipment process. When one eats extra fat, more LDL pieces can get stuck alone the vessel walls, if there are not enough HDLs to release them. Blood vessels can thus get blocked, resulting in the heart an attack[18,19]. Ideally one should have more HDL. HDL cholesterol is also known as the good cholesterol as travels in the bloodstream from the peripheral areas of the body, bringing cholesterol to liver for break down. LDL cholesterol transports cholesterol from the liver to all cells in the body. If the cholesterol available is more than required, then LDL will end up circulating in the blood stream and eventually get deposited on the inner walls of the artery[20-23]. It is called the bad cholesterol, because it can cause blockage and result in lack of blood supply.

Cholesterol Guidelines

Average risk	Border line	High risk	Goal level	Current risk
200 mg/dl	200-239 mg/dl	240 mg/dl	Under 170mg/dl	

Other lipids	Required level	Your current level
HDL	Men-more than 40 mg/dl Women-more than 50 mg/dl	
LDL	Less than 100 mg/dl	
Triglycerides	Less than 140 mg/dl	

Cholesterol and Lifestyle: A Western lifestyle of high stress, fatty food and sedentary lifestyle leads to an increase in insulin resistance[24]. High lipid level leads to-

- More production of insulin (due to the consumption of fat simple sugars).
- Deposition of fat on your belly that leads to abdominal obesity.
- More LDL, that sticks to your arteries and causes blockages.

CONCLUSION

The study showed that all the over weighted person that we observed, their total cholesterol level was increased with their increasing age, the amount of HDL

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is lower and LDL is highly increased in different age groups. So they may be at risk for various diseases such as heart diseases, atherosclerosis etc. High cholesterol is regarded as one of the most important factors for plaque deposition and hardening of arteries (atherosclerosis). Like the West a high consumption of junk food, this problem is now becoming prevalent among the South Asian population also.

REFERENCES

[1] P.T.Ivanova, S.B.Milne, M.O.Byrne, Y.Xiang, H.A.Brown ; Glycerophospholipid identification and quantitation by electrospray ionization mass spectrometry. Meth.Enzymol, **432**, 21–57 **(2007)**.

[2] D.W.Russell; The enzymes, regulation, and genetics of bile acid synthesis. Annu.Rev.Biochem., **72**, 137–174 **(2003)**.

[3] D.W.Russell; The enzymes, regulation, and genetics of bile acid synthesis. Annu.Rev.Biochem., **72**, 137–174 **(2003)**.

[4] T.Kuzuyama, H.Seto; Diversity of the biosynthesis of the isoprene units. Nat.Prod.Rep., **20**, 171–183 **(2003)**.

[5] Lee Hooper; Risks and benefits of omega 3 fats for mortality, cardiovascular disease, and cancer: Systematic review. British Medical Journal, **332**, 752–760 **(2006)**.

[6] E.Heinz; Plant glycolipids: structure, isolation and analysis. In advances in lipid methodology. Christie Oily Press, **3**, 211-332 **(1996)**.

[7] R.A.Coleman, D.P.Lee; Enzymes of triacylglycerol synthesis and their regulation. Prog.Lipid.Res., **43**, 134–176 **(2004)**.

[8] P.T.Ivanova, S.B.Milne, M.O.Byrne, Y.Xiang, H.A.Brown; Glycerophospholipid identification and quantitation by electrospray ionization mass spectrometry. Meth.Enzymol, **432**, 21–57 **(2007)**.

[9] E.Fahy, S.Subramaniam, H.A.Brown ; A comprehensive classification system for lipids. J.Lipid Res., **46(5)**, 839–61 **(2005)**.

[10] The Nomenclature of lipids. Recommendations. European Journal of Biochemistry, **79(1)**, 11–21 **(1976)**.

[11] Roger Johnsona, Prudence McNutt, Stephen MacMahon1, Richard Robson2; Use of the friedewald formula to estimate LDL-cholesterol in patients with chronic renal failure on dialysis. Clinical Chemistry, **43**, 2183-2184 **(1997)**.

[12] G.Schumann; Clin.Chem.Lab Med., **40**, 635-642 **(2002)**.

[13] G.Schumann; Clin.Chem.Acta, **327**, 69-79 **(2003)**.

[14] Z.Klin; Chem.Klin.Biochem, **8**, 658 **(1970)**.

[15] Andries J.Bakker, Bidjaiperkash Mirchi, Johannes T.Dijkstra, Freek Reitsma, Haye Syperda, Appie Zijlstra; IFCC method for lactate dehydrogenase measurement in heparin plasma is unreliable. Clinical Chemistry, **49**, 662-664 **(2003)**.

[16] I.M.Morisok, J.es.Clayson; Fine J.S.Clin.Chem, **34**, 535 **(1988)**.

[17] K.M.Eyster; The membrane and lipids as integral participants in signal transduction. Adv.Physiol.Edu, **31**, 5-16 **(2007)**.

[18] Dariush Mozaffarian; Dietary fats, carbohydrate, and progression of coronary atherosclerosis in postmenopausal women. American Journal of Clinical Nutrition, **80(5)**, 1175-1184 **(2004)**.

[19] E.Honoré, J.Barhanin, B.Attali, F.Lesage, M.Lazdunski; External blockade of the major cardiac delayed-rectifier K channel (Kv1.5) by polyunsaturated fatty acids. Proc.Natl.Acad.Sci.USA, **91(5)**, 1937-1941 **(1994)**.

[20] J.A.Reiffel, A.McDonald; Antiarrhythmic effects of omega-3 fatty acids. Am.J.Cardiol, **98(4A)**, 50i–60i **(2004)**.

[21] Catherine H.MacLean; Effects of n-3 fatty acids on cancer risk. Journal of the American Medical Association, **295(4)**, 403–415 **(2006)**.

[22] Lee Hooper; Risks and benefits of omega 3 fats for mortality, cardiovascular disease, and cancer: systematic review. British Medical Journal, **332**, 752–760 **(2006)**.

[23] Heiner C.Bucher, Peter Hengstler, Christian Schindler, Gabriela Meier; n-3 polyunsaturated fatty acids in coronary heart disease: a meta-analysis of randomized controlled trials. The American Journal of Medicine, **112(4)**, 298–304 **(2002)**.

[24] L.H.Storlien; Dietary fats and insulin action. Diabetologica, **39(6)**, 621–631 **(1996)**.