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Research Article

### STUDY OF PREVALENCE AND PATTERN OF DYSLIPIDAEMIA IN TYPE 2 DIABETES MELLITUS PATIENTS ATTENDING MEDICAL WARD OF AYUB TEACHING HOSPITAL, ABBOTTABAD

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**Abstract:**

**Summary:** Diabetes is endemic globally with increasing prevalence in both developing and developed countries. Persistent hyperglycaemia of diabetes is associated with micro as well as macro vascular complications like coronary heart disease, stroke, diabetic renal disease, diabetic retinopathy and neuropathy etc. Dyslipidemia contribute to considerable increased risk of atherosclerosis and consequent mortality in diabetic patients. It often precedes onset of diabetes particularly type 2 DM and may persist inspite of adequate control of blood sugar. The objective of the study was to study frequency of dyslipidemia in type 2 diabetes mellitus patients attending the Department of Medicine of Ayub Teaching Hospital Abbottabad.

**Methods:** Patients with Type 2 Diabetes mellitus coming to Medical OPD as well as among those admitted in Medical 'B' Ward fulfilling the inclusion criteria were selected. Blood was taken in the fasting state for lipid profile, fasting blood glucose and glycosylated haemoglobin determination.

**Results:** Out of total 196 In frequency distribution Mean age of the patients was 61.21±7.307 ranging from 40 to 70 years. There were 84(42.86%) female and 12(57.14%) were male. In triglycerides 80(40.82%) were found with dyslipidemia. In LDL cholesterol 116(59.18%) dyslipidemics. In HDL 156(79.59%) were dyslipidemia patients.

**Conclusion:** Results suggest high (86%) frequency of dyslipidemia among type 2 diabetes mellitus study subjects. Most common pattern observed was mixed type dyslipidemia. These lipid abnormalities might be the important in view of development of cardiovascular or cerebrovascular diseases. Hence type 2 diabetic patient should undergo the routine monitoring of blood sugar and lipid profile so that any abnormalities can be identified and preventive measures along with interventions can be initiated at the earliest.

**Keywords:** Type 2 Diabetes Mellitus, Dyslipidemia, Pattern, Lipid profile

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## INTRODUCTION:

Type 2 diabetes mellitus (DM) is a metabolic disorder, characterised by hyperglycaemia resulting from defects in insulin secretion, insulin action, or both <sup>1</sup>. The International Diabetes Federation has estimated that the number of people with diabetes worldwide in 2015 was 415 million and this is projected to reach 642 million by 2040 <sup>2</sup>. In 2015 diabetes was the leading cause of mortality, whereby 5 million people died from diabetes and diabetes-related complications.<sup>2</sup> The long-term macrovascular complications of diabetes contribute to the high morbidity and mortality associated with the disease with as many as 80% dying from some form of cardiovascular disease (CVD)<sup>3</sup>. Well-known risk factors for CVD include age, gender, hypertension (HT) and DM. Other lifestyle behaviours such as tobacco smoking, excessive alcohol consumption, sedentary lifestyle and poor diet with resultant obesity further contribute to elevating one's CVD risk. Diabetic patients often suffer from HT and also have abnormal lipoprotein metabolism.<sup>1,4</sup> Dyslipidaemia is one of the major risk factors for CVD in DM. The most common pattern of dyslipidaemia is hypertriglyceridaemia and reduced HDL cholesterol levels and an increased concentration of small dense low-density lipoprotein (LDL) particles. The precise pathogenesis of diabetic dyslipidaemia is not known; however, a large body of evidence suggests that insulin resistance has a central role in the development of this condition. The main cause of the lipid changes associated with DM is attributed to increased free fatty acid flux secondary to insulin resistance <sup>5-8</sup>. Patients having diabetic dyslipidemia have lipid particles that are more atherogenic than in non-diabetic people <sup>9-11</sup> Because of this additive cardiovascular risk of hyperglycemia and hyperlipidemia, it is needed to detect and treat the lipid abnormalities at the earlier. In view of this present study was conducted with objective to study prevalence and pattern of dyslipidemia in type 2 diabetes mellitus patients attending Medical Ward of Ayub Teaching Hospital, Abbottabad.

## MATERIAL AND METHODS:

### Study Setting:

The study was conducted in the department of Medicine, Ayub Teaching Hospital; Abbottabad. It is situated on the Silk Road and is a tertiary care hospital with three established general medical units with more than 150 beds. It provides both undergraduate and postgraduate teaching facility. Hospital drains patients from widespread area i.e. Hassan Abdal to Northern areas. Every medical unit is run by a professor, an Associate Professor, two Assistant Professors, one Senior Registrar, eight to

ten postgraduate trainees and 10-15 house officers.

**Sampling technique:** Consecutive non probability sampling technique

### Sample Selection

#### Inclusion criteria:

1. Patients diagnosed with type 2 diabetes for 4 years or more
2. Age: 40-70 years.
3. Gender: Both

#### Exclusion criteria:

1. Diabetics taking lipid lowering agents

### Data Collection Procedure:

Ethical clearance was obtained from Institutional Ethics Committee. Study subjects were assured regarding the confidentiality. Before the personal interview objective of the study was explained to participants and informed consent was taken. Data was collected after approval from hospital ethical and research committee. Those patients fulfilling the inclusion criteria were selected from Medical ward/OPD of Ayub Teaching Hospital. Patients were briefed about the aims and benefits of the study and a written informed consent was taken. Data was collected by using the predesigned proforma (annexed-I). Patients were confirmed as diabetics by taking the history carefully of type-II diabetes for the last four years at least and were on oral anti diabetics or insulin but not taking the lipid lowering agents. Fasting blood samples were drawn from the patients under strict aseptic technique and sent to the hospital laboratory on the same day. Fasting blood sugar and lipid profile of all the patients included in the study was measured under the supervision of Pathologist who is the fellow of CPSP and had more than 10 years working experience in Pathology. Height and weight of all the patients were measured and BMI for every patient was calculated. All the patients were asked about the family history of hypertension and blood pressure of every patient was measured. All the study procedure and data collection were performed by the trainee himself to limit the selection bias.

### Data Analysis Procedure:

All the data was entered and analyzed by using SPSS software ver. 16.00. Frequencies and percentages were calculated for categorical variables like gender, presence of dyslipidemia and presence of hypertension. Mean±SD was calculated for continuous variables like age and BMI. All the results were presented as tables and graphs. Data was stratified by age, gender, hypertension and BMI with respect to the presence of dyslipidemia. To know the difference by age, gender, BMI and hypertension by outcome variable i.e. dyslipidemia, chi-square test

was used at 5% level of significance.

### RESULTS:

In this study 196 patient of dyslipidemia with type 2 diabetes mellitus were enrolled having age 40 to 70 years, the mean age of the patients was  $61.21 \pm 7.307$  years, mean duration of diabetes mellitus was  $14.10 \pm 8.208$  ranging from 5 to 36 years, mean height in meters was  $1.5134 \pm 0.14850$  ranging from 1.22 to 1.83 meters, mean height in kg was  $65.82 \pm 11.326$  ranging from 45 to 90 kg, mean BMI was

$29.02 \pm 5.083$  ranging from 19 to 49, mean total cholesterol was  $194.49 \pm 29.496$  ranging from 140 to 280 mg/dl, mean triglycerides was  $144.08 \pm 17.994$  ranging from 110 to 90 mg/dl, mean LDL cholesterol was  $102.8571 \pm 14.32230$  ranging from 80 to 160 mg/dl, mean HDL cholesterol was  $55.3061 \pm 11.11286$  ranging from 30 to 70 mg/dl, mean systolic blood pressure was  $143.0612 \pm 26.71437$  ranging from 100 to 190 mmHg and diastolic blood pressure was  $82.2449 \pm 7.30727$  ranging from 60 to 100 mmHg out of total 196 patients as shown in table 1.

**Table 1: Descriptive Statistics (n=196)**

	Min	Max	Mean	Std. Deviation
Age (years)	40	70	61.21	7.307
Duration of Diabetes Mellitus	5	36	14.10	8.208
Height (meter)	1.22	1.83	1.5134	.14850
Weight (kg):	45	90	65.82	11.326
BMI	19	49	29.02	5.083
Fasting Lipid Profile (Total Cholesterol)	140	280	194.49	29.496
Fasting Lipid Profile (Triglycerides)	110	190	144.08	17.994
Fasting Lipid Profile (LDL-Cholesterol)	80.00	160.00	102.8571	14.32230
Fasting Lipid Profile (HDL-Cholesterol)	30.00	70.00	55.3061	11.11286
Blood Pressure(Systolic) (mmHg):	100.00	190.00	143.0612	26.71437
Blood Pressure (Diastolic)(mmHg):	60.00	100.00	82.2449	7.30727

### Frequency distribution of BMI Group with HDL group:

In frequency distribution of BMI group with HDL cholesterol group, patients found with normal weight

04(2.0%), overt weight 12(6.0%) and obese 24(12.2%) dyslipidemics patients found, out of total 196 patients as shown in table 2.

**Table 2: Frequency distribution of BMI Group with HDL group:**

		HDL group		Total
		Dyslipidemics	Normal	
BMI Group	Normal weight	4 2.0%	40 20.4%	44 22.4%
	Overweight	12 6.1%	36 18.4%	48 24.5%
	Obese	24 12.2%	80 40.8%	104 53.1%
Total		40 20.4%	156 79.6%	196 100.0%

### Frequency distribution of BMI Group with LDL group:

In frequency distribution of BMI group with LDL cholesterol group, patients found with normal weight

20(10.2%), overt weight 28(14.3%) and obese 68(34.7%) dyslipidemics were found, out of total 196 patients as shown in table 3.

**Table 3: Frequency distribution of BMI Group with LDL group:**

		LDL group		Total
		Normal	Dyslipidemics	
BMI Group	Normal weight	24 12.2%	20 10.2%	44 22.4%
	Overweight	20 10.2%	28 14.3%	48 24.5%
	Obese	36 18.4%	68 34.7%	104 53.1%
Total		80 40.8%	116 59.2%	196 100.0%

**Frequency distribution of BMI Group with Triglycerides group:**

In frequency distribution of BMI group with triglycerides group, patients found with normal

weight 16(8.2%), overt weight 20(10.2%) and obese 60(30.6%) dyslipidemics were found, out of total 196 patients as shown in table 4.

**Table 4: Frequency distribution of BMI Group with Triglycerides group:**

		Triglycerides group		Total
		Normal	Dyslipidemics	
BMI Group	Normal weight	28 14.3%	16 8.2%	44 22.4%
	Overweight	28 14.3%	20 10.2%	48 24.5%
	Obese	60 30.6%	44 22.4%	104 53.1%
Total		116 59.2%	80 40.8%	196 100.0%

**Frequency distribution of BMI Group with Total Cholesterol group:**

In frequency distribution of BMI group with total cholesterol group, patients found with normal

weight 12(6.1%), overt weight 28(14.3%) and obese 52(26.5%) dyslipidemics were found, out of total 196 patients as shown in table 5.

**Table 5: Frequency distribution of BMI Group with Total Cholesterol group:**

		Total Cholesterol group		Total
		Normal	Dyslipidemics	
BMI Group	Normal weight	32 16.3%	12 6.1%	44 22.4%
	Overweight	20 10.2%	28 14.3%	48 24.5%
	Obese	52 26.5%	52 26.5%	104 53.1%
Total		104 53.1%	92 46.9%	196 100.0%

**Frequency distribution of Age group with HDL group:**

In frequency distribution of age group with HDL cholesterol group, patients from age group of 40 to

55 years found dyslipidemics were 9(4.6%) and from age group of 56 to 70 years were 31(15.8%), out of total 196 patients as shown in table 6.

**Table 6: Frequency distribution of Age group with HDL group:**

		HDL group		Total
		Dyslipidemics	Normal	
Age group	40 to 55 years	9 4.6%	38 19.4%	47 24.0%
	56 to 70 years	31 15.8%	118 60.2%	149 76.0%
Total		40 20.4%	156 79.6%	196 100.0%

**Frequency distribution of Age group with LDL group:**

In frequency distribution of age group with LDL cholesterol group, patients from age group of 40 to

55 years found dyslipidemics were 30(15.3%) and from age group of 56 to 70 years were 86(43.9%), out of total 196 patients as shown in table 7.

**Table 7: Frequency distribution of Age group with LDL group:**

		LDL group		Total
		Normal	Dyslipidemics	
Age group	40 to 55 years	17 8.7%	30 15.3%	47 24.0%
	56 to 70 years	63 32.1%	86 43.9%	149 76.0%
Total		80 40.8%	116 59.2%	196 100.0%

**Frequency distribution of Age group with Triglycerides group:**

In frequency distribution of age group with triglycerides group, patients from age group of 40 to

55 years found dyslipidemics were 17(8.7%) and from age group of 56 to 70 years were 63(32.1%), out of total 196 patients as shown in table 8.

**Table 8: Frequency distribution of Age group with Triglycerides group:**

		Triglycerides group		Total
		Normal	Dyslipidemics	
Age group	40 to 55 years	30 15.3%	17 8.7%	47 24.0%
	56 to 70 years	86 43.9%	63 32.1%	149 76.0%
Total		116 59.2%	80 40.8%	196 100.0%

**Frequency distribution of Age group with Total Cholesterol group:**

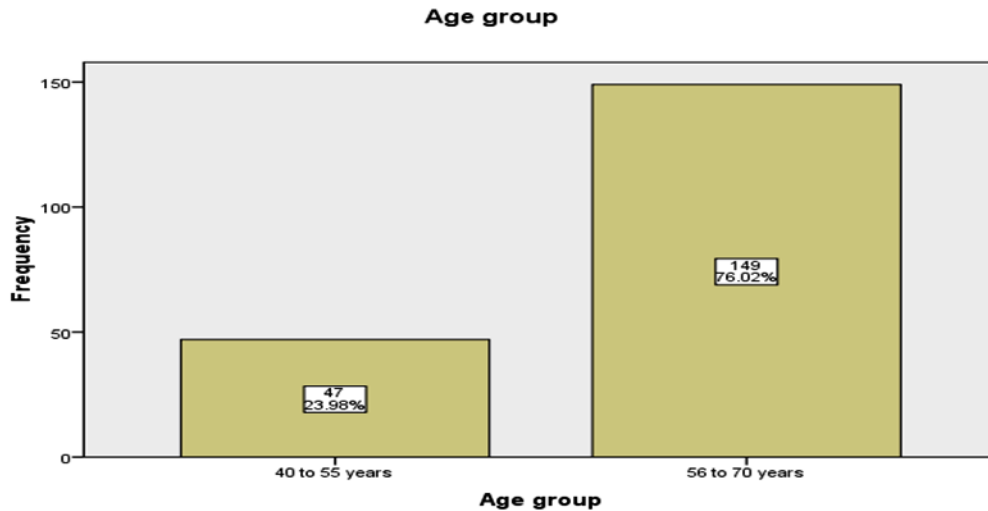
In frequency distribution of age group with total cholesterol group, patients from age group of 40 to

55 years found dyslipidemics were 14(7.1%) and from age group of 56 to 70 years were 78(39.8%), out of total 196 patients as shown in table 9.

**Table 9: Frequency distribution of Age group with Total Cholesterol group:**

		Total Cholesterol group		Total
		Normal	Dyslipidemics	
Age group	40 to 55 years	33 16.8%	14 7.1%	47 24.0%
	56 to 70 years	71 36.2%	78 39.8%	149 76.0%
Total		104 53.1%	92 46.9%	196 100.0%

**Frequency of age group:**In frequency of age group, patients found between 40 to 70 years were 47(23.98%) and between 56 to 70 years were 149(76.02%) out of total 196 patients as shown figure 1.



**Figure 1: Frequency of age group (n=196)**

**Frequency of total cholesterol:**

In frequency of total cholesterol, patients found normal were 104(53.06%) while 92(46.94%) were found with dyslipidemia out of total 196 patients as shown in figure 2

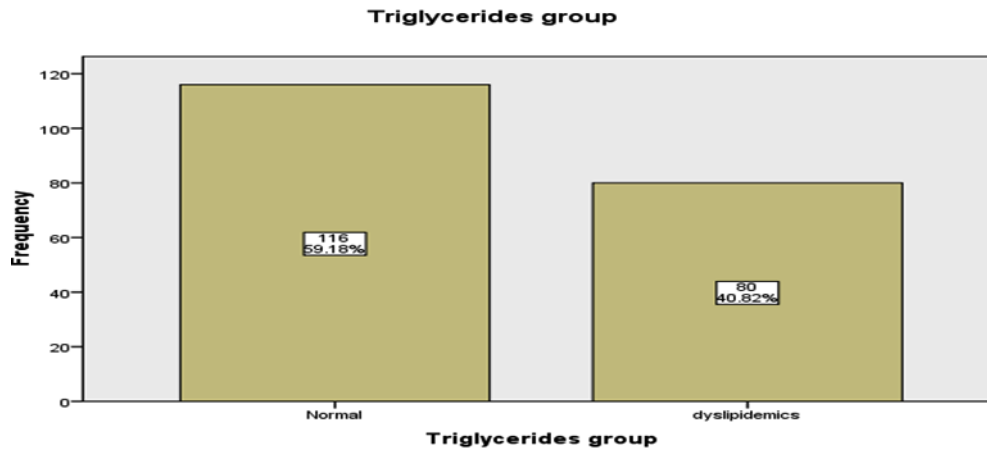


**Figure 2: Frequency of total cholesterol (n=196)**

**Frequency of Triglycerides:**

In frequency of triglycerides, patients found normal were 116(59.18%) while 80(40.82%) were found with dyslipidemia out of total 196 patients as shown in figure 3.

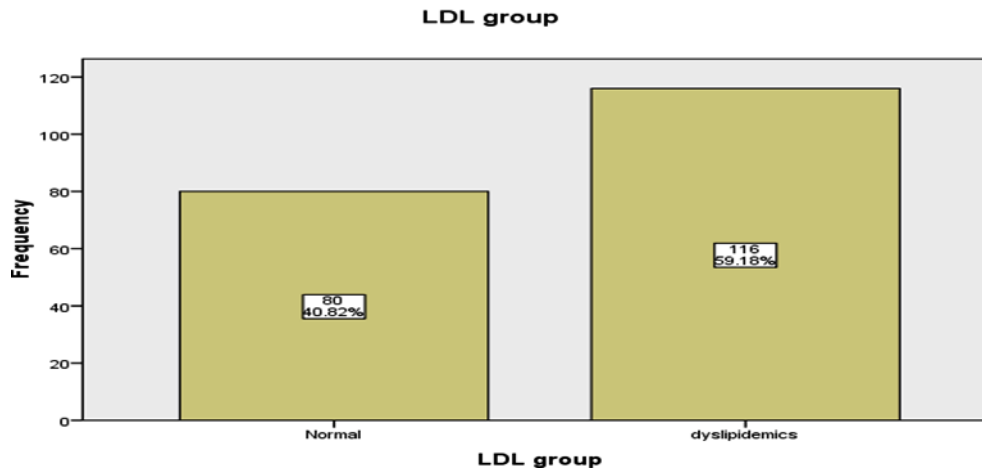




**Figure 3: Frequency of Triglycerides (n=196)**

**Frequency of LDL cholesterol:**

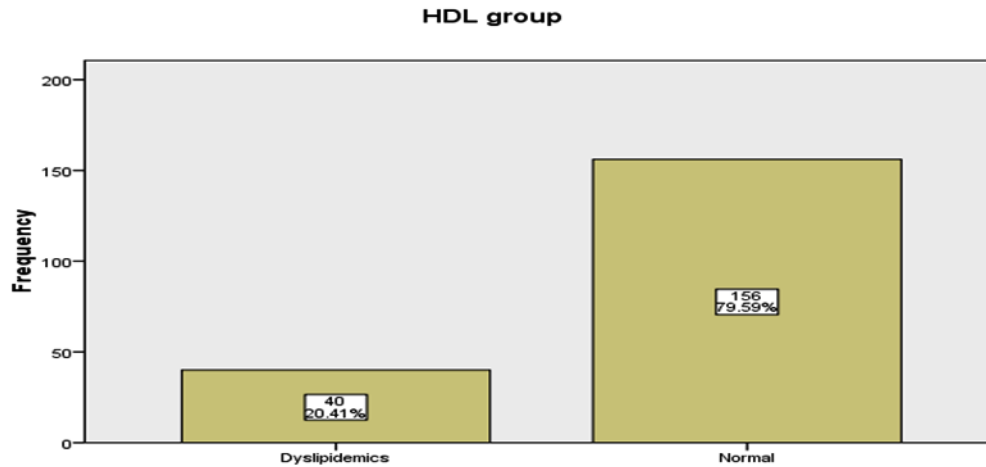
In frequency of LDL cholesterol, patients found normal were 80(40.82%) while 116(59.18%) were found with dyslipidemia out of total 196 patients as shown in figure 4.



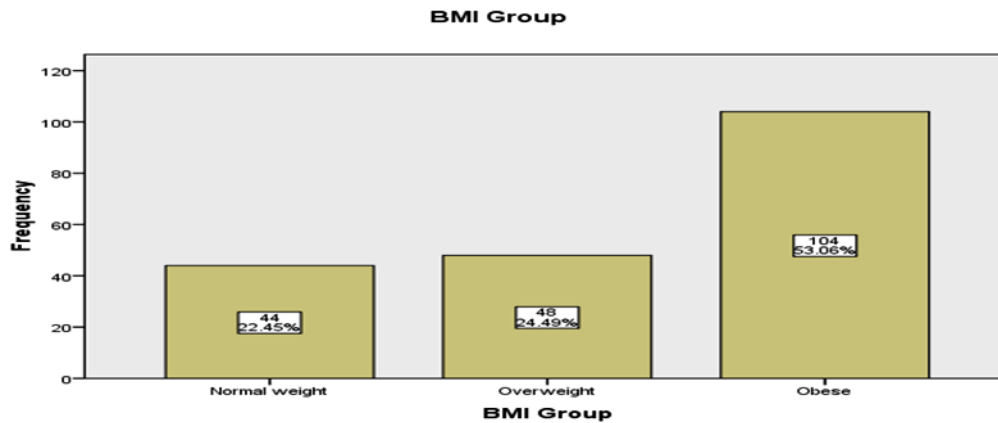
**Figure 4: Frequency of LDL cholesterol (n=196)**

**Frequency of HDL cholesterol:**

In frequency of HDL cholesterol, patients found normal were 40(20.41%) while 156(79.59%) were found with dyslipidemia out of total 196 patients as shown in figure 5.



**HDL group**  
Figure 5: Frequency of HDL cholesterol (n=196)



**BMI Group**  
Figure 6: Frequency of BMI (n=196)

### DISCUSSION:

In this study 196 patient of dyslipidemia with type 2 diabetes mellitus were enrolled having age 40 to 70 years, the mean age for the patients was  $61.21 \pm 7.307$  years, mean duration of diabetes mellitus was  $14.10 \pm 8.208$  ranging from 5 to 36 years, mean height in meters was  $1.5134 \pm 0.14850$  ranging from 1.22 to 1.83 meters, mean height in kg was  $65.82 \pm 11.326$  ranging from 45 to 90 kg, mean BMI was  $29.02 \pm 5.083$  ranging from 19 to 49, mean total cholesterol was  $194.49 \pm 29.496$  ranging from 140 to 280 mg/dl, mean triglycerides was  $144.08 \pm 17.994$  ranging from 110 to 90 mg/dl, mean LDL cholesterol was  $1028571 \pm 14.32230$  ranging from 80 to 160 mg/dl, mean HDL cholesterol was  $55.3061 \pm 11.11286$  ranging from 30 to 70 mg/dl, mean systolic blood pressure was  $143.0612 \pm 26.71437$  ranging from 100 to 190 mmHg and diastolic blood pressure was  $82.2449 \pm 7.30727$  ranging from 60 to 100 mmHg. Hypertension was the only risk factor which was more frequent in males than females in this study. In Kinmen, the most common abnormality was high

blood pressure.<sup>12</sup> In the Iranian population, low HDL cholesterol was the most common metabolic abnormality in both sexes.<sup>13</sup> In western India, the prevalence of low HDL cholesterol was 90.2% in women and 54.9% in men.<sup>14</sup> In frequency distribution of BMI group with HDL cholesterol group, patients found with normal weight 04(2.0%), overt weight 12(6.0%) and obese 24(12.2%) dyslipidemics patients found.

In frequency distribution of BMI group with LDL cholesterol group, patients found with normal weight 20(10.2%), overt weight 28(14.3%) and obese 68(34.7%) dyslipidemics were found. In this study frequency distribution of BMI group with triglycerides group, patients found with normal weight 16(8.2%), overt weight 20(10.2%) and obese 60(30.6%) dyslipidemics were found. The WHO estimates the prevalence of obesity to 4.8% in less affluent countries, 17.1% in countries undergoing economic transition and 20% in the developed world. [15]

In 1991, 53% men and 44% women in the United Kingdom were obese.<sup>16</sup> In our study 56% participants were obese. High incidence of obesity contributes to a very high frequency of Metabolic Syndrome in our patients, especially women. In frequency distribution of BMI group with total cholesterol group, patients found with normal weight 12(6.1%), overt weight 28(14.3%) and obese 52(26.5%) dyslipidemics were found, out of total 196 patients as shown in table 9. In frequency distribution of age group with HDL cholesterol group, patients from age group of 40 to 55 years found dyslipidemics were 9(4.6%) and from age group of 56 to 70 years were 31(15.8%), this study shows the frequency distribution of age group with LDL cholesterol group, patients from age group of 40 to 55 years found dyslipidemics were 30(15.3%) and from age group of 56 to 70 years were 86(43.9%), In frequency distribution of age group with triglycerides group, patients from age group of 40 to 55 years found dyslipidemics were 17(8.7%) and from age group of 56 to 70 years were 63(32.1%). This study shows the frequency distribution of age group with total cholesterol group, patients from age group of 40 to 55 years found dyslipidemics were 14(7.1%) and from age group of 56 to 70 years were 78(39.8%). Our study shows the frequency of age group, patients found between 40 to 70 years were 47(23.98%) and between 56 to 70 years were 149(76.02%) In frequency of total cholesterol, patients found normal were 104(53.06%) while 92(46.94%) were found with dyslipidemia. In our study the frequency of triglycerides, patients found normal were 116(59.18%) while 80(40.82%) were found with dyslipidemia In frequency of LDL cholesterol, patients found normal were 80(40.82%) while 116(59.18%) were found with dyslipidemia In frequency of HDL cholesterol, patients found normal were 40(20.41%) while 156(79.59%) were found with dyslipidemia. Obesity plays a central role in causing Metabolic Syndrome, so the fundamental approach to this syndrome is weight reduction and increased physical activity. [17,18] However, drug treatment could be appropriate for diabetes. [19]

Pharmacological therapy consists of metformin, statins, fibrates, angiotensin converting enzyme inhibitors, and thiazolidinediones, all of which can decrease the risk and incidence of cardiovascular diseases. Sibutramine is also useful for weight reduction on a short-term basis. [20,21]

### CONCLUSION:

Present study showed the same as in many previous studies concluded that common lipid abnormalities during diabetes induced dyslipidemia. Results

suggest a high prevalence of dyslipidemia, which might be playing a major role in the development of cardiovascular diseases among diabetic patients. The optimal care of diabetic patients should include routine monitoring of blood sugar and serum lipid profile. Aggressive lifestyle changes, such as weight reduction and physical exercise should be initiated first followed by medication with lipid lowering drugs.

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