Study of Glycosylated Haemoglobin and Fasting Lipid Profile in Diabetes Mellitus

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Abstract: *It is the study to determine the correlation of HbA_{IC} with the serum lipids in patients with Type 2 diabetes and to find out whether HbA_{IC} can be used as a predictor of serum Lipids in Type 2 diabetes. For this study a total of 50 patients fulfilling the inclusion criteria, who got admitted in Yenepoya Medical College Hospital from January 2014 to August 2015 were taken up. All these patient's HbA_{IC} and FLP were checked after all necessary procedure and their relation with one another was assessed using latest available statistical analysis method.*

This study concluded that there was a positive correlation between HbA_{IC} and S. Cholesterol level. That is higher the HbA_{IC} value, higher were the values of S. Chol, TG, LDL & VLDL. A negative correlation was found between HbA_{IC} & HDL level. That is, higher the HbA_{IC} value, lower were the values of HDL.

Keywords- *Fasting lipid profile, Glycosylated hemoglobin, HDL, LDL, Sr. Chol, TG, VLDL*

I. Introduction

Diabetes mellitus is a chronic disease associated with significant morbidity and mortality. The International Diabetes Federation reports that the number of diabetic patients in the world is expected to increase from 415 million in 2015 to 642 million by 2040. Diabetes is characterized by disordered metabolism and inappropriate hyperglycemia due to either deficiency of insulin secretion or to a combination of insulin resistance and inadequate insulin to compensate.

Type 2 diabetes (formerly called non insulin dependent or adult onset) results from the body's ineffective use of insulin, and is largely the result of excess body weight and physical inactivity. Symptoms may be similar to those of Type 1 diabetes, but are often less marked. As a result, the disease may be diagnosed several years after onset, once complications have already arisen. Patients with Type 2 Diabetes have a 2-4 fold higher risk of cardiovascular disease compared to non-diabetic individuals and dyslipidemia is an important contributor to the increased risk in population. An early intervention to normalize circulating lipids has been shown to reduce cardiovascular complication and mortality.

Single blood sugar measurements might not reveal whether the blood sugar is well controlled or not as blood sugar keeps changing rapidly depending upon diet and exercise.HbA_{IC} levels give a measure of the average glycemic control over the past 6 to 12 weeks. So this is considered a good index of control of glycemia.

Studies have shown a linear relationship between HbA_{IC} and dyslipidemia. This study is done to see the correlation of HbA_{1C} with serum lipids in patients with type 2 diabetes, attending in the Hospital.

II. Materials And Methods

SOURCE OF THE DATA:
A total of 50 patients fulfilling the inclusion criteria, who got admitted in Yenepoya Medical College Hospital from January 2014 to august 2015 were taken up for the study.

METHOD OF COLLECTION OF DATA:
Study design: Prospective, qualitative study
Sample size: 50 patients includes both males and females taken for the study
INCLUSION CRITERIA:
Informed consent from all patients.
Both sexes
Age between 35 years to 60 years
Diabetes diagnosed according to ADA criteria 2013

EXCLUSION CRITERIA:
1. Patients with secondary causes of dyslipidaemia
2. Patients on
Lipid lowering drugs
OCPs– HRT
Steroids
Diuretics
3. Chronic alcoholism
4. Endocrine disorder

METHODOLOGY:
A total number of 50 diabetes patients were included in this study. All patients were explained regarding the study in detail and a written informed consent was obtained from each before the blood samples were drawn for investigations.A detailed proforma was filled for each patient.HbA$_{1C}$ & FLP values were obtained with use of autoanalyzer. Data is statistically analyzed to find out the correlation between HbA$_{1C}$ and each variable in the FLP.

III.   Observation And Results

Distribution of Lipid Profile:
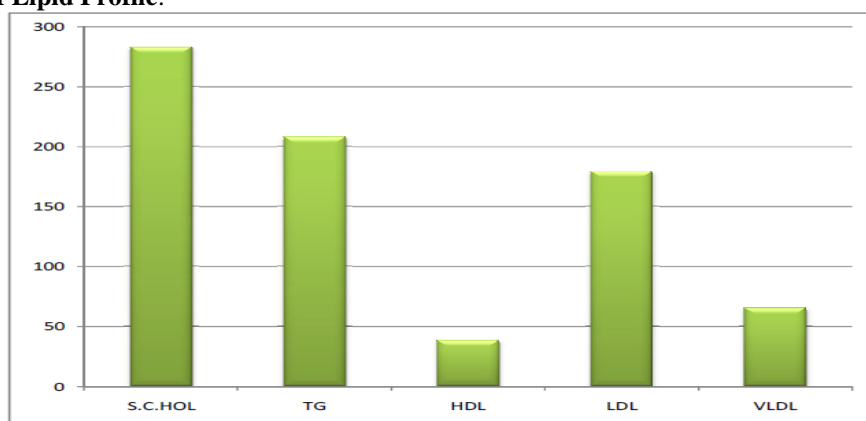
Mean Sr. CHOL was 282.72 with Std. deviation of 57.87
Mean TG was 208.00 with Std. deviation of 60.98
Mean HDL was 38.36 with Std. deviation of 11.25
Mean LDL was 179.36 with Std. deviation of 42.04
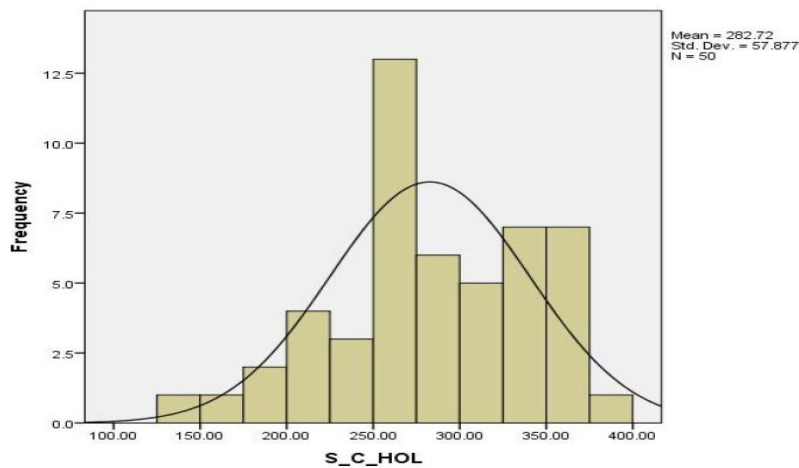Mean VLDL was 65.48 with Std. deviation of 35.96

HbA$_{1C}$ Values:

HBA$_{1C}$ Values		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	< 7.0	5	10.0	10.0	10.0
	7.1 - 9.0	8	16.0	16.0	26.0
	> 9.0	37	74.0	74.0	100.0
	Total	50	100.0	100.0	
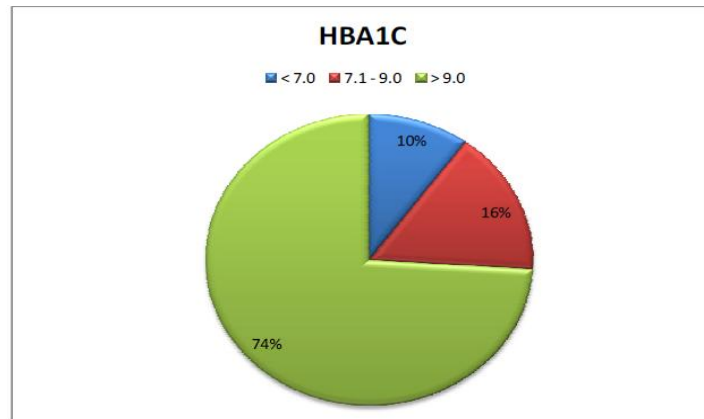
HbA$_{IC}$ values < 7.0 was in 10% patients; 26% lies in < 9.0; 74%   above 9.0

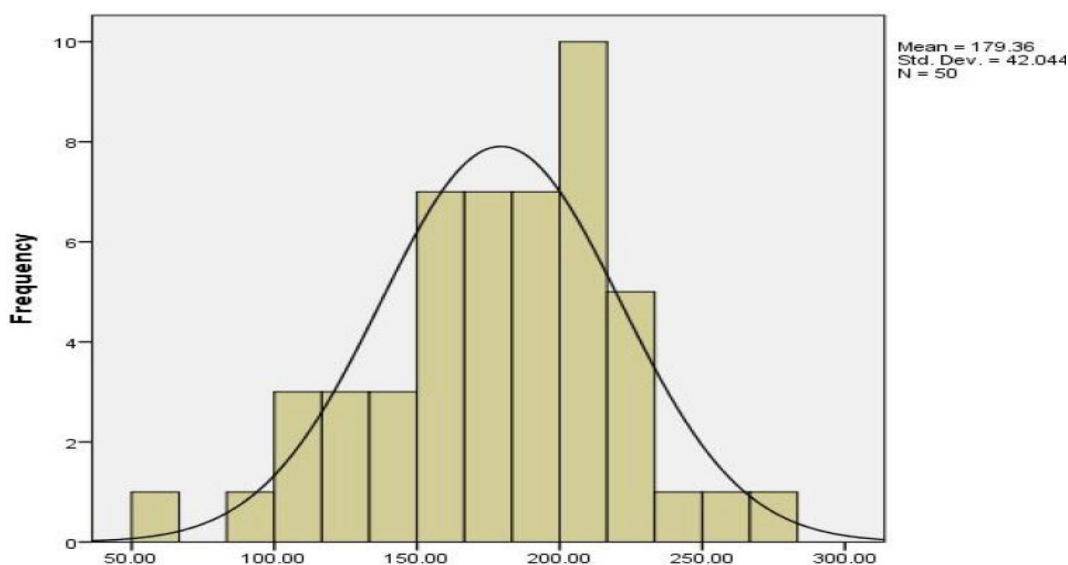**HbA$_{1C}$ & Sr.cholesterol:**

There was a Positive correlation between HbA$_1$c & Sr.chol. That is, in patients with higher HbA$_1$c values, Sr.chol values were also found to be high.
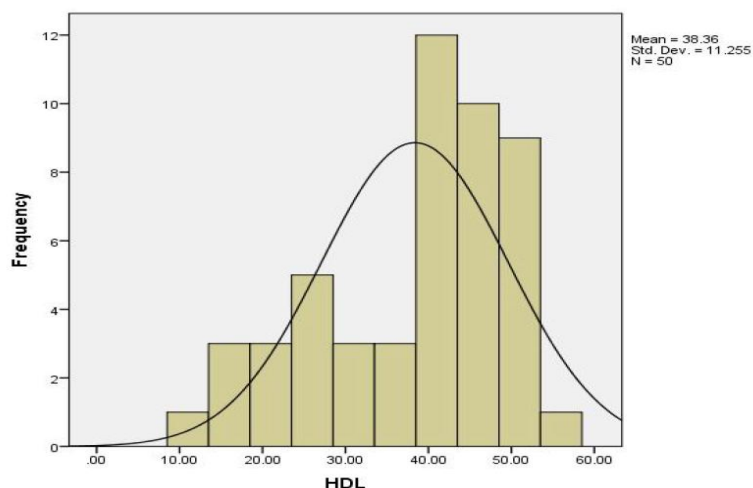
HbA$_{1C}$ & TRIGLYCERIDE:
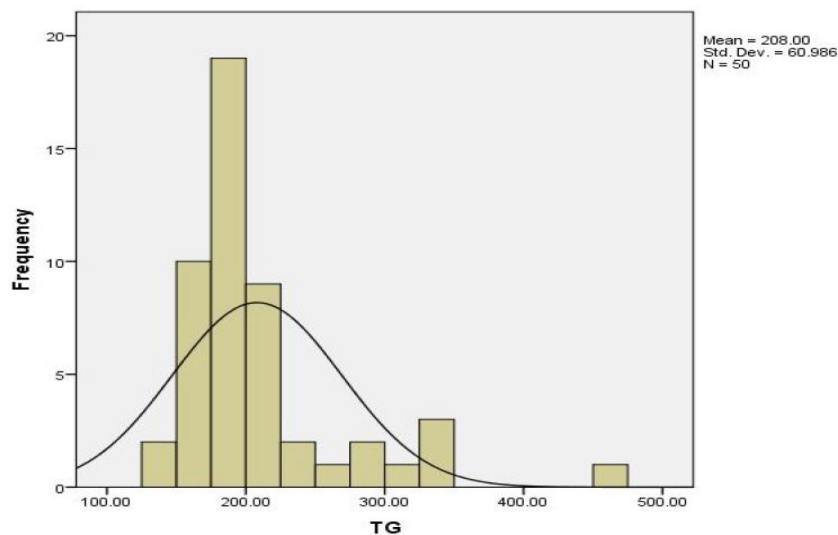
There was a positive correlation between HbA$_1$c & TG. That is, in patients with higher HbA$_1$c values, TG values were also found to be high.

HbA$_{1C}$ & LDL:

There was a positive correlation between HbA$_1$c & LDL. That is, in patients with higher HbA$_1$c values, LDL values were also found to be high.

HbA$_{1C}$ & HDL:

Negative correlation between HbA$_1$c & HDL. That is, in patients with higher HbA$_1$c values, HDL values were found to be low.

Descriptive Statistics of HbA$_{IC}$ & Lipid profile:

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
HBA$_{1C}$	50	6.40	14.00	10.09	1.94
S.CHOL	50	148.00	386.00	282.72	57.87
TG	50	140.00	467.00	208.00	60.98
HDL	50	11.00	54.00	38.36	11.25
LDL	50	56.00	280.00	179.36	42.04
VLDL	50	28.00	151.00	65.48	35.96

Correlation Statistics of HbA$_{IC}$ & Lipid profile:

Correlations							
		HBA$_{1C}$	**S.CHOL**	**TG**	**HDL**	**LDL**	**VLDL**
HBA$_{1C}$	Pearson Correlation	1	0.366[**]	0.277	-0.181	0.308[*]	0.288[*]
	p - value		0.009	0.051	0.209	0.030	0.043
	N	50	50	50	50	50	50
**. Correlation is significant at the 0.01 level (2-tailed).							
*. Correlation is significant at the 0.05 level (2-tailed).							

1. The correlation between HbA$_{1C}$ and serum cholesterol shows pearson correlation 0.366 and p value of 0.009 which means correlation is significant at 0.02 level.
2. The correlation between HbA$_{1C}$ and TG shows positive pearson correlation 0.277 and p value of 0.051.
3. The relation between HbA$_{1C}$ and HDL shows a negative correlation (Pearson Correlation = - 0.181) but it was found to be statistically insignificant.
4. The correlation between HbA$_{1C}$ and serum LDL shows pearson correlation 0.308 and p value of 0.030 which means correlation is significant at 0.05 level.
5. The correlation between HbA$_{1C}$ and serum V LDL shows pearson correlation 0.288 and p value of 0.043 which means correlation is significant at 0.05 level ($p < 0.05$).

IV. Discussion

A good glycemic control was present only in 10% of the study group and poor glycemic control was there in 74 %. However, only less than 20% of the study population had knowledge of their HbA$_{1C}$ values in our study group. This was very less as compared to the studies done by Harwell TS et al[1] (82.6 %), Heilser M et al[2] (66%), Delamater AM et al[3] and Goldstein DE et al[4].

In our study there was a positive correlation beween HbA$_{1C}$ and Sr.cholesterol values overall among the 50 patients included in the study. That is, in patients with higher HbA$_{1C}$ values, Sr.cholesterol values were also found to be high. This was similar to the results obtained by Selvin E et al[5], Khan HA et al[6], Rashid A et al[7], Ahmed W et al[8], Ghani MH et al[9], Ismail IS et al[10] and Mohammed E et al[11].

In our study there was a positive correlation beween HbA$_{1C}$ and TG values overall among the 50 patients included in the study. That is, in patients with higher HbA$_{1C}$ values, TG values were also found to be high. This was similar to the results obtained by Selvin E et al[5], Khan HA et al[6], Ghani MH et al[9], Ismail IS et al[10] and Mohammed E et al[11], Esteghamati A et al[12] and Onat A et al[13].

In our study there was a positive correlation beween HbA$_{1C}$ and LDL values overall among the 50 patients included in the study. That is, in patients with higher HbA$_{1C}$ values, LDL values were also found to be high. This was similar to the results obtained by Selvin E et al[5], Khan HA et al[6], Ismail IS et al[10], Gupta S et al[14], Glueck CJ et al[15], Rashid A et al[7], Ahmed W et al[8].

In our study there was a negative correlation between HbA$_{1C}$ and HDL values overall among the 50 patients included in the study. That is, in patients with higher HbA$_{1C}$ values, HDL values were also found to be low. This was similar to the results obtained by Selvin E et al[5], Khan HA et al[6], Ahmed W et al[8], Fedele D et al[16], Gatti A et al[17], Ghani MH et al[9], Mohammed E et al[11].

V. Conclusion

1. HbA$_{1C}$ can be used as a predictor of dyslipidemia in T$_2$DM patients.
2. HbA$_{1C}$ has a positive and significant correlation with LDL (P value < 0.05). i.e, in patients with higher HbA$_{1C}$ values, LDL values were also found to be high and this correlation was found to be significant, or most of the patients in our study, with poorly controlled T$_2$DM were found to have high levels of LDL cholesterol.
3. HbA$_{1C}$ has a positive correlation with Sr.cholesterol and TG. i.e., in patients with higher HbA$_{1C}$ values, Sr.cholesterol and TG values were also found to be high, or patients with poorly controlled T$_2$DM were found to have high levels of TG and total cholesterol.
4. A negative correlation was found between HbA$_{1C}$ and HDL, i.e., in patients with higher HbA$_{1C}$ values, HDL value was found to be low, or patients with poorly controlled T$_2$DM had low HDL cholesterol values.

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