ORIGINAL ARTICLE

Prevalence and pattern of dyslipidemia in hyperglycemic patients and its associated factors among Pakistani population

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Abstract In diabetes mellitus dyslipidemia is one of the major risk factors for cardiovascular disease. In type 2 diabetes mellitus early detection and treatment of dyslipidemia can avoid risk for cardiovascular disorder. The present study was carried to determine the prevalence and pattern of hyperlipidemia in patients with hyperglycemia. The cross sectional study was done in different laboratories of Pakistan, the laboratories served patients referred from different government and private hospitals between July 2014 and June 2015. All known cases of diabetes mellitus were evaluated for their lipid profile. Totally 200 diabetic patients were included in the study in which 120 (60%) were males and 80 (40%) were females. Prevalence of dyslipidemia among diabetic males was 97.18% while for females 87.15%. Among dyslipidemic male the proportion with mixed dyslipidemic patients was 17.5%, combined two parameters dyslipidemia was 47.5% and isolated single parameter dyslipidemia was 35%. In females these proportions in mixed, combined two parameters and isolated single parameter were 16.25%, 51.25% and 32.5%, respectively. Majority of hyperglycemic patients were dyslipidemic. The most prevalent pattern among male was combined dyslipidemia with high triglycerides (TG) and low High Density Lipoprotein (HDL) and in female it was high Low Density Lipoprotein (LDL) and low HDL. The most prevalent lipid abnormality in our study was low HDL followed by high TG.

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1. Introduction

Diabetes mellitus frequency is increasing many folds in South Asian population. Many factors like high body fat percentage, high susceptibility to environmental insulin, high degree of genetic predisposition and high level of insulin resistance are

involved in this metabolic disorder (Uttra et al., 2011). It is characterized by absolute deficiency in insulin secretion and insulin action associated with hyperglycemia, metabolism of protein, carbohydrate and lipids are disturbed (Abou-Seif and Youssef, 2004). Different research studies show that body composition components like lipid profile and body fat are responsible for the increased prevalence of this disease (Elinasri and Ahmed, 2008). In diabetes mellitus the lipid abnormalities are more prevalent because major key enzymes and lipid metabolism pathways are affected due to deficiency of insulin production and secretion (Taskinen, 2002). Dyslipidemia is one of the major risk factors for cardiovascular disease in hyperglycemic patients. High triglycerides (TG), low High Density Lipoprotein (HDL) cholesterol, and increased Low Density Lipoprotein (LDL) cholesterol are the characteristic feature of diabetic dyslipidemia. Type 2 diabetes affects an estimated 21 million people in the United States (CDCP, 2013). About 70–80% of diabetic patients will die of cardiovascular disease (ADS, 1998; Feher, 2004). The prevalence of hypercholesterolemia is not increased in patients with diabetes mellitus but mortality from coronary heart disease increases (Mooradian, 2009). American Diabetes Association (ADA) guidelines recommend maintaining serum levels of TG below 150 mg/dl, LDL cholesterol below 100 mg/dl and HDL cholesterol of more than 40 mg/dl in males and 50 mg/dl in females (ADA, 2004).

In the whole world about 382 million people are the victim of hyperglycemia. The regions of high prevalence are North America and Caribbean about 11%. According to International Diabetes Federation (IDF) estimates in 2013, 35 countries out of 219 countries have about 12% prevalence of diabetes. 10–19% of Asian population is currently affected due to diabetes. In Pakistan 7.1 million people suffer due to diabetes. The data from Pakistan showed a prevalence rate of 18–46% while 46–75% Pakistani patients with diabetes had metabolic syndrome (Sohail et al., 2006; Basit and Shera, 2008). The rationale of this study was to detect the lipid abnormality in hyperglycemic patients because in diabetes mellitus early detection and treatment of hyperlipidemia can prevent the progression of lipid abnormalities and minimize the risk for cerebrovascular accident and cardiovascular disorder.

2. Material and method

2.1. General data

A prospective cross sectional study was planned to analyze the pattern and prevalence of dyslipidemia in hyperglycemic patients during July 2014–June 2015. The study was carried out in different laboratories of Pakistan; a number of patients were referred from different government and private hospitals. A total of 200 patients 120 males and 80 females were included in the study. Diabetes was already diagnosed in all persons. Information about participants' age, sex, life style, monthly income, occupation and family history of diabetes were recorded. Before registering for the study written consent was obtained from the participants, expressing their willingness to participate in the study. Patients who have already taken lipid lowering drug and pregnant women were excluded from the study. Detailed history and clinical examination of all the included patients were done.

2.2. Blood sample collection

Five milliliters of venous blood samples were collected from fasting diabetic patients into fluoride oxalate plastic for estimation of blood glucose level and serum was separated by centrifuging the blood samples at 8000 rpm for 10–15 min for lipid profile analysis including TC, TG, HDL-C, LDL-C. CHOD-PAP Enzymatic Colorimetric (HUMAN GmbH, Wiesbaden, Germany) method was used for determination of lipid profiles using the Microtech 3000 plus clinical chemistry analyzer.

2.3. Statistical analysis

All the observations were tabulated and results were expressed as percentage and mean ± standard error. Data analysis was performed using mini tab software. To determine the coefficients CHI-SQUARE was used. ($P \leqslant 0.05$) is significant and ($P \geqslant 0.05$) is not significant.

3. Results

A total of 200 patients were studied.

3.1. Distribution of patients according to age, height and weight

In this study 31.5% ($n = 63$) were below 40 years of age while 68.5% ($n = 137$) were above 40 years and prevalence among male and female is 95.4% and 86.75%, respectively. According to the height 43 patients were between 5 and 5.2 inches, 70 were 5.3–5.5 while 59 and 28 persons were fall between 5.6–5.8 and 5.9–5.11 inches, respectively. Most of the patients in the study had weight 61–70 kg, while 21 and 44 diabetic persons had 80 kg and 71–80 kg, respectively shown in (Table 1).

Table 1 Number of patients according to different characteristics.

Characteristics	N (%)	Characteristics	N (%)
Gender		*Obesity*	
Male	120 (60%)	Obese	84 (42%)
Female	80 (40%)	Non-obese	116 (58%)
Age (Years)		*Hypertension*	
Below 40	63 (31.5%)	Yes	123 (61.5%)
Above 40	137 (68.5%)	No	77 (38.5%)
Height		*Smoking*	
5–5.2	43 (21.5%)	Yes	56 (28%)
5.3–5.5	70 (35%)	No	144 (72%)
5.6–5.8	59 (29%)	*Sedentary lifestyle*	
5.9–5.11	28 (14%)	Yes	86 (43%)
Weight		No	114 (57%)
41–50	12 (6%)	*Work*	
51–60	52 (26%)	Field	93 (46.5%)
61–70	71 (35.5%)	Office	65 (32.5%)
71–80	44 (22%)	No	42 (21%)
81–90	21 (10.5%)		