



## **Dyslipidemia induced hypertension in second trimester of pregnancy**

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### **Abstract**

Dyslipidemia during pregnancy is associated with the risk of adverse pregnancy outcomes. Objective of the current study was to illustrate the potential role of dyslipidemia in women with pre-eclampsia (PE) and to determine whether dyslipidemia can be used as a marker in predicting PIH. The present study was under taken in 100 healthy pregnant women and 100 pre-eclampsia pregnant women of age group between 20-35 years during second trimester of pregnancy. Blood pressure was higher in pre-eclamptic pregnant women as compared to the controls ( $P < 0.0001$ ). Serum lipid profile was measured enzymatically by standardized assay in 200 pregnant women. There was a significant dyslipidemic status in pre-eclampsia pregnant women compared with the controls. The total cholesterol, LDL-cholesterol and triglycerides levels were raised in 8.88%, 15.88% and 25.56% and HDL-cholesterol level was significantly decreased 33.5% in pre-eclamptic pregnant women when compared to controls. Thus findings of undertaken study suggest that abnormal serum lipid profile plays an essential role in vascular endothelial dysfunction and presence of pre-eclampsia during gestational period. Detecting dyslipidemia before 20 weeks of gestation helps to recognize pregnancies at high risk for pre-eclampsia and to detect and treat the disease earlier for a better maternal and perinatal outcome.

**Keywords:** Pre-eclampsia, Dyslipidemia and Lipid profile.

### **I. Introduction**

Pregnancy is a stressful condition in which many physiological and metabolic functions are altered. It is a physiological condition followed by high energy needed and raised oxygen requirement to develop oxidative stress (Easter et.al., 2003 ).

Pre-eclampsia is a hypertensive disorder during pregnancy therefore also known as pregnancy induced hypertension (PIH). When patients have liver dysfunction and hemolysis, they are classified as having HELLP syndrome (haemolysis, elevated liver enzymes and low

platelet count) (Curtin et.al.,1999). Although the definitions focus on these simply measured clinical parameters, pre-eclampsia must be recognized as a multiple system disorder, which variably may affect the brain, lung, kidney and liver.

Early pregnancy dyslipidemia is associated with an increased risk of Pre-eclampsia (PE) (Enquobahrie et.al., 2004). In the early pregnancy the mother exists in the anabolic state and the lipid serves as a source of calories for the growing fetus as well as for the mother in the third trimester (Lain et.al., 2017). There are many facts that show lipid profile abnormalities might be associated with the risk of PE. Lipid profile abnormalities increases as the gestational age of the mother increases. A meta-analysis study consisted of 24 case control studies confirmed that there is a strong association between hypertriglyceridemia and the risk of PE (Gallos et.al., 2013). The level of low density lipoprotein and triglycerides are increased to play an important role to a used preeclampsia (Mishra et.al., 2016). Increased levels of circulating lipids result in their accumulation within endothelial cells. This accumulation decreases the release of prostacyclin, resulting in oxidative stress via endothelial dysfunction (Ghio et.al., 2011), a key mechanism in the proposed pathophysiology of preeclampsia (Taylor et.al., 2009).

## **II. Materials and Methods**

The present study was performed in 200 pregnant women during second and third trimester of

pregnancy, who were attending and admitted in Department of Obstetrics and Gynecology, Swaroop Rani Nehru Hospital, Prayagraj, (U.P.) Pregnant women were categorized two comparative groups in which 100 normal pregnant women (i.e., control group) and 100 preeclamptic pregnant women (i.e., study group) in aged between 20 -35 years. Blood samples (5ml) were collected from the subject between 8.00 to 10 am, and centrifuged at 3000rpm for 15 min. at 40C, serum was separated for the estimation of lipid parameters i.e, Total Cholesterol, HDL cholesterol, LDL-cholesterol and triglycerides by kits, using autoanalyzer, to assess the oxidative stress during pregnancy.

### **Statistical analysis**

The statistical data are calculated by mean  $\pm$  S.D. The significance of difference between two groups was assessed by student t-test and distribution of probability P .

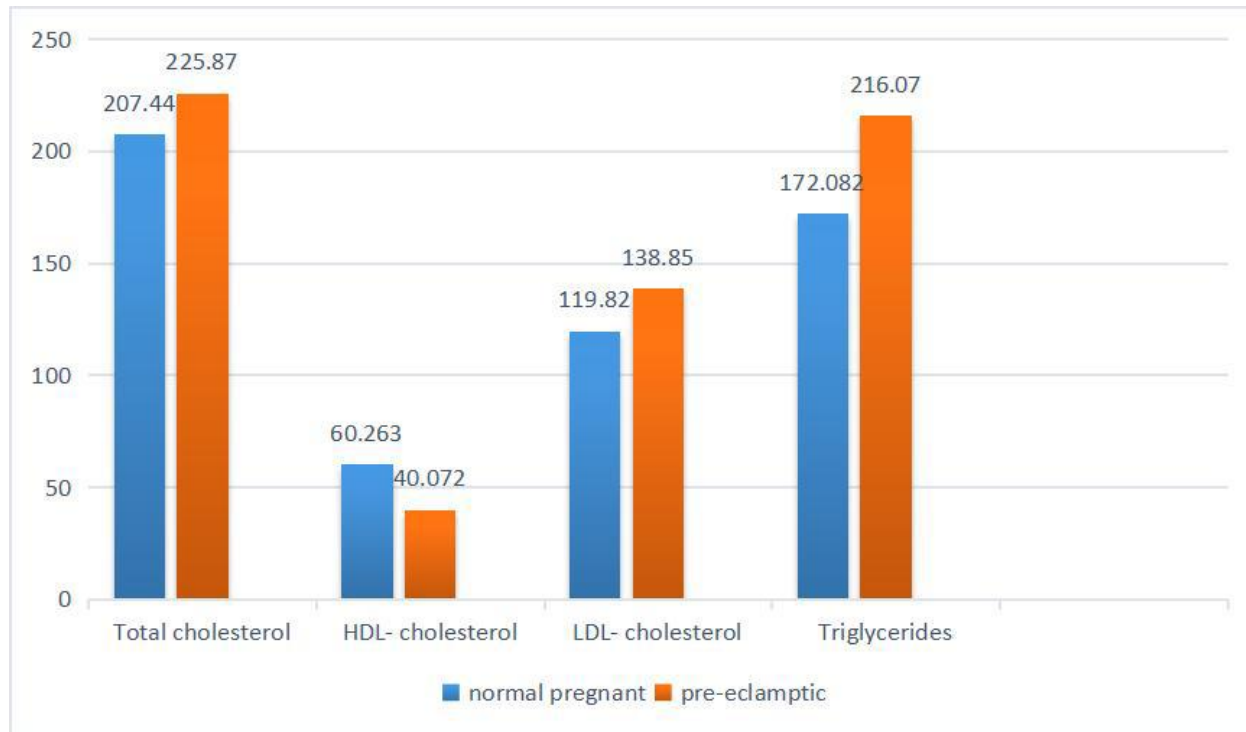
## **III. Results**

There was a significant dyslipidemic status in preeclamptic pregnant women compared with the controls, the level of lipid parameters including Total Cholesterol, LDL-c and Serum triglycerides were raised which is statistical significant ( $P < 0.0001$ ) in pre-eclamptic pregnant women, when compared to normal pregnant women. Levels HDL-C was found to be decreased in preeclamptic pregnant women as compared with the normal pregnant women, which is statistically significant ( $P < 0.0001$ )

Parameters	Normal pregnant n=100	Pre-eclamptic n=100	P-value
Total cholesterol (mg/dl)	207.44 $\pm$ 2.625	225.87 $\pm$ 9.061	0.0001
HDL- cholesterol (mg/dl)	60.263 $\pm$ 1.776	40.072 $\pm$ 8.080	0.0001
LDL- cholesterol (mg/dl)	119.82 $\pm$ 3.084	138.85 $\pm$ 3.007	0.0001
Triglycerides (mg/dl)	172.082 $\pm$ 4.992	216.07 $\pm$ 5.55	0.0001

Values were expressed as Mean  $\pm$  S.D.

Table showing values of lipid profile in Normal pregnant and Pre-eclamptic women.



Graph of Lipid Profile in normotensive and pre-eclamptic pregnant women.

#### IV. Discussion

Pre-eclampsia is a medical complication of pregnancy which develops mostly after 20 weeks of gestation and serious for both mother and fetus. Free radical formation is a general physiological process but raised production of free radicals, can damaged cell membrane. Lipid peroxidation is leading to chain reaction and intern is also responsible for PIH (Agrawal et.al., 2005).

Robson et.al., 1999, observed that the high cholesterol level increases the incidence of PIH, whereas if the cholesterol is at the normal range, the incidence of PIH, is less as, observed by ours study too.

From our study we also observed strong and consistent character of dyslipidemia, specially hypertriglyceridemia play an important role in risk of pre-eclampsia in pregnant women. In the undertaken study, the level of cholesterol, triglycerides and low density lipoprotein were significantly raised and reduced level of high

density lipoprotein concentration in pre-eclampsia patients as compared to control group ,these observations are similar to, Deshpande et al., 2016, Enquobahrie et.al., 2004. Similarly, some more studies also, showed association between hyperlipidemia and pregnancy-induced hypertension (Singh et.al., 2013 and Jameela et.al., 2019).

According to Shreya Yadav et.al., 2018, the serum triglycerides, low density lipoprotein levels are significantly raised in pre-eclampsia women as compared to normal pregnant women. The serum high density lipoprotein (HDL) level is significantly lower ( $P < 0.01$ ) in pre-eclampsia women as compared to healthy pregnant women. These results are similar with our findings while plasma lipid level is raised and it causes dysfunction in endothelial cell. During pregnancy oxidative stress is elevated by linoleic acid in endothelial cell. In case of pregnancy related with PIH serum lipoprotein levels were increased. Meena Mittal et.al., 2014 and her collageous reported that the level of serum triglycerides in

pre-eclampsia and eclampsia was significantly raised ( $p < 0.05$ ). This result is concordance with our finding, where we found an increase of serum triglycerides, which is highly significant. That elevation of serum triglycerides play an important role in pathogenesis of pre-eclampsia and eclampsia.

NAF Islam and his colleagues suggested that serum triglycerides levels, low density lipoprotein were statistically raised in pre-eclampsia as compared to control ( $P < 0.05$ ) while high density lipoprotein (HDL-c) levels were significantly fall in pre-eclampsia as compared to healthy pregnant women (Islam et.al., 2011), which further strengthen our similar findings.

Estrogen play essential role as a marker for induction of triglycerides, high density lipoprotein (HDL-c) and suppression of serum low density lipoprotein (LDL-c) during pregnancy and estrogen level decreases in pre-eclampsia. These results are also similar with our study (Dutta DC 2001). The decreased level of HDL-c in pre-eclampsia is not only based on hypoestrogenaemia but also depends on insulin resistance (Bradley et.al., 1995).

Similar in the present study we observed that all lipid parameters (Total cholesterol, LDL-C and Triglycerides except HDL-C) were significantly raised in pre-eclampsia women as compared to healthy normal pregnant women. These results are in accordance with the findings of Manish et al that found raised level of all lipid parameter except HDL-C in pre-eclampsia and eclampsia as compared with non pregnant women and normotensive pregnant women (Mishra et.al., 2016).

## **V. Conclusion**

Preeclampsia (PE) is a gestational-related disease presented with hypertension, peripheral edema, and proteinuria after 20 weeks of gestation. In PE, there are various metabolic changes like dyslipidemia. Although numerous studies suggest that a dyslipidemic pattern of increased total

cholesterol, triglycerides, and low-density lipoprotein cholesterol (LDL-C), along with decreased high-density lipoprotein cholesterol (HDL-C) concentrations may be associated with an increased risk of preeclampsia. It can be concluded that imbalance lipid profile is due to raised production of lipid to foster the healthy fetal development, which in turn causes dyslipidemia. Detecting dyslipidemia before 20 weeks of gestation helps to recognize pregnancies at high risk for pre-eclampsia and to detect and treat the disease earlier for a better maternal and perinatal outcome. Future research is needed to understand the role of dyslipidemia and other components of metabolic syndrome, such as insulin resistance and obesity, in the pathogenesis of preeclampsia and the mechanisms by which this relationship could be moderated.

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