Original Article

Frequency of Dyslipidemia in Diabetic Anemic Patients with and without Nephropathy

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Abstract

Objective: To compare frequency of dyslipidemia in anemic diabetics with and without nephropathy.

Method: The study design was comparative cross-sectional Hemotology Department. Eighty (n=80) patients who visited Diabetes management centre were included in the study. Sampling was done by using Non-probability, consecutive sampling technique. The participants were categorized in 2 groups. Group I consists of 40 anemic patients with diabetes and without nephropathy, group II includes 40 anemic diabetic nephropathy patients. Demo-graphic details were noted. Informed consent was obtained before taking blood sample. Analysis of samples for cholesterol level was done using ELISA technique. Reports were assessed and levels were noted. All the data was noted in specified proforma and analyzed through SPSS 22.0.

Results: During this study a total of 80 patients were inducted having mean ages of 49.2±7 years. There were 41.3% males and 58.3% female patients. Total iron binding capacity was 345±61.6mcg/dl, serum iron level was 24.24±5.54mmol/l. Mean serum cholesterol level in patients without diabetic nephropathy was 196.55 + 53.56mg/dl and in patients with diabetic nephropathy 221.11 + 41.11, p-value 0.04. Mean serum triglyceride levels were 170.35 + 35.94 in patients with diabetic nephropathy and 199.35 + 55.94, p-value 0.002. There were 37.5% patients having dyslipidemia without hephropathy and 70% in patients with hephropathy. p-value 0.001.

Conclusion: Study concluded that patients having any degree of diabetes associated nephropathy with concomitant anemia have increased frequency of dyslipidemia as compared to diabetics without nephropathy but having anemia.

Keywords: Diabetes, Anemia, Nephropathy, Dyslipidemia

Introduction

Diabetes Mellitus is a disease that affects almost every organ system of the body and results due to long standing and intricate overlap of an individual's lifestyle approaches, genetic makeup and environmental variables.[1] There has been a significant rise in the deaths and disabilities resulting from sedentary lifestyles, non-compliance to balanced diet and nicotine abuse. Type 2 DM has evolved into a serious concern threating the psycho-socio-economic and health provision status of a country.[2] Recent data from the International Diabetes Federation (IDF) suggest that globally 415 million people are suffering from diabetes and this number is predicted to float to 642 million till the year 2040 making every 11th person in the community affected by this disease. There has been a significant rise in the cases of type 2 DM especially in the developing countries.[3] IDF has allocated Pakistan in the Middle East Group which makes 9.7% of this total pool, of which 37 million

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people have developed diabetes.[4]

Diabetes disturbs the physiological processes of the body which has deleterious and wide ranging sequels accounting for the morbidity and complications. The long term hazards can further be categorized into micro and macro-vascular manifestations progressing from retinopathy to neuropathy and ultimately nephropathy in the former and coronary artery disease, cerebrovascular accident and limb ischemia in the later.[5] Renal involvement and insufficiency has the most lethal outcome of DM.[6] Apart from it cardiovascular health is subjected to a poor prognosis due to the altered lipid metabolism, endothelial injury and subsequent plaque formation (atherosclerosis).[7] Long standing diabetes alters the lipid metabolism and distribution leading to increased level of low density lipoproteins (LDL), trigycerides (TG) and Apo-lipoprotein B and sub-optimal levels of high density lipoproteins (HDL) threating intimal health and paving the way for micro and macro-vascular complications. Thus by managing lipid profile, the current study can modify risk and prevent cardiovascular complications.[7] Different studies have been done to determine frequency of dyslipidemia in diabetics and non-diabetics but no prospective study has been done to compare dyslipidemia in anemic diabetics with and without nephropathy.[5-8] The aim of the study was to ascertain the prevalence of dyslipidemia in diabetics with and without nephropathy having concomitant anemia.

Material And Methods

This is a comparative cross sectional study conducted during 2018 to 2019 in which a total of 80 patients were enrolled via non-probability consecutive sampling technique. The study population was divided into 2 subgroups namely Group I Anemic individuals with diabetes and without nephropathy and Group II Anemic individuals with diabetes and diabetic nephropathy containing 40 patients each. The patients falling into to the predefined inclusion criteria i-e age 35-55years of either gender presenting with anemia having type 2 Diabetes Mellitus without diabetic nephropathy and patients with clinical and laboratory evidence of varying degree of diabetic nephropathy i-e stage 1, 2 and 3 (without dialysis). Similarly the patients with the history of or having type 1 diabetes, iron deficiency anemia, deranged Erythropoietin (EPO) level or taking EPO therapy, hemodialysis, uncontrolled hypertension, liver abnormalities, malignant, chronic inflammatory disorders and infectious diseases and those taking drugs such as ACE inhibitors, sex hormones and iron therapy were excluded from the study.

According to selection criteria 40 diabetic patients with anemia but without nephropathy were included in group I and another 40 diabetic patients with anemia and nephropathy were included in group II on the basis of medical record. Informed consent was obtained before taking blood sample. Demographic details including name, age, gender, smoking status and dyslipidemia were also recorded. Blood samples were obtained by using 5cc disposable syringe in tubes containing no additives. These specimens of the blood were sent to the pathology laboratory of the Services hospital for measurement of serum cholesterol level and serum triglyceride levels. All information was recorded on proforma.

Data was collected, organized, entered and analyzed through SPSS (Statistical Package for Social Sciences) 22.0. Mean $\pm$ SD, for quantitative variables. Percentage and frequency were calculated for qualitative variables. Chi- square test was applied for qualitative variables. ANOVA was applied for continuous variables. Any p-value less than or equal to 0.05 was considered significant.

The study was undertaken after approval from hospital ethical committee (IRB/2019/552/SIMS dated:25-05-2019). The official consent and permission was taken from concerned authority to conduct the study. Patients were included in the study after their informed consent was obtained. The samples were obtained as routine investigations under aseptic measures. Secrecy and privacy was maintained at all costs according to the principles laid down in Helsinki Declaration of Bioethics.

Results

During this study a total of 80 patients were inducted having mean ages of 49.2±7 years. There were 41.3% males and 58.3% female patients. Total iron binding capacity was 345±61.6mcg/dl, serum iron level was 24.24±5.54mmol/l. Mean serum cholesterol level in patients without diabetic nephropathy was 196.55 + 53.56 mg/dl and in patients with diabetic nephropathy 221.11 + 41.11, p-value 0.04. Mean serum triglyceride levels were 170.35 + 35.94 in patients with diabetic nephropathy and 199.35+55.94, p-value 0.002. There were 37.5% patients having dyslipidemia without hephropathy and 70% in patients with nephropathy, p-value 0.001.
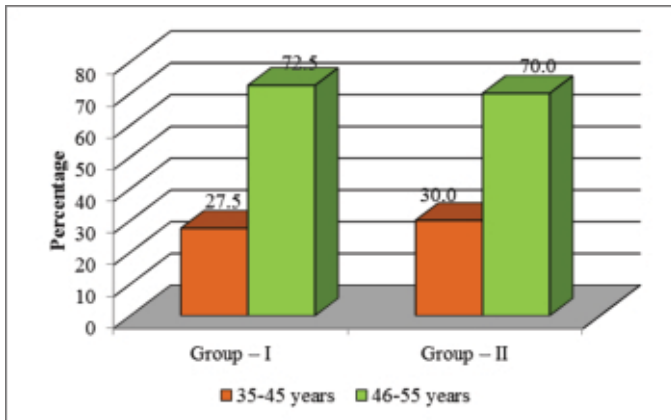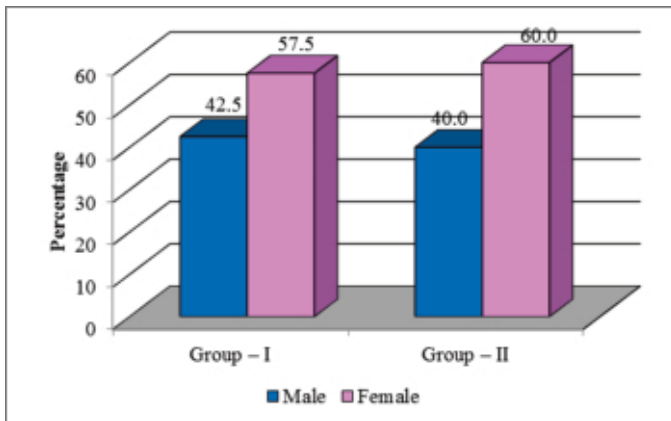
Figure–1: *Comparison of Age Between Both Groups*

Figure –2: *Comparison of Sex Between Both Groups*

Table 1: *Comparison of Frequency of Dyslipidemia among Diabetic Anemics with and without Nephropathy*

Variables	GROUP – I Diabetic Anemic without Nephropathy	GROUP – II Diabetic Anemic with Nephropathy	p-value
Age	49.75 + 8.536	48.78 + 7.163	0.582
HbA1c	7.94 + 1.20	7.69 + 0.94	0.514
Serum cholesterol	196.55+53.56mg/dl	221.11 + 41.11	0.04
Serum triglyceride	170.35 + 35.94	199.35 + 55.94	
Dyslipidemia	37.5%	70%	0.001

Discussion

Renal involvement and insufficiency is one of the most lethal and notorious complication of DM exponentially increasing the risk of cardiovascular deaths from cardio-renal etiology particularly in the first-world countries where the incidence of DM related end-stage renal disease has been observed around 30%-50% in the past 20 years.[9-10] Diabetic nephropathy is characterized by the presence of micro-albuminuria which eventually leads to the renal shutdown.[11] The main trigger in the progression of diabetic nephropathy is the endothelial insult resulting from the raised glucose content of the blood apart from other subsidiary phenomenon such as subclinical inflammation, reactive oxygen species, accelerated atherosclerosis, caspases activation and smooth muscle proliferation.[12] Eventually elements of chronic inflammatory processes take over and turn the body into an arena of disrupted metabolism for the lipid, proteins and carbohydrates and further worsening the renal functions.[13]

The data on the dyslipidemia in this context is scarce therefore this prospective study under discussion was planned to compare dyslipidemia in diabetic patients with and without underlying nephropathy.

During the study 80 patients were inducted and found that there mean age was 49.26±7.84 years. The patients were divided into equal groups. In group-I diabetic anemic with nephropathy while in group-II diabetic anemic without nephropathy were included. Study revealed that in both groups most of the patients were more than 45 years old as 72.6% diabetic anemic without nephropathy and 70% diabetic anemic with nephropathy were 46-55 years old while remaining proportion in both groups was 35-45 years old. Study carried out by Nand L reported that 50% patients were upto 45 years old and 50% were more than 45 years.[14] A similar study was done by Shahwan MJ where subjects fulfilling the criteria were observed for and after formal informed consent were inducted. About 27 (8.4%) suffered from Type 1 DM and 293 (91.6%) had type 2 form of DM. 72 of the later had diabetes induced renal insufficiency (Diabetic Nephropathy). The overall prevalence of such variant remained 22.5%. Diabetic nephropathy developed at a mean age of 55±12 years versus 52±13 years in the group with no renal complication. The age group of 40-49 years experienced the highest incidence (37.5%) of renal compromise with a toll of 27 patients, followed by the age group 50-59% with incidence of 15 (20.8%). It was observed that there more female 51.4% sufferers versus males 48.6% group-I identical to 55.6% female versus 44.4% in group-II. The age and gender distribution in both the groups was not statistically significant (p=0.35).

It was found that the patients with diabetic nephropathy had their mean triglycerides levels 1.98 mmol/L higher than those without the nephropathy (p=0.004). Similarly the subjects had a total cholesterol of 5.05 mmol/L above mean versus 4.57 mmol/L in otherwise healthy adults (p = 0.04). Whereas the fractions of Low Density

Lipoprotein-C (LDL-C) and High Density Lipoprotein-C (HDL-C) in both the individuals remained unaffected. Renal compromised patients had an LDL-C of 3.28 mmol/L above their means as compared to 3.02 mmol/L in healthy adults (p = 0.33), likewise weightage of HDL-C existed 0.95 mmol/L for the renal involvement group and 0.86 mmol/L for the unaffected pool (p = 0.45). There existed a conspicuous evidence of altered lipid metabolism in all those diabetic patients with concomitant renal insufficiency. The fraction of total cholesterol and triglycerides showed an up steep pattern in the studied group (p=0.003). The distribution of LDL-C though found to be shifted towards the subjects (45.8%) versus the control (38.9%), but had not statistical relevance (p = 0.49). Similarly the HDL-C appeared to be optimum in the healthy individuals (69.4%) as compared to those with nephropathy (58.3%), yet the correlation remained non-significant (p = 0.26).[15,16]

The picture of the distribution of altered lipid fractions was also identical to the study conducted by Maurya NK, having an average rate of occurrence of this maladaptation of about 25-60% in individual with diabetes.[17] Evidence from the Sudanese population in north of Sudan have supported similar outcomes in terms of elevated cholesterol 43.5% and triglycerides 34.8% in the blood of type 2 diabetics.[18] The results of the present study were also found to be congruous to those of the Comparison of serum lipid profile in type 2 diabetes with and without adequate diabetes control, having abnormality index of triglycerides and total cholesterol to be around 25% and 50% respectively.[19]

Conclusion

Diabetes is a leading life-threatening disease worldwide, if left untreated could cause several complications like diabetic ketoacidosis, cardiovascular disease, foot ulcers, kidney failure and retinopathy. Current study found that hyperlipidemia is more common in patient shaving diabetic nephropathy.

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Authors Contribution

MF: Conceptualization of Project

LR: Data Collection

RD: Literature Search

SZ: Statistical Analysis

AR: Drafting, Revision

UR: Writing of Manuscript