NORMAL SERUM LIPID PROFILE OF HEALTHY PREGNANT WOMEN ATTENDING ANTENATAL CLINIC OF UNIVERSITY OF MAIDUGURI TEACHING HOSPITAL, MAIDUGURI NIGERIA.

[1]Mairiga AG, [2]Mamza YP, [2]Balla HJ, [2]Shuwa HA, [1]Hadiza A, [1]Bilkisu I

[1]Department of Obstetrics and Gynaecology,
University of Maiduguri Teaching Hospital, Maiduguri Nigeria
[2]Department of Medical Laboratory Sciences,
University of Maiduguri Teaching Hospital, Maiduguri Nigeria

Correspondence and reprint request to: **Dr A.G. Mairiga,**
Department of Obstetrics and Gynaecology, University of Maiduguri Teaching Hospital, Maiduguri Nigeria
eMail:- dragmairiga@yahoo.com
GSM:- +234 8023726622, 8096547767, 8035281887

ABSTRACT

Background: Pregnancy is associated with marked physiological hyperlipidaemia. But hyperlipidaemia is said to complicate about 7% of all pregnancies; which may cause severe maternal diseases and premature birth.
Objective: To determine serum lipid profile and the lipid level variations between pregnancy trimesters among healthy pregnant women attending antenatal care at UMTH.
Method: A cross-sectional descriptive survey of healthy pregnant women attending antenatal care at UMTH.
Results: There was increase in all lipid fractions in pregnancy compared to non-pregnant state, progressive increase in HDL-C was seen as the pregnancy progresses, but with no significant difference between 2nd and 3rd trimesters. The serum levels of total cholesterol and HDL-C were significantly increased in the second and third trimesters of pregnancy.
Conclusion: This study demonstrated that pregnancy is associated with hyperlipidaemia. But the stage of pregnancy and the levels of serum lipid fractions at which pregnancy complications will begin to occur is yet to be determined and therefore further comprehensive and controlled studies are required to establish this.

Keywords: Serum lipids, pregnancy, Trimester, North-eastern Nigeria.

INTRODUCTION

Pregnancy is linked with marked physiological hyperlipidaemia[1]. Hyperlipidaemia in pregnancy is due to increased plasma fats. Fat is the major form of stored energy during pregnancy. About 4 kg are said to be stock up by 30 weeks of gestation; which is in the form of fat depot. [1] The increase in maternal lipid concentration, especially free fatty acids, in late gestation is most probably due to the decrease in maternal glucose insulin sensitivity in late pregnancy.[2]

Changes in lipid metabolism promote the accumulation of maternal fat stores in early and mid-pregnancy and enhance fat mobilization in late pregnancy. In early and mid-pregnancy, lipid deposition occurs and lipolysis is inhibited secondary to increased oestrogen, progesterone, and insulin resistance. [1]But in late pregnancy, there is increased lipolysis and

ketogenesis as pregnant women utilize the stored lipid to fulfil the energy needs and spares glucose and amino acids for the fetus.

Also elevated serum progesterone and estrogen levels may results in an increase in cholesterol during pregnancy. The cholesterol further increases the level of progesterone; the hormone that makes uterus to be passive; thus making it more favorable for an embryo to implant and grow to term.[1]Cholesterol helps with fetal brain development and also is part of each new cell formed as the fetus grows.

In normal pregnancy, serum cholesterol and triglyceride levels increase significantly, peaking in the third trimester and dropping to normal levels within four weeks after delivery.[3] But these changes depend on many factors such as dietary intake, genetic factors, drugs and exercises. However, it's not clear whether excessively high levels indicate a potential future risk for high cholesterol in women. Expected elevations for triglyceride and cholesterol levels during a normal pregnancy usually do not exceed 3.8mmol/lit and 8.7mmol/lit, respectively (corresponding 95th percentile values). However, elevations over the 95th percentile values can be observed during pregnancy, and patients with levels over these expected adaptation levels are more likely to have abnormal lipid levels later in life. [3]Also, it has been documented that hyperlipidaemia complicate about 7% of all pregnancies; which may cause severe maternal diseases and premature birth.[4]

This study was therefore undertaken to determine the serum total cholesterol (TC), triglyceride (TG), HDL-C, and LDL-C levels in healthy pregnant women attending our antenatal clinic.

METHOD

The study was a cross-sectional analytical survey of healthy pregnant women attending the antenatal clinic of the University of Maiduguri Teaching Hospital (UMTH). One hundred (100) apparently healthy females of child bearing age consisting of 25 apparently healthy non-pregnant women selected randomly from the students of University of Maiduguri; that served as control, and 75 pregnant women (25 in each of the 3 trimesters) were recruited, randomly between February 1st and April 30th 2012, for the study. Consent was given by the subjects before recruitment for the study, and the study had been approved by the ethical committee of UMTH in accordance with the Helsinki declaration.

The inclusion criteria were consent to participate in the study and subject within reproductive age (15 – 49 years) while exclusion criteria include: -

1) History of hypertension i.e. blood pressure equal to or > 140/90 mmHg
2) History suggestive of deep vein thrombosis
3) History suggestive of metabolic disorders such as diabetic disease
4) Presence of physical deformity and other signs of systemic diseases on physical examination

A proforma was developed for collection of the data. The data collected included the age, parity occupation and gestational age at booking. Also the clients' weight and blood pressure at booking were recorded.

Weight (kilogram) on bare-feet using a Shermond Weighing Scale (Suxxes, UK); height (centimeter) on bare feet using standard measuring meter rule and body mass index, calculated using the measured height and weight, were collected on each subject. And subjects were classified as underweight (BMI < 18.5kg/m^2), normal (18.5 – 24.9kg/m^2), overweight (25.0 – 29.9kg/m^2) and obese (> 29.9kg/m^2).

Venous blood sample, (5ml) was collected on each subject according to standard methods described by Bachorik *et al*, (1982)[5] after an overnight fast and the serum separated by centrifugation at room temperature for 1- 2

hours. Serum total cholesterol level was determined by enzymatic reactions as described by Meiattini *et al*, (1978),[6] triglyceride by enzymatic glycerol phosphate oxidase/peroxidase method as prescribed by Fossati *et al*, 1982[7], serum HDL-C was determined after precipitating according to the procedure described by Groove *et al*, 1979,[8] while LDL-C was determined by Fried Wald formula (Fried Wald, 1972).[9]

Data obtained was analyzed using the statistical software SPSS version 16 (SPSS Chi, Ill USA) students' test was used to compare the means of variables and level of significance was set at a P value of < 0.05.

RESULTS

A total of 100 subjects were included in this study, seventy five were apparently healthy pregnant women (cases), and 25 healthy non-pregnant women that served as control. Fifty four (54%) were primigravidas and 46% were multiparas. Sixty three (63%) were classified as having normal weight, 17% were overweight, 12% were underweight and only 8% were obese. Their level of formal education were; 29% no formal education, while 05%, 30%, and 36% were having primary, secondary and tertiary educations respectively.

The mean age for the pregnant women was 23.6 ± 4.9 years, while that of non pregnant women was 26.8 ± 9.8 (P < 0.05) Table 1

Table 1: Mean age, parity and serum lipid values for the pregnant women compared to non-pregnant women

Variable	Mean value Control (Non pregnant women)	Mean value Cases (Pregnant women)
Age (years)	26.8 ± 9.8	23.5 ± 4.9
Parity	1.4 ± 2.8	1.7 ± 1.9
BMI (Kg/m^2)	24.5 ± 6.5	21.6 ± 4.1
TC (mmol/lit)	4.8 ± 1.3	5.6 ± 1.9*
TG (mmol/lit)	1.2 ± 1.0	1.7 ± 0.6*
HDL (mmol/lit)	2.2 ± 0.9	3.0 ± 1.8*

***Statistically significant difference**

Basically there was increase in lipid profile fractions during pregnancy compared to control subjects, but the level of increase was not significant in LDL – C across the trimesters, so also Triglycerol was only significantly elevated in 3rd trimester (Table 2).

Table 2: Means of lipid fractions in each of the trimester of pregnancy compared to the control

Lipid fraction (mmol/L)	Control	Cases		
		1st Trimester	2nd Trimester	3rd Trimester
Total Cholesterol	4.2 ± 0.7	4.6 ± 0.8	5.7 ± 1.6*	6.3 ± 2.5*
Triglycerol	1.2 ± 1.0	1.6 ± 0.5	1.7 ± 0.5	1.9 ± 0.8*
HDL– C	2.0 ± 0.6	2.7 ± 0.9*	2.8 ± 1.4*	3.4 ± 2.7*
LDL – C	1.7 ± 0.8	1.2 ± 0.5	2.2 ± 1.6	2.0 ± 1.5

***Statistically significant difference**

Table 3: Comparison of lipid profile of pregnant women in the 1st and 2nd Trimesters

Lipid fraction (mmol/L)	1st Trimester	2nd Trimester (mmol/L)	P- Values .
Total Cholesterol	4.6 ± 0.8	5.7 ± 1.6	0.002*
Triglycerol	1.6 ± 0.5	1.7 ± 0.5	0.203
HD – C	2.7 ± 0.9	2.8 ± 1.4	0.907
LDL – C	1.2 ± 0.5	2.2 ± 1.6	0.007*

***Statistically significant difference**

DISCUSSIONS

The variations in plasma lipids levels show a discrepancy considerably in various communities. This discrepancy is secondary to among many factors such as variations in economic, cultural, geographic and social conditions. Age, gender, dietary habits and genetic makeup can also influence the lipid fraction levels.[10] One of the limitations of this study is that some of these confounding factors such as the socio-economic status and dietary habits could not be controlled. There was a statistically significant difference in age between the pregnant and the non-pregnant; the former being younger (23.5±4.9mmol/lit) than the later (26.8±9.8mmol/lit). This may have some influence on the result of our study. This is because age has influence on the lipid fraction levels.[10]

It is a known fact that people with Obesity are more likely to have lipid abnormality than those with normal BMI.[10] Even though there was significant difference between the BMI of the control (24.5 ± 6.5) and the cases (21.6 ± 4.1), the general BMI of the study population is within normal range (only 8% were obese), and therefore it may not have much influence on the serum lipids levels.

The total cholesterol level in the control population was 4.8 ± 1.3mmol/lit. This finding is similar to what was found in general population in Port-Harcourt (4.76mmol/L) [11] and Lagos (4.28mmol/L) [12] but higher than what was found in Benin (3.64mmol/L)[13] and Jos (3.54mmol/L).[14] These differences may be the influences of the confounding factors that are mostly not controlled in all these studies.

This study depicted that there is increase in the total cholesterol, TC and HDL-C in our pregnant women compared to non-pregnant women of reproductive age. Similar pattern of hyperlipidemia in pregnancy was found in most studies such as those from Kano,[15] Ekpoma[16] and Gujrat India.[17] And there is progressive increase in the levels of the lipid fractions as the pregnancy progresses to maximum levels at term. But an earlier study by Patrizia et al indicated that during the course of normal pregnancy, plasma tri-glyceride and cholesterol concentrations rise and as pregnancy progresses but both become normal at the third trimester.[18] In our study however, the increase in the level of LDL-C was statistically not significant. LDL-C is called "bad" cholesterol because it picks up cholesterol from the blood and takes it to the cells. A high LDL-C level is related to a higher risk of heart and blood vessel disease.

The lipid fraction that was consistently elevated during pregnancy is the HDL-C; which was elevated significantly in all the three trimesters. HDL particles carry cholesterol from peripheral tissues to the liver. Impaired transport of cholesterol from peripheral tissues

to the target area of utilization may cause the decrease in HDL-cholesterol in serum. HDL-C increases by 12th wk of gestation in response to oestrogen and remains elevated throughout pregnancy.[1] HDL-C is called "good" cholesterol because it removes excess cholesterol from the blood and takes it to the liver. A high HDL level is related to lower risk of heart and blood vessel disease.

The triglycerol level is mainly significantly elevated in third trimester. The serum level of triglycerol is most affected by diet, but can also be elevated in obese, thyroid or liver disease and genetic conditions. A high serum level in triglycerides was linearly associated with an increased risk of PIH, preeclampsia, large for gestational age, and induced preterm delivery.[4, 19] High levels of triglycerides are also related to a higher risk of heart and blood vessel disease.

In conclusion, this study has documented that hyperlipidaemia is a facet in our pregnant women. But hyperlipidaemia is also implicated in poor pregnancy outcomes. At what stage of pregnancy and the level of excess serum lipid fractions can complicate pregnancies, is yet to be determined. Further comprehensive and controlled studies are required to establish serum levels and pregnancy stage that can complicate pregnancy in our women.

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