



## STATUS OF GLYCOSYLATED HEMOGLOBIN AND LIPID PROFILE IN GESTATIONAL DIABETES PATIENTS

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### Abstract

**Aim:** The exact alterations in lipid profile as well as the levels of glycosylated hemoglobin in gestational diabetes are still not clearly documented. **Methods:** To add a new insight to the question, levels of lipid profile parameters and the levels of glycosylated hemoglobin were studied in patients with gestational diabetes and compared to controls. **Results:** Fasting plasma glucose levels, Plasma glucose levels 1 hr and 2 hrs after 75 gm oral glucose administration (Oral Glucose Tolerance Test) were significantly higher in cases than in controls. Glycosylated hemoglobin was significantly higher in cases than in controls. It was observed that there was a significant increase in serum triglycerides in cases with gestational diabetes when compared to controls. **Conclusion:** The results of our study suggests that abnormal glucose levels, Glycosylated hemoglobin and serum triglycerides plays an important role in gestational diabetes patients and therefore extensive studies are required. Early diagnosis of gestational diabetes provides safe baby and motherhood and in particular it will reduce the severity of complications and mainly fetal and maternal morbidity and mortality.

**Keywords:** Lipid profile, Serum cholesterol, Triglycerides, Glycosylated hemoglobin, Oral glucose tolerance test, Gestational diabetes

### Introduction

Gestational diabetes is the occurrence of diabetes in pregnant normal women and is associated with an increase incidence of congenital abnormalities when compared with normal pregnancy. Frequency of congenital malformation in infants of diabetic mothers is estimated to be 6-10% (1, 2). Alteration in lipid profile is known to occur in diabetic pregnancy (3, 4). Oxidative stress due to the damage brought about by free radicals is also known to influence the formation of anomalies in fetuses born to women with diabetes. Moreover, body's defense mechanisms would play a role in the formation of antioxidants and try to minimize the damage. Factors responsible for these anomalies are not fully understood but there are several reports showing that increased free radical production and antioxidant depletion in diabetic pregnant women may contribute to the formation of anomalies (5). In diabetes excess oxygen radicals may result from the auto oxidation of glucose (6), and increased level of glycated hemoglobin levels, because of increased glucose levels in the body (5). There is considerable evidence that antioxidant defense system is depleted and activity of antioxidant enzymes is reduced in diabetes (7).

In the present study, the following parameters were assessed in the serum to elucidate the

biochemical profile status in patients with gestational diabetes. Serum lipid profile parameters, blood glucose levels in oral glucose tolerance test and glycosylated hemoglobin levels were estimated in patients with gestational diabetes and compared to controls.

### Materials and Methods

#### Selection of Study Subjects

##### a. Cases

25 pregnant women with established diagnosed of Gestational diabetes were taken as cases. These patients do not have any other complications during pregnancy such as Hypertension, Jaundice, Urinary tract infections. All the 25 antenatal women are in 3rd trimester of pregnancy.

##### b. Controls

40 pregnant women without gestational diabetes in 3<sup>rd</sup> trimester and without any other complication during pregnancy are taken as controls.

All the cases and controls are selected randomly in the age group of 16-40 years. All the cases and controls are in 3rd trimester only.

Detailed history, clinical examination and obstetric examination of cases and controls

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enrolled in this study are carried out regarding any current or past history of Diabetes, Hypertension, Systemic diseases, any other chronic physical disability and any other obstetrical complications.

Informed consent from the cases & controls were taken.

#### Sample collection, processing & storage

Antecubital vein, peripheral vein of front of forearm was selected for venous blood collection. The arm was extended and a tourniquet was applied a few centimeters above the elbow to obstruct the venous return. The skin is sterilized over the vein with a cotton swab. A disposable sterile needle fixed to a disposable syringe of 10ml capacity into the vein is inserted which was held steady by thumb. The plunger is withdrawn and as the desired amount of blood was collected, the tourniquet was withdrawn. A swab is placed over the puncture site and the needle is withdrawn. The swab is pressed to arrest the bleeding. The needle is removed carefully avoiding contamination of fingers and slowly blood is transferred to an appropriate container. For separation of serum, blood taken into a plain vial is first allowed to clot and then centrifuged at 3000 rpm for 5 minutes. This separated serum was used to estimate:

- Total cholesterol
- HDL cholesterol
- Triglycerides

All specimens were clearly labeled with names of cases & controls along with date and time of collection.

Gestational diabetes is a pregnancy disorder of human which rates among one of the causes for maternal & fetal mortality and morbidity. More number of cases are seen in developing countries due to late diagnosis and inadequate antenatal services.

The inspiration for this study is to know the present morbidity status by analyzing the following biochemical parameters. By estimating the levels of these parameters, we can assess the ante partum severity of disease prognosis and outcome of pregnancy.

The following biochemical parameters were estimated in patients with gestational diabetes and compared to controls. Oral glucose tolerance test was performed by the standard method described by Harold varley (8). Glucose was determined using Hitachi 912 auto analyzer by the standard kit based on the glucose oxidase and peroxidase method (9). Glycosylated hemoglobin was determined by the method described by Little & Goldstein DE (10). Total cholesterol and triglycerides were estimated by enzymatic methods (11, 12). HDL-Cholesterol (HDL-C) was estimated by phosphotungstic acid precipitation followed by enzymatic analysis in supernatant fraction (13) and LDL-Cholesterol (LDL-C) was determined by using Friedewald's equation (14).

#### Statistical analysis

Statistical analysis between controls and cases was performed by the student t-test using the SPSS package.

#### Results

The mean  $\pm$  SD of serum lipid profile parameters in controls and cases with gestational diabetes were shown in Table 1.

The mean  $\pm$  SD of blood glucose values in oral glucose tolerance test (OGTT) in controls and cases with gestational diabetes were shown in Table 2.

The mean  $\pm$  SD of Glycosylated hemoglobin in controls and cases with gestational diabetes were indicated in the Table 3.

Table 1: The mean  $\pm$ SD values of serum lipid profile parameters in controls and cases with gestational diabetes

Parameter	Cases Mean $\pm$ SD (n= 25)	Controls Mean $\pm$ SD (n=40)	p value
Serum triglycerides	193.72 $\pm$ 9.33	154.15 $\pm$ 6.81	<0.001
Serum Total cholesterol	179.28 $\pm$ 19.28	177.53 $\pm$ 18.34	>0.05
Serum HDL cholesterol	57.72 $\pm$ 7.22	56.00 $\pm$ 7.27	>0.05
Serum LDL cholesterol	82.82 $\pm$ 19.96	90.70 $\pm$ 21.50	>0.05

Table 2: The mean  $\pm$ SD values of Oral Glucose Tolerance Test (OGTT) in controls and cases with gestational diabetes

Parameter	Cases Mean $\pm$ SD (n= 25)	Controls Mean $\pm$ SD (n=40)	p value
Fasting Blood Glucose	125.20 $\pm$ 12.17	81.95 $\pm$ 6.12	<0.001
Blood Glucose; 1 hr	199.00 $\pm$ 10.8	168.95 $\pm$ 6.14	<0.001
Blood Glucose; 2 hrs	176.76 $\pm$ 13.03	141.43 $\pm$ 7.85	<0.001

Table 3: The mean  $\pm$ SD value of glycosylated hemoglobin in controls and Study subjects (patients) with gestational diabetes

Parameter	Cases Mean $\pm$ SD (n= 25)	Controls Mean $\pm$ SD (n=40)	p value
Glycosylated hemoglobin	8.92 $\pm$ 0.47	7.16 $\pm$ 0.47	<0.001

## Discussion

We tried to assess by our study the biochemical profile in gestational diabetes. For this, we studied plasma glucose levels by Oral glucose tolerance test, Glycosylated hemoglobin, Serum triglycerides, Serum total cholesterol, Serum HDL cholesterol and Serum LDL cholesterol. We have done the comparative study of all these parameters with term matched control subjects and cases of Gestational diabetes. Similar reports of elevated triglyceride levels in gestational diabetes have been reported earlier by Kjos et al (4). In contrast to our findings Sobki SH et al reported lower levels of triglycerides in patients with gestational diabetes when compared to controls (15).

Fasting plasma glucose levels, Plasma glucose levels 1 hr and 2 hrs after 75 gm oral glucose administration (ORAL GLUCOSE TOLERANCE TEST) are significantly higher in cases than in controls. If the plasma glucose levels are higher, it results in increased morbidity to the fetus and also mother. By estimating this parameter, we can predict the severity of the disease process and can plan to provide better antenatal care by institutional treatment to save the mother and the child from all the grave complications of gestational diabetes. Similar reports of elevated blood glucose levels in gestational diabetes have been reported earlier by Taricco E et al (16).

Glycosylated hemoglobin is significantly higher in cases than in controls. This parameter provides the level of blood glucose 8-12 week period prior to determination. So, by estimating this parameter, we can avoid further deterioration of the disease process by early detection and prompt treatment. Significantly elevated levels of glycosylated hemoglobin in gestational diabetes were also reported by

researchers in several studies supporting our hypothesis (17, 18).

By the results of our present study it is evident that the serum triglycerides were significantly elevated in patients with gestational diabetes than in controls. So, by estimating this parameter, we can supplement diet which provides adequate nutrition to both the mother and the fetus as well as low in lipid content. Supplementing such diet during the antenatal period is the better choice of treatment in gestational diabetes to reduce fetal and maternal morbidity and mortality.

## Conclusion

Finally, our study show that abnormal glucose levels, Glycosylated hemoglobin and serum triglycerides plays an important role in gestational diabetes patients and therefore extensive studies are required. Early diagnosis of gestational diabetes provides safe baby and motherhood and in particular it will reduce the severity of complications and mainly fetal and maternal morbidity and mortality.

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