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Research Article

Comparison of glycosylated hemoglobin and different lipid parameters in with and without type-2 diabetes mellitus patients and controls

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Abstract:

Objective: To compare of glycosylated hemoglobin and different lipid parameters in with and without type-2 diabetes mellitus patients and controls.

Methods: This was a prospective and analytical study conducted in tertiary care hospital. A total of 50 cases of diabetes with & without complication and 50 controls of either sex and 35-75 years of age were included in the study. Clinically diagnosed & confirmed cases of Diabetes Mellitus in age group 35 to 75 years with >5 years history of diabetes on treatment of any duration, patients of diabetes with complications like retinopathy, nephropathy were included in the study.

Results: The FBS level was significantly (p=0.0001) higher among cases (122.26±68.39) compared with controls (79.28±11.84). The PPBS was also higher (p=0.0001) among cases (188.20±87.27) than controls (124.12±10.96). The level of HbA1C was significantly (p=0.0001) higher among cases (7.47±1.90) compared with controls (5.48±0.41). The increased level of TC, TG, LDL and VLDL was observed among cases than controls (p<0.01). However, decreased level of HDL was found among cases compared with controls (p>0.05).

Conclusion: The study found that there was elevation of lipid profile and HbA1C in the patients of type-2 diabetes.

Keywords: Type-2 diabetes, Glycosylated hemoglobin, Lipid profile

INTRODUCION

Diabetes mellitus is a group of metabolic diseases characterized by hyperglycemia resulting from defects in insulin secretion and insulin action or both. The chronic hyperglycemia is associated with long-term damage, dysfunction, and failure of normal functioning of various organs, especially the eyes, kidneys, nerves, heart, and blood vessels (American Diabetes Association, 2012). Diabetes-specific microvascular disease is a leading cause of blindness, renal failure, and nerve damage (Cade, 2008).

The prevalence of diabetes is rising all over the world due to population growth, aging, urbanisation, and the increase of obesity due to physical inactivity. Unlike the West, where the older are most affected, diabetes in Asian countries is comparatively high in young to middle-aged people. All these complications have long-lasting adverse effects on a nation's health and economy, especially for developing countries. As per estimate of the International Diabetes Federation (IDF), the total number of people in India with diabetes which was around 50.8 million in 2010 would be 87.0 million by 2030 (Ramachandran et al, 2010).

India faces a huge case load of type 2 diabetes mellitus (DM), which is projected to affect about 69.9 million Indians by the year 2025 (Sicree et al, 2006). With limited access to quality health care, this population is prone to develop microvascular complications such as neuropathy, nephropathy, retinopathy and macrovascular problems like cardiovascular diseases. Diabetic retinopathy (DR) is a common microvascular complication, which is one of the leading causes of adult visual impairment and blindness (Marozas and Fort, 2014). Though all traditional risk factors such as hyperglycemia, dyslipidemia, hypertension and duration of diabetes are associated with development and progression of DR (Nguyen et al, 2009), the altered milieu of oxidants and antioxidants in the sera of patients with type 2DM are additional contributors. In DM, the glucolipotoxicity leading to endothelial dysfunction and hyperglycemia is associated with free radical

mediated lipid peroxidation (Likidlilid et al, 2010; Su et al, 2008).

Glycated hemoglobin (HbA1c) is a routinely used marker for long-term glycemic control as an indicator for the mean blood glucose level. HbA1c predicts the risk for the development of diabetic complications in diabetes patients**.** Apart from classical risk factors like dyslipidemia, elevated HbA1c has now been regarded as an independent risk factor for CVD in subjects with or without diabetes. Estimated risk of CVD has shown to be increased by 18% for each 1% increase in absolute HbA1c value in diabetic population (Selvin et al, 2005). Lipids are a chemically diverse group of compounds that are poorly soluble in the aqueous environment of the cell.

The present study was conducted to compare of glycosylated hemoglobin and different lipid parameters in with and without type 2 diabetes mellitus patients and controls.

MATERIAL AND METHODS

This was a prospective and analytical study conducted in tertiary care hospital. A total of 50 cases of diabetes with & without complication and 50 controls of either sex and 35-75 years of age were included in the study.

Clinically diagnosed & confirmed cases of Diabetes Mellitus in age group 35 to 75 years with >5 years history of diabetes on treatment of any duration, patients of diabetes with complications like retinopathy, nephropathy were included in the study.

Patients with chronic alcoholics, smokers, juvenile Diabetes/ H/Type 1 Diabetes, Gestational Diabetes, adverse Renal & Liver Disease and acute & chronic inflammatory disease & Malignancy were excluded from the study.

Data Collection

Ethical clearance was taken before the commencement of the study. Written consent was obtained from the participants after they were given an explanation of the study details. The data was collected in a proforma which includes IPD/OPD no. various socio-economic parameters like name, age, sex, occupation, religion as well as detailed medical examinations and laboratory investigations. A brief questionnaire that included the history of diabetes, hypertention cerebrovascular accident, ischemic heart disease, as well as family history of diabetes and hypertension were introduced and recorded.

Methods

Under aseptic conditions 10ml of venous blood was collected. Out of this, 1 ml was collected in EDTA bulb after overnight fasting for estimation of HbA1c and remaining sample is allowed to centrifuged (3,000 rpm, for 20 min at 4deg.C) to obtain serum that was also stored at 80^0C for further biochemical measurements. Urine was also collected in clean container for microalbumin & routine, microscopic test. Standard methods were used to measure the biochemical parameters.

Statistical Analysis

Data were entered in a Microsoft Excel spreadsheet. All the entries were checked for any keyboard error. Data available were analysed by simple statistical means like percentage, mean and total number. All data processing was done using SPSS 16.0. The mean and SD was estimated for each of the lipid parameters. The comparison between diabetic and non-diabetic cases was carried out by using the student "t-test". Chi-square test was used to compare categorical variables between cases and controls. The p-value was set at 0.05.

RESULTS

Table-1: Age and sex distribution of cases and controls

Age and sex	Cases (n=50)		Controls (n=50)		p-value[1]
	No.	%	No.	%	
Age in years					
<40	6	12.0	10	20.0	0.06
41-50	26	52.0	13	26.0	
51-60	7	14.0	13	26.0	
>60	11	22.0	14	28.0	
Mean±SD	51.46±12.71		52.48±12.76		
Sex					
Male	25	50.0	26	52.0	0.84
Female	25	50.0	24	48.0	

[1]Chi-square test

Table-1 depicts the age and sex distribution of cases and controls. About half (52%) of cases and 26% of controls were in the age group 41-50 years. However, 22% of cases and 28% of controls were above 60 years. The mean age of cases was 51.46±12.71 and controls was 52.48±12.76. The difference in the age between cases and controls was statistically not significant (p>0.05), showing the comparability of the groups in terms of age. The male/female ratio between cases and controls was similar (p>0.05).

The FBS level was significantly (p=0.0001) higher among cases (122.26±68.39) compared with controls (79.28±11.84). The PPBS was also higher (p=0.0001) among cases (188.20±87.27) than controls (124.12±10.96) (Table-2).

Table-2: Comparison of glucose levels between cases and controls

	Cases (n=50)	Controls (n=50)	p-value
FBS	122.26±68.39	79.28±11.84	0.0001*
PPBS	188.20±87.27	124.12±10.96	0.0001*

*Significant

The level of HbA1C was significantly (p=0.0001) higher among cases (7.47±1.90) compared with controls (5.48±0.41) (Table-3).

Table-3: Comparison of HbA1C level between cases and controls

	Cases (n=50)	Controls (n=50)	p-value
HbA1C	7.47±1.90	5.48±0.41	0.0001*

*Significant

The increased level of TC, TG, LDL and VLDL was observed among cases than controls ($p<0.01$). However, decreased level of HDL was found among cases compared with controls ($p>0.05$) (Table-4).

Table-4: Comparison of Lipid levels between cases and controls

	Cases (n=50)	Controls (n=50)	p-value
TC	175.42±44.64	145.32±20.30	0.0001*
TG	156.32±87.35	80.08±34.25	0.0001*
HDL	41.90±9.08	45.48±11.55	0.08
LDL	102.36±37.22	84.80±18.20	0.003*
VLDL	31.15±17.48	15.94±6.78	0.0001*

*Significant

DISCUSSION

Patients with type 2 diabetes often exhibit an atherogenic lipid profile, which greatly increases their risk of CVD compared with people without diabetes. An early intervention to normalize circulating lipids has been shown to reduce cardiovascular complications and mortality (Haffner et al, 1998).

In the present study, in diabetic group there was significant elevation of total cholesterol, TG, LDL and VLDL when compared to controls. This was comparable to the study by Smith and LALL (2008). The HDL-C was significantly lower in diabetics when compared to controls. Suryavanshi et al (2006) also reported similar results.

A higher level of glucose and HbA1C was found among cases than controls in this study. Khan et al. (2007) reported the impact of glycemic control on various lipid parameters and observed the significant alterations in all lipid parameters with regard to glycemic control. The severity of dyslipidemia increases in patients with higher HbA1c value. Elevated levels of HbA1c and dyslipidemia are independent risk factors of cardiovascular diseases and hence, diabetic patients.

CONCLUSION

The study found that there was elevation of lipid profile and HbA1C in the patients of type-2 diabetes.

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