

Comparative Evaluation of Lipid Profile among Pregnant Women with and without Pregnancy Induced Hypertension Attending in Patliputra Medical College Dhanbad, Jharkhand

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ABSTRACT

Introduction: The association of alteration of serum lipid profile in hypertension has been well established. In pregnancy, normally, the altered levels of serum lipid profile increase the risk of Pregnancy-induced hypertension (PIH) which is one of the major causes of maternal and fetal mortality. Therefore, the present study was designed to investigate the alteration in serum lipid profile in pregnant women and in women with PIH. Study aimed to record the levels of total cholesterol (TC), low-density lipoprotein (LDL), high-density lipoprotein (HDL), very low-density lipoprotein (VLDL) and triglycerides (TG) in healthy pregnant women and women with pregnancy induced hypertension

Material and Methods: 90 pregnant women were recruited for this study. An informed consent was taken from each patient. Lipid profiles were assessed using standard procedures. Data was analyzed using SPSS for Windows (version 17.0, SPSS Inc., Chicago, Illinois, USA). The data is presented descriptively and test for significance was done using the student *t*-test for continuous data.

Results: the serum lipid levels of TC, VLDL, LDL and TG in PIH women were found to be higher and were statistically significant while HDL value was not significant, as compared with the healthy controls.

Conclusion: From the results of our study, it can be concluded that lipid parameters are increased in pregnancy induced hypertension which may be helpful in the prevention of complication caused by PIH.

Keywords: Pregnancy-induced Hypertension (PIH), Total Cholesterol (TC), Low-density Lipoprotein (LDL), High-Density Lipoprotein (HDL), Very Low-density Lipoprotein (VLDL) and Triglycerides (TG).

INTRODUCTION

Pregnancy-induced hypertension (PIH) is one of the major risk factors in present day health care practice with adverse fetomaternal consequences. About 10% of maternal death is contributed by complications of pregnancy related hypertension in our country.¹ Preeclampsia is a hypertensive disorder of pregnancy, characterized by vasospasm, proteinuria, and edema. Different factors like, molar pregnancy, multifetal gestations, certain chromosomal alterations of the fetus, familiar history of hypertension, diabetes mellitus, chronic hypertension, increased oxidative stress, and renal disease have been associated with preeclampsia.²

In a retrospective study over the period 2000-2009 in a

tertiary center in India, PIH was the third cause of maternal death.³ It may cause several critical problems in pregnancy such as premature delivery, intrauterine growth restriction, fetal death, maternal mortality and morbidity.⁴ Despite being the leading cause of maternal death and a major contributor of maternal and perinatal morbidity, the mechanisms responsible for the pathogenesis of PIH/pre-eclampsia have not yet been fully 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.⁵

Various studies in the field of cardiovascular research have shown that serum lipids have a direct effect on endothelial function and in this way, abnormal serum lipid profiles are also associated with endothelial dysfunction.⁶ Thus, abnormal lipid metabolism seems to have a significant role in the pathogenesis of PIH. Therefore, the present study was undertaken to compare the altered serum lipid profile including total cholesterol (TC), high-density lipoprotein (HDL)-cholesterol, low-density lipoprotein (LDL)-cholesterol and triglycerides (TG) in PIH/pre-eclamptic and normal pregnant women.

MATERIAL AND METHODS

The study was conducted in the department of Department of Physiology, Patliputra Medical College Dhanbad, Jharkhand, India from the period of January 2016 to Feb 2017. The study was approved by the Ethics Committees of the institution, and written informed consent was obtained from all the participants. A total of 90 pregnant women who attended the emergency outpatient department (OPD) or admitted in the Medical College and Hospital were selected for the study. The participants were divided into two groups: pregnant women with PIH (cases) and normal

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pregnant women (controls). All the subjects were ranging in age from 20 to 35 years with similar low socio-economic status and dietary habit. No subjects from any group were suffering from any acute or chronic illness during the study nor did they have any past history of cardiac, renal, hepatic dysfunction, dyslipidaemia or pre-existing hypertension before pregnancy. All such participants were excluded from the study.

Blood pressure was recorded using mercury sphygmomanometer and stethoscope from the left upper arm after the subjects had been sitting for more than 5 minutes according to the guidelines of American Heart Association.⁷ Triplicate readings were recorded after 5 minutes rest interval between the measurements and the average value was recorded.

PIH was defined as systolic blood pressure of at least 140mmHg and/or diastolic blood pressure of at least 90 mmHg, occurring on two or more occasions after 20 weeks of gestations.⁸

Blood samples were drawn from all the subjects following a fast of 12 hours and analyzed for Serum TG, TC and HDL by enzymatic methods with the help of Glaxo kits on ERBA Chem-5 semi auto analyzer. Serum LDL was calculated by Frederickson-Friedwald's formula according to which LDL= Total cholesterol - (HDL + VLDL). VLDL was calculated as 1/5 of Triglycerides.

STATISTICAL ANALYSIS

Data were statistically analyzed by Student's 't' test with the help of SPSS software. P value < 0.001 was considered statistically significant.

RESULTS

The present study comprises of 90 pregnant women who fulfilled the inclusion criteria. Each women was then evaluated for the blood pressure (BP), and on the basis of BP, they were divided into two groups i.e. healthy pregnant women (represented as the control group) and pregnant women with PIH (represented as the case group). Each group comprises of 45 pregnant women. The age of the studied pregnant women ranged from 20 to 35 years with the mean age of 27.6 years and 26.5 years in PIH cases and healthy groups, respectively. There was no statistically significant difference in the maternal ages of both groups.

The mean systolic and diastolic blood pressures were significantly higher in PIH group than in the normal pregnant groups. The mean systolic BP in PIH was 155.44 ± 9.97 mmHg while that of controls was 123.5 ± 13.81 mmHg. Similarly, mean diastolic BP in PIH was 97.98 ± 5.54 mmHg as compared to 77.17 ± 9.53 in healthy women, the difference between the two being statistically significant ($P < 0.001$). (Table 1)

Furthermore, the PIH patients had significantly higher serum levels of TC, VLDL, LDL and TG, compared with the healthy controls. The mean values in PIH cases were 241.47 ± 43.67 , 58.61 ± 11.87 , 134.39 ± 19.97 and 213.24 ± 40.49 respectively. However, in the control group the

Blood pressure (mmHg)	PIH (cases)	Healthy (control)	p value
Diastolic	97.98 ± 5.54	77.17 ± 9.53	<0.001*
Systolic	155.44 ± 9.97	123.5 ± 13.81	<0.001*
*significant at p value<0.001			

Table-1: Comparison of Blood Pressure in Cases and Control

Lipid parameter	PIH (cases)	Healthy (control)	p value
TC	241.47 ± 43.67	192.9 ± 26.68	<0.001*
HDL	53.92 ± 10.76	49.84 ± 12.67	0.1668
VLDL	58.61 ± 11.87	33.7 ± 5.21	<0.001*
LDL	134.39 ± 19.97	100.41 ± 11.51	<0.001*
TG	213.24 ± 40.49	168.22 ± 23.82	<0.001*

Table-2: Comparison of different Lipid parameters

corresponding values were 192.9 ± 26.68 , 33.7 ± 5.21 , 100.41 ± 11.51 and 168.22 ± 23.82 respectively. The mean HDL level was found to be more but was not statistically significant i.e 53.92 ± 10.76 in PIH cases and 49.84 ± 12.67 in healthy women. (Table 2)

DISCUSSION

PIH includes a group of hypertensive disorders developed due the gravid state. In the literature the relationship between the hypertension and alteration in serum lipid profile is well documented. Hormonal imbalance leading to altered lipid profile in serum is assumed to be the prime factor in etiopathogenesis of pregnancy - induced hypertension (PIH).^{9,10} Few studies have showed that the most dramatic damage in the lipid profile in normal pregnancy is serum hypertriglyceridemia, which may be as high as two to three folds in the third trimester over the levels in nonpregnant women.¹¹ In the present study, we compare the different lipid parameters in pregnancy induced hypertension and the healthy pregnant women. Here, we used normotensive pregnant women as a control group, whereas, hypertensive pregnant women as a cases group. The difference in systolic and diastolic blood pressures was found to be statistically significant ($p < 0.001$). A statistically significant increase [$P < 0.001$] was noted in the serum levels of TC, VLDL, LDL and TG between the control group and PIH cases whereas, serum level of HDL was not found to be significant which is similar to the result of Cuneyt Evruke et al¹² who also showed insignificant difference in HDL values.

In our study it was observed that the level of triglyceride is significantly high ($p < 0.001$) in pregnancies complicated by hypertension. This finding is consistent with findings of Aziz R et al.¹³

In the pathogenesis of pre-eclampsia, the initiating event has been postulated to be the reduced placental perfusion that leads to widespread dysfunction of the maternal vascular endothelium by mechanisms that are not well-defined. It has been described by Mikhail *et al* that increased serum TG levels leads to its increased endothelial accumulation, which may results in endothelial dysfunction in pregnancy. Increased TG in pre-eclampsia are likely to be deposited

in uterine spiral arteries and contribute to the endothelial dysfunction, both directly and indirectly through generation of small, dense LDL.¹⁴

In present study, serum VLDL level increased significantly in PIH, and this is in accordance with the study done by Jayanta De et al. The increase in the VLDL value is perhaps due to hypertriglyceridemia leading to enhanced entry of VLDL that carries endogenous triglyceride into circulation.¹⁵ Sattar et al¹⁶ reported no significant alteration in TC level whereas in our study statistically significant increase was seen in TC level in PIH women than in control group.

In this study, rise in LDL concentration in PIH women was observed than in normal pregnant women, and these results were statistically significant whereas Chappell et al¹⁷ showed rise in LDL concentration in pre-eclamptic but result was statistically insignificant.

CONCLUSION

This study showed a positive correlation between the serum lipids and PIH as compared to healthy pregnant women. Estimation of serum lipid profile in pregnant women could be a helpful diagnostic tool in the cases of PIH thus, preventing several critical problems in pregnancy such as premature delivery, intrauterine growth restriction, fetal death, maternal mortality and morbidity.

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