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To evaluate the status of serum lipid profile, β-hCG in pre-eclampsia compare with normal pregnancy-β-hCG as a predictors of preeclampsia

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Abstract
Background: Hypertensive disorders are among the commonest medical disorders during pregnancy & continue to be a major cause of maternal, perinatal morbidity and mortality worldwide. In developing countries like India, incidence is 3-14%.
Objective: In the present study we observe the status of lipid-peroxidation, lipid-profile & β-hCG levels in pre-eclampsia. The present study shows the increased lipid-peroxidation, lipid-profile except serum HDL and decreased β-hCG levels.
Methods: The present study is carried out on in the Department of Biochemistry and Department of Obs and Gynae on 200 antenatal patients attending outpatients in S.R.N Medical College Allahabad, over a period of twelve month during 2010-2012.
Result: In the present study we found increased lipid-profile (except HDL) and β- hCG levels in preeclampsia as compared to control. These results are statistically significant.
Conclusion: It is evident from the study that antenatal patients with elevated levels of serum βhCG and deranged lipid profile are at increased risk of developing hypertensive disorders of pregnancy in advanced pregnancy.

Keywords: preeclampsia, lipid profile, βhCG

Introduction

Preeclampsia is one of the leading causes of maternal and fetal mortality worldwide and a main cause of preterm labour. Women with a history of preeclampsia are at elevated risk for cardiovascular diseases later in life [1]. 2–7% of pregnant women are affected from preeclampsia (PE) [2] which occurred in the second half of pregnancy and is defined mainly by the symptoms hypertension and proteinuria. 5–8% of these women develop HELLP syndrome (hemolysis, elevated liver enzymes, and low platelet count).

Oxidative stress plays an important role in the pathogenesis of pre-eclampsia (Qiu *et al*. 2006) because it damages the maternal vascular endothelium,and there isindisputable evidence that the normal role of this cell layer is severely compromised in PE [3].Uncontrolled lipid peroxidation is a key contributing factor to pathophysiologic condition of preeclampsia [4, 5, 6, 7].

Elevated β-hCG levels in pre-eclampsia represented reactional hyperplasia of cytotrophoblastic cell to a slightly reduced oxygen supply. Hence elevated levels of β-hCG in second trimester may serve as predictor of pre-eclampsia.

The human chorionic gonadotropin (hCG) is a glycoprotein composed of two non-covalently linked subunits, α and β, and is produced by syncytiotrophoblast cells of the placenta. Maternal serum hCG peaks at 8 - 10 wk of gestation and then declines to reach a plateau at 18 - 20 wk of gestation. The free β-subunit can derive from three sources namely, direct trophoblast cell production, dissociation of hCG into free α- and free β-subunits, and by macrophage or neutrophil enzymes nicking the hCG molecules The free β-hCG circulating in maternal serum corresponds to only about 0.3-4% of the total hCG [8].

As preeclampsia is characterized by disturbed trophoblastic physiology, early placental dysfunction could be reflected by altered hCG levels [9].

Lipid profile as a predictor of preeclampsia is attributed to the metabolic alterations & risk factors which are similar in pre-eclampsia & arthrosclerosis and this might suggest a common pathophysiology [10]. Pregnancy is associated with physiological hyperlipidemia but in PIH they increase two fold [11, 12]. Abnormal lipoproteins levels are responsible for damage to endothelium that leads to high blood pressure, and proteinuria; these are important signs of PIH [13]. Association of serum lipids with gestational proteinuric hypertension is highly suggestive of a role for lipid profile analysis as a diagnostic tool.

This study was designed to evaluate the relationship between level of β hCG, lipid-peroxidation and lipid-profile test and severity of preeclampsia.

Material & Methods

This study was conducted in the Department of Biochemistry in collaboration with Obs and Gyn Department of Moti Lal Nehru Medical College, Allahabad. This study was performed on 200 pregnant women (in their IIIrd trimester of pregnancy) age between 20-35 years. All the pregnant women under our study were categorized under 2 groups that is, control group-(Normotensive pregnant women) and study group-(preeclamptic pregnant women). Details of the pregnant women such as age, height, weight, B.P. and name of the drug were recorded. There were 100 subjects in each group of study. For the biochemical parameters to be analyzed, blood samples were collected after an overnight fast the anticubital vein in all subjects. Plain vials were used for the estimation lipid profile. Total cholesterol and HDL-cholesterol were determined by Henly's method, while serum triglyceride was estimated by

Rosenberg and Gottfied method.
Data were statistically analyzed by unpaired T test and expressed in terms of 'P' value.

Result

The results with regard to the changes in lipid profile, in both groups are represented in Table 1 As shown total cholesterol level in both group are as follows: Control group (Normotensive group) 210.07 ± 22.22 and in study group (Preeclamptic group) 255.80 ± 33.93. The study group (Preeclamptic group showed significant rise with the p value of (P<0.01). HDL cholesterol level was found to be 48.88 ± 6.68 in control group (Normotensive) and 42.24 ± 3.65 in study group (Preeclamptic). The HDL cholesterol was found to be marginally lowered (P<0.01) in study group. It is evident that the mean LDL cholesterol was found to be 122.94 ± 17.81(mg %) in Normotensive group and 131.55 ± 23.48 (mg %) in the preeclamptic group showed a significant rise with the p value of (p<0.01). VLDL cholesterol level were 43.17 ± 8.14(mg %) in Normotensive group and 52.51 ± 19.06 (mg %) in preeclamptic group. The increase in VLDL- cholesterol in preeclamptic group was to be highly significant with the p value of (p<1.001). The mean Triglycerides (TG) was found to be 200.55 ± 46.20(mg %) in Normotensive group and 252.54 ± 37.40 in preeclamptic group. The increase level of TG in preeclamptic group was found to be highly significant (P<0.001) as compared to Normotensive group.

Observation Table

Table 1: Comparison of Mean Values of various components of Lipid profile and βhCG levels in study group and control group

S. No	Particulars	Study Group	Control group
1	Serum Total Cholestrol	255±33.98	219.07±22.27
2	Serum Triglycerides	252±37.40	200.55±46.20
3	Serum HDL	42.24±3.65	48.88±6.68
4	Serum VLDL	53.45±12.48	47.93± 13.28
5	Serum LDL	136±26.73	113.59±22.01
6	Serum βhCG (mIU/Ml)	1.90±0.50	1.08±0.30

Discussion

In the present study, all values of lipid profile were found to be significantly higher (except Serum HDL which was found to be significantly lowers in preeclampsia group) in preeclampsia as compared to normal pregnancy.
About two-third case in study group had total cholesterol levels more than four-fifth of cases in normotensive group. All cases in pre-eclampsia group and majority cases in normotensive group had S. TG levels more than 150mg/dl. Mean value of S. TG in pre-eclampsia group was found to be significantly higher (p<0.0001) relative to normotensive group i.e., 252.25±37.40 mg/dl & 200.55±46.20mg/dl respectively.
Many other studies showed the same results (Cekman *et al.* 2003[14], Enquobahrie *et al.* 2004 [15], Bayhan *et al.* 2005 [16], Maksane *et al.* [17]) they also found in their studies that S.TG levels in preeclampsia were significantly higher as compared to normotensive group.
In contrast to our data Vidyabati *et al.* (2010) [10] found that S. TG levels were higher in pre-eclampsia group, when compared to normotensive group, however this relation was not statistically significant. But Turnip *et al.* (2008) in their study found that S.TG levels decrease in preeclampsia compared to normotensive pregnant women.
All the cases in study group & more than three-fourth cases in control group had S. HDL levels in preeclampsia groups were significantly lower relatively normotensive group i.e 42.24± 3.65& 48.88±6.68 mg/dl respectively (p<0.0001)
Maksane *et al.* (2011) [17], found in their study that HDL-C level in preeclampsia group were significantly lower than normotensive group which was similar to our study.
Enquobahrie *et al.* (2004) [15] found S. HDL concentration were 7.07% lower in women with pre-eclampsia than in control group (p<0.0001) whereas, Vidyabati *et al.* (2010) [10] found in their study that HDL-C levels were higher in PIH group compared to normotensive group.
All the cases in pre-eclamptic group and more than 90% cases in normotensive group had S.VLDL levels more than 35mg/dl. Mean values of S. VLDL in pre-eclampsia group were
Our study show that mean β hCG level in preeclamptic women was 27,802.51 ± 2324.46 mIU/L which was significantly higher than pregnant normotensive women (12,551.08±1624.28) p-value was <0.001. The result of our study showed that there was significant difference between β hcg level of pregnant normotensive and preeclamptic women and the level of β hcg was higher in severe preeclampsia. Study of Dayal Meena, Gupta Paru [19] also shows higher level of β hcg in preeclamptic women 16,130.2 (.2.5 MoM) than normotensive pregnant women with β hcg level 4,621.8(0.95MoM) with p-value <.001. Another study conducted by Kanika Mandi, Munmun Das *et al.* [20] also support our findings. It seems that β hcg level in case of preeclampsia, in which there is placental perfusion disorder and severe damaging to placental cells. Therefore measuring the β hcg level may be an early sign for the diagnosis of the disease and prove to be an indicator of severity of the disease.
Patients with overt pre-eclampsia have been seen with increased maternal serum β-hCG level mainly in the third trimester. Study revealed that the100 placenta is the main source of β-hCG in the preeclamptic patients but whether this high circulating levels of beta hCG is due to placental overproduction, is not known. Some advocated that hCG secretion may be increased as a consequence of impaired trophoblastic invasion or placental immaturity [20]. It might result from the trophoblastic response to hypoxia with the development of a hyper secretory state [21].

Conclusion

The present study showed that elevated level of serum βhCG and dyslipidemia in early second trimester can be considered as predictors of subsequent PIH/Pre-eclampsia.

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