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RESEARCH ARTICLE
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IMPACT OF LIPID PROFILE IN HYPERGLYCEMIC PATIENTS

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ABSTRACT

Introduction- Type 2 diabetes mellitus (T2DM) is a syndrome of abnormal carbohydrate, fat and protein metabolism. T2DM is caused by absolute or relative lack of insulin and is a major public health concern. [1] According to the last International Diabetes Federation (IDF) report, the rate of diabetic patients will reach to 438 million patients worldwide in 2030. [2] Type 2 diabetes can be treated but due to its long-term complications, it causes many risks to health. Prolonged high sugar level in T2DM can affect the immune, cardiovascular, renal and ophthalmic systems, leading to complications like neuropathy, peripheral vascular disease, renal disease, retinopathy and coronary heart disease. Diabetic patients are highly prevalent to cardiovascular disease. [3-4]

Aim- Impact of Lipid Profile in Hyperglycemic patients

Material and Method- This research was conducted on 200 samples from individuals with type 2 diabetes mellitus and controls from medically fit subjects. Patients conducted at Biochemistry department in collaboration with Medicine Department at Index Medical College, Indore.

Result- In this study FBS were found highly significant **[<0.0001]** in case **222.74±21.01 (Mean±SD)** as comparision of healthy person **(Mean±SD) 86.44±8.75.** TC were found significant **[<0.0001]** in case 281.23±13.07 **(Mean±SD)** as comparisons of healthy person 166.17±12.65 **(Mean±SD).** TG were found significant **[<0.0001]** in case 359.30±62.54 **(Mean±SD)** as comparisons of healthy person 115.09±11.55 **(Mean±SD).** HDL were found significant **[<0.0001]** in case 28.37±6.13 **(Mean±SD)** as comparisons of healthy person39.37±4.91**(Mean±SD).** LDL were found significant **[<0.0001]** in case 172.37±15.97**(Mean±SD)** as comparisons of healthy person 105.27±15.80**(Mean±SD).**
VLDL were found significant **[<0.0001]** in case 48.85±4.71**(Mean±SD)** as comparisons of healthy person23.11±2.21**(Mean±SD).**

Conclusion- Type 2 diabetes mellitus patients, as well as in all patients with unexpected worsening of their lipid profile or vice-versa because our data statistically suggest that the effect of Plasma glucose associated with lipid disorders that are characterized by increased TC, Triglycerides, LDL-C, VLDL-C and decreased HDL-C levels

Key words- Diabetes mellitus, Lipid profile.

Introduction- Type 2 diabetes mellitus (T2DM) is a syndrome of abnormal carbohydrate, fat and protein metabolism. T2DM is caused by absolute or relative lack of insulin and is a major public health concern. [1] According to the last International Diabetes Federation (IDF) report, the rate of diabetic patients will reach to 438 million patients worldwide in 2030. [2] Type 2 diabetes can be treated but due to its long-term complications, it causes many risks to health. Prolonged high sugar level in T2DM can affect the immune, cardiovascular, renal and ophthalmic systems, leading to complications like neuropathy, peripheral vascular disease, renal disease, retinopathy and coronary heart disease. Diabetic patients are highly prevalent to cardiovascular disease. [3-4] A study between diabetic patients and healthy controls to compare the level of lipid profile. They concluded that diabetic patients had elevated levels of total cholesterol, triglycerides and low density lipids. This indicates that dyslipidaemia, is more common in diabetic patients, and may cause cardiovascular disorders.[5] The effect of lipid profile on type 2 diabetes mellitus. Patients with type 2 diabetes influences lipids, thus disclosing them to cardiovascular disease. They concluded that patients with type 2 diabetes mellitus had increased levels of triglycerides, decreased levels of high density lipid with either normal or increased levels of low density lipid. This indicates that type 2 diabetes influences on patients abnormal lipid profile along with increased risk of cardio vascular disease. Thus analysis of lipid profile in type 2 diabetics is very important in the clinical reviews and treatment. [6]

Material and Method-
GROUP CLASSIFICATION:
Group 1: Healthy controls (n=100)
Group 2: Diabetic patients (n=100)

Research design:
This research was conducted on 200 samples from individuals with type 2 diabetes mellitus and controls from medically fit subjects. Patients conducted at Biochemistry department in collaboration with Medicine Department at Sarojini Naidu Medical College , AGRA.

- Where 100 samples are taken as controls from non-diabetic patients
- 100 samples are taken from diabetic patients.
- This study design is a hospital-based analytical study.

Inclusion criteria:
- Male and female participants aged 20 to 80 years
- Diagnosed cases of Type 2 Diabetes Mellitus
- Healthy individuals serve as the control group

Exclusion Criteria:
- Patients with thyroid and other chronic diseases.
- Pregnant and lactating women.
- Any mental state restricting the subject from consenting to the study.
- Individuals with a history of radiotherapy for head and neck cancer, existing oral mucosal or salivary gland disorders, or those who had received antibiotics or corticosteroids within the past three months were excluded from the study.

- Any significant background illness
- Subjects with liver cirrhosis and genitourinary infection.
- Subjects who have recently received a blood transfusion or donated blood, with active infections, have hemoglobinopathies, or bleeding disorders.
- Those subjects whose complete blood count CBC showed iron deficiency anemia were also excluded.
- Cardiovascular disease, acute infectious disease, or chronic inflammation, usage was excluded.

Sample Collection:
5ml of fasting blood sample will be collected from antecubital vein in which 2ml collected in fluoride vial for plasma glucose estimation and 3ml collected in plain vial for lipid profile estimation.

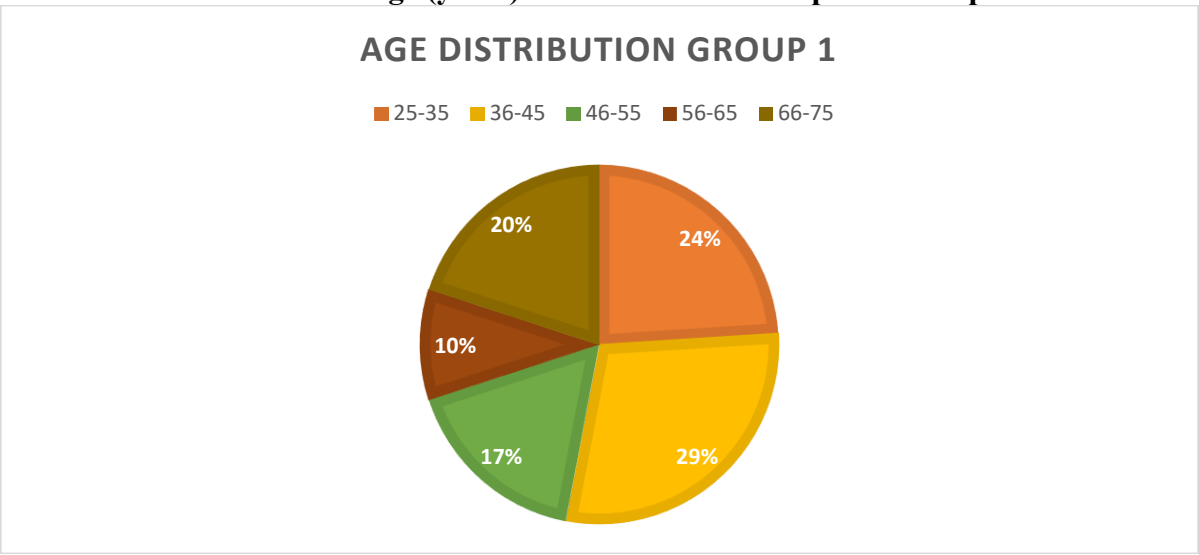
Specimen Processing:
Blood will be separated by centrifugation at 4000 rpm (rotation per minute) for 5 minutes in the biochemistry department and analysis will be conducted. The serum will be stored at -20°C until assayed.

STATISTICAL ANALYSIS:
Data will be collected in a predesigned, pretested semi-structured format. The results of the data will be analyzed using the latest version of the software, IBM SPSS, version 30, and Microsoft Excel. The descriptive analysis will be represented by the values in Mean and standard deviation.

Table no. 1: Distribution of Age (years) in the Group 1 & Group 2

		AGE					
	Groups	25-35	36-45	46-55	56-65	66-75	Total
1	Group 1	24	29	17	10	20	100
2	Group 2	17	29	27	15	12	100
	TOTAL	41	58	44	25	32	200

Chart no. 1: Age (years) Distribution of Group 1 & Group 2



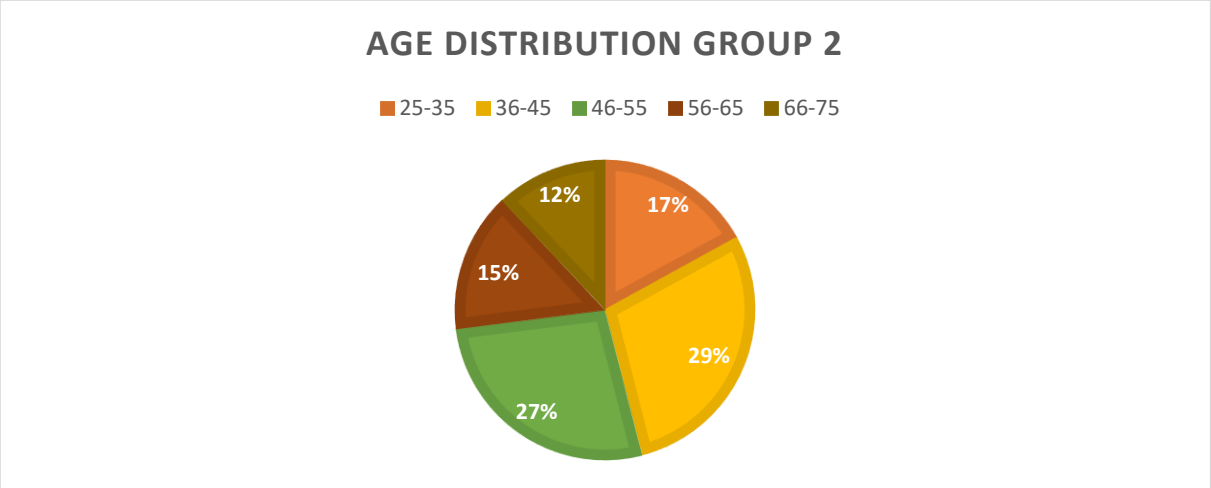


Table no. 2: Status of Biochemical Parameter in Group 1

N=100	FBS	TG	TC	HDL-C	LDC-C	VLDL-C
Min	70	98	146	27	74	19
Max	104	146	189	50	169	28
Mean	86.44	115.09	166.17	39.37	105.27	23.11
+ SD	8.75	11.55	12.65	4.91	15.80	2.21
+ SEM	.876	1.15	1.26	.492	1.58	.222
t-test	98.730	99.617	131.319	80.039	66.587	104.326

Table no. 3: Status of Biochemical Parameter in Group 2

N=100	FBS	TG	TC	HDL-C	LDC-C	VLDL-C
Min	182	200	231	20	137	41
Max	260	466	300	44	199	66
Mean	222.74	359.30	281.23	28.37	172.37	48.85
+ SD	21.01	62.54	13.07	6.13	15.97	4.71
+ SEM	2.10	6.25	1.30	.61	1.59	.471
t-test	106.006	57.444	215.083	46.261	107.925	103.656

Graph 1: Analysis of t-test variance among Group 1 & Group 2

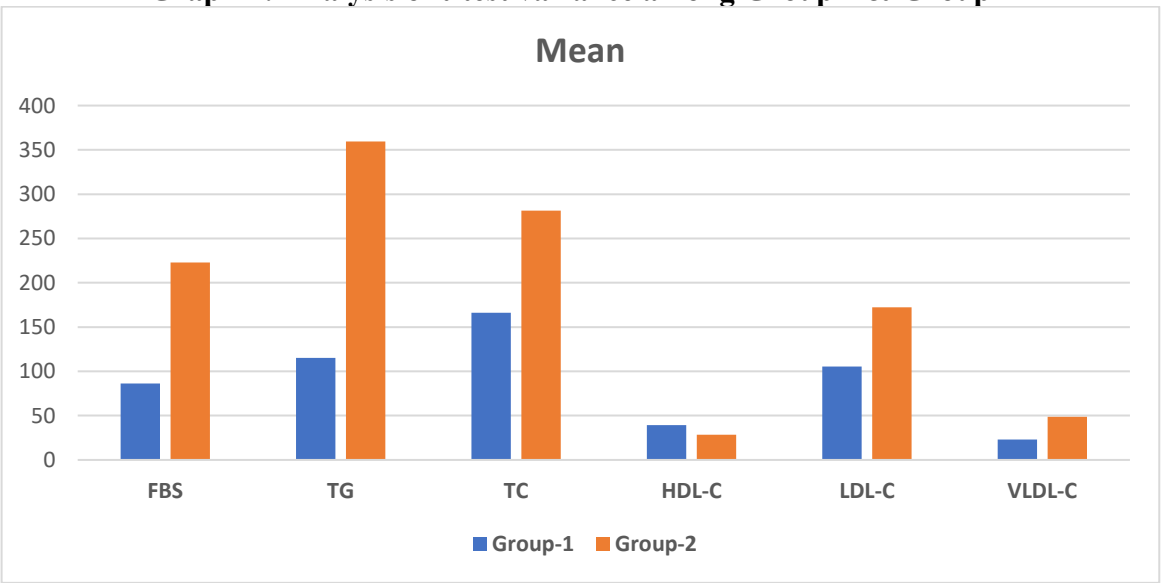


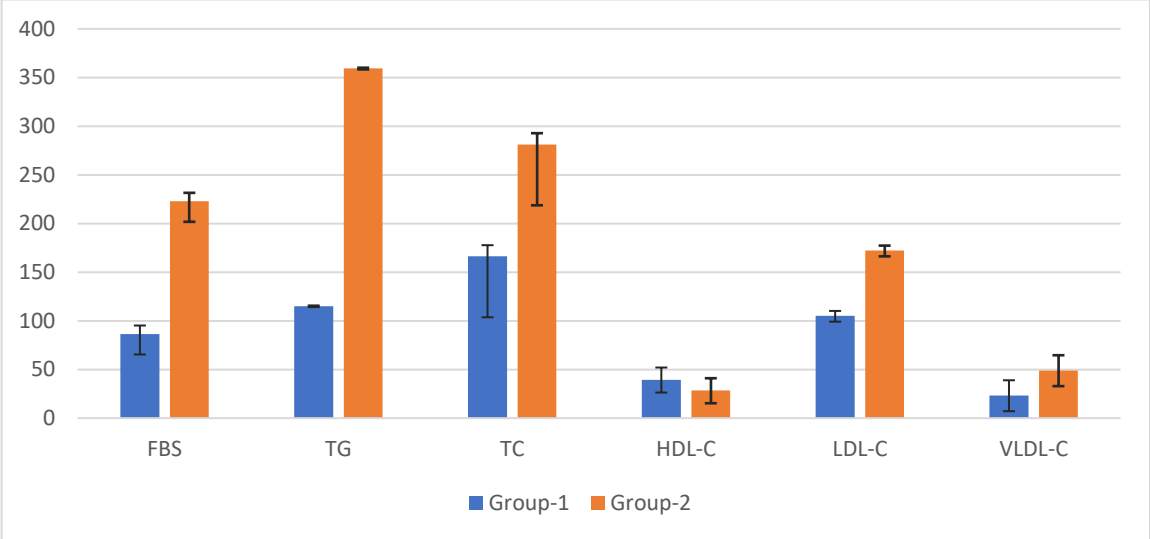
Table no. 4: Statistical comparison of biochemical parameters between Group 1 (healthy individuals) and Group 2 (diabetic patients).

Parameter	Group-1 Mean±SD	Group-2 Mean±SD	P- value
FBS	86.44±8.75	222.74±21.01	0.0001**
TG	115.09±11.55	359.30±62.54	0.0001**
TC	166.17±12.65	281.23±13.07	0.0001**
HDL-C	39.37±4.91	28.37±6.13	0.0001**
LDL-C	105.27±15.80	172.37±15.97	0.0001**
VLDL-C	23.11±2.21	48.85±4.71	0.0001**

p-value <0.0001 indicates that the result is extremely significant.

****EXTREMELY SIGNIFICANT**

Graph 2: Comparison of Biochemical parameter in Group 1 & Group 2



RESULT- In this study FBS were found highly significant **[<0.0001]** in case 222.74±21.01 **(Mean±SD)** as comparision of healthy person **(Mean±SD)** 86.44±8.75**.** TC were found significant **[<0.0001]** in case 281.23±13.07 **(Mean±SD)** as comparisons of healthy person 166.17±12.65 **(Mean±SD).** TG were found significant **[<0.0001]** in case 359.30±62.54 **(Mean±SD)** as comparisons of healthy person 115.09±11.55 **(Mean±SD).** HDL were found significant **[<0.0001]** in case 28.37±6.13 **(Mean±SD)** as comparisons of healthy person39.37±4.91**(Mean±SD).** LDL were found significant **[<0.0001]** in case 172.37±15.97**(Mean±SD)** as comparisons of healthy person 105.27±15.80**(Mean±SD).**
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Discussion: Daniel and Philip *et al.,* have determined the effect of lipid profile on type 2 diabetes mellitus. Patients with type 2 diabetes influences lipids, thus disclosing them to cardiovascular disease. They concluded that patients with type 2 diabetes mellitus had increased levels of triglycerides, decreased levels of high density lipid with either normal or increased levels of low density lipid. This indicates that type 2 diabetes influences on patients abnormal lipid profile along with increased risk of cardio vascular disease. Thus analysis of lipid profile in type 2 diabetics is very important in the clinical reviews and treatment. [7]**Popa *et al.,*** have studied that all the subjects with type 2 diabetes are at a higher risk of cardiovascular disease (CVD). Their Current interest is in identification and development of novel biomarkers which are specifically designed for individuals

with diabetes. [8] **Abikshyeet et al.** revealed the mean FSG as 4.22 ± 3.59 mg/dl for diabetic group14 and recorded a mean FSG of 7.64 ± 6.44 mg/dl. [9] Panchbhai again did a study in 2018 and found FBG as 6.83 mmol/dl.10 Another study conducted by Ravindran et al. observed mean of FSG as 6.567 ± 3.04 mg/dl for the diabetic group. [10]In obesity, the low plasma HDL-C levels have been attributed to increased fractional clearance of HDL secondary to depletion of its cholesterol. [11] **Schmitt *et al;*** reported LDL uptake by fibroblasts may be impaired in type 2 diabetes and this leads to increase in LDL: HDL ratio in type 2 diabetics. [12] Patients with type-2 diabetes have increased risk of cardiovascular disease associated with atherogenic dyslipidemia and coronary artery disease, especially myocardial infarction is the leading cause of morbidity and mortality worldwide. [13]

Conclusion: From this study, it can be concluded that type 2 diabetics is most common in middle aged subjects. So, clinicians should remain highly suspicious in middle aged subjects with lipid profile for increase in atherogenic parameters which may enhance the risk for atherosclerosis leading to coronary artery disease. Type 2 diabetes mellitus patients, as well as in all patients with unexpected worsening of their lipid profile or vice-versa because our data statistically suggest that the effect of Plasma glucose associated with lipid disorders that are characterized by increased TC, Triglycerides, LDL-C, VLDL-C and decreased HDL-C levels

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