

ORIGINAL ARTICLE

*Evaluation of Serum Lipid Profile in Pre-eclampsia and Normotensive Pregnancy in Rural Tertiary Care Hospital*Aparna Chaudhari¹, Sangeeta Trimbake¹, Mandar Chaudhari¹ and Gauri Purohit¹¹Department of Biochemistry,¹MIMER Medical College, Talegaon Dabhade-410507, Maharashtra, India**Abstract:**

Background: In developing countries, pre-eclampsia is a common medical complication in pregnancy. It is one of the largest causes for maternal and fetal mortality and morbidity. Abnormal lipid profile have been shown to play a significant role in the pathogenesis of preeclampsia. The aim of the study was to evaluate the role of abnormal serum lipid profile parameters in pathogenesis of preeclampsia. The objectives were to measure all lipid profile parameters and to study the correlation of dyslipidaemia (abnormal lipid metabolism) in pre-eclampsia in comparison with normotensive pregnant women. **Material and Methods:** In this hospital-based case control study, blood samples from 30 pre-eclamptic pregnant women (case group) and 30 normal pregnant women (control group) were collected and analysed for serum lipid profile. **Results:** On comparison of normotensive pregnant women with pre-eclamptic women, the levels of total cholesterol, LDL cholesterol, VLDL cholesterol and triglycerides were found to be significantly increased (P values \leq 0.001) and that of HDL cholesterol levels were found to be significantly decreased (P values \leq 0.001) in pre-eclamptic women. **Conclusion:** Abnormal lipid metabolism in pre-eclampsia is associated with development of atherosclerotic diseases. Someasurement of serum lipids profile may be helpful in early diagnosis and prevention of maternal and fetal complications in preeclampsia.

Keywords: Pre-eclampsia, Normal pregnancy, Dyslipidaemia, lipid profile.

Introduction:

Pregnancy is a state associated with changes in

anatomy, physiology, biochemistry^[1,2]. Pre-eclampsia is one of the most common complications of pregnancy especially in developing countries. It is a pregnancy specific syndrome and a leading cause of maternal and foetal morbidity and mortality^[3]. It is a multisystem disorder characterized by hypertension to an extent of 140/90 mmHg or more accompanied by proteinuria ($>300\text{mg/day}$), edema or both^[4]. Pre-eclampsia occurs in 3-5% of pregnancies worldwide^[5] and 5-15% of the pregnancies in India^[6]. It can lead to the occurrence of epileptic-like grand mal convulsions (eclampsia) in about 0.1% of pregnancies. Cerebral vascular accident is the most common cause of death. It is also a major contributor to maternal and perinatal morbidity and perinatal mortality. Furthermore, recent epidemiological evidence suggests that the development of cardiovascular disease in women in adult life increases the risk of intrauterine growth retardation (IUGR) in pre-eclampsia^[7]. Hypertension is the most important feature in preeclampsia which is supposed to be due to vasospastic phenomenon in kidney, uterus, placenta and brain^[8,9]. Preeclamptic disorder is mediated by placental products that reach the maternal circulation and trigger endothelial dysfunction, thereby evoking cardiovascular diseases, like vasospasm, increased endothelial permeability and activation of thrombogenic mechanisms, that may lead to the early events of atherosclerosis. The common pathological feature of the disease, whether in the placental bed, renal microvasculature or cerebral circulation, is vascular endothelial damage and dysfunction. There is a growing concept that maternal predisposing factors must combine with placental disorder to result in preeclamptic maternal syndrome^[10]. In pre-eclampsia, abnormal serum lipid parameters (dyslipidaemia) may lead to oxidative stress. The risk of pre-eclampsia is increased in women with elevated levels of oxidized low-density lipoproteins and triglycerides^[11]. Abnormal lipid profile is strongly associated with atherosclerotic cardiovascular diseases and has a direct effect on endothelial dysfunction. There

is increase in plasma lipid even in normal pregnancy but it is not atherogenic, may be physiological, due to hormonal control^[12]. Whenever this mechanism of adjusting physiologic hyperlipidaemia is altered that can lead to complications in pregnancy^[13]. Therefore, if serum lipid profiles are estimated in pregnancy, it will help to identify high risk cases prone for preeclampsia^[14]. So, this study was done to assess relationship between maternal plasma lipid concentration and risk of developing pre-eclampsia in pregnancy.

Material and Methods:

This was a case control study and was conducted at MIMER Medical College Hospital, Talegaon Dabhade after getting approval from Institutional Ethics Committee and after receiving signed informed consent from the patients. Total number of 60 participants of ages between 18 to 35yrs primi or multi-gravida and gestational age between 20 to 38 weeks were included in the present study. They were divided in to two groups, case group- 30 pregnant women clinically diagnosed with pre-eclampsia and control group- 30 normotensive pregnant women. Women with concomitant disease such as diabetes or a history of gestational diabetes, chronic hypertension, and kidney disease or coagulation were excluded. Fasting blood samples (5 ml) were collected by venipuncture and analyzed for total cholesterol (TC), serum triglycerides (TGs), high-density lipoprotein-cholesterol (HDL-C) and low-density lipoprotein(LDL-C) were estimated in the both groups. All estimations carried out on instrument XL640. Estimation of serum total cholesterol by CHOD-PAP method, serum triglycerides by GPO method, serum HDL- cholesterol by direct method, serum LDL- cholesterol by direct method and serum VLDL-cholesterol was calculated using Friedewald's formula (Friedewald et.al.1972). Data were statistically analyzed by unpaired t test and expressed in terms of P value ($p < 0.05$, considered).

Results:

In the present study serum lipid profile parameters were estimated in 30 pregnant women clinically diagnosed with pre-eclampsia (case group) and 30 normotensive pregnant women (control group). Control and case groups were comparable with respect to age (21.86 ± 3.12 & 22.86 ± 2.80) and gestational age (35.04 ± 2.43 & 34.44 ± 2.27)- respectively.

Table – 1: Comparison of Lipid Profile in study groups

Parameters	Case Mean n \pm SD, (n=30)	Control Mean \pm SD, (n=30)	T value	P value
Total Cholesterol (mg/dl)	203 \pm 18.93	177.08 \pm 12.29	5.61	0.0001
Triglycerides (TG mg/dl)	153.8 \pm 14.79	131.52 \pm 12.52	5.72	0.0001
High density lipoprotein (HDL mg/dl)	28.44 \pm 4.66	40.56 \pm 6.36	7.52	0.0001
Low density lipoprotein (LDL mg/dl)	142.84 \pm 8.71	116.64 \pm 11.26	16.22	0.0001
Very Low-Density Lipoprotein (VLDL mg/dl)	30.45 \pm 3.53	26.23 \pm 2.64	4.73	0.0001

* $P < 0.001$ - Significant

When normotensive pregnant women (control group) are compared with pre-eclamptic women (case group), it was observed that serum total cholesterol, serum triglycerides, serum low density lipoproteins and serum very low-density lipoproteins levels were significantly increased (P value < 0.001) in case group as compared to control group, whereas serum high density lipoprotein level was significantly decreased in case group as compared to control group.

Discussion:

Pre-eclampsia usually begins after 20 weeks of gestation in a woman whose blood pressure had been normal. It may lead to serious, even fatal complications for both mother as well as newborn baby. Dyslipidemia plays very important role in the pathogenesis of pre-eclampsia^[15]. Endothelial cell dysfunction may be associated with Increased lipid levels. In endothelial cell linoleic acid is mainly responsible for oxidative stress. During pregnancy, the serum lipoprotein levels increases and in pre-eclamptic women these levels increases upto two folds. Insulin resistance, hyperlipidemia and up-regulation of inflammatory markers may lead to increased levels of serum triglycerides in preeclampsia. Hyperestrogenemia in pregnancy is responsible for hypertriglyceridemia. The increased levels of triglycerides are related to hypercoagulability^[16]. The increase in plasma triglyceride concentration correlates with increase in plasma concentration of LDL^[17]. In present study, all the lipid parameters (total cholesterol, LDL cholesterol, VLDL cholesterol and triglycerides) except HDL cholesterol

were significantly increased in preeclampsia as compared to normotensive pregnant females (i.e. pregnancy without pre-eclampsia). HDL cholesterol is involved in reverse cholesterol transport by exchange of cholesterol, cholesterol esters and triglycerides from peripheral tissues to the liver where they are metabolised and excreted. HDL cholesterol is also involved in activating lipoproteins by transferring ApoE and Apo C to the nascent VLDL and Chylomicron so that lipoprotein lipase can act on it and release fatty acids that can provide energy by β oxidation. All these processes may compromise low levels of HDL-Cholesterol. In our study, HDL cholesterol level was significantly decreased in pre-eclamptic than normotensive pregnant women. This dyslipidemia may further lead to atherosclerosis which may further increase the mortality of pre-eclamptic patients. All our results are consistent with the results of several other studies.^[1,3,9,18]

Conclusion:

Women with pre-eclampsia had significantly higher serum total cholesterol, LDL, TG and significantly lower HDL in comparison to normotensive pregnant women. Abnormal lipid profile parameters (dyslipidaemia) has a direct correlation with preeclampsia. Some can consider lipid profile as a good predictor to avoid future complications in preeclampsia which will improve foeto-maternal outcome by early detection in high-risk patients.

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Conflicts of Interest: Nil

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