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ORIGINAL ARTICLE

Lipid Profile In Preeclampsia – A Case Control Study

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ABSTRACT

Background and Objectives: According to the current knowledge, rise in the serum triglycerides level is a major contributor in the pathogenesis of pre-eclampsia. In this context, this study was undertaken to compare the changes in lipid profile in normal pregnancy and in pre-eclampsia. **Method:** A Case control study was done consisting of 90 pre-eclamptic (cases) and 90 healthy pregnant women (controls). Fasting venous blood samples were collected during ante partum period and serum levels of Triglycerides (TG), Total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), very low density lipoprotein cholesterol (VLDL-C), high density lipoprotein cholesterol (HDL-C) were measured. **Results :** In the pre-eclamptic group serum triglyceride (193.37 ± 43.93 mg/dl) was increased significantly ($P < 0.001$) as compared to normal pregnant women. Other parameters TC, LDL-C, VLDL-C and HDL-C were not raised significantly. There is a positive correlation between serum triglycerides and systolic blood pressure and diastolic blood pressure in pre eclampsia cases.

Interpretation and Conclusion : The findings of the present study are consistent with previous studies, suggesting high levels of serum triglycerides as an important factor in the pathogenesis of pre -eclampsia.

Keywords. : Pre-eclampsia, Lipid profile, Triglycerides.

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Introduction

Pre-eclampsia occurs in about 3-5% of pregnancies and is an important cause of fetal and maternal morbidity and mortality world wide. In healthy pregnancies, adaptive changes take place in women's physiology to meet the demands of the

rapidly developing fetus. In pregnancies complicated by pre-eclampsia, these normal adaptive metabolic responses are further exaggerated [1]. Pre-eclampsia occurs during second and third trimester of pregnancy and it is more common in nulliparous women. It is characterized by blood pressure of 140/90 mm Hg or rise in systolic blood pressure of more than 30 mmHg or diastolic blood pressure of more than 15 mmHg after 20 weeks of gestation, in conjunction with proteinuria ≥ 300 mg/24 hours or greater or equal to 1+ or 100 mg/dl by dipstick response[2],[3].

Pre-eclampsia and related disorders are known to affect function of various organs involved in lipid and lipoprotein metabolism. Several studies have shown that endothelial dysfunction is related to

hyperlipidemia[4],[5]. Significantly elevated plasma concentration of Triglycerides (TG), phospholipids and total lipids and decreased high density lipoprotein – cholesterol (HDL-C) concentrations were found in women with pre-eclampsia in comparison to normal pregnancy[6],[7].

In this context, the present study has been undertaken to compare the changes in lipid profile in normal pregnancy and preclampsia.

Methods

Institutional ethical committee approved this study and verbal informed consent was also taken from the patients. In the present study, 90 cases of pre-eclampsia and 90 normal pregnant women (controls) from HSK (Hangal Shree Kumareswar) Hospital and Research Centre, Bagalkot were selected. The controls were normotensives. Both the cases and controls were primi gravida between 18 and 30 years of age and having more than 29 weeks of gestation. The cases and controls having past history of diabetes mellitus, hypertension, renal diseases, liver disorder and multiple pregnancies were excluded. History and examination findings of both cases and controls were noted. Fasting blood samples were collected; the serum was separated and analyzed for the following parameters.

Triglycerides were measured by GOP-PAP method[8],[9], optical density was measured at 546 nm. Total cholesterol and HDL cholesterol were measured by CHOD-PAP method [8],[9],[10],[11],[12], optical density was measured at 500 nm. Low Density Lipoprotein cholesterol (LDL- cholesterol) and Very Low Density Lipoprotein cholesterol (VLDL-cholesterol) were calculated by Friedwald's formula [13].

Statistical analysis was done using the unpaired T-test and Pearson's correlation..

Results

Blood pressure and BMI (Body Mass Index) of cases and controls is shown in [Table/Fig 1]. The mean value of SBP (Systolic blood pressure in mmHg) in cases was

144.67±10.56 and in control 115.3±6.81, there being a significant difference (P<0.001) between cases and controls. The mean DBP(Diastolic Blood Pressure in mmHg) mean in cases and controls was 97.73±5.7 and 75.45 ± 5.25 respectively, there again being a significant difference (P<0.001) between cases and controls. The mean BMI (Body Mass Index) of controls was 25.53± 3.08 and in cases 26.83± 3.28, P value was more than 0.05 , which was insignificant.

Lipid profile of cases and controls is projected in [Table/Fig 2]. The mean value of triglycerides in cases and controls were 214.86±51.49 mg/dl and 187.7±40.87 mg/dl respectively. There is significant elevation in TG (P<0.02) in study group in comparison with controls.

There was an insignificant difference in other lipid profile parameters of cases and controls.

There is a positive correlation between the systolic blood pressure and serum triglycerides (r=0.721), and also between diastolic blood pressure and serum triglycerides (r = 0.583).

Table/Fig 1: Blood Pressure and Body Mass Index of Cases and Controls

| | | Cases = 90 | Controls = 90 | P Value |
|-----|-----------|----------------|---------------|------------|
| BP | SBP mm Hg | 144.67 ± 10.56 | 115.3 ± 6.81 | P < 0.00 1 |
| | DBPmm Hg | 97.73 ± 5.7 | 75.45 ± 5.25 | P < 0.00 1 |
| BMI | | 26.83 ± 3.28 | 25.53 ± 3.08 | P > 0.05 |

Values are mean ±SD

BP: Blood Pressure, SBP: Systolic blood pressure, DBP: Diastolic blood pressure

BMI: Body mass index

Table/Fig 2: Lipid profile of cases and controls

| Lipid profile | Cases = 90 | Controls = 90 | P Value |
|---------------|--------------|---------------|----------|
| TG mg/dl | 214.86±51.49 | 187.7±40.87 | P < 0.02 |
| HDL mg/dl | 43.2±08.71 | 41.43±6.88 | P > 0.05 |
| LDL mg/dl | 111.43±40.70 | 113.97±29.38 | P > 0.05 |
| VLDL mg/dl | 40.33±10.84 | 37.47±08.01 | P > 0.05 |
| TC mg/dl | 193.37±43.98 | 203.1±38.57 | P>0.05 |

TG : Triglycerides

HDL : High density lipoprotein

LDL : Low density lipoprotein

VLDL: Very low density lipoprotein

TC : Total Cholesterol

Discussion

Pregnancy is a physiological stress in which many changes occur in the milieu interior of the body, more and more stress being laid on the biochemical changes, which occur in the blood during normal pregnancy, become exaggerated in complications of pregnancy like pre-eclampsia.

The most common factor associated with pre-eclampsia is placental vasculopathy. If pre-eclampsia is multi causal disease, then TG-related vasculopathy may be one possible etiological factor[3].

Women with pre-eclampsia have higher levels of circulating serum triglycerides an essential step in lipid mediated endothelial dysfunction. The mechanisms driving the abnormal elevation of triglycerides leading to pre-eclampsia are unclear.

During pregnancy, there is an increase in the hepatic lipase activity and decrease in lipoprotein lipase activity. Hepatic lipase is responsible for the increased synthesis of the triglycerides at the hepatic level, and the decreased activity of lipoprotein lipase is responsible for the decreased catabolism at the adipose tissue level, whereas placental VLDL receptors are up regulated. This results in re-routing of TG rich lipoproteins to the fetoplacental unit. However in pre-eclampsia the vascularization of the fetoplacental unit may be impaired, resulting in yet-undefined compensatory mechanisms that may further increase synthesis of maternal TG levels. The decreased catabolism of TG rich lipoproteins by reduced placental uptake and the putative concomitant decrease of lipoprotein lipolysis results in the accumulation of TG rich remnant lipoproteins in the maternal circulation[14,15], as observed during present study shown in Table 2.

Another hypothesis is that hypertriglyceridemia is probably a consequence of competition between chylomicrons and very low-density lipoprotein cholesterol for the lipoprotein lipase. Classically, chylomicron clearance occurs in two sequential steps: (1) triglyceride hydrolysis by lipoprotein lipase, (2) uptake of the remnant by the liver. Delay in the second step leads to accumulation of remnants in plasma and is generally thought to represent the atherogenic risk of hypertriglyceridemia. The present study also showed a significant rise in TG in pre-eclamptic patients in comparison to normal pregnant women [14]. Elevation in plasma triglyceride in pre-eclampsia has been reported in several

studies[16], raised plasma TG may be a potential contributor to hyperlipidemia[5,17]. It also indicates that there exists a consistent positive association between elevated maternal TG and the risk of pre-eclampsia[14]. TG mediated endothelial dysfunction and vasculopathy may contribute to the pathophysiological mechanisms of preeclampsia that warrants further analysis.

There is a positive correlation between serum triglycerides and the systolic blood pressure and diastolic blood pressure in pre-eclampsia cases, this is consistent with previous studies[15].

In conclusion, the present study is consistent with previous studies suggesting that plasma lipids appear to be of immense value in understanding the pathogenesis and elevated serum triglycerides as an important contributing factor of pre-eclampsia.

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