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SERUM LIPID PROFILE IN NON-PREGNANT AND PREGNANT HAUSA-FULANI WOMEN AT SECOND AND THIRD TRIMESTERS OF PREGNANCY IN KURA LOCAL GOVERNMENT AREA, KANO STATE, NIGERIA

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ABSTRACT
Serum levels of total cholesterol (TC), high density lipoprotein cholesterol (HDL-CH) and low density lipoprotein cholesterol (LDL-CH) concentrations were determined in two hundred and fifty (250) apparently healthy females of child bearing age (non pregnant, 127 and pregnant 123) who attended the antenatal and other clinics at Kura Comprehensive Health Centre, Kano State from August to December 2005. Body weight and height of each subject were taken to calculate body mass index (BMI). Mean serum TC, HDL-CH and BMI values were found to be higher in pregnant than in non pregnant subjects. When the pregnant subjects were classified on the basis of gestational age, 35.0% were in second trimester and 65.0% were in the third trimester. Mean serum TC, HDL- CH and LDL- CH values were significantly higher (p< 0.05) in second trimester subjects than third trimester subjects. Though a preliminary study, the result of this work will contribute in unraveling the serum lipid profile among pregnant and non pregnant Hausa - Fulani women in Northern Nigeria.

Key word: serum lipoproteins, pregnant women, Hausa-Fulani, Northern Nigeria

INTRODUCTION

Many scientific evidences have raised concern about the adverse effects of abnormal blood lipid levels, like cholesterol and other lipids and lipoproteins, on atherosclerotic disease Gotto, (1994). The importance attached to the need for routine examination of the serum lipid and lipoprotein profile in human subjects, especially during pregnancy is well established Seymour, (1979). Even though no clear cut trend was established in Hausa-Fulani communities Atiku *et. Al.,* (2000), a number of studies e.g. Miller, *et. A.l.,* (1979) have revealed that serum lipid and lipoprotein profile varies with age, sex, diet and race. The serum lipid and lipoprotein profile of many communities, especially those of the northern parts of Nigeria, remain to be established. This study was therefore designed to assess the variation of the serum lipid and lipoprotein profile among the non-pregnant and pregnant women and also between the stages of the pregnancy, to provide useful information for local referencing.

MATERIALS AND METHODS

Subjects for the study

Two hundred and fifty (250) apparently healthy females of child bearing age consisting of non-pregnant (127) and pregnant (123) women who attended the Antenatal and other clinics at Kura Comprehensive Health Centre located about 30 kilometers from Kano, city were recruited for the study. Informed consent was given by the subjects before the study was carried out and the study had previously been approved by the ethical committee of Ahmadu Bello Universuty, Zaria, Nigeria. The inclusion criteria were:-

1. Willingness to participate fully in the study
2. No history of hypertension i.e. blood pressure equal to or > 140/90 mmHg
3. No history suggestive of deep vein thrombosis
4. No history suggestive of diabetic disease
5. Absence of physical deformity and other signs of systemic diseases on physical examination

Collection of anthropometric data

Anthropometric data collected on each subject included: Weight (kilogram) on bare feet using a bathroom scale (Beexon, Hungry); height (centimeter) on bare feet using standard measuring meter rule and body mass index, calculated using the measured height and weight from this study.

Blood Sample collection

Venous blood sample, (5ml) was collected on each subject according to standard methods described by Bachorik, (1982) after an overnight fast and the serum separated by centrifugation at room temperature for 1- 2 hours. Serum total cholesterol level was determined by the method of Zlatkis *et al.,* (1953), while serum HDL-CD was determined after precipitating out VLDL and LDL according to the procedure of Lopes-Virella *et al.,* (1977).

Hypercholesterolemia was defined as total cholesterol greater than 200 mg/dl. The study's questionnaire included demographic characteristics like age, gender, and residence of the participants. Information about smoking habits was included despite the taboo attached to it generally in the Hausa community. Current smokers were defined as those who smoke at least one cigarette per day; never smokers as those who have never tried a cigarette in their life and former smokers were defined as those who had stopped smoking more than one year ago. Body mass index was calculated as weight (in kilograms) divided by standing height (in meters squared). Obesity was defined as body mass index > 29.9 kg/m^2. Arterial blood pressure was measured at the right arm with (Aneroid mercury sphygmomanometer), at the end of physical examination with subject in sitting position. The systolic blood pressure level was determined by first perception of sound (of tapping quality). The diastolic blood pressure level was determined by phase V when the repetitive sounds become fully muffled (disappeared). Changes in loudness were not considered. Subjects whose average blood pressure levels were greater or equal to 140/90 mmHg were not included. The blood analysis took place at the department of Biochemistry, Bayero University, Kano.

Statistical analyses

Statistical analyses of the data were carried out with EPI- info 6.0 software packages (CDC Atlanta, Georgia, USA). Variables are presented as mean values ± standard error of the mean, the level of significance was set at P <0.05.Microsoft Excel was used for the tabulations. Comparisons between mean values of BMI and serum cholesterol lipoproteins of pregnant and non pregnant subjects were made by student t-test.

RESULTS

The mean values of Total Cholesterol, HDL-CH and LDL-CH are presented in Table 1. TC and HDL are higher and LDL lower in the pregnant than in non-pregnant group but varied within the normal limits of < 200mg/dl, > 30 mg/dl and 130mg/dl respectively. The mean body mass index is within normal range (i.e. < $25kg/m^2$) but significantly higher P< 0.05 in the pregnant than in non-pregnant group.

Table 1: Mean Values of Body Mass Index (BMI), Total Cholesterol, HDL and LDL among the pregnant and non-pregnant groups

Variable (Unit)	Pregnant group n=123 Mean (SEM)	Non-Pregnant group n= 127 Mean (SEM)
Age (Yrs)	22.7 (0.54)	25.7 (0.64)*
BMI	21.5(0.23)*	20.7(0.31)
TC (mg/dl)	163.8(3.5)*	161.9 (2.5)
HDL (mg/dl)	34.9(0.98)*	32.2(0.49)
LDL (mg/dl)	127.2 (2.8)	130.1 (2.0)

KEYS: BMI- Body Mass Index, TC-Total Cholesterol, HDL- High Density Lipoproteins, LDL- Low Density Lipoproteins, *Level of Significance P<0.05

Table 2: BMI and Serum Total Cholesterol (TC), HDL and LDL Concentrations (mg/dl) in pregnant women at second and third trimesters of the pregnancy

Stage of Pregnancy	TC	HDL - CH	LDL – CH	BMI
Second Trimester	175.4 (38.3)*	37.8 (12.2)*	135.6 (29.2)*	21.5(0.23)*
Third Trimester	157.2 (37.8)	33.3 (9.9)	122.3 (30.9)	20.7(0.31)

*P< 0.05 , Second Trimester n=123, Third Trimester n = 127

Table 2 shows the variation of serum lipids between the pregnant and non-pregnant cohorts. There is an inverse relationship in BMI and serum lipids distribution, which are statistically significant (p<0.05) in the second than in the third trimester of the pregnancy.

DISCUSSION

More than 60 percent of the females that participated in this study were less than 30 years of age as of the time of conducting this research. This study has a relatively large sample size when compared with a similar study on serum lipids profile on pregnant and lactating mothers in Dawakin Kudu local government area, Atiku *et. Al.,* (1998) and the one carried out in Greece Chrysohoou*,* (*2004*). Over 98% of the participants i.e. both pregnant and non pregnant subjects have normal total cholesterol levels of < 200 mg/dl; only one subject (0.81%) of the pregnant subject had total cholesterol level greater than 200mg/dl. This indicates that hypercholesterolemia is not a common feature in this environment, most probably because of some genetic factors. However, our values are insignificantly lower than those obtained on non- pregnant female medical students of Bayero University Kano Atiku *et. al.,* (2000). The difference can be explained on the basis of age, good nutrition and better healthy conditions amongst the students, because most of them are from the elite houses with good nutrition and better environmental sanitation.

Our cohorts are older than the students who were mostly in the adolescent and teenage periods, hence vulnerable to accelerated growth. The growth burst of the adolescent period is associated with increase in lipid deposition, particularly for development of secondary sexual characteristics and adipose tissues in the body. The good nutrition enjoyed by the students is believed to have added to the higher serum cholesterol lipoproteins above the values obtained from our study. Also, better environmental conditions isolate them from water related parasitic infestations that do compete with an individual on the poorly balanced cereal diets most of our women in the rural areas consume, because, these women depend on the water from the ponds for their basic domestic activities. These, parasitic infestations are known to consume nutrients in the intestine, hence, leading to malnutrition and increase in lipid breakdown which possibly accounts for the low serum cholesterol values in our subjects compared to the female students. Even though our study indicates normal serum cholesterol values, studies else where suggest that even for those with normal levels of total cholesterol, risk of myocardial infarction is high when HDL – Cholesterol is low Brewer, (2003); Bersot, *et. Al.,* (2003). This highlights the importance of total- to-HDL cholesterol ratio for the evaluation of blood lipids and the prevention of atherosclerotic disease. It has also been reported that the total cholesterol – to – HDL ratio predicts the risk to coronary heart disease regardless of the absolute LDL and HDL cholesterol Bersot, *et. Al.,* (2003). It is observed that > 99% of pregnant subjects and the entire non – pregnant group had total cholesterol levels below 200mg/dl and HDL cholesterol > 30mg/dl respectively. Moreover, the average total cholesterol to HDL cholesterol ratios in the pregnant and non – pregnant stand at 4.7 mg/dl and 5.03mg/dl respectively, above the threshold indicated by the ATP III guide lines i.e. 3.5 mg/dl for the high risk people Brewer, (2003). This higher ratio indicates low HDL – CH levels and despite that coronary heart disease is not a common feature in this environment. This can be attributed to the low fat intake among the cohorts, as the staple foods of most Hausa – Fulani people are cereals based. Therefore, ratios above 3.5mg/dl should not be used as a basis for treating hypercholesterolemia in this environment. This study shows that pregnancy is associated with increase in total serum cholesterol and HDL levels. The observed higher mean values of cholesterol and HDL in the pregnant subjects may be secondary to increase in the hormonal levels associated with pregnancy, such as estrogen which when given exogenously tend to increase HDL Gustafson and Svanborg, (1972). The increase is higher in the second trimester and may be of maternal advantage to burn the excess fat depots for energy and use the carbohydrates and proteins for the growing fetus, Knoop *et. al.,* (1973). Also, the higher level of HDL in the pregnant group will provide protection against the risk of coronary heart disease since pregnancy is associated with hemodynamic changes.

It has been reported that the distribution of lipoprotein levels in general population are different from the bell – shape curve and has been the trend observed in this study. While no clear cut trend was documented in the study by Atiku *et, al.,* (2000), this study showed that Total cholesterol and HDL are higher with significant difference ($P<0.05$) in HDL-CH value in the pregnant women compared to the non-pregnant group.

CONCLUSION AND RECOMMENDATION

It can be concluded that many factors affect serum total cholesterol and lipoproteins profile among different people, these include; age, stage of pregnancy, socio-economic, genetic factors and dietary pattern of individuals. Therefore, more studies are needed to include both males and females in this environment to determine whether there is a linkage between the serum lipoproteins and the incidence of coronary heart diseases in this locality.

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