Original Article

Evaluation of Serum Lipid Profile During The Trimesters of Pregnancy

Lipid Profile during Pregnancy

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ABSTRACT

Background: During pregnancy, lipid metabolism is remarkably increased due to hormonal changes, which lead to various changes in serum lipid levels. Very high levels of lipids can have adverse effects on the maternal and foetal health.

Objective: To analyze serum total cholesterol (TC), triglycerides (TGs), low density lipoprotein (LDL) and high density lipoprotein (HDL) in pregnant women during all trimesters.

Study Design: Retrospective (hospital record based) study

Place and Duration of Study: This study was carried out in Gynaecology and Obstetrics ward at Liaquat University Hospital, Jamshoro and Hyderabad from March 2011 to February 2012.

Materials and Methods: 5ml blood sample was taken & analyzed for lipid profile using Hitachi 902 chemistry autoanalyzer. The data was analyzed by using SPSS 16.

Results: The results showed that all these lipid parameters were raised during the all trimesters of pregnancy in comparison to the control subjects, except that the LDL level was almost equal to the control subjects during the 1st trimester. Additionally, comparison showed that Total Cholesterol, Triglycerides and LDL in the 2nd and 3rd trimesters were significantly higher than in the 1st trimester. **Conclusion**: Serum lipids are significantly increased during the all trimesters of pregnancy. As very high levels of lipids may increase the risk of development of various pregnancy complications for the mother and the developing foetus, lipid profile should be part of routine investigation during pregnancy.

Key Word: Pregnancy, Trimesters, Triglycerides, Cholesterol.

INTRODUCTION

During pregnancy, various changes occur in the metabolic state to meet the nutrient requirements of the developing foetus, which result in excessive fat accumulation and hyperlipidaemia in the pregnant woman[1-4]. During the 1st and early 2nd trimesters, increased insulin level causes increased fat deposition and storage in the adipose tissues. These effects lead to increased maternal weight[4,5]. Increased insulin level upregulates the placental proteins, which transport lipids to the foetus for its growth[6]. During the late 2nd and the 3rd trimesters, there occurs increased lipolysis and insulin resistance, which result in hyperlipidaemia[7,8]. Babies born to obese mothers are often overweight and are at increased risk for developing obesity and metabolic syndrome in later life[9,10]. It is well known that maternal diabetes can lead to the birth of overweight baby, but it has been suggested that the maternal obesity appears to be more significant to cause the birth of an overweight baby[11]. It has also been demonstrated that maternal prepregnancy increased body weight and hyperlipidaemia have significant effects, which cause excessive foetal growth when the woman becomes pregnant[12,13,14] On the other hand, increased maternal cholesterol and triglycerides increase the risk of cardiovascular complications, preeclampsia and preterm labor[15]. Additionally, increased levels of maternal lipids during pregnancy can also result in the development of atherosclerosis in the baby in later life[16,17]. Hence, lipid levels are very important parameters to be investigated during various trimesters to control the complications for the better health of the pregnant woman and her foetus. This study investigated serum Lipid profile during all three trimesters of pregnancy to know its importance which could help to avoid various pregnancy complications.

MATERIALS AND METHODS

One hundred pregnant women and fifty non pregnant women (as a control group) between the age of 20 to 40 years were included in the study. The test subjects were selected among those pregnant women, admitted at Gynaecology and Obstetrics ward at Liaquat University Hospital, Jamshoro and Hyderabad during the period from March 2011 to February 2012. The subjects who had the history of diabetes mellitus, hypertension or any other systemic illness were excluded from the study

RESULTS

The results are summarised in the table 1 and figure 1.

Table No.1: Serum Cholesterol, Triglycerides, HDL and LDL levels (Mean ± S.D in mg/dl) of pregnant women during 1st, 2nd and 3rd trimesters and in controls.

Variables	Controls	1st Trimester	2nd Trimester	3rd Trimester
Triglycerides	102.9±13.1	160.9±21.1	211.5±34.5	209.1±24.3
Cholesterol	126.1±12.3	152.1± 10.9	181.2±18.4	201.6±7.1
LDL	84.7±12.6	84.4±18.9	101.5±14.2	142.2±6.4
HDL	38.3±4.9	43.6±2.1	42.4±1.4	45.9±2.8

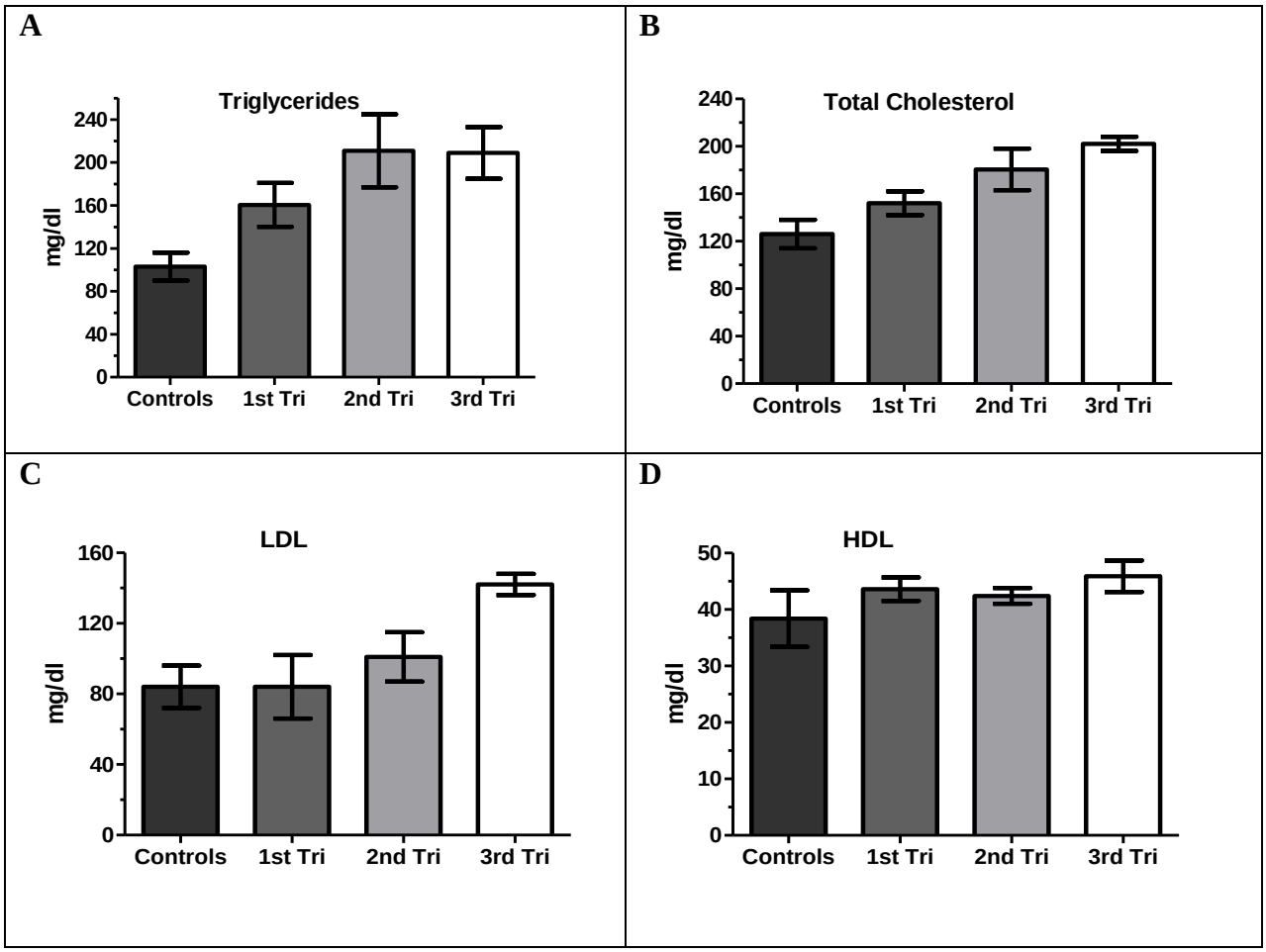

Figure No.1: A. Serum Triglyceride levels; B. Serum total cholesterol levels; C. Serum low density lipid (LDL) levels; D. Serum high density lipids (HDL) levels. Tri: Trimester.

DISCUSSION

In the presented study, we found the increased levels of all basic parameters of lipid profile, i.e., serum TGs, cholesterol, LDL and HDL throughout all the three trimesters of pregnancy in comparison to the control subjects, with the exception of LDL which was almost equal to the control subjects during only the first trimester of pregnancy. Our results correlate with the findings of a group, which showed the increased levels of cholesterol and LDL throughout the pregnancy[18,19]. For TGs and cholesterol it was shown that they increase with the increase in gestation[20,21]. High levels of TGs and LDL have already been shown during the first trimester of pregnancy[22]. Our results show slightly more increase in TGs during second trimester in some pregnant women. Multiple studies have been conducted on lipid profile levels during the initial and last trimesters of pregnancy globally which have shown a general increase. In the current study, we investigated the lipid profile during all three trimesters with the interesting findings of overall increased levels of all the parameters, i.e., TGs, cholesterol, LDL and HDL, which indicates a profound effect of lipid metabolic changes during the pregnancy. Increased levels of TGs and cholesterol in the mother have been shown to be important for the good growth and development of the foetus[23]. Cholesterol has been shown to be essential for the development of embryonic / foetal brain, the steroid hormones and the bile acids. Hence, maternal lipids are

transported through placenta in to the foetus for organogenesis and nourishment of the foetus[24.25]. On the other hand, very high levels of maternal cholesterol can cause adverse effects not only on the pregnant woman, but also leads to pathological changes in the foetal aorta, leading to development of atherosclerosis in later life[16,17]. High level of TGs in a pregnant woman has been shown to increase the risk of cardiovascular complications, preeclampsia and preterm labor[15]. We also found high levels of HDL during all the trimesters of pregnancy, which is a good cholesterol for the health. This finding indicates that during the pregnancy, the body has a highly controlled system to cope with the high levels of non healthy lipids, i.e., TGs, total cholesterol and LDL by raising the HDL level. Chen. H et.al. showed that Leucine amino acid has good impact on lipid and glucose metabolism in the offspring from obese mice[26]. Therefore, protein diet, rich in Leucine amino acid could be good for the health in pregnancy.

CONCLUSION

Our results show that serum total cholesterol, triglycerides, LDL and HDL levels are moderately raised during all the three trimesters of pregnancy. To avoid the resulting complications, such as, high blood pressure and the development of pre-eclampsia in a pregnant woman and the adverse effects on the foetus, we recommend that lipid panel be part of routine investigation during pregnancy.

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