



Diabetes Lipidus - A persistent problem. Frequency and patterns of dyslipidemia among the diabetic adults of Pakistan.

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ABSTRACT... Objective: To determine the frequency of dyslipidemia and its types in adult diabetics of Karachi. **Study Design:** Cross Sectional, Observational study. **Setting:** Diabetes Outpatient Clinic in JPMC, Karachi. **Period:** January 2019 to June 2019. **Material & Methods:** 248 adult diabetics presenting in diabetic outpatient clinic in JPMC, Karachi selected by non-purposive convenient sample technique. Diagnosed diabetics who were not on any lipid lowering therapy were included in the study. Non diabetics and those diabetics who were already on lipid lowering drugs were excluded. After relevant information is taken the lipid profile of the participants was done with a 12 hours fasting and the data was secured on a pre-designed performa. The results were analyzed on SPSS version 20. **Results:** Among the 248 diabetics that presented 88(35.4%) were males and 160(64.5%) were females. The prevalence of dyslipidemia was 85.9% (213 diabetics had dyslipidemia). High triglycerides were present in 52.4% (130), high LDL in 28.2% (70) and low HDL in 175(70.6%). [P=0.000]. At least one dyslipidemic factor was deranged in 81(32.7%), two in 102(41.1%) and 3 in 30(12.1%) persons. In males, 53 out of 88(60.2%) were dyslipidemic, and in females all had dyslipidemia (100%). [P = 0.000]. Hypertriglyceridemia was present in 38(43.1%) males and 92(57.5%) females [P=.021], High LDL in 21(23.8%) males and 49(44%) females [P=.163], while low HDL was present in 16(22%) males and 159(99%) females [P=.000]. **Conclusion:** Dyslipidemia is highly prevalent in our population. Female diabetic patients had relatively higher triglycerides than men.

Key words: Cholesterol, Diabetes, Dyslipidemia, Gender, Triglycerides.

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INTRODUCTION

Diabetic dyslipidemia, or more specifically called diabetes lipidus, is a phenomenon that is existing worldwide and it continues to create mayhem in the medical world. The bad news is that its prevalence still prevails globally. The leading cause of atherosclerosis then contributes to cardiovascular morbidity and mortality, cerebrovascular infarcts and other ischemic incidents in both developed and the developing countries. The WHO asserts that hypercholesterolemia has caused 2.6 million deaths (4.5% of total) and 29.7 million disability adjusted life years (DALYS). In 2008, the global prevalence of hypercholesterolemia (≥ 5.0 mmol/l) was 39% (37% for males and 40% for females) among adults. The fall in mean cholesterol between 1980 and 2008 was unfortunately less than 0.1 mmol/L per decade.¹

The hallmark of diabetic dyslipidemia is high triglycerides, low HDL and increased LDL-cholesterol particles. These deviations occur due to increased free fatty acid flux secondary to insulin resistance.² Studies have established the link between dyslipidemia, diabetes and cardiovascular events. Cardiovascular risk increases significantly as low-density lipoprotein cholesterol (LDLC) increases. Cholesterol-lowering therapies are credited for the reduction in expiries due to coronary heart disease and there is a clear association between lipid lowering therapies and improved global outcomes from cardiovascular disease.³ Hence the management of dyslipidemia remains the cornerstone of primary and secondary prevention of cardiovascular diseases. Dyslipidemia is the foremost modifiable risk factor for vascular

disease. In the INTERHEART case-control study with 27098 participants in 52 countries, dyslipidemia had the highest mortality odds ratio (3.25), followed by smoking (2.87), psychosocial factors (2.67), and history of diabetes (2.37), and hypertension (1.91).⁴

Studies in Asia suggest that dyslipidemia is highly prevalent in this geographical region. The rationale of our study was to highlight yet again the high prevalence of dyslipidemia and its types and probe into the downsides in its management. This would consequently aid us in focusing on the awareness and compliance to diet and exercise and increase our efforts to aggressively manage dyslipidemia by lipid lowering therapy.

MATERIAL & METHODS

It is a cross sectional, observational study on 248 adult diabetics which presented in the diabetic outpatient clinic in JPMC, Karachi. JPMC is a tertiary care hospital in the heart of the city catering to lower socio economic sector of the population. They were selected by non-purposive convenient sampling technique. Diagnosed diabetics who were already not on any lipid lowering therapy were included in the study. Non diabetics and those diabetics who were already taking lipid lowering drugs were excluded. The ethical approval was obtained, AEF F.2-81/2018-GENL 8256 JPMC. After relevant personal data was taken, the lipid profile of the participants was done with a 12 hours fasting and the results was secured on a pre-designed performa. These results were analyzed on SPSS version 20.

Duration of diabetes mellitus

Newly diagnosed, for up to 10 years or more than 10 years.

Sedentary life style

It was defined if patient had less than 150 minutes of exercise per week which included brisk walk or other aerobic exercises.

Smokers

They were defined as people currently smoking or have had smoked in past.

Hypertension

Blood pressure > 130 mmHg/ 80 mmHg

The body mass index

Weight/height (Kg/m²). Asian cut-off was used for defining over weight and obesity.

Central obesity

Waist circumference >90 cm for men and >80 cm for women.

Diabetes Control:

An HbA1C level <7 was taken as controlled diabetes mellitus.

Dyslipidemia

Was defined on the basis of presence of any of the following-1) a high triglyceride level (>150 mg/dL) 2) a high LDL-cholesterol level (>140 mg/dL) 3) a low HDL-cholesterol level (men, <40 mg/dL; women, <50 mg/dL)

Serum ALT

In males greater than 30 and females greater than 19.

RESULTS

Among the 248 diabetics that presented 88(35.4%) were males and 160(64.5%) were females. Regarding age groups 33 (13.3%) were of less than 45 years, 122(49.2%) were of 45-55years, and those older than 55 years were 93(37.5%). The means with Std Dev. and range is mentioned in Table-I.

The prevalence of dyslipidemia was 85.9% (213 diabetics had dyslipidemia). High triglycerides were present in 52.4% (130), high LDL in 28.2% (70) and low HDL in 175(70.6%). [P=0.000]. At least one dyslipidemic factor was deranged in 81(32.7%), two in 102(41.1%) and 3 in 30(12.1%) persons. In males, 53 out of 88(60.2%) were dyslipidemic, and in females all had dyslipidemia (100%). [P = 0.000]. Hypertriglyceridemia was present in 38(43.1%) males and 92(57.5%) females [P=.021], High LDL in 21(23.8%) males and 49(44%) females [P=.163], while low HDL was present in 16(22%) males and 159(99%) females [P=.000].

	Mean	Median	Std. Deviation
Age (years)	52.99	50.00	9.806
Duration of Diabetes (years)	9.895	10.000	6.1594
If yes, duration of hypertension(years)	6.1120	4.5000	5.78908
If yes, pack per years	18.176	20.000	10.4895
BP(systolic)	128.44	130.00	20.551
BP(diastolic)	79.51	80.00	12.355
BMI	27.4758	27.1816	4.85230
FBS	177.96	159.50	70.677
HbA1c	8.46	7.90	1.765
S. Cholesterol	158.48	157.50	40.164
Triglyceride	184.41	154.00	112.054
S.LDL	83.76	79.50	39.468
S.HDL	41.62	42.00	4.674
ABI (rt)	1.0459	1.0000	.20345
WHR	.9490	.9555	.06692

Table-I. Means (SD and Range) of quantitative variables.

Groups	Total in group	Dyslipidemia present[P=.213]	High Triglycerides present[P=.586]	High LDL present[P=.817]	Low HDL present P=.016]
Underweight	1	1	0	0	0
Normal	36	31(86%)	17	13	24
Overweight	40	34(85%)	19	10	22
Obese 1	37	28(76%)	18	11	26
Obese 2	64	57(89%)	40	17	52
Obese 3	64	58(90%)	32	19	48

Table-II. Dyslipidemia with BMI groups.

Dyslipidemia frequency according to age groups is illustrated in Figure-1. In the 56 patients having diabetes within 5 years the dyslipidemia was present in 46 of them (82%), in those with duration of diabetes between 5 to 10 years the dyslipidemia was in 78 out of 94(83%) patients and those with 10 years or more duration the dyslipidemia was 89 out of 101 patients` (88%) [P=0.575]. Dyslipidemia was present in 59 diabetics out of 68(86%) with good control and 136 out of 168(81%) diabetics with poor control [P=.494]. Dyslipidemia according to various ethnicities is displayed in Figure-2. Patients with a sedentary lifestyle were 189 out of which 162(85.7%) had dyslipidemia and out of 59 who had non sedentary lifestyle 51(86%) had dyslipidemia. [P=0.540]. BMI with dyslipidemia is displayed on Table-II. In hypertensive patients, out of 112 dyslipidemia was present in 90(80.3%)

[P=.022], hypertriglyceridemia was present in 54(48%) [P=.094]. A high LDL in 31(27.6%) [P=.452] and a high HDL in 78(69.6%) [P=.506].

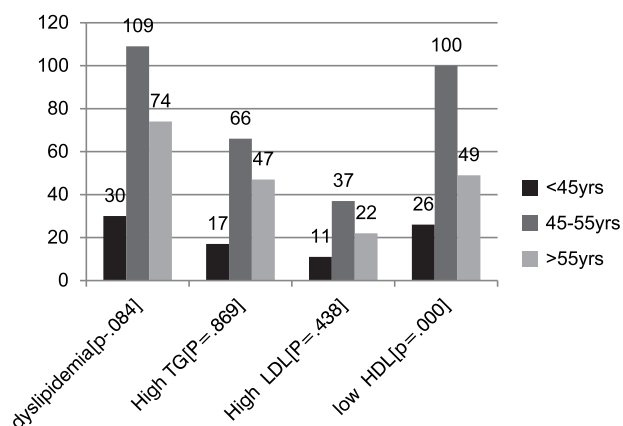


Figure-1. Dyslipidemia and its parameters in different age groups.

Diabetics who smoked were 23 among which 13(56.5%) had dyslipidemia [$P=.000$], 10 had a high triglycerides (43.4%) [$P=.247$], 3 had high LDL (13%) [$P=.067$] and low HDL (13%) [$P=.000$].

Regarding those diagnosed with NAFLD there were 90, 84(93%) had dyslipidemia. [$P=.006$]. Similarly with those with deranged ALT, out of 186, 175(94%) had dyslipidemia [$P=.000$], 104 had high triglycerides (56%) [$P=.049$], 54(29%) had high HDL [$P=.310$], and 163(87%) had low HDL [$P=.000$]. The prevalence of dyslipidemia in those with metabolic syndrome is displayed in Figure-3.

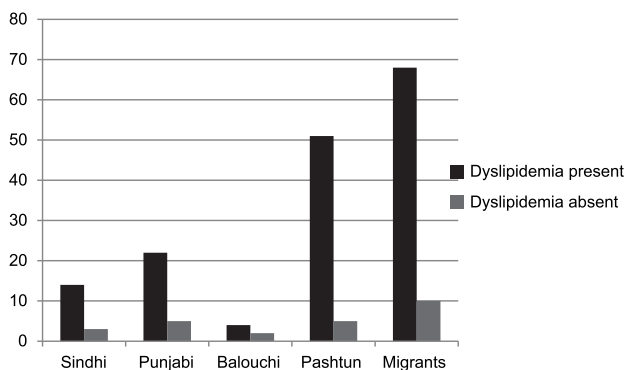


Figure-2: Dyslipidemia with Ethnicity groups.

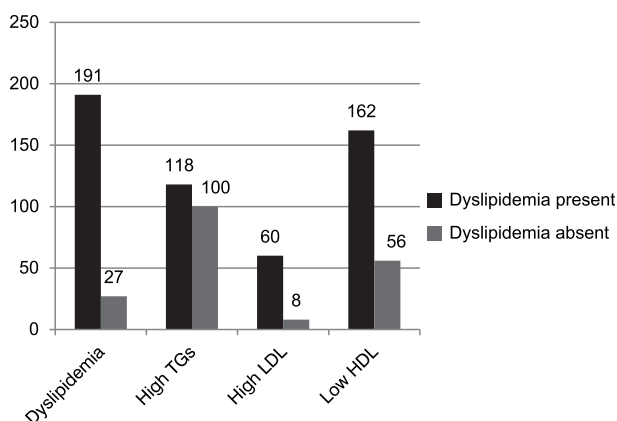


Figure-3: Dyslipidemia in metabolic syndrome.

DISCUSSION

The results of this study show that dyslipidemia is still a challenge that has not been overcome due to reasons which need to be addressed by the patients and the physicians. It's a dilemma that in spite of the countless studies that give

glaring results of high dyslipidemia prevalence worldwide since the previous decades there has been no worthwhile progress in its lessening. Our results are consistent with other studies conducted in Pakistan⁶ and those around the world.^{7,8} Sarfaraz⁶ showed males to have a higher frequency of dyslipidemia compared to females which was vice versa in this study but an Iranian study agreed that all the dyslipidemic parameters were deranged in females.⁹

When Amina¹⁰ studied the pattern of dyslipidemia she found high triglycerides to be more common among diabetics (which differs from our research) while Pandya¹¹ found both triglycerides and LDL to be higher among diabetics and Sarfaraz's study showed that low HDL is the commonest parameter.⁶ Several studies⁹ agree to our results that dyslipidemic parameters are higher in females compared to males probably because of their higher probability of a sedentary lifestyle, and a higher BMI prevalence and a higher association with non-alcoholic hepatitis.

The middle age group had the highest deranged lipid parameters because of their atherosclerosis processes, their unhealthy eating habits and a lack of awareness and priority towards self-care. The elderly showed a lesser frequency because by this age the ones with dyslipidemia are generally treated and (hence not included in this study) and the ones presented were those with a missed diagnosis whose dyslipidemia need to be addressed urgently. The alarming fact is that dyslipidemia was significantly present in the younger group proving the drift of atherosclerotic phenomenon starting earlier in life. However, Abdul Razaq concludes that dyslipidemia increased with age in his study.¹²

The more the duration of diabetes the more the chance of dyslipidemia to be present agreed upon by us but the Nepalese study did not find an association with it.¹³ Dyslipidemia seems an independent factor to the control of diabetes since even those with good control had dyslipidemia but Pandya¹¹ insists that good control is a favorable factor for prevention of dyslipidemia.

A sedentary lifestyle augments dyslipidemia which was emphasized by Robinson¹⁴ and hence the repeated stress on the role of physical activity but our study showed that dyslipidemia is an inborn genetic factor as not much difference in prevalence was found in both the groups. The body mass index is significantly associated with the presence of dyslipidemia emphasized by our study and other worldwide studies^{15,16} highlighting the need for weight control.

Hypertension, diabetes and dyslipidemia are an established coexisting phenomenon with an adverse impact on the vascular endothelium with worsening atherosclerosis. This has lead scientists to coin the word "lipitension" for such a relationship emphasizing on a combined aggressive treatment¹⁷ of all the modalities especially for hypertriglyceridemia.¹⁸ There was no much associated significance between smoking and dyslipidemia in our study which correlated with Nakhjavani's findings.⁹

Nonalcoholic fatty liver disease and non-alcoholic steatohepatitis has been concomitant with atherogenic dyslipidemia and HDL dysfunction which with hyperglycemia leads to the process of inflammation, lipooxidative stress and insulin resistance which sequels to cardiovascular and liver cirrhotic end complications.¹⁹ There is hepatic overproduction of the very low-density lipoprotein particles and dysregulated clearance of lipoproteins from the circulation in NAFLD. There is undisputable evidence that cardiovascular disease is the most common reason of mortality in patients with NAFLD.²⁰ Therefore not surprisingly our results of high prevalence of dyslipidemia in NAFLD diabetics correlate to results of other studies especially with high triglycerides.²¹ A raised ALT level is positively correlated with dyslipidemia and triglyceridemia proven by several studies.²² Dyslipidemia is one of the key culprit in the cluster of dysmetabolic syndrome leading to the atherosclerotic pathogenesis caused by insulin resistance and increased fatty acid levels^{23,24} and thus dyslipidemia was one of the commonest components of metabolic syndrome in our study.

CONCLUSION

The high prevalence of dyslipidemia and its positive correlation to cardiovascular diseases warrants a regular update on its statistics and there exists a need to understand the pattern of dyslipidemia and accurately assess the control of lipids in this population in a real world setting. The results are an eye opener that there is still an urgent need to spread awareness to the dire consequences of dyslipidemia both to patients and physicians. All diabetic patients should repeatedly be insisted on behavioral lifestyle changes. Patients should adopt these changes regardless of drug therapy. The NCEP-ATP III Therapeutic Lifestyle Change Diet can result in a 5% to 15% reduction in LDL cholesterol level.²⁵ A structured regular routine of physical activity should be inculcated in their daily routine. An aerobic exercise program using large-muscle groups will greatly improve weight reduction. The overweight and obese patients should optimize their caloric intake and reduce the proportion of fats and carbohydrates in their diet.^{26,27} The association of dyslipidemia leading to nonalcoholic liver disease in diabetics is also decreased with substantial weight and diet control.²⁸ A diet rich in fruits, vegetables, nuts, soluble fiber and whole grains with use of monounsaturated oils (for example, olive oil and canola oil) and low in animal fat, saturated and trans-fat and cholesterol seems to substantially reduce risk of dyslipidemia independent of serum lipid levels. Increased soy consumption can increase HDL cholesterol level. Reducing LDL-C can reduce cardiovascular morbidity and mortality hence aggressive dyslipidemia management is a part of primary as well as secondary prevention. For a country wide efficacy in reducing the dyslipidemia numbers a structured effective programs are needed to bring about a change in the prevalence of dyslipidemia in the years ahead.

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
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3	Syed Masroor Ahmed	Critically revised the manuscript Gave Final Approval.	
4	Zeeshan Ali	Contributed to conception or design analysis of result.	
5	Marium Fatima	Critically revised the manuscript.	
6	Zohaib Ahmed Khan	Critically revised the manuscript.	