



## GESTATIONAL DIABETES MELLITUS WITH DYSLIPIDEMIA: A CASE CONTROL STUDY AMONG ANTENATAL CLINIC (ANC) ATTENDEES AT NSCB MEDICAL COLLEGE & HOSPITAL, JABALPUR, INDIA

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### ABSTRACT

**Background-** Deranged lipid profile levels may be associated with gestational diabetes mellitus (GDM) and its complications. This study was designed in order to compare the occurrence of dyslipidemia among gestational diabetic and non-diabetic pregnant females.

**Materials & Methods-** A case control study with the total number of 111 participants, (61 cases and 50 controls) attending ANC clinic of NSCB medical college and hospital, Jabalpur, were recruited. Data on sociodemographic and clinical correlates were collected and Blood glucose and lipid profile estimation was done in all participants.

**Results-** Study reveals that 65.6% of cases shows abnormally high level of total cholesterol (>200mg/dl) compare to control group which shows only 4% abnormally high level of total cholesterol. This difference was found statistically significant. Similar trend was observed with LDL and VLDL levels. About 44% of cases show abnormally low level of serum HDL (<35mg/dl) while only 2% of control shows abnormally low level of HDL.

**Conclusion:** Our results show that lipid profile is significantly deranged in pregnant women with GDM compared to normal pregnant women.

**KEYWORDS :** GDM (Gestational Diabetes Mellitus), Dyslipidemia

### Introduction:

Pregnancy is a state of both metabolic and hormonal change. Changes occur in carbohydrate and lipid metabolism during pregnancy to ensure a continuous supply of nutrients to the growing fetus despite intermittent maternal food intake. These metabolic changes are progressive and may be accentuated and precipitate as gestational diabetes mellitus (GDM) and dyslipidemia. GDM is the occurrence of diabetes in pregnant normal women and dyslipidemia is deranged lipid profile both are associated adverse pregnancy outcome. Women with gestational diabetes mellitus (GDM) and dyslipidemia have an increased risk of developing Type 2 diabetes or cardiovascular diseases (CVD) in later life [1,2] Dyslipidemia is an established independent risk factor for cardiovascular diseases.[3-5]. Insulin resistance is found to be the primary mechanism leading to lipid derangements in individuals with diabetes. [6].

Amraei and Azemati in Ghana reported significant difference in total cholesterol levels between pregnancy complicated by GDM and normal pregnancy. [7] In a study done in Pakistan on the lipid profile and serum insulin levels in gestational diabetes mellitus, by Rubina Aziz et al. [8]. However E Koukkou et al reported lower LDL levels in GDM compared with the controls. VLDL cholesterol levels for the GDMs were significantly higher than in controls. [9]. There is paucity of studies in India on this topic.

With the above background this study was done with an aim to find out the prevalence of dyslipidemia among GDM females compared with no diabetic pregnant females.

### Materials & Methods

**Study Design:** The subjects for this study were recruited from this research done to find out Association of gestational diabetes mellitus with various pathological and biochemical correlates. The study was a hospital based case control study.

**Study Area:** Antenatal clinic in NSCB Medical College & hospital.

**Sample size:** Taking expected proportion of individuals exposed in the controls, to be 0.05, the assumed odds ratio to be 6, and the desired level of confidence 0.95 and power for the detection of a significant difference between the two groups to be 80%, the minimum sample size per group was found to be 50. Final study was done recruiting 61 cases and 50 controls.

**Study Period:** The study was conducted over a period of 6 months from 1st march to 31st Aug 2017.

**Study population:** Pregnant females, aged 18-35 years, attending ANC clinic at NSCB medical college and hospital irrespective of gestational age who fulfil the exclusion and inclusion criteria were included in the study. Cases included those antenatal females who had GDM, either newly detected or on follow up by DIPS (Diabetes in Pregnancy Study Group India) criteria, and controls were antenatal females without diabetes, attending ANC clinic of NSCB medical college and hospital, Jabalpur, were included in the study.

### Exclusion criteria

- Women who were known diabetics before pregnancy,
- Patients with known lipid metabolic disorders, Hypothyroidism, Renal disorders and age above 35 were excluded to avoid overlap of overt diabetes in above 35 years.

### Method:

After obtaining the written informed consent sociodemographic data was taken from cases and controls and about 5ml blood sample was drawn under aseptic precaution from antecubital vein and collected in a sterile tube.

DIPS (Diabetes in Pregnancy Study Group India) criteria used for diagnosis of GDM is a single step procedure irrespective of the last meal. Pregnant women attending the antenatal OPD were given 75g anhydrous glucose in 250-300ml of water and plasma glucose was estimated after 2 hour. A 2-hours plasma glucose  $\geq$  140 mg/dl is taken as GDM.

Lipid profile was measured using the Randox instruments which includes Rx imola. Randox imola is a compact fully automated bench-top clinical chemistry analyzer, capable of handling the workload of a medium to high throughput laboratory.

**Statistical analysis:** The data was compiled and entered in the Microsoft excel sheet. It was analyzed using statistical software SPSS 20.0 software (IBM USA). The data was represented in tables and charts. The frequency was displayed of all variables and mean and standard deviation was calculated for quantitative variables. Unpaired student t test was applied for comparing means (quantitative data). Chi square test was applied to find out the statistical difference between the groups for qualitative data set.

**Results:** A total of 61 cases and 50 controls participated in the study. The mean age group of cases was 25.16 ± 4.59 and that of controls was 24.70 ± 3.71 years. About 30% belonged to rural area and 70% to urban area with significantly more number of GDM cases in urban than in rural area (p>0.05). More than half of the study participants were 1st time pregnant, about one third were second gravida and rest were 3rd gravida and above.

When the presence of dyslipidemia among GDM females was compared with non-diabetic pregnant females the values of Total cholesterol, triglycerides (TG), Low Density Lipoprotein (LDL) and Very low density lipoproteins (VLDL) were found to be significantly higher among GDM cases compared to non-diabetic controls. The values of HDL was found to be lower among cases compared to controls and this distribution was also found statistically significant. (Table-1)

Similar trend was observed when the mean values of these parameters were compared between cases and controls, with statistically significant difference observed among the two groups.

(Table-2)

**Table 1. Dyslipidemia among cases (n<sub>1</sub>=61) and controls (n<sub>2</sub>=50)**

Lipid Profile		Study participants			Significance
		Cases (%)	Controls (%)	Total (%)	
TOTAL CHOLESTEROL	Normal	21 (30.4)	48 (69.6)	69(100)	χ <sup>2</sup> =44.29 p value <0.05*
	Raised	40 (95.2)	2 (4.8)	42(100)	
TG	Normal	17(26.2)	48 (73.8)	65 (100)	χ <sup>2</sup> =52.55 p value <0.05*
	Raised	44 (95.7)	2 (4.3)	46 (100)	
	<35mg/dl	27 (96.4)	1 (3.6)	28 (100)	
	>35mg/dl	34 (40.9)	49 (59.1)	83 (100)	
LDL	Normal	17 (26.6)	47 (73.4)	64 (100)	χ <sup>2</sup> =49.22 p value <0.05*
	Raised	44 (93.6)	3 (6.4)	47 (100)	
VLDL	Yes	22 (95.7)	1(4.3)	23 (100)	χ <sup>2</sup> = 19.41 p value <0.05*
	No	39 (44.3)	49 (55.7)	88 (100)	

\*Significant

**Table 1. Mean values of different parameters of lipid profile among cases (n<sub>1</sub>=61) and controls (n<sub>2</sub>=50)**

CHARACTERISTICS	Cases (N=61)	Controls (N=50)	Significance
Total Cholesterol	215.26 ±46.974	154.40 ±20.472	t=8.517;p<0.05*
TG	168.54 ±46.890	113.68 ±32.767	t=6.989;p<0.05*
HDL	39.02 ±11.023	44.60 ±4.811	t=3.561;p<0.05*
VLDL	32.34 ±10.346	20.20 ±5.245	t=7.540;p<0.05*
LDL	144.92 ±38.372	93.38 ±23.569	t=8.297;p<0.05*

\*Significant

**Discussion:**

In this study, it was observed that lipid profiles (TG, TCHOL, LDL and VLDL cholesterol) were significantly elevated in gestational diabetes mellitus. HDL level significantly lower in GDM as compared to normal pregnant women. Triglycerides concentrations for GDM were significantly higher than controls for all the age groups. This agreed with a study by **Amraei and Azemati** [7] who reported a

significant increase in the concentration of triglycerides levels in pregnancy complicated by glucose intolerance as compared to normal pregnancy. However **Ghafoor et al** [10] did not find significant difference in triglycerides concentration between women with previous GDM cases and controls. The discrepancies could be as a result of differences in the method of selection of subjects for the study.

The significant increase in total cholesterol concentrations in GDM compared with controls in this study is as a result of the fact that GDM significantly alters cholesterol metabolism leading to dyslipidemia. These findings are consistent with reports by **Amraei and Azemati** [7], who reported significant difference in total cholesterol levels between pregnancy complicated by GDM and normal pregnancy. In a study done in Pakistan on the lipid profile and serum insulin levels in gestational diabetes mellitus, by **Aziz and Mahboob** [11] reported significantly higher total cholesterol levels in women with GDM than the controls.

**Rossner and Ohlin** [12] in their study found that fat storage increases in the second trimester of pregnancy leading to increase plasma triglyceride concentration. LDL is formed from VLDL which is the principal transport form of triglyceride in the blood and so in GDM, when triglyceride concentration increases, LDL increases accordingly. In this study, LDL cholesterol levels were significantly higher in GDMs than the controls. These results are in agreement with previous reports of **Amraei and Azemati** [7] and **Aziz and Mahboob** [11] that indicated that LDL cholesterol increases significantly during pregnancy and more especially pregnancy complicated by GDM. However, **E Koukkou et al** [9] reported lower LDL levels in GDM compared with the controls. VLDL cholesterol levels for the GDMs were significantly higher than in controls. This could be as a result of the high triglycerides levels observed in this study. VLDL is formed from triglycerides synthesized in the liver de novo or by re-esterification of free fatty acids. Therefore, VLDL level increases when triglyceride level increases. The results of this study are in agreement with reports by **Amraei and Azemati** [7]; **Aziz and Mahboob** [11]. The increased levels of triglycerides, total cholesterol and LDL cholesterol observed in GDMs is as a result of increase fat storage [12] and **progesterone** [13] in the second trimester of pregnancy, that act in a way to reset the lipostat in the hypothalamus leading to increase in the lipids concentration.

In present study HDL cholesterol levels for the GDM case were significantly lower than the controls. This is contrary to the report by **E Koukkou et al** [9], and **Wiznitzer et al.** [14], who did not find significant difference in HDL levels between GDM and normal pregnant women. The results of this study, is however consistent with a report by **Aziz and Mahboob** [11], who reported significantly lower HDL levels in GDM compared with normal pregnant control women. **Amraei and Azemati** [7], **Koivunen et al.** [15] also reported significantly lower HDL levels in pregnant women with impaired glucose tolerance than the controls.

**Conclusion and recommendations:** From this study it can be concluded that gestational diabetes can be associated with presence of dyslipidemia. Screening of dyslipidemia in GDM ANCs and early detection & treatment can reduce the risks for the mothers as well as for babies.

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