A RETROSPECTIVE STUDY: CORRELATION AMONG HBA1C AND SERUM LIPID PROFILE IN KARACHI'S PATIENTS OF TYPE-II DIABETES.

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Abstract

Introduction: The diabetic patients have an increased tendency to develop dyslipidemia which may results to high risk of cardiovascular diseases. To study the correlation among type-II diabetic patient and the serum lipid profile to estimate the diagnostic value of HbA1c as a co-biomarker of dyslipidemia. **Method:** The present study was performed at Dr. Essa Laboratory & Diagnostic Centre, Karachi, Pakistan between August and October 2019. There were 491 type-II diabetic (DM-2) selected for the study (254 male and 237 female) with the mean age of 52.77 and the data was collected through review of clinical reports of patients at Bio-chemistry lab of Dr. Essa Laboratory & Diagnostic Centre. The fasting HbA1c and lipid profile (Cholesterol, Low-density lipoprotein, high- density lipoprotein, very low density lipoprotein, triglycerides and ratio of total cholesterol and triglycerides) along with their age and gender data was recorded. The correlation analysis was done by SPSS statistical package version 16.0. **Result:** In a total of 491 DM-2 patients 254 (51.7%) were male and 237 (48.3%) were female with a female to male ratio of 1: 1.07. Mean age was 52.77 years ± 12.6SD. Among the 491 patients 211 have >7% HaA1c and 283 had ≤ 7% HbA1c. The glycated Hba1c have significant correlation with cholesterol, triglyceride and VLDL levels and non- significant correlation of HbA1c and HDL and LDL. **Conclusion:** This study indicates that HbA1c has a significant correlation with parameters of lipid profile. HbA1c can be used a marker for predicting dyslipidemia and CVD in T2DM patients. We suggest regular periodic monitoring of HbA1c and lipid levels in such patients. This study adds to existing knowledge supporting correlation between HbA1c and parameters of lipid profile.

Keywords: Type-II Diabetes, Correlation, lipid profile, HbA1c

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INTRODUCTION

DM 2 significantly affecting the human health, life-style, economy and health care system by rapidly increasing the public health issues worldwide[1]. International Diabetes mellitus (IDF) indicate that globally 463 million adults have diabetes and that will increases to 700 million by 2045. Currently Pakistan is at 4th position (19.4 million) in the list of top 10 countries with most number of diabetic individual which will rise to 3rd position with 31.1 million by 2045 [2]. Globally 5% of the all the death due to DM or its related complications DM-2 patients are at high risk of developing diabetic dyslipidemia which may leads to macrovascular and microvascular disease [3].Glycated hemoglobin is regularly check for monitoring the long–term glycemic control. The main target is to maintain the levels below 7% as increased levels may rise the prevalence of developing the diabetic complication in diabetes patients [4]. The uncontrolled glycemic levels is related to minor to major effects to various organ such as eyes, kidney, nerves, heart, blood vessels. These biomarkers have shown significant correlation with lipid profile in many researches. To date there is no such data have been reported from our region as there is phonotypical and genotypical major differences is present among the African, American and Asian region which justified the objective of present study.

METHOD

The present retrospective cross- sectional study was conducted at Dr. Essa Laboratory & Diagnostic Centre. A written informed consent was obtained from the entire participant covering all the aspects of study and publishing its results. The data was collected their record logs during August to October 2019. Individual was selected on the criteria of diagnosed DM-2 according to the American diabetes association criteria established in 2007 [5]. The National cholesterol educational program Adult treatment panel III guidelines were followed for the reference level of serum lipid profile [6].

SPSS statistical package version 16.0, spearman's rho test is used to evaluate the correlation between HbA1c and parameters of lipid profile. The level of significance was set at 95%. The lipid profile parameters was recorded in mg/dl and

HbA1c is recorded in percentage of the total hemoglobin.

RESULTS

This is a cross sectional retrospective study conducted on a data of 491 patients (237 females and 254 males) from Dr Essa laboratory and diagnostic center from their testing record logs during august 2019 to October 2019. Mean age of subjects was 52.8 ± 12.65 years (range: 19-88 years). Median of HbA1c, triglycerides, cholesterol, LDL, VLDL, total cholesterol and HDL was 6.3 (4.9, 12.2), 132.0 (60, 730), 6.30 (4.9, 12.2), 108.0 (31, 371), 26 (12, 146), 640 (356, 1920), 44 (22, 70) mg/dl, respectively (Table 1). There was a positive significant correlation of HbA1c with total cholesterol (r_S= .113, p < .05), triglyceride (r_S= .172, p < .05) VLDL (r_S = .171, p < .05) and negative significant correlation with LDL (r_S= -.094, p < .05) levels. However, there was no significant correlation of HbA1c with HDL (r_S= -.082, p > .05) (Table 2).

Table 1. Descriptive statistics of HbA1c and parameters of lipid profile

	hba1c	cholesterol	HDL	LDL	VLDL	Triglyceri de	Total cholesterol
N	491	491	491	491	491	491	491
Median	6.3000	180.00	44.00	108.00	26.00	132.00	640.00
Skewness	1.021	.832	-.919	.975	2.512	2.523	1.742
Std. Error of Skewness	.110	.110	.110	.110	.110	.110	.110
Kurtosis	.444	2.899	18.161	4.208	10.004	10.067	5.761
Std. Error of Kurtosis	.220	.220	.220	.220	.220	.220	.220
Range	7.30	322	48	340	134	670	1564
Minimum	4.90	118	22	31	12	60	356
Maximum	12.20	440	70	371	146	730	1920

Table 2. Results of the Spearman correlation coefficient between serum lipids and HbA1c levels			hba1c
Spearman's rho	Cholesterol	Correlation Coefficient	-.033
		Sig. (2-tailed)	.463
	HDL	Correlation Coefficient	-.082
		Sig. (2-tailed)	.069
	LDL	Correlation Coefficient	-.094*
		Sig. (2-tailed)	.038
	VLDL	Correlation Coefficient	.171**
		Sig. (2-tailed)	.000
	Triglyceride	Correlation Coefficient	.172**
		Sig. (2-tailed)	.000
		Correlation Coefficient	.113*
Correlation is significant at the 0.01 level (2-tailed) **			
Correlation is significant at the 0.05 level (2-tailed).*xd			

DISCUSSION

This study was aimed to find an association between glycemic control and risk of hyperlipidemia and CVD in T2Dm. HbA1c was taken a tool and checked for any associated correlated with lipid profile via applying spearman correlation (rho). We found there was a positive significant correlation of HbA1c with total cholesterol (r_S= .113, p < .05), triglyceride (r_S= .172, p < .05) VLDL (r_S = .171, p < .05) and negative correlation with LDL (r_S= -.094, p < .05) levels. However, there was no significant correlation of HbA1c with HDL (r_S= -.082, p > .05) and cholesterol (r_S=-.033, p > .05). In a study conducted in Iran Alireza et al. found a correlation between HbA1c and parameters of lipid profile, Cholesterol (p=0.001), triglycerides (p=0.006) and LDL (p=0.004) and no correlation between HDL (p=0.821). This is consistent with our findings. As we also found there was a positive significant correlation of HbA1c with total cholesterol (r_S= .113, p < .05), triglyceride (r_S= .172, p < .05) VLDL (r_S = .171, p < .05) and negative correlation with LDL (r_S=-.094, p < .05) levels. However, there was no significant correlation of HbA1c with HDL (r_S=-.082, p > .05) [7]. Consistent with our study Baranwal et al. found significant correlation between levels of HbA1c and parameters of lipid profile (significant at 0.01 level) [4]. Another study also suggested HbA1c as reliable biomarker of glycemic control and prediction of serum lipid profile in diabetic patients. HbA1c>6% tend to have moderate to severe lipedema should be examined on regular basis [8]. Samdani et al. study also suggest relationship of glycated hemoglobin with lipid profile. The levels of TC, TG, HDL-C, LDLC, FBS and HbA1c were significantly different between those aged ≥50 years and <50 years old patients [9]. Several other investigator's findings are also in agreement of present study supporting the association between HbA1c and lipid profile [10, 11] In the present study, we found a significant positive correlation of HbA1c with TC, TG and VLDL levels and negative correlation with LDL, while there was no significant association of HbA1c with HDL and cholesterol. The significant correlation found in our study and so many previous studies suggest that high levels of HbA1c should not be ignored in T2DM patients as this may be associated with risk of dyslipidemia and CVD. HbA1c should be used as diagnostic tool and it along with lipid profile should be periodically examined in such patients.

CONCLUSION

This study indicates that HbA1c has a significant correlation with parameters of lipid profile. HbA1c can be used a marker for predicting dyslipidemia and CVD in T2DM patients. We suggest regular periodic monitoring of HbA1c and lipid levels in such patients. This study adds to existing knowledge supporting correlation between HbA1c and parameters of lipid profile.

ETHICS APPROVAL: The ERC gave ethical review approval. **CONSENT TO PARTICIPATE:** written and verbal consent was taken from subjects and next of kin. **FUNDING:** The work was not financially supported by any organization. The entire expense was taken by the authors. **ACKNOWLEDGEMENTS:** We would like to thank the all contributors and staff and other persons for providing useful information. **AUTHORS' CONTRIBUTIONS:** All persons who meet authorship criteria are listed as authors, and all authors certify that they have participated in the work to take public responsibility of this manuscript. All authors read and approved the final manuscript. **CONFLICT OF INTEREST:** No competing interest declared.

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