

ORIGINAL ARTICLE

STUDY OF SERUM LIPID PROFILE IN PREGNANCIES COMPLICATED BY PREECLAMPSIA

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ABSTRACT:

Objective: To evaluate the lipid profile among patients who present preeclampsia and correlate these parameters with 24-hour proteinuria. **Methods:** This study involved 42 women with preeclampsia and 35 healthy pregnant women in the third trimester of pregnancy as controls. Blood samples were obtained from all the patients, and the serum levels of triglycerides, total cholesterol, low-density lipoproteins (LDL), high-density lipoproteins (HDL) and very low density lipoproteins (VLDL) were determined. Cases and controls were matched for maternal age, gestational week and body mass index. **Results:** The VLDL and triglyceride values from the women with preeclampsia were significantly higher than those of the healthy women. There was a positive correlation between increased proteinuria and higher VLDL and triglyceride levels in patients with preeclampsia. **Conclusion:** Among the patients with preeclampsia, higher VLDL and triglyceride levels were positively correlated with proteinuria. These observations indicate that the pregnant women who presented elevated lipid levels were more susceptible to cardiovascular disorders and, consequently, pre-eclampsia.

Key words: Cholesterol, lipid profile, preeclampsia, pregnant

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This article may be cited as: Patel M, Pujara N. Study of Serum Lipid Profile in Pregnancies Complicated by Preeclampsia. J Adv Med Dent Scie Res 2015;3(6):S73-S76.

INTRODUCTION

In Preeclampsia is a condition that pregnant women develop. It is developed by high blood pressure and a high level of protein in the urine. Preeclamptic women will often also have swelling in the legs, feet and often hands. This condition usually appears during the second trimester of pregnancy, often in the latter part of the second or in the third trimesters, although it can occur earlier. It affects both the mother and the unborn baby and occurs in approximately 5% of all pregnancies, being an important cause of maternal morbidity and mortality (1,2)

An abnormal lipid profile is known to be strongly associated with atherosclerotic cardiovascular diseases and has a direct effect on endothelial dysfunction.

The most important feature in toxemia of pregnancy is hypertension which is supposed to be

due to vasospastic phenomenon in kidney, uterus, and placenta and brain (3). Altered lipid synthesis leading to decrease in PGI₂: TXA₂ ratio is also supposed to be an important way of pathogenesis in pregnancy induced hypertension (4). Thus abnormal lipid metabolism seems important in the pathogenesis of pregnancy induced hypertension (PIH) too.

Study of lipid profile from serum has advantage of early diagnosis, predicting prognosis, and monitoring the progression of developing pathology. The idea of screening the patients by blood based tests is appealing from several points of view including its ease, economic advantage, noninvasiveness, and possibility of repeated sampling.

Moreover, the hormonal imbalance is a prime factor for the pathogenesis of pregnancy induced hypertension and this endocrinal imbalance is

reflected in alteration of serum lipid profile. Therefore, simple measurement of serum lipid parameters may be of good predictive value in toxemia of pregnancy, avoiding the costly endocrinological investigations.

MATERIAL AND METHOD:

Study design and size

Cross-sectional study was performed which included 77 patients: 42 women with preeclampsia and 35 healthy women. The patients were divided into two groups: pregnant women with preeclampsia (cases) and normal pregnant women (controls).

The cases and controls were matched according to maternal age, gestational age, race and body mass index (BMI), in accordance with the selection criteria previously established.

The study group and controls were selected from among the patients seen at Gujart adani institute of medical science between June 2011 and January 2014. The study was approved by the Ethics Committees of Hospital and written informed consent was obtained from all patients.

The sample size was calculated to compare two groups (cases and controls) with a 5% prevalence of preeclampsia, confidence level of 95% and a power of 80%. In this case, it was expected that the maximum difference in proteinuria in the test group would be 30%, compared with the unexposed group. Thus, the sample size would be a minimum of 33 women in each group.

Measurements and laboratory tests

All the women seen at the hospital in the third trimester of singleton pregnancies were considered eligible for inclusion in the study. Gestational age was based on menstrual date and confirmed through ultrasound.

Women with diabetes, chronic hypertension, autoimmune diseases or renal diseases were excluded.

Preeclampsia was diagnosed in accordance with the criteria proposed by the National High Blood Pressure Education Program, 10 i.e. blood pressure $\geq 140/90$ mmHg and proteinuria ≥ 300 mg in 24 hour urine samples.

Blood samples were collected from all participants after a 12- hour fast using 5 ml tubes containing

ethylenediaminetetraacetic acid (EDTA). The samples were immediately centrifuged and processed using a lab test diagnostic kit. The serum levels of triglycerides, total cholesterol, LDL, HDL and VLDL were interpreted in accordance with the recommendations of the National Cholesterol Education Program (Programa Nacional de Educaão para o Colesterol, PNEC).(5)

Preeclamptic patients were then asked to collect urine for 24 hours for proteinuria quantification. This was done by means of photometric readings after addition of sulfosalicylic or trichloroacetic acid.

Statistical analysis

The mean serum lipid concentrations of the cases and controls were compared using Student's t test. The mean level of each lipid was correlated with the 24 hour proteinuria concentration using Pearson's coefficient test. Significance was set at $P < 0.05$. We also used the Student t test to compare the means of the groups for arterial pressure, proteinuria, total cholesterol, high-density lipoproteins (HDL), LDL, very low density lipoproteins (VLDL) and triglycerides, taking $P < 0.05$. Correlations between proteinuria and cholesterol were made using Pearson's correlation coefficient, considering only the group with preeclampsia. The analyses were performed using the SPSS software, version 16.

RESULT

During the study period, 42 preeclamptic and 35 healthy pregnant women fulfilling the inclusion criteria were invited to participate in the study.

The participants' characteristics are presented in Table 1 and the data demonstrate that there were no significant differences in the women's ages, extent of pregnancy, body mass index (BMI) or race.

Furthermore, there were no significant differences in the total serum cholesterol, LDL and HDL levels between the preeclampsia cases and the healthy women.

The preeclamptic patients had significantly higher serum levels of triglycerides and VLDL, compared with the healthy controls (Table 2).

The triglyceride and VLDL levels were positively and significantly correlated with the severity of proteinuria (Table 2).

Table 1: Demographic and clinical characteristics of participants

| CHARACTERISTIC | PREECLAMPSIA n=42 | HEALTHY CONTROLS n=35 | P VALUE |
|-----------------------|----------------------|--------------------------|---------|
| RACE/ETHNICITY | | | |
| WHITE | 18 (44.9) | 13 (34.7) | |
| MIXED | 21 (47.8) | 18 (53.3) | 0.4 |
| BLACK | 3 (7.1) | 4 (11.4) | |
| AGE | 24.5 ± 4.9 | 23.6 ± 4.4 | 0.8 |
| BODY MASS INDEX | 28.1 ± 3.5 | 27.5 ± 3.8 | 0.9† |
| GESTATIONAL AGE | 35.0 ± 2.9 | 35.7 ± 1.6 | 0.4† |

Chi-square; † Student t test. Values expressed in numbers and percentages or mean and standard deviation.

Table 2: Correlation between 24-hour proteinuria and lipid profile among 72 pregnant women

| | PROTEINURIA (MG/DL OVER 24 HOURS) | | | | P |
|-------------------|-----------------------------------|-------------|-------------|-------------|---------|
| | ABSENT | 0.3-0.9 | 1-2 | >2 | |
| TOTAL CHOLESTEROL | 229.0(53) | 225.0(42) | 231.0(69) | 273.0(65) | 0.08 |
| LDL | 133.0(46.7) | 121.8(34.9) | 123.0(42.6) | 150.2(50.4) | 0.45 |
| VLDL | 43.3(11.9) | 48.3(18.5) | 59.7(25.7) | 67.8(17.2) | <0.0005 |
| HDL | 53.0(14) | 55.0(14) | 49.0(12) | 56.0(11) | 0.87 |
| TRIGLYCERIDES | 216(59) | 241(93) | 298(128) | 339(86) | <0.0001 |

DISCUSSION:

Pre-eclampsia (PE), a non-convulsive form of pregnancy-induced hypertension, accounts for a significant proportion of maternal and fetal morbidity and mortality (6)

Pre-eclampsia and eclampsia is associated with substantial risks for the fetus. These include intrauterine growth restriction, death and prematurity with attendant complications whereas the mother is at risk of renal failure, pulmonary edema, stroke, and death. Despite considerable research, the cause or causes of preeclampsia remain unclear and there are no clinically useful screening tests to identify women in whom it will develop (7). Early pregnancy dyslipidemia is associated with an increased risk of Pre-eclampsia.(8)

Woman with a history of pre-eclampsia have significant differences in lipid parameters and an increased susceptibility to lipoprotein oxidation when compared with women who had normal pregnancy. Disorders of lipoprotein metabolism are reported to be a major cause of hypertension and proteinuria in Pre-eclampsia (9)

The preeclamptic patients in our study presented significantly higher concentrations of triglycerides and VLDL than shown by the healthy women. In a review of 22 studies, Ray et al.¹⁰ reported that

women with elevated triglycerides had twice the risk of preeclampsia, and the four studies that adjusted for confounders (age, BMI and parity) indicated that the risk was four times higher, compared with women with normal triglycerides. It was also suggested that triglyceride assessment between 28 and 32 weeks could be predictive of preeclampsia.¹¹

According to above findings it is postulated that alteration of lipid metabolism may play a important role in the development of symptoms of Preeclampsia. So, present study was carried out to investigate the alteration in lipid profile in preeclampsia and healthy women.

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Source of support: Nil

Conflict of interest: None declared

