Lipid profile in pregnant women in South Eastern, Nigeria

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ABSTRACT

Lipid profile parameters viz: Total Cholesterol, Total Triglyceride, HDL-C, LDL-C and VLDL levels were determined in ninety apparently healthy pregnant women attending their routine antenatal clinic at Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria. About 90 apparently healthy pregnant women were recruited into the study and their ages were between 18 and 40 years, they were grouped according to the following age groups viz: 18-24, 25-29, 30-34 and ≥35 years of age and with 28,26,20 and 16 pregnant women respectively while another 30 apparently healthy non pregnant women were also included as control subjects. Women on contraceptives were excluded from the study. Total cholesterol, total triglyceride and HDL-C levels were determined using standard Chemical Pathology techniques. While LDL-C and VLDL-C parameters were derived from Total Cholesterol, Total triglyceride and HDL-C levels through calculations. It is puzzling to note the result of our research finding in the first, second and third trimesters showed that the levels of total cholesterol and total triglyceride in pregnant women were significantly higher than in non pregnant women at P<0.05. While the results HDL-C, LDL-C and VLDL follow the same trend. From the results obtained it is possible that these pregnant women could be predisposed to hyperlipidaemia during pregnancy, this could be attributed to their nutritional pattern. Our findings revealed that pregnant women in sub Saharan Africa may be more predisposed to hyperlipidaemia than non pregnant women.

KEYWORDS: Total cholesterol, Triglyceride, hyperlipidaemia, Trimesters, Pregnancy, Lipoproteins.

INTRODUCTION

Scientifically, it has been revealed that serum lipid and lipoprotein profile varies with age, sex, diet and race, [1]. It was also reported that over 98% of the pregnant and non-pregnant subjects have normal total cholesterol levels of >200mg/dl; only one subject of the pregnant subject had a total cholesterol level of >200mg/dl, [2]. Serum cholesterol, triglyceride and phospholipid concentrations increase in late pregnancy, [3,4]. This hyperlipidaemia is as result of the metabolic adaptation to the pregnant state, saving glucose for the fetus,[5]. Serum cholesterol and triglyceride levels begin to rise in the fourth month of pregnancy and peak at term of a 25% to 50% rise in serum cholesterol levels to 6.86± 0.21 mmol/L and a 150% increase in serum triglyceride to 2.03± 0.15mmol/L ,[6]. Chemical analysis of tissue samples and histologic studies suggest that both cholesterol and triglyceride accumulate in the liver during normal pregnancy.

The lather is thought to represent a storage pool of metabolic fuel to sustain the fetus during periods of starvation and inadequate nutrition,[6]. Blood lipid concentrations, lipoprotein and apolipoproteins in the plasma increase significantly during pregnancy, [7]. Fat storage occurs primarily during mid-pregnancy [8, 9]. Evidences exist that progesterone which increases markedly
in the second half of pregnancy may act to reset the lipostat in the hypothalamus. Hypercholesterolemia is an important cause of early atherosclerosis,[10]. However, conflicting evidence for an association between parity and the risk of cardiovascular disease in women [11, 12]. LDL-C levels peak at mid trimester, probably as a consequence of the hepatic effect of estradiol and progesterone [19]. It has been suggested that the increase in plasma triglycerides and LDL-C patterns during pregnancy might be used to identify women who will develop atherogenic changes later in life [20].

The aim of embarking on this research work is to access the changes in lipid profile in the pregnant women in South Eastern, Nigeria.

MATERIALS AND METHODS

Study centre: The research work was drawn from pregnant women attending routine antenatal clinic at Nnamdi Azikiwe University Teaching Hospital, Nnewi, Nigeria. The laboratory analysis was performed in the Chemical Pathology Department of the Teaching Hospital.

Subjects: A total of ninety apparently healthy pregnant women were recruited into the study while another 30 apparently healthy non pregnant women were also recruited and served as control subjects. Blood samples were collected from all the subjects for the Laboratory evaluations of total cholesterol and triglyceride. Oral consents were obtained from these subjects before embarking on the research work.

Exclusion Criteria: All the women (pregnant and non-pregnant) enlisted into the research work were not on herbal medication. They were also not on any form of contraceptives and non reactive against HBsAg.

**Determination of total cholesterol, total triglyceride and HDL-C levels**

Total cholesterol and total triglyceride levels of apparently healthy pregnant women and non pregnant women were determined colorimetrically as described by Tietz, [21]. The HDL-C was determined by method of Bayer Diagnostic Kits, [22]. While LDL-C and VLDL were determined through calculations emanating from the results of Total Cholesterol, Total triglyceride and HDL-C levels.

**Statistical analysis**

The mean, standard deviation and standard error of mean were calculated for all the parameters. Students T-test and normal distribution were used to test for significance.

**RESULTS**

Total Cholesterol, Total triglyceride, HDL-C, LDL-C, VLDL parameters were investigated in ninety apparently healthy pregnant women were recruited into the study. They were grouped according to the following age groups viz: 18-24, 25-29, 30-34 and ≥35 years with 28, 26, 20 and 16 pregnant women respectively. While another 30 apparently healthy non pregnant were also enlisted and used as control subjects. They were grouped as follows: 18-24,25-29, 30-34 and ≥35 years with 7,12,5 and 6 non pregnant population respectively. The result of the mean values of our research work showed lipid profile levels in pregnant women during the first trimesters were significantly higher than the non pregnant women, $P<0.05$. In the first trimester the subjects were classified according to their age groups compared with corresponding age groups of their non pregnant women. (Table 1). The mean values of our result showed that lipid profile levels in pregnant women were significantly higher than non pregnant women during the second and third trimesters; where $P<0.05$ is the level of significance. (Table 2).

<table>
<thead>
<tr>
<th>Group</th>
<th>Total Cholesterol mmol/l</th>
<th>HDL mmol/l</th>
<th>LDL mmol/l</th>
<th>Total Triglycerides mmol/l</th>
<th>VLDL mmol/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non pregnant 18-24yrs (n=7)</td>
<td>4.54± 0.40</td>
<td>1.30±0.35</td>
<td>3.2±0.60</td>
<td>1.0± 0.21</td>
<td>0.45±0.37</td>
</tr>
<tr>
<td>Pregnant 18–24 yrs n = 28</td>
<td>4.74±0.38*</td>
<td>1.80±0.40*</td>
<td>3.93±1.20*</td>
<td>1.77±0.12*</td>
<td>0.80±0.45*</td>
</tr>
<tr>
<td>Non pregnant 25-29yrs (n=12)</td>
<td>4.06±0.22</td>
<td>1.29±0.50</td>
<td>2.77±0.23</td>
<td>0.88±0.10</td>
<td>0.4±0.15</td>
</tr>
<tr>
<td>Pregnant 25-29yrs n =26</td>
<td>5.01±0.24*</td>
<td>2.0±0.15*</td>
<td>3.00±0.60*</td>
<td>1.47±0.12*</td>
<td>0.65±0.68*</td>
</tr>
<tr>
<td>Non pregnant 30-34yrs (n=5)</td>
<td>4.06±0.36</td>
<td>1.31±0.70</td>
<td>2.65±0.70</td>
<td>1.16±0.09</td>
<td>0.53±0.60</td>
</tr>
<tr>
<td>Pregnant 30-34 yrs n = 20</td>
<td>5.19±0.38*</td>
<td>2.1±1.37*</td>
<td>3.09±0.08*</td>
<td>1.59±0.15*</td>
<td>0.72±0.27*</td>
</tr>
</tbody>
</table>
Table 2: Mean values of lipid profile levels of pregnant women and non pregnant women in 2nd and 3rd trimesters

<table>
<thead>
<tr>
<th>Lipid profile parameter</th>
<th>Pregnant</th>
<th>Non pregnant</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Cholesterol (mmol/l)</td>
<td>5.02±0.26</td>
<td>4.41±0.21</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>HDL (mmol/l)</td>
<td>2.03±0.44</td>
<td>1.41±1.36</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>LDL (mmol/l)</td>
<td>3.46±0.6</td>
<td>3.08±1.40</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>Total Triglycerides (mmol/l)</td>
<td>1.595±0.29</td>
<td>0.96±0.70</td>
<td>P&lt;0.05</td>
</tr>
<tr>
<td>VLDL (mmol/l)</td>
<td>0.57±1.4</td>
<td>0.36±0.35</td>
<td>P&lt;0.05</td>
</tr>
</tbody>
</table>

DISCUSSION

About 90 apparently healthy pregnant women that participated in this study were less than 40 years. This study has a relatively large sample size when compared with similar studies carried on serum lipids profile on pregnant women in Dawakin Kudu local government area,[13] and the one carried out in Greece,[14]. The result of our research work showed that the lipid profile parameters in the pregnant women studied were higher than the non pregnant women. Pregnancy induces significant metabolic changes. The concentrations of lipids, lipoproteins and apolipoproteins in the plasma increase appreciably during pregnancy. It has been reported that lipid levels are affected by maternal changes such as rise in insulin, progesterone, 17-β-estradiol and human placental lactogen. Other maternal factors such as BMI, maternal weight gain, maternal nutrition, pre-pregnancy lipid levels and various medical complications of pregnancy may also have significant effects on the lipid metabolism and plasma levels,[15].

We observed in our study that during the first trimester, there was an increment in the levels of all the lipid profile parameters among the women of Igbo extraction of Sub Sahara Africa. This may be adduced to the fact that during the period of pregnancy, their nutritional status is greatly enhanced and in continuous supply by relations and neighbors with the belief that they are feeding two individuals. Total cholesterol levels generally increased during pregnancy by approximately 40% and returned to pre-pregnancy levels within one year of post partum[16]. It has been reported by various authors that there is a slight decrease of lipid profile during the first trimester[17,18]. A possible explanation for the decrement during the first trimester may be a decrease intake of food due to nausea and vomiting which characterize the early stage of pregnancy[15].

The levels of lipid profile parameters during the 2nd and 3rd trimesters also exhibited a significant higher levels than non pregnant population, P<0.05. [18] reported that triglyceride levels double in the third trimester. We observed that pregnant women of Sub Sahara Africa may be predisposed to hyperlipidaemia during pregnancy, this may be attributed to their feeding pattern and especially lack of exercise. Over 90% of women from this part of the world hardly avail antenatal services during the period of child bearing.

It is probable that increased levels of HDL-C may protect against heart attack and stroke and mop up LDL-C from the arteries and also HDL-C may remove excess triglyceride and VLDL from the blood during pregnancy. Despite hyperlipidaemia in pregnancy in our region, no statistical data of sudden death has been reported among pregnant women. Probably the fat deposition could be channelled to cholesterol pool which serves as a precursor for the biosynthesis of steroid hormones especially estrogen which promotes the growth and maintenance of reproductive system and also development of secondary sexual characteristics in females.

CONCLUSION

Our findings revealed that the results of the lipid profile parameters in pregnant women of sub Saharan Africa in the first, second and third trimesters were higher than non pregnant women of the same geographical location.

REFERENCES


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