



ORIGINAL RESEARCH PAPER

Pathology

CORRELATION BETWEEN HbA1c AND LIPID PROFILE IN TYPE 2 DIABETES MELLITUS IN TERTIARY CARE HOSPITAL, SITAPUR: A RETROSPECTIVE STUDY”

KEY WORDS: lipid profile, type 2 diabetes mellitus, HbA1c

Prof. Vijai Singh*	Professor & Head, Department of Pathology, Hind Institute of Medical sciences, Ataria, Sitapur, U.P.*Corresponding Author
Dr Kanchan Garg	Assistant Professor, Department of Pathology, Hind Institute of Medical sciences, Ataria, Sitapur, U.P
Dr. Shambhavi Tripathi	Associate Professor, Department of Pathology, Hind Institute of Medical sciences, Ataria, Sitapur, U.P
Dr Tanvi Singhvi	Associate Professor, Department of Pathology, Hind Institute of Medical sciences, Ataria, Sitapur, U.P

ABSTRACT

Aim and Objectives - Demonstrate the influence of dyslipidemia on HbA1c in diabetic rural patients. **Introduction** - In India, a rise in dyslipidemia along with increasing urbanization have led to various lifestyle related disorders like T2DM, cardiovascular and metabolic syndromes. It is also associated with more than 4 million deaths per year. The lipid abnormalities in hyperglycemic patients such as increased cholesterol, increased LDH, high triglycerides (TG), and low high-density lipoprotein (HDL) are contributing to the mortality and morbidity. **Material & Methods** - This study was conducted at the Department of Pathology, Hind Institute of Medical Sciences, Ataria, Sitapur, U.P. Serum lipid profile was done from serum separated from patient blood drawn from vein in red vacutainer on Randox RX Monaco, examined within 4 hours of collection. HbA1c level was done from plasma separated from patient blood drawn from vein in purple vacutainer on arkary Adams A1c Lite HA-8380v. Statistical correlation between dyslipidemia and Hb1Ac was calculated using SPSS version 20.0. Our study therefore attempted to demonstrate the influence of dyslipidemia on HbA1c in diabetic and non-diabetic subjects and whether can it be advocated as a combined biomarker of lifestyle pattern. **Conclusion** - HbA1c can be used as a potential biomarker for predicting dyslipidemia in type 2 diabetes patient in addition to as a glycemic control parameter.

INTRODUCTION

Diabetes mellitus is a group of metabolic disease characterized by hyperglycemia resulting from defect in insulin secretion, insulin action or both. Obesity is an independent risk factor for cardiovascular disease, including coronary artery disease and congestive heart failure, in both men and women¹. Disorders of lipid metabolism are common and prominent in diabetes and are important risk factors for the high frequency of atheromatous complication in the disease². The failure of various organ especially the eye, kidney, nerves, heart and blood vessels are seen in diabetes mellitus patient. HbA1c predict the risk for the development of diabetic complication³. Ravi pati *et al*⁴ also observed a direct correlation between HbA1c concentration and the severity of coronary artery disease in diabetic patient. Estimated risk of CVD has shown to be increased by 18% for each 1% increase in absolute HbA1c value in diabetic population⁵. The rate of formation of HbA1c is directly proportional to the ambient glucose concentration. The HbA1c represents the integrated values of glucose over the last three months and give the information of glycemic control.

MATERIAL AND METHOD: -

This study was conducted at clinical pathology department, Hind Institute of Medical Sciences, Mau, Ataria. Serum lipid profile was done on patients' blood sample drawn from vein in red vacutainer, examined within 4 hours of collection. HbA1c level done from plasma separated from patient blood in purple vacutainer.

Inclusion criteria: Patient of type 2 Diabetes Mellitus who were suffering with the disease for a minimum of 1 year.

Exclusion criteria: Patient of type 1 Diabetes Mellitus. Patient suffering from chronic renal failure or liver impairment and pregnancy were excluded from our study.

Statistical Analysis:

Statistical Analysis was done by using SPSS 20.0 Version. The Mean SD, correlation coefficient (r) and correlation

(Pearson's) test was used to interpret the results.

RESULT:

In this study 70 participants of type 2 Diabetes Mellitus were taken, among them 38 were male and 32 were female (table 1).

Table 1: Sex distribution of study population

	Total	Males	Females
No of patients	70	38	32
Percentage (%)	100	54.3	45.7

Table 2-Lipid Profile of study population based on sex

Lipid Profile	Total	Male	Female
Hypercholesterolemia	24	15	09
Hypertriglyceridemia	26	14	12
LowHDL	05	03	02
High DL	15	07	08

In table2, Lipid profile was taken into consideration. 24 patients had TC levels >200 mg/ dl, 26 Patients had TG level >150mg/ dl, 5 patients had LDLlevels >100 mg/dl & 15 HDL patients had<50 mg/dl.

Table 3-Distribution of Lipid Profile and Hb A1c.

Parameters	Mean +SD
Mean HbA1c	7.7+ 2.21
Mean total cholesterol	210.16+ 78.04
Mean Triglycerides	193.45+ 166.78
Mean HDL	62.81+ 26.94
Mean LDL	96.23+ 49.17
Mean VLDL	39.32+ 33.85

In table 3, mean total cholesterol was 210.16, mean total triglycerides was 193.45, mean LDL was 96.23, mean HDL was 62.81, mean VLDL was 39.32 and Mean VLDL was 39.32.

Table 4: - Correlation analysis between serum Lipid

profile and HbA1c

Parameters	Correlation coefficient (r)	p-value
Total cholesterol-HbA1c	0.194	0.110
Triglyceride-HbA1c	0.118	0.329
HDL-HbA1c	0.431	0.000
LDL- HbA1c	0.019	0.866
VLDL-HbA1c	0.075	0.539

In table 4, HbA1c positively correlated with total cholesterol (0.19), TG (0.11) but HDL(0.43), VLDL(0.07) LDL(0.01) did not show significant correlation with HbA1c.

DISCUSSION:

In the study, lipid profile parameters were evaluated in diabetes patient and correlated with HbA1c. The levels of HbA1c & FBG did not give significant variation between male and female. The levels of TC were significantly high in female and no significant difference in TG & HDL levels between male and female were seen which corresponds with previous studies⁶⁻¹¹.

This study demonstrates the typical dyslipidemia in diabetes characterized by high triglyceride and low HDL. Hyperlipidemia in female may be attributed to the effect of sex hormone on body fat distribution which leads to altered lipoproteins. Another reason includes differences in coagulation, the pattern of obesity between men and women and possible role of hyperinsulinemia. The measurement of HDL is simple which can be conducted even in non- fasting state of patient and can be determined regardless of TG concentration. Hence, HDL cholesterol can be of great value in determining dyslipidemia in diabetic patient. KhaHA *etal*¹² showed the impact of glycemic control on various lipid parameters in which the diabetic patient were categorized into 3 groups: glycemic control (HbA1c<6%); group 2 poor glycemic control (HbA1c>6-9%) and group 3 worst glycemic control (HbA1c>9%). As elevated HbA1c and dyslipidemia are independent risk factor of CVD, Diabetic patient with elevated HbA1c and dyslipidemia can be considered as a very high-risk group for CVD. Improving glycemic control can substantially reduce the risk of cardiovascular events in diabetics¹³.

CONCLUSION:

Positively significant correlation seen between HbA1c and total cholesterol, Triglycerides. Thus, HbA1c can be used as a potential biomarker for predicting dyslipidemia in type 2 diabetes patients in addition to as a glycemic control parameter. Therefore, we can prevent and postpone the cardiovascular and peripheral complications by timely intervention of the disease.

Acknowledgement– No

Conflict of Interest– Nil

REFERENCES:

- Hubert HB, Feinleib M, McNamara P *etal*. *circulation*, 67, 1983, 968-977.
- Amos Af, McCarty DJ, zimmer P. The rising global burden of diabetes and its complication. *DiabetMed*, 14 (suppl.5), 1997, SI-S85.
- Little RR. Recent progress in glycohaemoglobin (HbA1c) testing. *Diabetes care*, 23, 2000, 265-266.
- Ravipati G, Aronow WS, Ahn C, Sujata K, Saule LN, Weiss MB. Association of hemoglobin A1c level with the severity of coronary artery disease in patient with diabetes mellitus. *AmJCardiol* 2006; 97:968-969.
- Selvin E, Marinopoulos S, Berkenblit G, Rami T, Brancati FL, Powe NR, *etal*. Meta-analysis: glycosylated hemoglobin and cardiovascular disease in diabetes mellitus. *AnnInternMed* 2004; 14:421-431.
- Faulkner MS, Chao WH, KamthSK. Total homocysteine, diet and lipid profiles in type 1 and 2 diabetic and non -diabetic adolescent. *J Cardiovasc Nurs* 2006; 21:47-55.
- WHO. Global survey on geriatrics in medical curriculum. Geneva:WHO: 2002.
- Fitchett D. Lipid management Who screen? Who to treat? *GeriatrAging* 2005; 8: 21-28.
- Masri H, Yazdani M. The relationship between serum LDL- cholesterol, HDL- cholesterol and systolic blood pressure in patients with type 2 diabetes. *KardiolPol* 2006; 64:1364-1368.

- Cardenas GA, Lavie CJ, Milani RV. Importance and management of low levels of high-density lipoprotein cholesterol in older adults. Part1: Role and mechanism. *GeriatrAging* 2004; 7: 40-44.
- DeFreitas EV, jo Brandao AA, Pozzan R, Magalhaes ME, Flaavia Fonseca Pizzi O, *etal*. Importance of high -density lipoproteins- cholesterol (HDL-C) levels to the incidence of cardiovascular disease (CVD) in the elderly. *ArchGerontolo Geri* 2011; 52: 217-222.
- Khan H A, Sobki SH, Khan SA. Association between glycemic control and serum lipid profile in type 2 diabetic patients: HbA1c predicts dyslipidemia. *ClinExpMed* 2007; 7: 24-29.
- Selvin E, Wattanakit K, Steffes MW, Coresh J, Sharrett AR. HbA1c and peripheral arterial disease in diabetes: the Atherosclerosis Risk in communities study. *Diabetes care* 2006; 29: 877-882.