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SERUM LIPID LEVELS IN WOMEN WITH GESTATIONAL DIABETES IN PORT HARCOURT, NIGERIA

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ABSTRACT
Gestational diabetes mellitus is the most common metabolic disorder among pregnant women, and as such it is of great public health concern, especially in a developing economy like Nigeria. It has implications for the health of both mother and foetus. This study evaluates the levels of the serum lipid fractions in GDM subjects. Fifty (50) pregnant women with GDM within the age range of 24 to 44 years and gestational age of 24 to 32 weeks and 25 healthy pregnant without GDM as controls were involved in this study. Those with known pre-gestational diabetes, history or clinical features suggesting chronic liver disease and polycystic ovarian syndrome were excluded from this study. Six millilitres of venous blood was obtained from each subject by standard procedure and the serum obtained was analysed for lipid profile using enzymatic method. It was observed that GDM patients had significantly reduced level of HDL than control subjects, and higher levels of other lipid parameters and also TC/HDL ratio. The results indicate impaired lipid metabolism in GDM subjects. Proper management of lipid metabolism in pregnant women with GDM may prove a useful clinical step in preventing fatal pregnancy outcome for mother and foetus.

KEYWORDS: Lipids, gestational diabetes, Total cholesterol, Port Harcourt.

INTRODUCTION
Gestational diabetes mellitus (GDM) is a condition that is characterized by alterations in carbohydrate metabolism that are diagnosed for the first time during pregnancy (Conget, 2002). The pathogenesis of gestational diabetes involves abnormalities of insulin-sensitive tissues; sensing of glucose by cells of the pancreas is abnormal and there is inadequate insulin response (Catalano *et al*., 2003). Thus, gestational diabetes is a condition that results from the contributory effect of insulin resistance and abnormal function of beta cells. Pregnancy therefore is a diabetogenic state that is characterized by impaired sensitivity of insulin (Siddiqui *et al*., 2011).

Normally, glucose tolerance requires a balance between insulin secretion and insulin sensitivity (Baz *et al*., 2016). Glucose intolerance worsens early in pregnancy in diabetic women (Murthy *et al*., 2002). Therefore, gestational diabetes mellitus is a reflection of a predisposition to type 2 diabetes mellitus or manifestation of metabolic alterations that are associated with pregnancy (Butte, 2000). The increase in insulin secretion is as a result of insulin resistance, which is probably due to increase in maternal hormones (Baz *et al*., 2016). It has been reported that there is increase in levels in female hormones such as progesterone, estrogen and prolactin during pregnancy (Guyton & Hall, 2006). The hormones cause a decrease in the phoshorylation of insulin receptor substance, and therefore leading to insulin resistance (Siddiqui *et al*., 2011).

Gestational diabetes mellitus is not a pathophysiological classification but an operational type, so as to identify women who have diabetes mellitus during pregnancy (Baynes, 2015). This classification includes women with type 1 diabetes mellitus during pregnancy or those with undiagnosed asymptomic type 2 diabetes mellitus, and gestational diabetes mellitus has its onset in the third trimester of preganacy (Baynes, 2015).

There is a dearth of data on the alterations in lipid metabolism in pregnancy. There is increase in maternal free fatty acids in late gestation probably due to decreased maternal glucose insulin sensitivity (Catalano *et al*., 2003). Insulin resistance can cause abnormal changes in all lipid fractions (Wilcox, 2005) and this can lead to increased triglyceride (TG) and low density lipoproteins (LDL) levels, and low levels of high density lipoproteins (HDL). Studies indicate that abnormalities in lipid metabolism play a significant role in the development of gestational diabetes mellitus (Asare-Anane, 2013).

Pregnancy and diabetes mellitus have been reported to have additive effect on the development of an atherogenic lipid profile (Asare-Anane, 2013). Gestational diabetes mellitus leads to increased risk of hypertension and other complications for mother and foetus during pregnancy (McGrowder *et al*., 2009).

METHODOLOGY

The study involved a total of 50 pregnant women with Gestational Diabetes Mellitus attending clinic Braithwaite Memorial Specialist Hospital and 25 healthy pregnant women as control subjects. Selection of GDM was based on the criteria of the WHO standard for classifying pregnant women as diabetic. The bio-data and medical history of the subjects were obtained using questionnaire. The subjects that participated in this research gave their informed consent. Pregnant female subjects were also excluded from the study. Ethical consent was also obtained for this research study.

Pregnant women who satisfied the following criteria were included in the study: pregnant women who had GDM, elevated Fasting Blood sugar level, maternal age between 24 and 44 years and gestational age of between 24 and 32 weeks. Those with pre-gestational diabetes, history of liver disease and polycystic ovarian syndrome were excluded from the study.

Six mililitres (6ml) of blood were collected from the subjects. The blood samples were centrifuged at 3,000rpm for 10 minutes and the plasma separated and put in a plain bottle and Fluoride-Oxalate bottle for glucose assay. The plasma samples were then preserved at -20^{o}C in the refrigerator prior to analysis. Analysis for lipid profile and fasting blood glucose were done using enzymatic method while glycated haemoglobin was done using immunochemical method, manufactured by Randox.

RESULTS

Table 4.1 Demographic parameters for study subjects

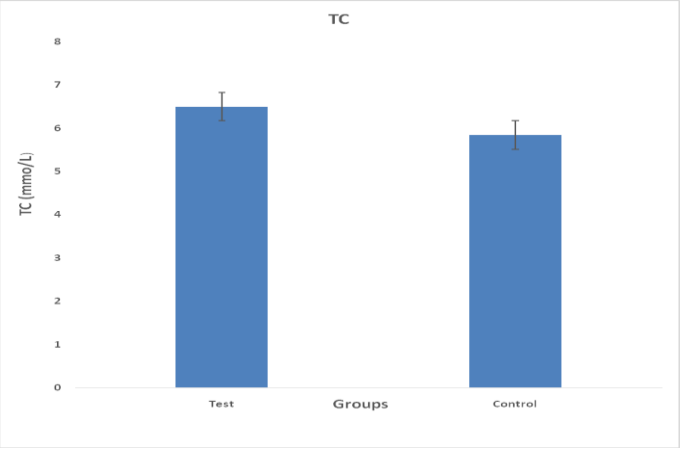
	Age (Yrs)	Wt (Kg)	Ht (m)	BMI (Kg/m^2)
GDM (N=50)	33.58±4.64	88.04±9.17	1.67±0.05	31.94±3.53
Control (N=25)	33.48±5.83	89.28±9.13	1.68±0.05	31.71±3.38

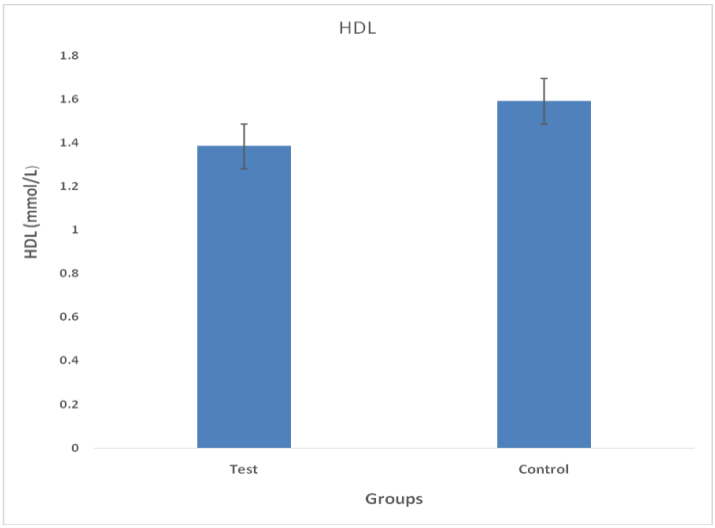
Table 4.2 Mean ± SD of parameters for GDM patients and control subjects

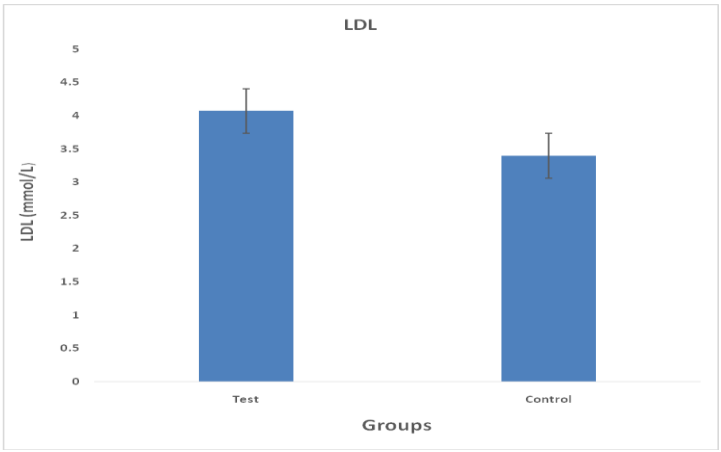
	FBS (mmol/L)	HbA1c (%)	PROG (mmol/L)
GDM (n=50)	6.73±1.07	6.60 ± 1.30	46.7±1.5
Control (n=25)	4.45±0.67	4.90 ± 0.44	33.7±1.0
p-value	2.50E-17	6.42E-17	2.76E-50

Table 4.3 Mean ± SD of lipid parameters for GDM patients and control subjects

	TC (mmol/L)	VLDL (mmol/L)	TG (mmol/L)	HDL (mmol/L)	LDL (mmol/L)	TCHOL: HDL (mmol/L)
GDM (N=50)	6.50±0.20	1.04±0.30	2.29±0.70	1.38±1.00	4.07±0.30	4.73±0.43
Control (N=25)	5.84±0.10	0.85±0.50	1.88±1.00	1.59±0.10	3.40±0.20	3.69±0.31
p-value	2.99E-21	2.06E-20	3.38E-20	1.38E-10	5.98E-18	4.67E-18







DISCUSSION

This study analyzed the lipid profile of women with Gestational diabetes mellitus in comparison with women who are physiologically normal in pregnancy, clearly presenting normal sugar levels. The mean age of the GDM patients was 33.58±58 years while that of control subjects was 33.48±5.83 years, and the BMI values were 31.94±3.53kg/m^2 and 31.71±3.38kg/m^2 respectively. There was no significant difference in age and BMI.

The mean fasting blood glucose and glycated haemoglobin for GDM patients was significantly higher than that of control subjects. This is probably due to the impaired insulin sensitivity that occurs in pregnancy (Siddiqui *et al*., 2011) and increase in the production of glucose in the liver (Baz *et al*., 2016). It has been reported that glucose worsens in diabetic pregnant women (Murthy *et al*., 2002).

The progesterone level of GDM patients was significantly higher than that of control subjects. Maternal hormones increase in pregnancy, including progesterone (Guyton & Hall, 2006). Progesterone alters sensitivity to insulin, a situation that is observed in GDM, by decreasing the appearance of glucose transporter (GLUT4) or impairing beta cells adaptive response to increased secretion of insulin (Aagaard-Tillery *et al*., 2005). Progesterone is used as a vaginal suppository to prevent preterm labour in the second or especially the third trimester (Alimohammadi *et al*., 2015). The lipid parameters, with exception of HDL, were significantly raised in GDM patients than in controls. This is probably due to increase in the metabolism of fatty acids (Yoshino *et al*,. 2014). This increase in free fatty acid is due to the maternal physiological changes wherein there is a re-orientation in metabolism toward lipid utilization (Baz *et al*., 2016). The GDM patients had significantly lower level of HDL. The results of this study, is however consistent with a report by Aziz and Mahboob (2006), who reported significantly lower HDL levels in GDM compared with normal pregnant control women. These changes in lipid levels are as a result of insulin resistance which affects all lipid parameters (Wilcox, 2005). These findings agree with the work of Asare-Anane, 2013).

The results from this study indicate that women with GDM are more predisposed to cardiovascular diseases due to decreased levels of HDL, a cardio-protective lipid, accompanied with increased levels of some other lipid parameters, especially LDL, TG and abnormal TC/HDL ratio.

It is therefore recommended that women with GDM should be given adequate clinical care, especially in the management of changes in lipid metabolism in order to ensure better outcome for both mother and foetus.

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