International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

[Lipid Panel in Pregnancy

Ikpe Vitalis, Alex Idoko & Obasi Chinenye
Department of Biochemistry, Faculty of Natural Sciences
Caritas University, Amorji-Nike Enugu
Email: vitalis.ikpe@yahoo.com

ABSTRACT

Pregnant women develop physiological alterations that can be evaluated in the laboratory. This study investigated changes in lipid parameters during the three trimesters of pregnancy. Sixty pregnant women (aged 20-35years) and 60 non-pregnant women of the same age range (controls) were assessed. Blood samples were collected from both groups and assayed for total cholesterol (TC), low density lipoprotein (LDL), high density lipoprotein (HDL) and triglycerides (TG). Changes in maternal lipid panel during pregnancy differ with trimester. In the first trimester, there were increases in the concentrations of TC (11%), LDL (44.6%) and TG (14.3%) while HDL decreased by 45.5%. During the second trimester, all the lipid parameters decreased in concentration, TC by 22%, TG by 8.3%, HDL by 45% expect LDL that increased marginally by 7.3%. In the third trimester, LDL increased more in concentration (46.9%), TC returned to baseline while HDL and TG decreased more than in the second trimester by 60% and 14.6% respectively. These results are statistically significant (P<0.05). It is therefore imperative to include a lipid panel as part of periodic ante-natal care.

Key Words: *Lipids, measurements, trimesters, pregnancy, significance.*

INTRODUCTION

A lipid panel is a profile measurement of the various lipids present in the blood and most often used to assess the risk of heart disease. There are two common concerns about lipids in the diet. One is their high caloric value which may lead to undesired weight gain. The other is their association with high total cholesterol levels which constitute a risk factor to cardiovascular disease (Mensink et al., 2011; Dubois et al., 2014). The amount of saturated fat in the diet correlates strongly with cholesterol levels. Saturated fats are generally solid at room temperature. Fat from animals (e.g. butter and lard) is almost always saturated. Also some oils from plants (e.g. palm oil, coconut oil) are saturated. Limiting the intake of fat and oil in the diet, especially saturated fats, keeps cholesterol levels low and thus lower the risk of heart disease (Mayo, 2013; Jensen et al., 2011). More than 200 million women become pregnant every year and in most cases the outcome of labour is successful. Because of the hormonal status changes during pregnancy, various adaptive mechanisms are initiated due to sex hormones. Among them is the alteration of the energetic metabolism to lipid metabolism (Merabishvili et al., 2014). Pregnancy develops in trimesters. The trimester is of three stages; the first, second and third month are the first trimester. The fourth, fifth and sixth are the second trimester while the seventh, eighth and ninth months constitute the third trimester (Potter, 2012; Nuller, 2013). Lipid panel or profile is a panel of blood investigations that serves as an initial broad medical screening tool for abnormalities in lipids. A lipid panel typically includes total cholesterol (TC), low density lipoprotein (LDL), high density lipoprotein (HDL), triglycerides (TG) and very low density lipoprotein (VLDL). The results of these tests can identity certain genetic diseases and can determine approximate risks for cardiovascular diseases, certain forms of pancreatitis and other diseases (Ness et al., 2014).

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

Rationale

A lipid panel contains information about several different kinds of lipids that normally circulate in the blood. Values are numerical but in order to simplify explanation, ranges of numerical values are often placed into categories such as 'low risk' or 'high risk'. During pregnancy maternal metabolism must satisfy the demands of the developing foetus in addition to the energy requirements of the mother. Early pregnancy is considered the anabolic phase. In contrast, late pregnancy is referred to as the catabolic phase. These metabolic changes allow the metabolism of the gravid female to store energy in early pregnancy to meet the energy requirements of late gestation (Stock et al., 2013). Thus, it is the aim of this study to undertake a lipid panel analyses during the three trimesters of pregnancy.

METHODOLOGY

Fasting blood samples were collected from sixty pregnant women and sixty non-pregnant women in the age range of 20-35 years. The samples were allowed to clot, centrifuged at 3000 revolutions per minute for 10 minutes and serum samples separated into labeled plain tubes. All the samples were analyzed within 24hours after collection for total cholesterol (TC), low density lipoprotein(LDL), high density lipoprotein(HDL) and triglycerides(TG) using Randox kits(United kingdom) and measured with Uv/Vis spectrophotometer (Model EL-313, USA).

RESULTS

Table1: Mean Values for Controls and Pregnant Women

	TG (mmol/L)	TC (mmol/L)	LDL (mmol/L)	HDL (mmol/L)
Controls	10.85 ± 5.45 (5.4-16.3)	3.5±0.67 (2.83-4.17)	1.68±0.28 (1.4-1.96)	1.78±49 (1.29-2.27)
Pregnant Women	11.75±4.55 (7.2-16.3)	3.1±1.1 (2.0- 4.2)	2.1±1.05 (1.05-15)	0.97±0.32 (0.65-1.29)

Table2: Mean Values for first, Second and Third Trimesters of Pregnancy.

	TG (mmol/L)	TC (mmol/L)	LDL (mmol/L)	HDL (mmol/L)
Controls	10.85 ± 5.45 (5.4-16.3)	3.5±0.67 (2.83-4.17)	1.68±0.28 (1.4-1.96)	1.78±49 (1.29-2.27)
First Trimester	12.67±3.63 (9.04-16.3)	4.0±0.22 (3.78-4.22)	3.0±0.10 (29-3.1)	0.97±0.32 (0.65-1.29)
Second Trimester	11.75±0.78 (7.2-16.3)	2.8±0.78 (2.02-3.58)	1.80±0.78 (1.02-2.58)	0.97±0.49 (0.48-1.46)
Third Trimester	9.25±2.05 (7.2-11.3)	3.6±0.27 (3.33- 3.87)	3.15±0.49 (2.66-3.64)	0.71±0.02 (0.69-0.73)

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

CHART FOR PREGNANT WOMEN

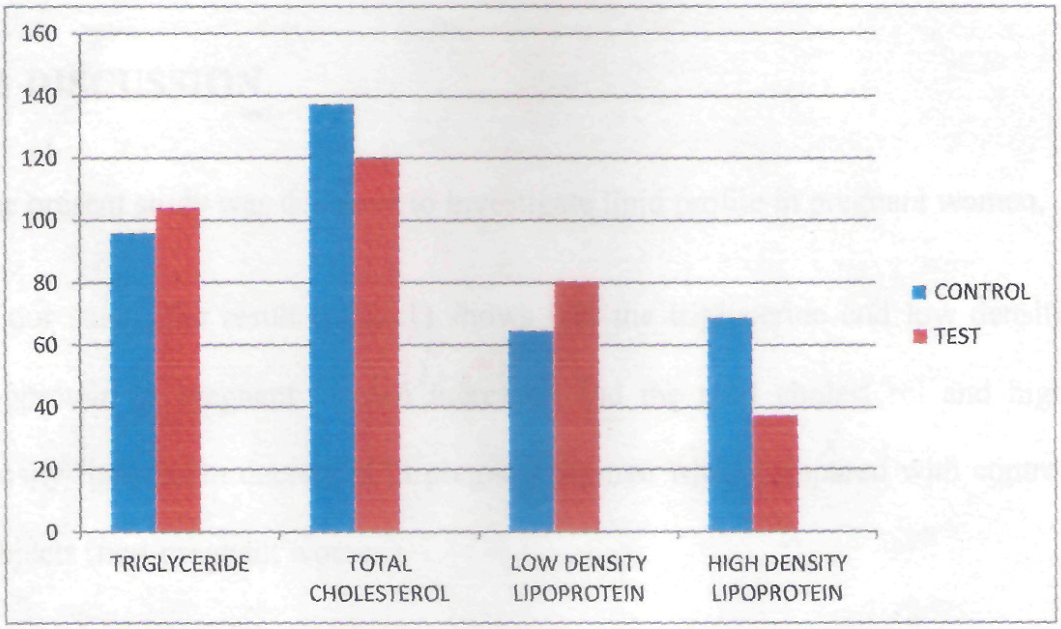
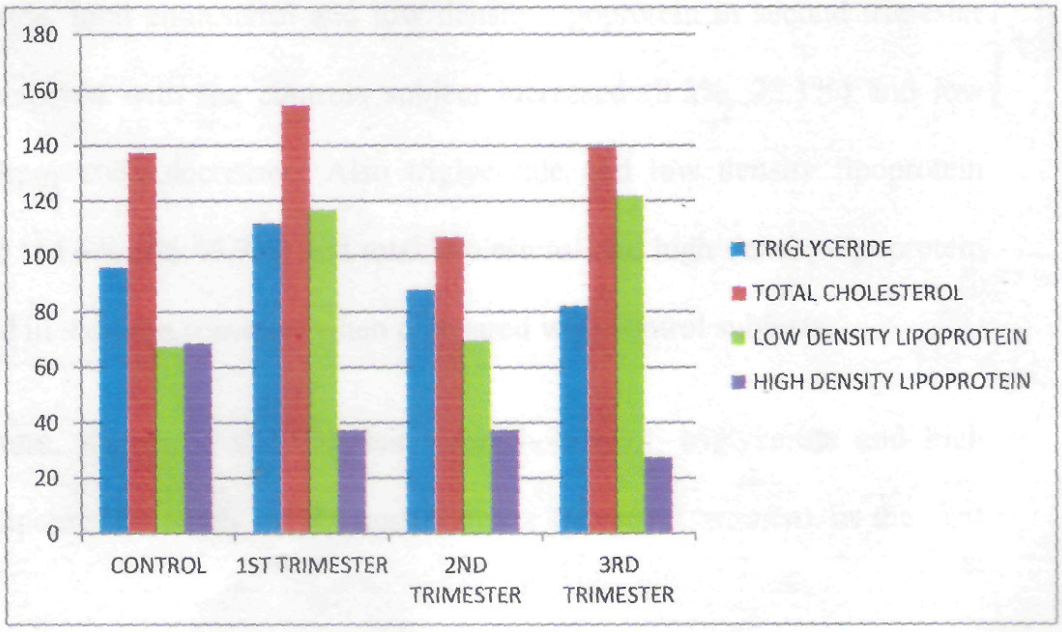


CHART FOR FIRST, SECOND AND THIRD TRIMESTER FOR PREGNANT WOMEN



International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

DISCUSSION

This study was designed to investigate lipid panel in pregnant women. Lipid panel is commonly ordered as part of physical examination along with other panels such as the complete blood count and basic metabolic panel. The alterations of serum lipid indices are associated with gestational age (Stoke and Metcalt, 2013). Cholesterol is an organic molecule, a sterol or modified steroid and the most publicized lipid. It is biosynthesized by all animal cells because it is an essential structural component of animal cell membranes that is required to maintain both membrane structural integrity and fluidity (Razin et al., 2012). Cholesterol level was increased in the first trimester (11%), decreased in the second trimester (22%) and returned to baseline in the third trimester. Within cells, cholesterol is the precursor molecule in several biochemical pathways. In the liver, cholesterol converts to bile which contains bile salts that solublize fats in the digestive tract and aid in the intestinal absorption of fat molecules and soluble vitamins A, D, E and K. cholesterol is also a precursor of sex hormones, progesterone, oestrogen, testosterone and their derivatives (Ohvo et al., 2011). High density lipoprotein (HDL) is one of the major group of lipoproteins which are complex particles comprised of multiple proteins which transport all fat molecules (lipids) around the body within the water outside cells (Oliver, 2011).

HDL helps to remove excess cholesterol deposit from the arterial lining. Its concentration decreased in the first trimester (46%), second semester (45%) and the third trimester (60%). Low density lipoprotein (LDL) is the unhealthy cholesterol everyone tries to avoid. Cholesterol is necessary for optimal body functioning but there must be a balance between healthy and unhealthy cholesterol (Aluarez et al., 2013). While HDL levels decreased in the three trimesters of pregnancy, LDL levels increased in all the trimesters. LDL concentration increased in the first semester (45%), second semester (7.3%) and third trimester (47%). HDL helps to keep LDL under control by carrying it along to the cholesterol processing center where it is transformed for overall cell stability but high levels of LDL makes it difficult for HDL to keep it under control. Triglyceride (triacylglycerol) is an ester derived from glycerol and fatty acids. It enables the bidirectional transference of adipose fat and blood glucose from the liver. Triglycerides are another type of fat used to store excess energy from the diet (Nelson et al., 2014). In this study, the triglyceride concentration increased in the first trimester (14.3%) but decreased in the second trimester (8.3%) and the third trimester (14.6%). Elevated triglyceride levels are caused by over weight and obesity, physical inactivity, cigarette smoking, excess alcohol consumption and diet high in carbohydrates (Ghio et al., 2013; Jeremy et al., 2012). Two mechanisms specific for pregnancy seem to be responsible for the observed changes. First, elevated oestrogen levels during gestation result in an increased hepatic synthesis of triglyceride rich very low density lipoprotein (Julius et al., 2012). Secondly, removal of lipoprotein triglyceride is reduced due to low activities of lipoprotein lipase and hepatic triglyceride lipase especially in the first trimester (knopp et al., 2013). Changes in maternal lipid panel during pregnancy differ with trimester. This pattern of result is due to the fact that during early pregnancy, there is an increase in body fat accumulation associated with hyperphagia and increased lipogenesis, but during late pregnancy, there is an accelerated break down of fact deposits which play a key role in fetal development. Lipid panel assessment is strongly recommended to be

included in the monitoring investigations during pregnancy in order to institute prompt and adequate management strategies to prevent deleterious effect of hyperlipidemia. Pregnant women should minimize the intake of trans fat food which may lead to increase in heart disease, cardiovascular risk, obesity, depression and hypertension.

REFERENCES

Aluarez, J., Iglesias, A., Menik. A., and Herrera, E. (2013). Longitudinal Study of Lipase during Gestation in Women. *Research Journal on Medical line* 37(21): 299 -308.

Ascherio, A., and Willet, W.C. (1997). Health effects of Trans fatty acids. *Research Journal on Clinical Nutrition* 66(4): 1006 - 1015.

Bery, S. (2012). High Density Lipoprotein. *Biochemistry textbook New york.* WH freeman: 65

Demonty, I., Ras, R.T., Vander Knaap, H.C., Duchateau, G.S., Meijer, L., and Zock, P.L. (2014). Continuous dose response relationship of the low densityLipoprotein - cholesterol lowering effect of phytosterol intake. *Research Journal on Nutrition* 139 (2): 271 - 84.

Dubois, C., Armand, M, Mekki, N., Portugal, H., Pauli, A.M., and Benard, P. (2014). Effects of increasing amount of dietary cholesterol on ' post-pranchialipemia and lipoproteins in human subjects. *Journal of lipid Research.* 26(19): 93 -200.

Ghio, A., Beritiolo, A., Resi, V., Volpe, L., and Dicianni, G. (2013). Triglyceride Metabolism in pregnancy. *Advanced Clinical Chemistry* 55: 133-53.

Jensen, R.G., Hagerty, M.M., and Me Mahon, K.E. (2015). Lipid of human milk and Infants formula. *Medical Journal Clinical Nutrition* 2(6): 990 - 1016.

Jeremy, M.B., John, L.T., and Lubert, S. (2012). Metabolism of Trigl*yceride* Biochemistry Textbook 5th edition. 766 - 727.

Julius, U., Fritsch, H., Fritsch, W., Fucker, K., Leanhart, W., and Hanefell, M. (2012). Impact of hormone replacement therapy on postprandial lipoprotein and Lipoprotein in normolipidic postmenopausal women, *Clinical Investigation* 72: 502 - 507.

Knopp, R.H., BoneX, A.M., Laurvcion, A., Pallardo, L.H., and Herrera, E. (2013). Lipoprotein metabolism in pregnancy *Perinatal Biochemistry.* Boca Raton: CRC Press; 19-51.

Merabishvii, V., Kambladze, O., and Sulaberidze, T. (2014). Peculiarities of Lipid metabolism during pregnancy. *Georgian Medical News* 138: 86 - 9.

Mensink, R.P., and Katan, M.B. (2011). Effects of Dietary Fatty Acids on Serum Lipids and Lipoprotein. *A met -analysis of 27 trial* 12(8): 911-9.

Miller, V.T. (2013). Dyslipoproteinemia in Women Endocrinology Metabolism *Clinical North;* 19:381-8.

Ness, R.B., Schotland, H.M., and Flegal, K.M. (2014). Reproductive history and coronary heart disease risk in women. *Epidemiology Review* 16: 298 -314.

Nelson, D.L., and Cox, M.M (2014). *Lenhinger Principle of Biochemistry* 3rd edition. Worth Publishing: New York.

Oliver, M.F. and Ischemia. N. (2011), Heart disease in young women. *Medical Journal* 3(4): 249 -251.

International Journal of Medical Science and Applied Biosciences
ISSN: 2545-5893(Print) 2545-5877 (Online)
Volume 4, Number 2, June, 2019
http://www.casirmediapublishing.com

Ohvo - Rekilta. H_ RjKtedt, B., Leppimaki, P., and Slotte, J.P. (2012). Cholesterol interactions with phospholipids in membrance. *Research Journal on medical line* 2(1): 66 - 77.

Pawlina, W., and Ross, M.V (2013). With correlated cell and molecular Biology. *Philadalphia* -230.

Potter, J.M., and Nester, P.J (2012). *Journal of Osteology & Gyncology* 13 (3): 165-179.

Razin, S. and Tully, J.G. (2013). Cholesterol requirement of mycoplasma. Journal of Bacteriology102 (2):306-310.

Stock, M.J., and Metcalt. J. (2013). Maternal physiology during gestation. New York Reven press: 947-983.