CODEN [USA]: IAJPBB ISSN: 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES

http://doi.org/10.5281/zenodo.1344160

Available online at: http://www.iajps.com Research Article

ANALYSIS OF MATERNAL SERUM TRIGLYCERIDES IN WOMEN WITH PRE-ECLAMPSIA IN LOCAL FEMALE POPULATION OF PAKISTAN

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Abstract:
Introduction: *Pre-eclampsia with a frequency of 3-7% is a pregnancy related disorder constituting one of the leading causes of fetal and maternal morbidity and mortality world-wide. It is more frequent in nulliparous young women and in older multiparous women.*
Objectives of the study: *The basic aim of the study is to analyses the maternal serum triglycerides in women with pre-eclampsia in local female population of Pakistan.*
Material and methods: *This study was conducted at DHQ hospital Sheikhupura during 2018. With the approval of the institutional ethics committee, all patients fulfilling the inclusion criteria was recruited after informed verbal consent. It is a descriptive case series study conducted in the hospital. The study population comprised of 120 pregnant females. Among 120 pregnant females, 40 were eligible cases who were singleton pregnancies with the diagnosis of pre-eclampsia according to the criteria for the definition of pre-eclampsia.*
Results: *The age of the studied pregnant females ranged between 16 and 42 years. The mean age of cases (pre-eclamptic) and controls (normal) pregnant women was 29.6 (6.1) and 29.5 (6.1) years respectively. There was no statistically significant difference in the maternal ages of both groups. Body mass index, which was only recorded at the time of blood sampling was not significantly different.*
Conclusion: *It is concluded that total cholesterol, triglyceride, non-HDL-C, and HDL-C levels measured during pregnancy are significantly related to the risk of preeclampsia.*
Keywords: *analysis, maternal serum triglycerides, women, pre-eclampsia, local female population, Pakistan.*

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Please cite this article in press Ayesha Shahid et al., ***Analysis of Maternal Serum Triglycerides in Women with Pre-Eclampsia in Local Female Population of Pakistan.,*** *Indo Am. J. P. Sci, 2018; 05(08).*

INTRODUCTION:

Pre-eclampsia with a frequency of 3-7% is a pregnancy related disorder constituting one of the leading causes of fetal and maternal morbidity and mortality world-wide. It is more frequent in nulliparous young women and in older multiparous women. Pre-eclampsia is characterized by the new onset of hypertension and proteinuria occurring from 20 weeks of gestation onward [1].

Despite being the one of the leading causes of the maternal morbidity and mortality, the etiology and pathogenesis of pre-eclampsia remain to be elucidated. Until date, endothelial dysfunction in the placental vasculature is considered as a widely accepted theory for the etiology and the pathogenesis of the disease [2]. Several other factors including genetic, immune, vascular and oxidative stress are also implicated in the pathogenesis of pre-eclampsia, which lead to the studies for identification of potential screening markers of the disease [3].

Preeclampsia is a potentially devastating disease of pregnancy that complicates 2%–8% of all pregnancies in the United States and can threaten the life of both the mother and her unborn child. Manifesting after 20 weeks of gestation, preeclampsia is a multiorgan disorder defined as de novo hypertension (systolic blood pressure ≥140 mm Hg; diastolic blood pressure ≥90 mm Hg) combined with proteinuria (≥300 mg/24 hours), as defined by the American Congress of Obstetricians and Gynecologists [4]. Without intervention, the mother is at substantial risk for seizures (eclampsia), renal and liver failure, pulmonary edema, stroke, and death. For the fetus, preeclampsia poses increased risks of intrauterine growth restriction, prematurity, and death. Preeclampsia is also recognized as a major risk factor for cardiovascular disease later in life for both the woman and her child. Despite considerable research, the only effective treatment for preeclampsia is to deliver the baby, placenta, and all products of conception [5].

Maternal endothelial dysfunction is a classic hallmark of preeclampsia. Many markers of endothelial dysfunction have been reported in preeclamptic women, including an imbalance of anticoagulation and procoagulation factors and increased levels of fibronectin, endothelial cell adhesion molecules, and other factors in the coagulation cascade. Increased levels of circulating lipids result in their accumulation within endothelial cells [6]. This accumulation decreases the release of prostacyclin, resulting in oxidative stress via endothelial dysfunction, a key mechanism in the proposed pathophysiology of preeclampsia [7].

Theoretical Background

Pre-eclampsia is a multi-organ disorder of pregnancy that manifests after 20 weeks of gestation with new onset hypertension and proteinuria. Pre-eclampsia is a major contributor to maternal and perinatal morbidity and mortality worldwide, especially in developing countries. In Africa and Asia, they contribute to 9% of deaths. Pre-eclampsia can progress to cause maternal liver dysfunction, renal impairment and ultimately seizures and death. The fetus is affected by intrauterine growth restriction, preterm birth, stillbirth or neonatal death, and these women have an increased lifetime risk of cardiovascular disease compared with the rest of the population[8].

Objectives of the study

The basic aim of the study is to analyses the maternal serum triglycerides in women with pre-eclampsia in local female population of Pakistan.

MATERIAL AND METHODS:

This study was conducted at DHQ hospital Sheikhupura during 2018. With the approval of the institutional ethics committee, all patients fulfilling the inclusion criteria was recruited after informed verbal consent. It is a descriptive case series study conducted in the hospital. The study population comprised of 120 pregnant females. Among 120 pregnant females, 40 were eligible cases who were singleton pregnancies with the diagnosis of pre-eclampsia according to the criteria for the definition of pre-eclampsia given by the International Society for the Study of Hypertension in Pregnancy.

Pathology of diseases

Pre-eclampsia was diagnosed in previously normotensive women with two repeat (at least 4 h apart) diastolic blood pressure measurements of 90 mmHg or greater after the 20th week of gestation, plus proteinuria of more than 300 mg/l in 24 h as measured quantitatively or >2+ protein with dipstick and 80 were non-preeclamptic and otherwise healthy pregnant females. Those women who were in labor, with ruptured membranes or with multiple pregnancies were not recruited in the study. The pregnant females with any known concurrent medical complications were also excluded. The control group comprised a consecutive sample of pregnant women followed-up at our setting and undergoing routine late second or third-trimester blood analysis and with none of the exclusion criteria.

Collection of data

All enrolled women were undergone detailed medical

and menstrual history followed by a general, systemic and obstetrical examination. A venous blood sample was taken for serum triglyceride levels and other routine investigations in non- fasting state. All information was recorded in a specially designed proforma.

Statistical analysis

Data was analyzed using SPSS for Windows (version 17.0, SPSS Inc., Chicago, Illinois, USA). The data is presented descriptively, providing the number of women, mean values and standard deviations. The differences between preclamptic cases and normal pregnant women were investigated using *t*-test for continuous data

RESULTS:

The age of the studied pregnant females ranged between 16 and 42 years. The mean age of cases (pre-eclamptic) and controls (normal) pregnant women was 29.6 (6.1) and 29.5 (6.1) years respectively. There was no statistically significant difference in the maternal ages of both groups. Body mass index, which was only recorded at the time of blood sampling was not significantly different. Mean systolic and diastolic blood pressures were significantly higher in pre-eclamptic group than in the normal pregnant groups. (table 01)

Table 01: Demographic characteristics of selected patients

Physical variables	Mean (SD)		*P* value
	Pre-eclampsia (*n*=40)	Normal (*n*=80)	
Age (years)	29.6 (6.1)	29.5 (6.1)	0.952
BMI (kg/m^2)	32.0 (6.3)	31.1 (5.2)	0.387
Systolic blood pressure (mmHg)	143.1 (7.8)	125.1 (19.6)	<0.01*
Diastolic blood pressure (mmHg)	94.3 (4.9)	78.0 (13.3)	<0.01*
Gestational age at blood sampling (weeks)	24.8 (5.9)	25.2 (5.2)	0.311

BMI: Body mass index, SD: Standard deviation, *Significant difference at *P*<0.01

Mean serum triglyceride concentrations in pre-eclamptic and controls normal pregnant women were 3.1 mmol/l and 2.5 mmol/l respectively. There was significantly high serum triglyceride concentration ($P < 0.01$) in the pre-eclamptic group than in the normal pregnant women. No significant differences were observed in other measured lipid profile including total cholesterol, HDL and LDL (table 02).

Table 02: Comparison of lipid profile of normal pregnant women and pre-eclampsia patients

Serum lipids (mmol/l)	Mean (SD)		*P* value
	Pre-eclampsia (*n*=40)	Normal (*n*=80)	
Total cholesterol	6.7 (1.3)	6.4 (1.3)	0.284
HDL	1.5 (0.3)	1.5 (0.4)	0.817
LDL	3.9 (1.1)	3.8 (1.0)	0.561
Triglyceride	3.1 (0.8)	2.5 (0.1)	<0.01*

DISCUSSION:

Dyslipidemia in preeclamptic women is characteristic of what occurs in insulin-resistant, hyperglycemic women who are not pregnant, many of whom also have the clustering of metabolic syndrome characteristics that include hypertension [10]. This suggests that a similar pathophysiological process may be occurring in women with preeclampsia and could be contributing to the dyslipidemic changes. Insulin resistance and type 2 diabetes are characterized by the increased overproduction of the triglyceride-rich very-low-density lipoprotein cholesterol and subsequent increased levels of other triglyceride-rich lipoproteins, which are included in non-HDL-C and reflected in elevated triglyceride levels [11].

Pregnancy is a hyperlipidemic state which is not atherogenic but under hormonal control. Women who develop preeclampsia have different serum lipid profile as compared with normotensive pregnant women. Pregnant women with hyperlipidemia and hypertriglyceridemia have increased incidence of developing more severe forms of preeclampsia. Women with elevated lipid levels likely have preexisting endothelial dysfunction that is worsened as a result of the physiological burden of pregnancy; this condition may be further exacerbated by increased maternal vascular inflammation[11]. It is possible that preeclamptic women have higher baseline levels of total cholesterol, triglycerides, and LDL-C and lower levels of HDL-C prepregnancy, but only a handful of studies have taken prepregnancy measurements in preeclamptic women, and we were not able to assess the impact of prepregnancy lipid levels on the risk of preeclampsia [12].

Previous studies evaluating the association between lipid levels during pregnancy and preeclampsia have suggested measuring lipid levels in all pregnant women as a means of early-pregnancy "screening" of women who may be at higher risk for development of the disease [13]. However, results from our meta-analysis indicate that LDL-C and HDL-C levels measured during pregnancy would not be as useful in predicting preeclampsia as other lipid types. HDL-C levels were significantly different between preeclamptic and normotensive women during only the third trimester of pregnancy, which may be too late for an effective prediction tool. Preeclamptic and normotensive women showed marginally significant differences in LDL-C levels during both the second and third trimesters of pregnancy; however, with a WMD of only 3.89 mg/dL in the second trimester, this marker may not be clinically useful as a prediction tool [4].

Women who developed preeclampsia did have significantly elevated total cholesterol, triglyceride, and non-HDL-C measurements as early as the second trimester; thus, these lipid measurements obtained early in pregnancy may be helpful in identifying women at higher risk of developing preeclampsia. Although a WMD of 12.49 (for total cholesterol), 25.08 (for triglycerides), or 11.57 (for non-HDL-C) may not be clinically significant as an individual marker, when combined with other biomarkers known to differ in preeclamptic women[14], such as increased mean arterial pressure, soluble fms-like tyrosine kinase-1, and placental growth factor total cholesterol, triglyceride, and/or non-HDL-C measurements could be clinically useful in identifying women at higher risk for developing preeclampsia [15].

Recent research has demonstrated that LDL-C is not the only form of cholesterol associated with adverse outcomes. In fact, it has been shown that the inclusion of other atherogenic lipoproteins, referred to as non-HDL, which include very-low-density lipoproteins and other apolipoprotein B–containing lipoproteins, is more predictive of cardiovascular disease than LDL-C levels alone [16].

CONCLUSION:

The age of the studied pregnant females ranged between 16 and 42 years. The mean age of cases (pre-eclamptic) and controls (normal) pregnant women was 29.6 (6.1) and 29.5 (6.1) years respectively. There was no statistically significant difference in the maternal ages of both groups. Body mass index, which was only recorded at the time of blood sampling was not significantly different. **Conclusion:** It is concluded that total cholesterol, triglyceride, non-HDL-C, and HDL-C levels measured during pregnancy are significantly related to the risk of preeclampsia. It is concluded that total cholesterol, triglyceride, non-HDL-C, and HDL-C levels measured during pregnancy are significantly related to the risk of preeclampsia.

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