



STUDY OF LIPID PROFILE IN NORMOTENSIVE & PRE-ECLAMPTIC PREGNANT WOMEN

Biochemistry

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ABSTRACT

Hypertension associated with pregnancy whether it is pre-existent or developed during pregnancy, is one of the most common conditions encountered by obstetricians. Hypertension increases both maternal and fetal mortality and morbidity, as it virtually involves every organ and system in the body. The main objective of the study was to estimate, Serum Lipid Profile in Normotensive Pregnant Women & Pre-eclamptic Pregnant Women. The study comprised of total 60 subjects; 30 Controls and 30 Patients. 60 subjects were broadly categorized as 30 Normal Healthy Pregnant Women (for Controls), 15 Pregnant Women with Pre-eclampsia and 15 Pregnant Women with Pre-eclampsia having Proteinuria. Blood samples were collected after an overnight fasting & were analysed for lipid profile. It was observed that the study (pre-eclamptic) group which showed dyslipidaemia in early pregnancy, particularly hypertriglyceridaemia seem to be high risk group for pre-eclamptic pregnant women who develop pre-eclampsia had increased total cholesterol, LDL-C & VLDL-C including triglyceride as compared with normotensive pregnant women. In all these pre-eclamptic cases HDL-C is subsequently decreased as compared with normotensive pregnant women.

KEYWORDS

Hypertension, Pre-eclampsia, Normotensive, Hyperlipidaemia, Dyslipidaemia

Introduction

Pre-eclampsia is a disorder that occurs only during pregnancy and affects both the mother and the fetus. Affecting at 5 percent of all pregnancies, it is rapidly progressive condition characterized by high blood pressure, swelling lower extremities and protein in the urine. Sudden weight gain, headaches and changes in vision are important symptoms. However, it was reported that some women with rapidly advancing disease don't have all these symptoms. Typically blood pressure elevations and pre-eclampsia occur in the late second or third trimester and gestational overcome is hardly affected. According to the World Health Organization, pre-eclampsia is a major cause of both maternal and fetal neonatal morbidity and mortality⁽¹⁻⁵⁾. Hyperlipidaemia can compromise endothelial function and this may contribute to the development of atherosclerotic vascular disease⁽⁶⁾. Human pregnancy is associated with pronounced physiological hyperlipidaemia⁽⁷⁾. In normal pregnancy this feature is not atherogenic and is believed to be under hormonal control⁽⁸⁾. In complicating pregnancies the mechanism regulating physiologic hyperlipidaemia may malfunction. Abnormal lipid profiles may have a role in the promotion of oxidative stress and vascular dysfunction seen in pre-eclampsia⁽⁹⁾.

Current dogma proposes 2 stages of model in the development of pre-eclampsia, with the placenta holding the key as the symptoms of pre-eclampsia disappear soon after birth or pregnancy termination⁽¹⁰⁾ when the placenta is no longer present. Stage first noted that placenta from women with pre-eclampsia appeared to be poorly perfused⁽¹¹⁾ and presently it is known that a consistent features associated with this poor perfusion is defective trophoblast invasion of the myometrial portion of the spiral arteries^(12,13). In normal pregnancy trophoblast invasion of the spiral arteries renders them dilated, flaccid and unresponsive to vasoconstrictive agents^(6,7), but if a defective invasion occurs, the spiral arteries retain their musculoelastic properties and responsiveness to vaso active substances leading to placental ischemia⁽¹³⁾.

The second stage appears to involve the release of unknown factors into the maternal circulation from the placenta, which then causes the multi system complications. Maternal risk factors have been identified that are believed not only to make the mother's uterus and the fetal placenta more prone to the initial defective trophoblastic invasion, but also to sustain the mother's reaction to the release of the placental factors. The human placenta produces a wide range of important molecules of which an intricate balance is required throughout pregnancy. In pre-eclampsia this balance may become disturbed and the identification of such changes may be an indicator of placental dysfunction.

Dyslipidaemia is a common occurrence in pre-eclampsia⁽¹⁴⁾ and triglyceride, fatty acids and low density lipoproteins (LDL) cholesterol are all increased along with reductions in high density lipoproteins (HDL)⁽¹⁵⁾. These changes can be found to precede the symptoms of pre-eclampsia. There is also evidence for atherosclerosis of decidual vessels⁽¹⁵⁾ and this gives support to a role for dyslipidaemia in pre-eclampsia which through lipid peroxidation, could contribute to the endothelial dysfunction.

The main objective of the study was to estimate, Serum Lipid Profile in Normotensive Pregnant Women & Pre-eclamptic Pregnant Women

Materials and methods:

The study was undertaken in the Department of Biochemistry Hi-Tech Medical College & Hospital, Bhubaneswar, Odisha affiliated to Utkal University, during the year 2008 to 2010. All patients were clinically evaluated. Detailed history was taken including age, parity, obstetric history and presence of any risk factor. The pregnant cases were obtained from the Department of Obstetrics & Gynaecology OPD & IPD from November 2008 to August 2010, Hi-Tech Medical College & Hospital, Bhubaneswar, Odisha. The estimation of Serum Lipid Profile was done in the Department of Biochemistry.

The study consisted of total 60 subjects; 30 Controls and 30 Patients. 60 subjects were broadly categorized as 30 Normal Healthy Pregnant Women (for Controls), 15 Pregnant Women with Pre-eclampsia and 15 Pregnant Women with Pre-eclampsia having Proteinuria were enrolled in this study. Primigravida and multigravida women were participated in this study. Blood and urine samples were collected from the outdoor, indoor and labour room of the Obstetrics and Gynaecology Department of Hi-Tech Medical College & Hospital, Bhubaneswar. Proper and complete clinical and obstetrical examinations were done at the time of antenatal visit and also at the time of admission.

Blood sample was collected after an overnight fast. Blood 5 ml from each subject was collected in a disposable syringe from the antecubital vein avoiding venostasis and this was transferred to a clean dry centrifuge tube slowly by the side of the tube after removing the syringe to avoid any hemolysis. The sample was kept for proper coagulation and serum was subsequently separated by centrifugation at 3000 rpm for 20 min. Fresh sera and blood samples were used for the analysis of various parameters. If the need required sera was refrigerated at 4 degree Celsius. The samples were biochemically analysed for lipid profile & 24 hr urine protein.

The data obtained was analysed statistically by computing descriptive

statistics, the mean, standard deviation and Student't' test. The results were considered statistically significant whenever $p \leq 0.01$.

Results

The total cholesterol level in Control group (Normotensive group) 162.31 ± 12.19 mg/dl and in study group (pre-eclamptic group) 236.33 ± 3.45 mg/dl. The study group (pre-eclamptic group) showed significant rise with the p value of ($P < 0.01$). The mean Triglycerides (TG) was found to be 139.26 ± 15.58 mg/dl in Normotensive group and 221 ± 5.73 mg/dl in pre-eclamptic group. The increase level of TG in pre-eclamptic group was found to be highly significant ($P < 0.001$) as compared to Normotensive group. The LDL cholesterol level as 94.79 ± 13.21 mg/dl in Normotensive group and 171.8 ± 4.32 mg/dl in pre-eclamptic group. The increase in LDL-cholesterol in pre-eclamptic group was found to be highly significant with the p value of ($p < 0.01$). The mean VLDL level was found to be 27.96 ± 9.56 mg/dl in Normotensive group and 44.2 ± 1.14 mg/dl in pre-eclamptic group. The increase level of VLDL in pre-eclamptic group was found to be highly significant ($P < 0.001$) as compared to Normotensive group.

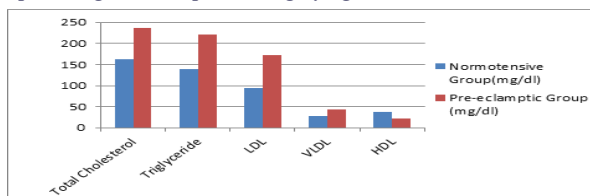
The mean HDL cholesterol was found to be 36.9 ± 4.28 mg/dl in Normotensive group and 21.8 ± 1.57 mg/dl in the pre-eclamptic group. The HDL cholesterol was found to be marginally lowered ($P < 0.01$) in study group.

The mean Blood Pressure levels were found to be 116 ± 5.86 (mm of Hg) systolic and 72.33 ± 5.66 (mm of Hg) diastolic in Normotensive group and 136.93 ± 3.55 (mm of Hg) systolic and 97.46 ± 3.18 (mm of Hg) diastolic in pre-eclamptic group. The increase level of BP in pre-eclamptic group was found to be highly significant as compared to Normotensive group.

Table 1: Comparison of lipid profile & blood pressure in Normotensive & Pre-eclamptic group

PARAMETER	NORMOTENSIVE GROUP MEAN±SD	PRE-ECLAMPTIC GROUP MEAN±SD
Cholesterol(mg/dl)	162.31 ± 12.19	236.33 ± 3.45
Triglyceride(mg/dl)	139.26 ± 15.58	221 ± 5.73
LDL(mg/dl)	94.79 ± 13.21	171.8 ± 4.32
VLDL(mg/dl)	27.96± 9.56	44.2 ± 1.14
HDL(mg/dl)	36.9 ± 4.28	21.8 ± 1.57
Blood Pressure(mm of Hg)	Systolic- 116± 5.86 Diastolic- 72.33±5.66	Systolic- 136.93 ± 3.55 Diastolic- 97.46±3.18

* $p \leq 0.01$ significant, * $p \leq 0.001$ highly significant



Graph1: Mean Lipid Profile levels in Normotensive & Pre-eclamptic Pregnant Women.

Discussion and Conclusion

In this study it has been observed that the study group which showed dyslipidaemia in early pregnancy, particularly hypertriglyceridaemia seem to be high risk group for pre-eclamptic pregnant women who develop pre-eclampsia had increased total cholesterol, LDL-C and VLDL-C including triglyceride as compared with normotensive pregnant women. In all these pre-eclamptic cases HDL-C is substantially decreased as compared with normotensive pregnant women.

On analyzing these results it was found that there has been marked increase in the level of all the lipid profile parameters (Total Cholesterol, LDL, VLDL, & TG) except HDL-C level which has shown a decreasing trend. Thus, altered dyslipidaemia observed in our above findings seem to have a potential bearing on the pathophysiology of pregnancy induced hypertension and pre-eclampsia. Similar observations have been documented by Wladimiroff et al ⁽¹⁶⁾ and Clausen et al ⁽¹⁷⁾ in Pre-eclamptic and

Normotensive Pregnancies. It was also found that there has been marked increase in the level of all the blood pressure parameters (systolic and diastolic) in pre-eclamptic pregnant women than the controls.

In this study serum triglyceride level has shown persistent increase in pre-eclamptic patients as their pregnancy advances, whereas no such increase has been observed in case of controls. Our study also corroborated with the findings of Equobohrie et al ⁽¹⁸⁾ and Cekmen et al ⁽¹⁹⁾. The above mentioned findings confirm that there has been increasing triglyceride accumulation in pre-eclamptic patients leading to endothelial dysfunction.

The principal modulator of hypertriglyceridemia which is observed in pregnancy is estrogen. Estrogen induces hepatic biosynthesis of endogenous triglycerides which is carried by VLDL ⁽²⁰⁾. This process seems to be modulated by hyper insulinism found in pregnancy ⁽²¹⁾. All these factors lead to enhancement of pathophysiology of pre-eclampsia.

In view of above findings it may be concluded that pre-eclamptic pregnant women have higher levels of Serum Cholesterol, TG, LDL-C, VLDL-C, and low level of HDL-Cholesterol as compared to the normotensive pregnant women. Alteration of Serum Lipid Profile is a marker of oxidative stress which plays a significant role in etiopathogenesis of pre-eclampsia. Proteinuria is also a dominant finding in all pre-eclamptic pregnant patients and the intrinsicity of proteinuria seems to rise with the advancement of pre-eclamptic pregnancy.

Thus, more stress should be given for assessment of serum lipid levels and proteinuria in all pregnancies which may be helpful in early diagnosis and prevention of complication in pre-eclampsia.

Acknowledgements

I would like to thank our Head of Department, faculty's members, my postgraduate colleagues of the department of Biochemistry, Hi-Tech Medical College, Hospital & Research Center.

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