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Lipoprotein abnormalities in diabetic patients

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Abstract--Objectives: To evaluate and compare blood glucose levels and lipid profile in diabetic vs healthy adults. Methodology: This descriptive cross sectional study was conducted from January 2021 to April 2021. The study samples were collected from Northwest General Hospital Peshawar. Sixty patients with diagnosed type 2 diabetes and an equal number of control subjects were included in this study. After the recruitment of subjects according to the inclusion criteria, subjects were divided into two cohorts; Patients with Diabetes (Group I N=60) and a Non-Diabetic Control Group (Control group N=60). Blood from the subjects was checked for glucose levels and lipid profile. Blood was taken and analysed at the Hospital Lab via Cobas 6000 analyser. Data was analysed using SPSS version 26.0 for MacBook Pro. T test was applied to the data and p value was kept at <0.05 for significance. Results: Fasting Blood Glucose (FBS) rise was statistically significant ($p=0.03$) with a mean and standard deviation (SD) of $161.21\pm46.31^*$ for Group I and 79.29 ± 18.56 for Group II with a Mean Difference (MD) of 81.92. Triglycerides (TGs) rise was

statistically significant ($p=0.03$) with a mean and SD of $197.29\pm 68.56^*$ for Group I and 141.16 ± 42.63 for Group II with a MD of 56.13. High Density Lipoprotein (HDL) were decreased significantly ($p=0.01$) in the Group I ($30.08\pm 3.02^*$) in comparison with Group II (45.1 ± 4.98) with a MD of 5. Conclusions: In conclusion, our study results show that diabetic patients have lipoprotein derangements. However, further studies are required for not only understanding the medical condition but also to establish a possible link of developing cardiometabolic syndrome and cardiovascular diseases.

Keywords--lipoproteins, diabetes, obesity, insulin.

Introduction

Metabolic disorder called Diabetes Mellitus (DM) mainly caused by hyperglycemia due to either deficiency of insulin or insulin resistance. This maybe sometimes due to both, making DM a global health challenge [1]. Nowadays there is a rise in the prevalence of DM. In the year 2011, around 366 million people were affected by this disease across the globe (2). DM is a public health concern of serious and growing nature. It also carries a substantial economic burden all over the world. Figures from the year 2019 show that an estimated 463 million people are living with DM. If efforts are not taken, this number could go beyond 700 million by the year 2045 [3]. The situation has taken the form of a pandemic. This rise in the DM cases can be linked to lifestyle changes, aging and rise in the obese population [4-5]. This is noteworthy that DM can cause severe complications. [6] This may include metabolic derangements including lipid profile. Dyslipidaemias are present in a major portion of patients that represent the diabetic population [7-8]. Abnormalities of lipid profile including TGs, Cholesterol, HDL and LDL may cause cardiovascular complications in diabetic patients. [9-10]. The aim of this article is to assess, evaluate and compare blood glucose levels and lipid profile in diabetic vs healthy adults. Early detection of lipid abnormalities may lead to better outcomes i.e., decreasing the risk for cardiovascular and cerebrovascular accidents.

Methodology

This descriptive cross-sectional study was conducted from January 2021 to April 2021. The study samples were collected from Northwest General Hospital Peshawar. Sixty patients with diagnosed type 2 diabetes and an equal number of control subjects were included in this study. After the recruitment of subjects according to the inclusion criteria, subjects were divided into two cohorts; Patients with Diabetes (Group I N=60) and a Non-Diabetic Control Group (Control group N=60). Inclusion criteria included patients of both sexes with diagnosed diabetes mellitus (diagnosis made by consultant keeping both clinical and haematological values of the variables in account). Exclusion criteria included patients with kidney disease, secondary hypertension, thyroid, liver or parathyroid related medical conditions. Controls included healthy subjects of both sexes between 18-40 years of age. Blood from the subjects was checked for glucose levels and lipid profile. Blood was taken and analysed at the Hospital Lab

via Cobas 6000 analyser. Data was analysed using SPSS version 26.0 for MacBook Pro. Data was presented as mean and SD in the form of tables and figures. T test was applied to the data and p value was kept at <0.05 for significance.

Results

Mean and SD for age were recorded as 31.2 ± 8.1 years for Group I and 23.4 ± 4.6 years. Of the sixty patients in Group I, twenty were male and forty were females. In Group II, out of the sixty patients, twenty-six were males and the rest thirty-four were females. FBS rise was statistically significant ($p=0.03$) with a mean and standard deviation (SD) of $161.21 \pm 46.31^*$ for Group I and 79.29 ± 18.56 for Group II with a Mean Difference (MD) of 81.92. TGs rise was statistically significant ($p=0.03$) with a mean and SD of $197.29 \pm 68.56^*$ for Group I and 141.16 ± 42.63 for Group II with a MD of 56.13. High Density Lipoprotein (HDL) were decreased significantly ($p=0.01$) in the Group I ($30.08 \pm 3.02^*$) in comparison with Group II (45.1 ± 4.98) with a MD of 5. Total Cholesterol rise was not statistically significant ($p=0.12$) with a mean and SD of 235.44 ± 53.15 for Group I and 178.37 ± 29.18 for Group II with a MD of 57.07.

Table 1
Shows results of FBS Level and Lipid Profiles of the subjects in Group I and Group II

	Group I (N=60)	Group II (N=60)	Mean Difference	p-Value
FBS (mg/dl)	$161.21 \pm 46.31^*$	79.29 ± 18.56	81.92	0.03
TGs(mg/dl)	$197.29 \pm 68.56^*$	141.16 ± 42.63	56.13	0.03
HDL (mg/dl)	$30.08 \pm 3.02^*$	45.1 ± 4.98	15.02	0.01
LDL (mg/dl)	105 ± 33.15	110 ± 29.13	5	0.23
Total Cholesterol (mg/dl)	235.44 ± 53.15	178.37 ± 29.18	57.07	0.12

195.44 ± 45.61

183.37 ± 44.53

* Represents statistically significant values of Diabetic patients in comparison to Healthy Adults.

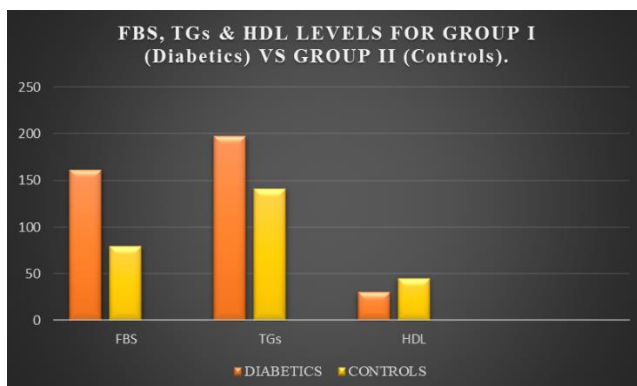


Figure 1. Shows results of FBS, TGs and HDL Levels of the subjects in Group I and Group II

Discussion

Centre for Disease Control reports that almost 97% diabetics show one or more lipid abnormalities [11]. However, other studies report that the prevalence of diabetes induced dyslipidemia can vary between 25%-60% [12]. This variation in prevalence may be due to differences in the Body Mass Index (BMI) and the different genetic variation of populations. A study by Ahmad et al reported that 21% diabetic subjects had raised serum cholesterol i.e., >200mg/dl while 34.2% diabetic subjects of the study had raised TGs i.e., >150mg/dl [13]. While our study found out that TGs mean and SD of 197.29±68.56* for Group I (Diabetics) and 141.16±42.63 for Group II (Controls) with a MD of 56.13. Different values of TGs in different researches may corroborate to the fact that dietary habits of the different populations may vary [14-15].

Our study has various clinical implications. It was established for the first time in our population that patients show an explicit relationship between Diabetes and Dyslipidaemias. This study does have some epidemiological strengths; including the fairly large sample size of the study, a well-established inclusion and exclusion criteria. Also, the strong quality controls add strength to the study. Our study confirms that a relation exists between dyslipidaemias (derangement of lipid profile) and diabetes, in our population. However, due to the cross-sectional nature of our study, the results of our study do have limitation. Another limitation of our study was the inability to follow up the patients due to financial and logistic constraints.

Conclusion

Diabetes Mellitus is one of the commonest risk factors for cardiovascular disease and stroke. Our study found out that the raised levels of FBS and TGs were statistically significant ($p=0.03$). While the levels of high-density lipoprotein (HDL) were decreased significantly ($p=0.01$) in the diabetic group in comparison with controls. In conclusion, our study results show that diabetic patients have lipoprotein derangements. However further studies including: systemic reviews, meta-analysis and level I evidence studies are required for not only understanding the medical condition but also to establish a possible link and to further help us understand the explicit effect governing this risk of developing cardiometabolic syndrome and cardiovascular disease.

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