Analysis Of Lipid Profile In Saliva Of Diabetic Patients - A Pilot Study

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Abstract:

Aim:

The aim of this study was to analyze the salivary lipid profile in patients with type 1 diabetes mellitus.

Method:

10 patients with diabetes mellitus and 10 normal patients was taken as a study group. Lipid profile was estimated through measuring the levels of cholesterol, triglyceride, HDL,LDL and VLDL in the saliva of all the patients.

Results:

The level of cholesterol, triglyceride, LDL and VLDL are significantly high in diabetic patients than the control group. HDL levels does not have any significant difference.

Conclusion:

It was concluded that, a rise in cholesterol, triglyceride, LDL and VLDL levels may lead to a high risk conditions like hypercholesterolemia, hypertriglyceridaemia and hyperlipidemia, etc .

Keywords: cholesterol, triglycerides, LDL, HDL, VLDL, diabetes.

INTRODUCTION:

Diabetes mellitus (DM) is a group of metabolic diseases characterized by increase blood glucose level resulting from defects in insulin secretion, insulin action, or both [1]. Without insulin, the amount of glucose in the bloodstream is abnormally high, causing unquenchable thirst and frequent urination. The body's inability to store or use glucose causes hunger and weight loss [2]. Insulin deficiency causes excessive metabolisation of free fatty acids, this may lead to a disorder in lipid metabolism. Insulin is a hypoglycemic hormone secreted from β-cell of the islet of pancreas. Insulin also has an effect on lipid metabolism [3]. Insulin affects many sites of mammalian lipid metabolism. It stimulates synthesis of fatty acid in liver adipose tissue and in the intestine. The insulin has also been reported to increase the cholesterol synthesis. The activity of lipoprotein lipase in white adipose is also increased. From this point of view the assessment of various lipid fractions in the case of diabetes mellitus may be of some help in the prognosis of patients and in preventing the possibilities of complications or secondary disorders [4]. Lipid abnormalities in patients with diabetes are likely to play important role in the development of atherogenesis. These lipid disorders include not only quantitative but also qualitative abnormalities of lipoproteins which are potentially atherogenic [5]. Hyperlipidemia and altered lipid metabolism is commonly seen in diabetes. The relationship between elevation of serum lipids and vascular complication of diabetes has long been of interest because both tend to occur with greater frequency in diabetes mellitus than in general population. The increased risk of vascular disease in diabetic patients may be in part due to the associated hyperlipidemia [6]. The prevalence of dyslipidemia in diabetes mellitus is 95% [7]. The dyslipidemia is a major risk factor for coronary heart disease (CHD) [8]. Early detection and treatment of hyperlipidemia in diabetes mellitus can prevent the progression of lipid abnormalities and minimize the risk for atherogenic cardiovascular disorder and cerebrovascular accident [9].
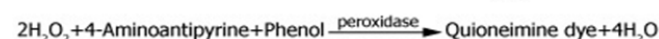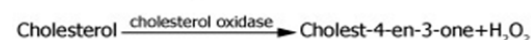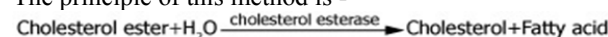
MATERIALS AND METHODS:

Patients of known cases of diabetes and patients without diabetes were selected randomly. A detailed history was taken and all necessary clinical examinations were performed. Consent from each patient was taken after a detailed explanation of the whole procedure. Saliva samples were estimated for levels of cholesterol, triglyceride, HDL, LDL and VLDL levels.

Estimation of Cholesterol -

Cholesterol was estimated by cholesterol esterase/ cholesterol oxidase method.
The principle of this method is -

$$Cholesterol\ ester + H_2O \xrightarrow{\text{cholesterol esterase}} Cholesterol + Fatty\ acid$$

$$Cholesterol \xrightarrow{\text{cholesterol oxidase}} Cholest\text{-}4\text{-}en\text{-}3\text{-}one + H_2O_2$$

$$2H_2O_2 + 4\text{-}Aminoantipyrine + Phenol \xrightarrow{\text{peroxidase}} Quioneimine\ dye + 4H_2O$$

The appearance of quinoneimine dye formed when coupled with 4-aminoantipyrine and phenol is measured at 500nm by spectrophotometry.

Estimation of Triglycerides -

Triglycerides were estimated using enzymatic colometric method. triglycerides are hydrolyzed completely to free fatty acids and glycerol by lipoprotein lipase. The released glycerol is oxidized with glycerol dehydrogenase from Erwinia aroideae in the presence of NAD+, were the reduction of the enzyme-linked NAD+ is coupled to the reduction of nitro blue tetrazolium as a chromogenic indicator with phenazine methosulfate serving as an intermediate electron carrier of NADH. The absorbance at 570 nm is measured.

Estimation of HDL -

HDL was estimated by phosphotungstate method.
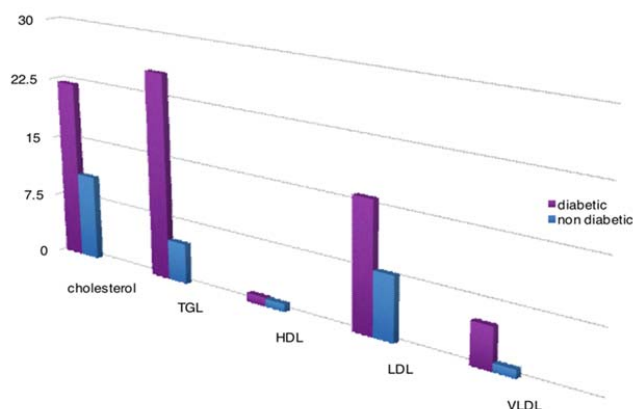
Estimation of VLDL and LDL -

LDL and VLDL were calculated by Friedwald's formula. The ultra centrifugal measurement of LDL is time consuming and expensive and requires specialist equipment. For this reason, LDL-cholesterol is most commonly estimated from quantitative measurements of total and HDL-cholesterol and plasma triglycerides (TG) using the empirical relationship of Friedwald.

RESULTS AND DISCUSSION:

Using independent t-test, it was found that there is significant difference in the levels of cholesterol, triglyceride, LDL and VLDL among diabetic and non-diabetic patients as the p value < 0.05.

HDL was found to be not significant as the p value > 0.05.Mean cholesterol value for non diabetic individuals was found to be 10.60 mg /dl where as it was found to be 22.10mg/dl in case of diabetic patients. There was a five fold increase in triglyceride levels as it was 5 mg/dl in non diabetic patients and 22.50 mg/dl in diabetic patients. There was a significant increase in LDL and VLDL levels also. LDL for diabetic patients was found to be 15.89 mg/dl which was a three fold increase as compared to non diabetic patients. VLDL levels in diabetic patient was found to be 5.100 mg/dl where as non diabetic individuals showed a value of 1.054 mg/dl of VLDL. In case of HDL, there was a decrease in non diabetic patients showing a value of 1.11 mg/dl and 0.990 mg/dl for diabetic patients. Thus, the results shows a significant increase in lipid profile in the saliva of diabetic patients.

A study conducted in Nishtar Hospital, Multan by Ahmad et al showed that 21% patients with type-2 diabetes had raised serum cholesterol (>200mg/dl) and 34. 2% patients have raised triglycerides in serum (>150mg/dl) [10]. Another study conducted at Hazara division Pakistan on "Frequency of dyslipidaemia in type 2diabetes mellitus in patients of hazara division" showed that serum triglyceride was raised in 59% [11]. Firdous et al, who reported that adverse effects of diabetes mellitus on dyslipidaemias are more marked in women than men [12]. H.O. Otamere *et al* in a study stated that overall diabetes mellitus is closely associated with Dyslipidemia but age group and DM duration may not be strong indices for lipid profile prediction especially with respect to subjects under management [13]. In this study, LDL, VLDL, tryglycerides and Cholesterol levels were significantly raised; and HDL levels were lowered in diabetic compared to non diabetic patients. Diabetes lowers the good cholesterol levels (HDL) and increases the level of bad cholesterol (LDL). This is called diabetic dyslipidemia. Thus these results occur because the lipid profiles of diabetic patients are going in the wrong direction.

CONCLUSION:

Hence, this study concludes that salivary lipid fractions such as cholesterol, triglycerides, LDL and VLDL except HDL were elevated in diabetic patients compared to normal people without diabetics. Hence, diabetic patients have a higher risk of hypercholesterolemia, hyper triglyceridaemia, hyperlipidemia etc. This study helps in knowing the alterations in salivary lipid profile in diabetic patients and to know the different complications it may lead to.

	Diabetic		Non-diabetic		P-value
	MEAN	S.D.	MEAN	S.D	
Cholesterol (mg/dl)	22.10	7.094	10.60	3.806	0.000
TGL (mg/dl)	25.50	6.835	5.00	1.209	0.000
HDL (mg/dl)	0.990	0.4067	1.11	0.4701	0.549
LDL (mg/dl)	15.89	6.850	7.86	3.080	0.003
VLDL (mg/dl)	5.100	1.3671	1.054	0.2096	0.000

REFERENCE:

1) American Diabetes Association, 2005. Diagnosis and classification of diabetes Mellitus. Diabetes Care 28, 1: 537-42.
2) Chatrejee C C (1992) Human physiology (vol I). Role of endocrine in lipid metabolism. (Editor- Medical allied agency) s. 546-550, Culcutta-INDIA.
3) Godkar P and Godkar D (2003) Text book of medical laborarty technology.Ed.2 chemistry of carbohydrates (Bhalani publishing house) s.176-233,New Delhi-India.
4) Jain, A.P. and Gupta, D.P. (1980). Study of blood lipids in Diabetics without any manifest vascular complications. J. Dia. Asso. Ind. Vol. XX, 29-34.
5) British Journal of Pharmacology and Toxicology 2(3): 135-137, 2011 ISSN: 2044-2467Lipid Profile in Diabetes Mellitus; What Impact Has Age and Duration 1H.O. Otamere, 2C.P. Aloamaka, 3P.O. Okokhere and 1W.A. Adisa 1Department of Physiology, Faculty of Basic Medical Science, College of Medicine, Ambrose Alli University, Ekpoma, Nigeria 2Department of Physiology, Faculty of Basic Medical Science, College of Health Sciences, Delta State University, Abraka, Delta State, Nigeria 3Department of Internal Medicine, Irrua Specialist Teaching Hospital, Irrua, Edo State, Nigeria.
6) Suri, R.K., Guptha, M.M. and Chakkravarthi, A.K. Hyper-lipidaemias and vascular populations of diabetes mellitus. J. Ass. Phys. India., 27: 505 (1979).
7) Chattanda, S.P. and Y.M. Mgonda, 2008. Diabetic dyslipidemia among diabetic patients attending specialized clinics in Dar es Salaam. Tanzania Med. J., 23(1): 08-11.
8) Krishna, P., Roopakala and KM. Prasanna, 2005. Dyslipidemia in type 1 diabetes mellitus in the young. Int. J. Diab. Dev. Ctries, 25(4): 110-12.
9) World Applied Sciences Journal 12 (9): 1382-1384, 2011 ISSN 1818-4952 Lipid Profile of Patients with Diabetes mellitus (A Multidisciplinary Study) Khursheed Muhammad Uttra, Bikha Ram Devrajani, Syed Zulfiquar Ali Shah, 1 22 Tarachand Devrajani, Thanwar Das, Samar Raza and Naseem 2 2 2 2.
10) Ahmad, A., A.R. Khan, Z.A. Raja and G. Mustafa, 2003. Measurement of serum cholesterol and triglyceride; Evaluation in patients with diabetes, hypertension and cerebrovascular accidents in South Punjab. Professional, 10(2): 92-98.
11) Ahmed, N., J. Khan and T.S. Siddiqui, 2008. Frequency of Dyslipidaemia in type 2 Diabetes mellitus in patients of Hazara division. J. Ayub. Med. Coll. Abottabad, 20(2): 51-4.
12) Firdous, S. And M.Z. Khan, 2007. Comparison of patterns of lipid profile in type-2 diabetics and non diabetics. Ann. King. Edward. Med. Coll., 3(1): 84-7.
13) H.O. Otamere, C.P. Aloamaka, P.O. Okokhere and W.A. Adisa Lipid Profile in Diabetes Mellitus; What Impact Has Age and Duration.