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Research Article

**A RESEARCH TO REVIEW THE DYSLIPIDEMIA PROTOTYPE
IN THE PATIENTS OF TYPE II DIABETES MELLITUS (T2DM)
WITH RESPECT TO INSULIN LEVEL AND AGE**¹Dr. Sana Suleman, ²Dr. Nida Afzal, ³Dr. Samia Rahman¹House Officer DHQ Teaching Hospital Gujranwala**Abstract:**

Objectives: The main purpose of the study is to revise the prototype of dyslipidaemia in Type 2 Diabetes Mellitus patients. To find out the relationship between the duration of disease of dyslipidaemia with the growing age and insulin level and insulin confrontation in patients is also an important objective of the study arranged.

Methods: The study organized was of collaborative type. It was organized in Jinnah Hospital, Lahore from November 2016 to December 2017. The study consisted of patients of Type 2 Diabetes Mellitus and healthy persons as a control group. In both the patients and control groups serum level of Cholesterol, triglycerides, low weight lipoproteins, high-weight lipoprotein and insulin were observed. Homeostatic Model of Assessment of Insulin resistance was used by the investigators to check the opposition or resistance of insulin. Biochemical parameters were also used to identify the relationship between time extent of the illness and enhancement in age. The arithmetic investigation was completed by using SPSS.

Results: Total 112 persons were included in the study. Out of these 72 were sufferers and 40 were normal or healthy individuals as a control group. It was found in the result of the study that hypertriglyceridemia was most commonly presentation in about 44 patients while the low weight-lipoprotein-hypercholesterolemia was the second most frequently occurring which was present in about 36 patients. While 20 sufferers of low-weight-lipoprotein hypercholesterolemia and 17 of hypertriglyceridemia were observed in control or healthy group. Dyslipidaemia or insulin opposition had no effect on length time of the disease. Serum insulin levels and length of disease greatly affect each other in a negative way. On regression investigation, it was concluded that age doesn't affect the dyslipidaemia, serum insulin level or insulin confrontation.

Conclusion: It was concluded from the study that hypertriglyceridaemia was the most frequently present dyslipidaemia. Hypercholesterolemia was a menacing aspect of vigorous persons. In addition to this, it was also resulted out that length of disease was inversely related with serum insulin levels and its association is positive with dyslipidaemia.

Keywords: Diabetes mellitus, Dyslipidaemia, Insulin opposition.

Corresponding author:**Dr. Sana Suleman,**

House Officer DHQ Teaching Hospital Gujranwala.

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INTRODUCTION:

Diabetes mellitus is spreading worldwide at a greater rate. It was observed that the incidence of diabetes mellitus was in 171 million persons in the year 2000 and it is expected to increase to about 366 million after 10 years. The prevalence rate of National Diabetic mellitus in Pakistan is 6.67% and that of relative diabetes is 7.90%. The main cause of Type 2 Diabetes mellitus is fatness or obesity. With the increase in age of the patient and the growth and progress of the disease, Dyslipidaemia, insulin levels and insulin opposition tends to be worsened. As recognized by national and international studies, Dyslipidaemia is present in metabolic syndrome and various specimens of dyslipidaemia in Type 2 Diabetes mellitus and fatness. Most of the studies organized in the national community found greater levels of triglycerides, total cholesterol and low-density. While in some studies it was recognized that lipoproteins are in lower concentration in T2DM. Few studies reported that the level of HDL is normal in DM. Despite its cure, Dyslipidaemia becomes more dangerous with the passage of the time. And it can cause greater complexities in diabetic mellitus. Studies organized on intercontinental level observed that the cause of dyslipidaemia, reduced insulin level and increase in insulin opposition are the growing age and succession of the anarchy. Only a few studies reported that growing age can affect the biochemical constraint. While in Pakistan there is no study reported to observe the effect of duration of disorder on biochemical parameters. In Pakistan, many studies were organized on dyslipidaemia and they find out the sequences of the dyslipidaemia but no study was found to observe the association of the growing age and time length of the disease with dyslipidaemia, insulin levels and insulin opposition. The current study was arranged to identify the sequences of the dyslipidaemia in T2DM sufferers and healthy individuals and correlation of growing age and time length of the disease on dyslipidaemia, insulin levels and insulin opposition.

PATIENTS AND METHODS:

The study organized was of collaborative type. It was organized in Jinnah Hospital, Lahore from November 2016 to December 2017. The study was organized according to the recent Good Clinical Practices and the announcement of Helsinki 1975 newest version 2008. AMC Ethical committee had permitted the study. After the announcement and approval study was started.

Non-Probability sampling technique was used. By using this technique patients with T2DM were chosen

according to the criteria of the World Health Organization. The patients who were suffering from the disease for at least one year were selected. Their glucose level was measured to be $>750\text{mmol/L}$ and $>11.1\text{mmol/L}$ after two hours of breakfast. In type 1 DM the patients suffering from some diseases like an endocrine disease, persistent renal stoppage, already using lipid or insulin lowering medicines, smokers and severe rabble-raising diseases were not included in the experimental study. The complete physical check-up, history, laboratory analysis, complete blood test, sedimentation rate of red blood cells by using Westergren's method and renal function tests were done in patients. And the patients showing negative results were not added in the study. It was advised to all patients that before analysis or tests they should never change their food or not to do any physical activity until their blood sample is obtained. The permission was obtained from each patient included in the study in the form of blueprints.

After that, a blood sample was obtained from each patient. 10ml blood was drawn out from a venous system with a clean venipuncture. The blood sample was obtained from an antecubital vein. The disposable syringe was used. Complete contamination-free conditions were arranged during the experiment. At 37°C blood sample was permitted to coagulate for 30 minutes. When clots were obtained, serum was estranged. The serum was estranged by centrifugation at 3000 cycles per second for 15 minutes. Serum was then transferred to small clean test tubes. Before chemical analysis of serum these were kept at -20°C . Now different methods were used to analyze the blood serum. Blood CP was achieved by Sysmex automated analyzer, ESR was identified by Westergren's process, serum TC by the immune-inhibition method, serum glucose by glucose oxidase method, serum LDL by the immune-inhibition method, serum triglyceride by the calorimetric method, serum HDL by Friedewald formula and serum insulin by enzyme-linked immunosorbent assay. Homeostatic Model of Assessment of Insulin resistance was used for the measurement of insulin opposition.

The mathematical investigation was completed by using SPSS. After statistical or numerical analysis, average standard deviation of the age of the patients, time length of the disease, serum TC, TG, HDL, LDL, insulin and insulin opposition was also identified and analyzed. To know about the connection of dyslipidaemia, Spearman's correlation analysis was used. The same method was used to study the insulin level, insulin opposition with the

increase in age and period of the disorder. The numerically important value was supposed to be $P < 0.05$.

As observed in the patients, the most common form of the disorder was hypertriglyceridemia which was found to be present in 44 patients. The second most prevalence form was low-density lipoprotein-hypercholesterolemia present in 36 cases. While the situation was different in the control group. In the control group, the most commonly found disease was low-density lipoprotein in 20 patients and hyperglyceridaemia was on the second number with about 177 sufferers.

RESULTS:

Total 120 patients were added in the study group, out of which 72 were patients and 40 were healthy acting as a control group. 40 males and 32 females were added. 27 were male and 13 females in case of the control group. The characters of both the study and comparison groups were analyzed. Average ages of individuals suffering from disease, the time limit of disease, BMI, serum TC, TGs, LDL, HDL, Insulin and insulin opposition were notified. The average duration of the disease was also reported which was about 4.3 ± 4.27 years. In the case of BMI, it was about $27.29 \pm 4.12 \text{ Kg/m}^2$. However, it was about $24.78 \pm 5.16 \text{ Kg/m}^2$. It was noticed that serum TC, TG and insulin opposition was greater than healthy control groups. While HDL in T2DM was less than that of the control group. However, serum LDL and insulin levels were equal in both groups.

Patients were classified into fatty and non-fatty in both groups. Patients were divided having hypercholesterolemia and low HDL. BMI WAS $>25 \text{ kg/m}^2$ for obese patients, $>200 \text{ mg/dl}$ for TC, $>150 \text{ mg/dl}$ for TG, $>100 \text{ mg/dl}$ for LDL and $<40 \text{ mg/dl}$ for HDL, these were the incise off values. Normal insulin had the incise off value about $10 \mu\text{Lu/L}$ whereas the insulin opposition incises off

values were about 2.5. It was found that 46 were fatty persons and 26 were non-fatty among the sufferer's case. Whereas 20 were fatty and 20 were obese in case of control or comparison group. Hypercholesterolemia was present in 22 cases, hyperglyceridaemia in 44 cases, LDL-hypercholesterolemia in 36 and low HDL in 101 cases. If we compare them with control group these values were found to be 7, 17, 24 and 12 cases respectively.

The ratio of patients having more than 150 mg/dl was observed to increase. It was increased from 23.6% at two years of diseased condition to 37.5% subsequent to 5 years of a diseased condition. Similarly, an increase in patients was observed in the case of hypercholesterolemia which was from 18% after two years to 32% after 5 years. There was no increase in duration of DM observed or identified in case of TC and HDL. According to the investigation of Spearman's association, it was found that the time period of disease was not associated with dyslipidaemia or insulin opposition. But it was observed that time period of the disease was related to the serum insulin level. This relation was however negative. Dyslipidaemia, serum insulin levels or insulin opposition was not found to be related with age on numerical Investigation. 50 patients were observed having hyperinsulinaemia and 64 patients were observed having insulin opposition. 42 patients were found having rigorous and 30 patients having gentle insulin opposition as observed in the study group. In overweight persons, 11 individuals were observed having normal or gentle insulin opposition by HOMA-IR index, demonstrating chances of Type 2 Diabetes Mellitus in overweight individuals. According to the Spearman's association investigation which was carried out on T2DM patients, a sturdy association was analyzed between serum insulin and insulin opposition coefficient.

Table – I: Gender Distribution in Both Groups

Gender	Study Group (72)	Control Group (40)
Male	40	27
Female	32	13

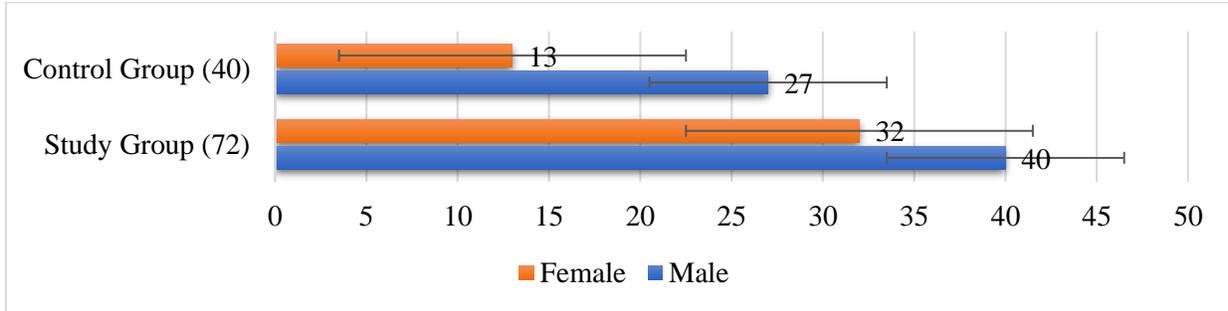


Table – II: Group Wise Parameters Analysis

Parameters (Average)	Study Group (72)		Control Group (40)		P-Value
	Mean	±SD	Mean	±SD	
Age	42.92	3.09	36.65	4.54	0.6
BMI	27.29	4.12	24.78	5.16	0.006
S.TC	182.13	37.12	167.82	35.96	0.04
S.TGs	200	102.65	148.67	90.27	0.008
S.LDL	100.54	28.61	104.4	27.6	0.47
S.HDL-C	42.53	9.66	39.44	8.12	0.04
S.Insulin	13.2	6.93	13.47	5.12	0.83
Homa IR	4.78	2.61	3.14	1.2	0.001

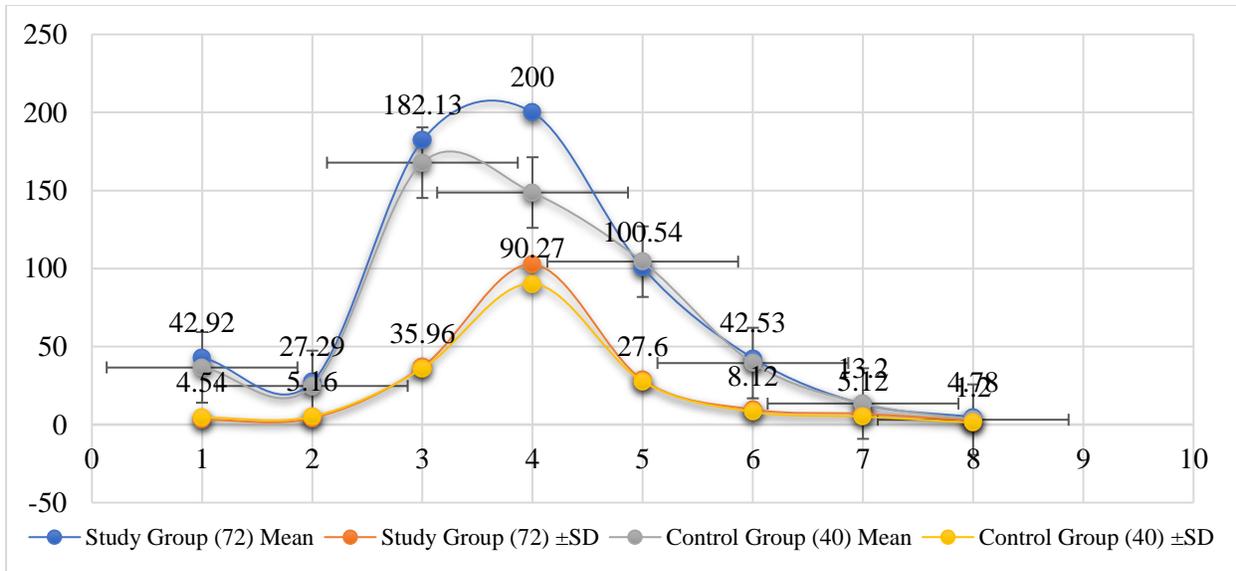


Table – III: Range of Both Groups

Parameters (Range)	Study Group (72)	Control Group (40)
Age	30 – 50	30 – 35
BMI	19.23 – 38.4	15.69 – 35.6
S.TC	113.68 – 261.79	85.54 – 242.45
S.TGs	69.03 – 525.66	43.36 – 472.57
S.LDL	23.2 – 178.65	42.54 – 163.95
S.HDL-C	18.94 – 90.48	29 – 63.8
S.Insulin	4.9 – 43.1	7.1 – 26.98
Homa IR	1.45 – 1.88	1.58 – 6.28

Table – IV: Comparison of Different Parameters in Healthy and Diabetic Cases

Parameters	T2DM	Healthy
Obesity	46	20
Total Hypercholesterolemia	22	7
Hypertriglyceridemia	44	17
Hypercholesterolemia-LDL	36	24
Low HDL	10	12
Hyperinsulinism	50	8
Insulin Resistance	74	23

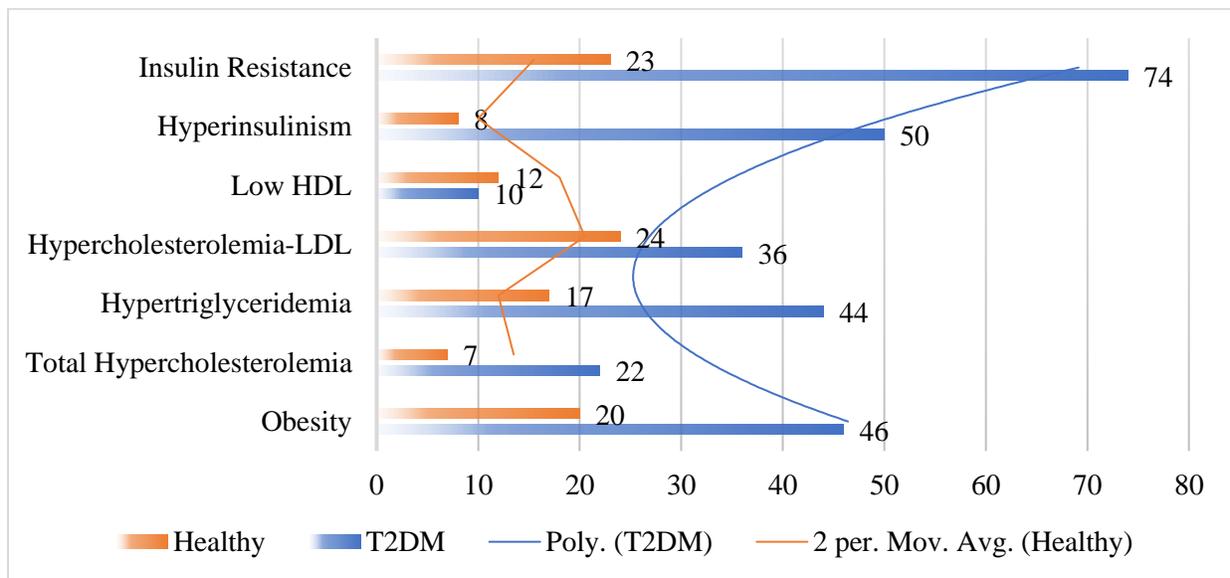
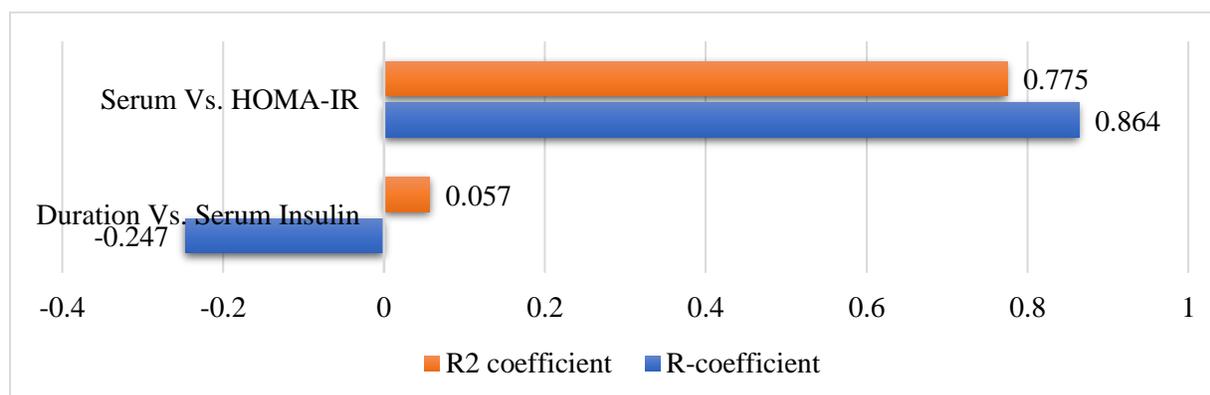


Table – V: R-Coefficient Comparison

Comparison	P-Value	R-coefficient	R ² coefficient
Duration Vs. Serum Insulin	0.03	-0.247	0.057
Serum Vs. HOMA-IR	0.0001	0.864	0.775



DISCUSSION:

The study which we are discussing was the first one study which reported the relationship between growing age and the time interval of disease on dyslipidaemia, insulin level and insulin opposition in Pakistani T2DM. In many nationwide and intercontinental studies, kinds of dyslipidaemia and their numbers have been shown in journalism in patients of Type 2 diabetes mellitus, in vigorous fleshy and non-obese individuals. However, in Pakistan, no study was observed to find out the association between growing ages the time interval of the disease with dyslipidaemia, insulin levels and insulin opposition.

It was reported that the most common disease found among patients was hypertriglyceridaemia with the ratio of about 61%. The second most frequently observed was LDL-hypercholesterolemia about 50%, followed by hypercholesterolemia 30.5%. The most rarely found was low HDL about 13.8% in patients suffering from diabetes mellitus. These estimations were found according to the observations of recently discussing the study. These results are comparable with other international studies which also show the hypertriglyceridaemia as frequently found dyslipidaemia. According to the reports of the one study, in males the most frequently found dyslipidaemia was hypertriglyceridaemia followed by LDL-hypercholesterolemia, while in females the most commonly observed was hypercholesterolaemia followed by LDL-hypercholesterolemia. According to some other reports of the study, the highest ratio among diabetes mellitus was of S.TG followed by LDL. Our study also shows similar results. However

other study reported dyslipidaemia as higher in percentage. However, the results of some studies were different from the results of our study. Such as one study observed the low HDL as the most frequent dyslipidaemia. However, some studies also reported the hypercholesterolemia found most commonly in diabetes mellitus patients in Pakistan. In contrast to our study, one study also reported no patient having low HDL. A study organized in Karachi reported the two dyslipidaemia which was high LDL and low HDL as the most widespread verdict. In another study among women, high LDL was found to be more widespread than raised TC in Pakistani diabetes patients. Different model sizes, the different time period of disorder, and BMI of the samples used during study can cause the different results of dyslipidaemia in diabetes mellitus patients. To recognize the actually most common dyslipidaemia pattern in the Pakistani community, greater population-based legion should be analyzed after preparing the impenetrable factors to attain precise results.

Different patterns of dyslipidaemia were also recognized by worldwide studies. In study organized in China reported the triglyceridaemia as most frequent dyslipidaemia followed by high TC, followed by LDL in diabetic patients. These results are comparable to our findings. It was also observed that dyslipidaemia was most common in females.

It was also reported that the most common dyslipidaemia was LDL-hypercholesterolemia which was 60%, followed by hypertriglyceridaemia which was 42.5%, followed by less LDL about 30% and

total hypercholesterolemia in case of vigorous fatty and non-fatty or normal individuals. In control groups, high serum TG and low serum HDL were found to be common dyslipidaemia according to the findings of some studies.

In our study, no specific association was found on the mathematical scale but it was analyzed that with the development of the disorder a distinct deterioration was observed. However, in our findings, a little inverse association was observed between the interval of disease and serum insulin levels R coefficient. Some studies reported a direct relationship between dyslipidaemia and time interval of disease. Some studies find out that there is no relationship between serum, TC, HDL, and LDL and time interval of disease but there exists a direct relationship between serum, TG, and very less dense lipoprotein with the time period of the disorder. In this study, it was also reported that serum TC, TG, HDL and VLDL were also linked to the growing age of the sufferer. This was not observed in our study. In another study, it was identified that in Iranian population dyslipidaemia was disintegrated because of growing age. In our study time interval of the disease was not observed to be linked with insulin opposition. While it was reported that insulin level declines and insulin opposition enhanced when the age increases or time period become longer in T2DM according to intercontinental study reports.

As compared to other studies in our study enhanced insulin level and insulin opposition was identified in most of the diabetic patients. In our study, a highly direct relationship was found in serum insulin levels and insulin opposition in T2DM patients. If we talk about the control groups, insulin opposition was observed in fatty persons but not in normal persons. More studies consisting of greater community size can precisely describe the occurrence of dyslipidaemia and insulin opposition inhale and hearty society of Pakistan. Our study reported that with the enhanced time period of the disease serum insulin level decreased and dyslipidaemia disintegrate. If dyslipidaemia combines with hyperglycemia it can cause complexities in diabetic patients. In this case, dyslipidaemia disintegrate. It should be cured with control sugar content in blood in T2DM patients.

We considered a little sample size for the study. It was a major drawback of our study. Additionally BMI based groups were also neglected by our study. We can check the precision of our study by observing it in a greater sample size. We cannot comprehend

the targeted population with observed population because of little sample size. It can be obtained by studying the experiment again with a large population size.

CONCLUSION:

Hyperglyceridaemia was the most frequent dyslipidaemia while hypercholesterolemia was a jeopardy factor in completely fit persons in T2DM patients. Serum insulin levels and time period of the disease were negatively associated with each other while serum insulin level and dyslipidaemia were directly related to each other.

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