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RESEARCH ARTICLE

Lipid profile in pre-eclampsia and normal pregnancy

Jagannath Patar, Nilabh Acharjee

Corresponding author: Dr Nilabh Acharjee, PGT, Department of Obstetrics &Gynaecology, Tezpur Medical College, Tezpur, Assam, India; Email : nilabha03@gmail.com

ABSTRACT

Background: Pre-eclampsia is globally a cause of maternal and fetal morbidity and mortality. Hence, it is important to study the lipid profile and risk factors for prevention, management and prognosis of the disease. **Objectives:** Present study was conducted to observe differences between normal and preeclampsia lipid profiles. **Method and materials**: A case control study was conducted in the Obstetrics and Gynaecology department, Tezpur Medical college, Tezpur, Assam from March 2022 to February 2023. In this study 100 cases were selected, out of which 50 normotensive pregnant women as a control and 50 pre-eclampsia women as study group. All routine baseline investigations, serum lipid profile estimation was done by collecting blood samples from antecubital veins from every case and control following a fast of 12 - 14 hours in plain vials and then analyzed in the department of Biochemistry, Tezpur Medical college, Tezpur. **Results**: It was found that mean ± SD of triglyceride (224.30±38.41 mg/dl), total cholesterol (206.82±29.89 mg/dl) and LDL cholesterol (119.94±20.24 mg/dl) among the women in the study group was higher than the mean ± SD of triglycerides (178.06±21.0 mg/dl2), total cholesterol (166.64±18.80 mg/dl) and LDL cholesterol (90.22±15.41 mg/dl) among women in the control group. Again, mean ± SD of HDL cholesterol among the study group was lower than the mean ± SD of HDL cholesterol among the control group. Statistically, there is a significant difference in case of triglycerides, total cholesterol, HDL - cholesterol and LDL- cholesterol. **Conclusion**: Abnormal lipid profile during pregnancy plays an important role in the development of Pre-eclampsia.

Keywords: Pre-eclampsia, lipid profile, triglycerides, high density lipoproteins.

Elevated blood pressure and proteinuria after 20 weeks gestation in a previously normotensive patient confirm its diagnosis. Incidence is 3-5% worldwide [4]. Normal adaptive metabolic responses are exaggerated in pregnancy by preeclampsia. It manifests itself during second and third trimester [5]. In India, incidence varies 5-15%; primigravida 10% and multigravida 5% [6].

Mild preeclampsia: Blood pressure ≥140/90 mm of Hg on two measures at least 6 hours apart but not more than 7 days apart, and proteinuria ≥300 mg on a 24 hours urine or two dipstick results of at least 30mg/dl ("1+"). Severe preeclampsia: Blood pressure during bed rest ≥160/110 mm of Hg, and proteinuria ≥ 5 gm/dl on a 24 hours urine collection even if BP is in the mild range. In PE, hypertension is caused by vasospasm in the kidneys, uterus, placenta and brain. In pregnancy endothelial prostacyclin levels 8-10 times higher. Only 1-2 times greater in PE patient than normal pregnant women. Thromboxane levels also higher in PE than normal pregnant women [7]. Endothelial cell injury and its dysfunction results in pathogenesis of PE. Significant difference in lipid parameters and increased susceptibility to lipoprotein peroxidation – the most common factor associated with PE is placental vasculopathy compared to normal pregnancy. In PE, triglyceride related vasculopathy could be one etiological factor [8]. Endothelial cell destruction ensures vasospasm because prostacyclin is a vasodilator and thromboxane is a vasoconstrictor [9]. Increased lipid synthesis raises the thromboxane prostacyclin rate, which contributes to the pathogenesis of pregnancy induced hypertension [10]. In preeclampsia increased triglycerides are likely to be deposited in uterine spiral arteries and cause endothelial dysfunction directly and indirectly through

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generation of small dense LDL, cholesterol, resulting in endothelial dysfunction causing feto-placental insufficiency and proteinuria. Present study was conducted to observe differences between normal and preeclampsia lipid profiles.

Materials and methods

This is a case control study and was conducted on 100 selected cases in the Department of Obstetrics &Gynaecology, Tezpur Medical College, Tezpur who were regularly attended outdoor. 50 cases were with preeclampsia and 50 cases were normotensive as case control.

Inclusion criteria: singleton between 20-42 weeks gestation, 18-37 years of age and were known cases of preeclampsia.

Exclusion criteria: women with eclampsia, multiple pregnancies, severe anaemia and history of smoking or any other chronic medical illness were excluded.

Booked patients were admitted at term in the antenatal clinic on regular basis and also admitted as emergency, but those who never attended antenatal clinic are also admitted as emergency over a period of 1 year from March 2022 to February 2023. The cases were thoroughly examined and clinically assessed recording all information considered important and doing all investigations done viz. CBC, KFT, LFT, HIV, HBSAg, VDRL, Blood pressure, 24 hour urine sample was taken.

Estimation of serum lipid profile: Peripheral blood sample (5ml) was collected from antecubital vein from all cases including control group following a fast of 12-14 hours, collecting in vacutainer and sent for analysis. Sample were analyzed for serum triglyceride, total cholesterol, and HDL (high density lipoprotein) - cholesterol (C) by enzymatic methods with the help of ROCHE diagnostic kit in auto-analyzer Hitachi 912. Serum LDL (low density lipoprotein) - C was calculated by using Friedewald equation: LDL-C=TC-(TG/5+HDL-C).

Statistical analysis: Data was expressed as mean and percentage. Statistical analysis was done by using Chi-square, Mann Whitney test, Student T test. Statistical package for social sciences (SPSS- 22) and Microsoft Excel software were used for analysis. P <0.05 was considered as significant at 95% CI.

Results

In the present study table 1 shows that out of 50 patient of study, 26 (52%) cases are in the age group of 20-24 years, followed by 14 (28%) in the age group of 25-29 years, 6(912%) cases in <20 years and 4 (8%) cases are in the age group > 30 years. The youngest patient is 17 years and oldest is 33 years old in the study.

Table 1: Table showing age distribution of patients

Age (Years)	No. of patients	Percentage (%)
<20	6	12%
20—24	26	52%
25—29	14	28%
30-- >30	4	8%
Total	50	100%
Mean age	23.5	
SD	+4.24	

Table 2 shows that out of 50 cases selected, SBP (systolic blood pressure) between 141-160 mm of Hg in 25 (50%), 161-180 mm of Hg in 13 (26%), 181-200 mm of Hg in 10 (20%) and >200 mm of Hg in 2 (4%) cases.

Table 2: Table showing distribution of systolic blood pressure in the cases

SBP on admission (mm Hg)	No. of cases	Percentage
141-160	25	50%
161-180	13	26%
181-200	10	20%
>200	2	4%
Total	50	100%

Table 3 it was found that out of 50 cases selected, DBP (diastolic blood pressure) between 91-100mm of Hg in 9 (18%), 101-110 mm of Hg in 16 (32%), 111-120 mm of Hg in 20 (40%) and >120 mm of Hg in 5 (10%) cases.

Table 3: Table showing distribution of diastolic blood pressure in the cases

DBP on admission (mm Hg)	No. of cases	Percentage
91-100	9	18%
101-110	16	32%
111-120	20	40%
>120 mm Hg	5	10%
Total	50	100%

In table 4 it was found that mean ± SD of triglyceride, total cholesterol and LDL cholesterol among the women in the study group was higher than the mean ± SD of triglycerides, total cholesterol and LDL cholesterol among women in the control group. Again, mean ± SD of HDL-cholesterol among the study group was lower than the mean ± SD of HDL-cholesterol among the control group. Statistically, there is a significant difference in case of triglycerides, total cholesterol, HDL-cholesterol and LDL-cholesterol.

Table 4: Table with serum lipid profile of cases and controls

Parameters	Study Group; (Mean±SD) mg/dl	Control Group; (Mean±SD) mg/dl	P-value
Triglyceride	224.30±38.41	178.06±21.02	<0.001
Total cholesterol	206.82±29.89	166.64±18.80	<0.001
HDL-cholesterol	38.92±6.09	45.64±4.69	<0.001
LDL-cholesterol	119.94±20.24	90.22±15.41	<0.001

SD – Standard deviation, HDL – High density lipoprotein, LDL – Low density lipoprotein

Discussion

It has been many discussions about the role of lipid metabolism in the development of preeclampsia (PE). The

lipid changes are thought to play a role in the endothelial cell damage that is characteristic of PE. All cells and tissues have low level of lipid peroxidation. In good health, free radicals and antioxidant are balanced [11]. It has been seen in previous studies that plasma lipid levels in preeclampsia were higher than in healthy pregnant women [12, 13].

This present study was conducted to compare serum lipid in preeclampsia and normal pregnancy. In the preeclampsia group, mean ± SD serum triglyceride level was 224.30 ± 38.41 mg/dl. But, in the control group, the mean ± SD of serum triglyceride level was 178.06 ± 21.02 mg/dl; this difference is statistically significant. Jayanta De et al [14], and Torun Clausen et al [15], also observed a significant increase in triglyceride levels in preeclampsia women than normotensive.

In our study, mean serum concentration of total cholesterol is 166.64 ± 18.80 mg/dl in controls and 206.82 ± 29.89 in preeclampsia; the difference is statistically significant. Shruthi Mohanty et al [16], Md. Zakir H et al [17], also observed a significant increase in total cholesterol levels in preeclampsia than normotensive women.

In this study, mean serum concentration of LDL cholesterol is 90.22 ± 15.41 mg/dl in control group and 119.94 ± 20.24 mg/dl in preeclampsia group; Torun Clausen et al [15], Carlos A Negrato et al [18], also observed a significant increase in LDL cholesterol levels in preeclampsia cases than normotensive cases.

In our study, mean serum concentration of HDL cholesterol is 45.64 ± 4.69 mg/dl in control and 38.92 ± 6.09 mg/dl in preeclampsia women; the difference is statistically significant. S Ware Jauregui et al [19] and Carlos A Negrato et al[18] also observed a significant decrease in HDL cholesterol levels in preeclampsia women compared to normal.

Conclusion

Abnormal lipid profile during pregnancy plays an important role in the development of pre-eclampsia. Raised triglycerides, LDL-C and decreased HDL-C leads to the development of preeclampsia by causing oxidative stress and endothelial dysfunction. Chance of recurrence in the next pregnancy is high. By detecting the lipid profile changes in early pregnancy, it is helpful in early diagnosis and can prevent and slow down the progress of the disease by medication or lifestyle modification.

Conflict of interest: None. **Disclaimer:** Nil.

References

1. Pai M, Kushtagi P, Daftary SN, Chakravarti S. Holland and Brews, Manual of Obstetrics. Preeclampsia. 4th Ed. New Delhi: Elsevier; 2015. p. 86-95
2. Magnussen EB, Vatten LJ, Lund-Nilsen TI, Salvesen KA, Romundstad PR. Prepregnancy cardiovascular risk factors as predictors of preeclampsia: population based cohort study. BMJ. 2007; 335(7627): 978-81.
3. Mittendorf R, Latin KY, Williums MA, Walker CK. Preeclampsia - A nested , case control study of risk factors and their interactions. The Journal of reproductive medicine. 1996; 41(7): 491-96.
4. Wang A, Rana S, Karumanchi SA. Preeclampsia: the role of angiogenic factors in its pathogenesis. Physiology. 2009; 24(3): 147-58.
5. Aziz R, Mahboob T. Preeclampsia and lipid profile. Pakistan journal of medical sciences. 2007; 23(5): 751-54.
6. Dutta DC. Hypertensive disorders in pregnancy. In: Konar HL, editor. Text book of Obstetrics. 7th Ed. Kolkata: New central book agency; 2011. p. 220-21.
7. Fitzgerald DJ, Entman SS, Mulloy K. Biosynthesis proceeding the clinical manifestation of pregnancy induced hypertension. Circulation. 1987; 75 (5): 956-63.
8. Ray JG, Diamond P, Singh G, Bell CM. Brief overview of maternal triglycerides as a risk factor for preeclampsia. BJOG: An International journal of Obstetrics and Gynaecology. 2006; 113(4): 379-86.
9. Redman CWG. Immunology of preeclampsia. Semin Perinatol. 1991; 15: 257-62.
10. Robson SC. Dewhurt's text book of Obstetrics and Gynaecology for Postgraduates. New York: Blackwell Sciences Ltd; 1996. p.167-69.
11. Agarwal A, Gupta S, Sharma RK. Role of oxidative stress in female reproduction. Reproductive biology and endocrinology. 2005; 3(1): 1-21.
12. Sattar N, Bendomir A, Berry C, Shepherd J, Greer IA, Peckard CJ. Lipoprotein subfraction concentration in preeclampsia: pathogenic parellels to atherosclerosis. Obstetrics &Gynaecology. 1997; 89(3): 403-8.
13. Hubel CA, McLaughlin MK, Evans RW, Hauth BA, Sims CJ, Roberts JM. Fasting serum triglycerides, free fatty acids and malondialdehyde are increased in preeclampsia, are positively correlated, and decreased within 48 hours post-partum. American Journal of Obstetrics &Gynaecology. 1996; 174(3): 975-82.

14. De J, Mukhopadhyay A, Saha PK. Study of serum lipid profile in pregnancy induced hypertension. Indian Journal of Clinical Biochemistry. 2006; 21(2): 165-68.
15. Clausen T, Djurovic S, Henriksen T. Dyslipidemia in early second trimester is mainly a feature of women with early onset preeclampsia. British Journal of Obstetrics and Gynaecology. 2001; 108(10): 1081-87.
16. Mohanty S, Nayak N, Nanda NN, Rao P. Serum lipids and malondialdehyde levels in primiparous patients with pregnancy induced hypertension. Indian Journal of Clinical Biochemistry. 2006; 21(1): 189-92.
17. Howlader ZH, Kabir Y, Kha TA, Islam R, Begum F, Huffman FG. Plasma lipid profile, lipid peroxidation and antioxidant status in preeclamptic and uncomplicated pregnancies in Bangladesh. J Med Sci. 2007; 7(8): 1276-82.
18. Negrato CA, Jovanovic L, Tambascia MA, Geloneze B, Dias A, Calderon ID, et al. Association between insulin resistance, glucose intolerance, and hypertension in pregnancy. Metabolic syndrome and related disorders. 2009; 7(1): 53-9.
19. Ware-Jauregui S, Sanchez SE, Zhang C, Laraburre G, King IB, Williams MA. Plasma lipid concentrations in preeclamptic and normotensive Peruvian women. International Journal of Gynaecology and Obstetrics. 1999; 67(3): 147-55.

Jagannath Patar [1], Nilabh Acharjee [2]
[1] Associate Professor, Department of Obstetrics &Gynaecology, Tezpur Medical College, Tezpur, Assam, India; [2] PGT, Department of Obstetrics &Gynaecology, Tezpur Medical College, Tezpur, Assam, India.