LIPID PROFILE IN PREECLAMPSIA PATIENTS AS COMPARED TO NORMAL PATIENT

Kayastha S, Tiwari B, Subedi R

Department of Obstetrics and Gynecology, Nepal Medical College Teaching Hospital, Attarkhel, Gokarneshwor-8, Kathmandu, Nepal

ABSTRACT

The main objective of the study was to see the association of dyslipidemia in preeclampsia (PET) as compare to normotensive (NT) patients. It was a descriptive study done in Nepal Medical College Teaching Hospital Department of Obstetrics and Gynecology from April 2019 from April 2020. A total of 75 PET (test group) and 75 NT (control group) in their third trimester were included. Their fasting lipid profile was studied. It was found that triglyceride (TG) and very low density lipoprotein (VLDL) was significantly high among PET group as compared to that of NT patients. The mean TG of PET group was 266.11± 98.61 and the NT group was 187±58.56 (p=0.00) and the mean VLDL of PET group was 46.00±15.31 and NT group was 37.88±12.85 (p=0.001). On the other hand, the total cholesterol (TC), low density lipoprotein (LDL) and high density lipoprotein (HDL) were not significantly different in both the groups. It was also found that with the severity of the disease (Preeclampsia), the level of TG and VLDL increased significantly. Therefore, among the investigation done for PET, we should include lipid profile, especially the TG and VLDL. Furthermore, TG and VLDL should be measured serially (at least once a week) so as to predict the progress of PET and manage the patient accordingly.

KEYWORDS

Breastfeeding, Caregivers, Knowledge
Preeclampsia, lipid profile, TG, LDL, VLDL, HDL, TC, Nepal

CORRESPONDING AUTHOR

Dr. Sanita Kayastha,
Associate Professor
Department of Obstetrics and Gynecology,
Nepal Medical College Teaching Hospital, Attarkhel,
Gokarneswor-8, Kathmandu, Nepal.
Email: sanitakayastha@gmail.com
Orcid No: https://orcid.org/0000-0003-3243-2564
DOI: https://www.doi.org/10.3126/nmcj.v22i4.34189

INTRODUCTION

Preeclampsia (PET) is hypertension of 140mm Hg systolic and/or 90mm Hg diastolic or more than that on at least two occasions, done 6 hours apart after the 20 week of gestation in women known to be normotensive (NT), associated with proteinuria.[1,2] The incidence of PET globally is 2-10% of all pregnancy.[3,4] PET is one of the commonest cause of maternal mortality and perinatal morbidity and mortality.[5-7] It is a multisystem disorder, and affects almost all the organ of the body. However, it's exact etiopathology is not known till now.

During course of the normal pregnancy, level of total cholesterol (TC), triglyceride (TG), low density lipoprotein (LDL) increases. TC is required for placental steroid synthesis and stores in mothers' body. Compare to normal pregnancy, PET is directly associated with significant increased levels of TC, TG, LDL and very low density lipoprotein (VLDL) where as the high density lipoprotein (HDL) is decreased as compared to normal pregnancy and has been proposed that in preeclampsia, increased levels of circulating lipids result in their accumulation within cells.[8,9] This accumulation decreases the release of prostacyclin resulting in oxidative stress via endothelial dysfuntion. Thus, the maternal endothelial dysfunction is classic hallmark of PET.[10]

There were many studies done to see the level of dyslipidemia in PET patients but the findings were inconsistent.[11-19] A large systematic meta-analysis was done to see the association of dyslipidemia in PET patients with the inclusion of 74 studies (from 1950 - July 2013) in which they found that TC, TG LDL and VLDL was significantly increased and HDL was decreased.[11] Similar findings were observed in studies done by Anuradha and her team[12] and Despande *et al*[13] whereas in some studies significant rise of only TG was found as compared to NT group.[14-16] Many studies observed that PET preceded by dyslipidaemia in first and second trimester particularly hypertriglyceridemia and elevated lipoprotein which indicates that they may be etiologic and pathophysiologic mechanism responsible for PET.[17-19] In paper describes the association of dyslipidemia in PET group as compared to NT group of pregnancy at a tertiary care center in Nepal.

MATERIALS AND METHODS

This cross-sectional descriptive study was done at Department of Obstetrics and Gynecology of Nepal Medical College Teaching Hospital from April 2019 - April 2020. Ethical approval was taken Nepal Medical College Institutional Review Committee. The patients taking part in the study were explained about the study, the extra expenditure and written consent was taken.

Patients with PET in third trimester (28 weeks till 41 weeks) were selected as the test group (n=75). The patients with history of diabetes, hypertension, renal disease, liver disorders, multiple pregnancies were excluded. The NT group (n=75) (control group) of same period (third trimester) were also selected. Detailed history of the test and control group of patient regarding age, parity, gestation was taken. The pregnant women of both the groups were advised to do fasting lipid profile test (i.e. TG, TC, LDL, VLDL and HDL) at the central clinical laboratory of the hospital. The laboratory test results were collected and mean of the all the parameters were calculated and were tested for statistical significance by applying the chi-square test using SPSS 16.0 software.

RESULTS

The patient characteristics (similar in the two groups) are shown in the Table 1. The mean systolic blood pressure of PET group was 149.33±16.05 where as in the NT group (control) was 106.27±13.13 (p = 0.000). The diastolic

Table1: Demographic features of NT and PET groups

Characteristics	Category	NT group (n=75)	PET group (n=75)	t/χ^2 χ^2-value	p-value
Age in years		27.57 ± 4.98	26.92 ± 5.62	0.769	0.443
Parity	1	38(50.67%)	43(57.33%)	0.671*	0.413
	≥2	37(49.33%)	32(42.67%)		
Blood pressure	Systolic	106.27 ± 13.13	149.33 ± 16.05	17.986	0.000
	Diastolic	72.27 ± 13.31	99.87 ± 10.19	14.252	0.000

*Pearson Chi-Square

Table 2: Serum lipid profile among NT and PET groups

Characteristics	NT (n=75)	PET(n=75)	Mann-Whitney U value	p-value
Total cholesterol	184.88 ± 38.04	198.25 ± 60.85	2326.5	0.068
High density lipoprotein	51.28 ± 18.06	51.19 ± 15.44	2668.5	0.588
Low density lipoprotein	102.80 ± 34.13	96.45 ± 46.05	2347.5	0.080
Very low density lipoprotein	37.88 ± 12.85	46.00 ± 15.31	1899.5	0.001
Triglyceride	187.00 ± 58.56	266.11 ± 98.61	1328.0	0.000

Table 3: Statistical significance of serum lipid profile of mild and severe PET as compared to normal pregnancy

Serum Lipids	Category	No. of Patients	Mean	SD	Chi-square	p-value
Total cholesterol	Normal	75	184.88	38.04	3.366	0.186
	Mild PET	47	194.26	56.29		
	Severe PET	28	204.96	68.37		
High density lipoprotein	Normal	75	51.28	18.06	2.172	0.338
	Mild PET	47	51.55	15.73		
	Severe PET	28	50.57	15.21		
Low density lipoprotein	Normal	75	102.8	34.13	3.717	0.156
	Mild PET	47	97.74	40.84		
	Severe PET	28	94.29	54.45		
Very low density lipoprotein	Normal	75	37.88	12.85	15.759	0.000
	Mild PET	47	43.85	15.96		
	Severe PET	28	49.61	13.66		
Triglyceride	Normal	75	187.00	58.56	42.670	0.000
	Mild PET	47	237.53	90.49		
	Severe PET	28	314.07	94.29		

Kruskal- Wallis H test

blood pressure of PET group was 99.87±10.19 whereas in NT group was 72.27±13.31 (p = 0.000).

The mean lipid profile values of the both the groups are shown in the Table 2. The mean TG in PET group was 266.11±98.61 and NT group was 187.00=58.56 (p = 0.00). VLDL of PET group was 46.00±15.31 and NT group was 37.88±12.85 (p = 0.001). The value of TG and VLDL of PET group were significantly high as compared to the NT group whereas the TC (p=0.068), LDL (p=0.080), HDL (P=0.588) were similar in each group. A total of 28 cases (37.33%) of severe PET group and total 47 cases (62.66%) of mild PET were observed. When mild and severe PET were compared with the control group with the severity of the disease from mild to severe PET, the value of TG and VLDL also increases significantly (Table 3). Such finding was not observed in case of TC, LDL and HDL.

DISCUSSION

PET is one of the commonest medical condition encountered in pregnancy. It is associated with various complications and even maternal mortality.[5] A total of 60,000 maternal death world-wide per year are estimated due to PET.[20] If timely detection and management of the cases of PET in tertiary level hospital, we can avoid the complications of the conditions. The most important factor for the management of the problem is diagnosis of the condition in time. Furthermore, if we can predict the disease, we

are more prepared to confront the problem, plan the pregnancy with timely intervention.

In this study, we have studied the lipid profile of patient with preeclampsia (PET group) along with those of normal patients (NT group) in third trimester with the similar age and parity. In our study, the TG and VLDL values were significantly higher among PET group than in NT group (control) (p = 0.001). There was no significant difference in TC, LDL and HDL level in both the groups. These finding were similar to the study done by Lima and his team.[21] In their study, the TG and VLDL values were highly significant (P = <0.0001) and compared to control group. De and his group[22] studied lipid profile in all three trimester. They also found significant elevation of TG and VLDL in third trimester as compared to NT patient. In the study done by Das and his team,[23] however, only rise of TG was found in the preeclampsia patients (PET group) as compared to normal patient (NT group) (p = <0.002) and no difference in other parameters of lipid profile were observed. The rise in only the TG value have found in many other studies as well.[24,25] Ray *et al*[26] reported that women with elevated TG had twice the risk of PET abnormalities. It was also suggested that TG assessment between 28 to 32 wks could be predictive of PET.[27]

In our study we also found that with severity of the disease, the level of TG and VLDL increased significantly. Similar finding was present in the study done by Anuradha and her team.[11] However, in their study along with TG and VLDL, LDL and TC also increased significantly. Thus serial lipid profile specialy TG and HLDL can be done once a week in cases of PET to the plan the further management and delivery of the baby.

We can include lipid profile as routine investigation to be carried out in cases of PET. Also in some selective cases of high risk patient such as obesity, chronic hypertension, history of fetal loss and bad obstetric history lipid profile can be done to predict the disease around 28 to 32 weeks of gestation, so that we can be more careful of these cases.

REFERENCES

1. Cunningham F J, Norman FG, Kenneth J L *et al*. Hypertensive disorders in pregnancy. Williams Obsterics, 22Edition, Megraw Hill 2005; 761-64.
2. Ray IG, Diamond P, Sing G, CM Bell. Brief overview of Maternal triglycerides as a risk factor for preeclampsia. *Brit J Obstet Gynaecol* 2006; 113: 379-86.
3. Linmark G, Lindmark G, Lindberg B, Hogstedt S. The incidence of hypertensive disease in pregnancy. *Acta Obset Gynaecol Scand Suppl* 1984; 118: 29-32.
4. Report of the National High Blood Pressure Education Program Working Group on High Blood Pressure in Pregnancy. *Am J Obstet Gynaecol* 2000; 183: S1-S22.
5. Chesley LC. History and epidemiology of preeclampsia- eclampsia. *Clin Obstet Gynaecol* 1984; 27: 801-20.
6. Eskenazi B, Fenster L, Sidney S, Elkin EP. Fetal growth retardation in multiparous and nulliparous women with preeclampsia. *Am J Obstet Gynaecol* 1993; 169: 1112-8.
7. Williams KP, McLean C. Peripartum changes in maternal cerebral blood flow velocity in normotensive and preeclamptic patients. *Obstet Gynaecol* 1993; 82: 334-7.
8. Ghio A, Bertolotto A, Resi V *et al*. Triglyceride metabolism in pregnancy. *Adv Clin Chem* 2011; 55: 133-53.
9. Taylor R, Robert J. Endothelial Cell Dysfuntion. 3rd ed. San Diego,CA : Elsvier, 2009.
10. Deanfield J, Donald A, Ferri C *et al*. Endothelial function and dysfunction. Part 1: Methodological issues for assessment in the different vascular beds: a statement by the working Group on Endothelin and Endothelial Factors of the European Society of hypertension. *J Hypertens* 2005; 23: 7-17.
11. Spracklen CN, Smith CJ, Softlas FA, Robinson GJ, Ryckman KK. Maternal hyperlipidemia and the risk of preeclampsia: a meta – analysis. *Am J Epidiomol* 2014; 180: 346-58.
12. R Anuradha, Durga T. Estimation of lipid profile among preeclampsia woman by comparing with normal pregnancy. *Inte Contemp Med Res* 2016; 3: 1958-61.
13. Deshpande H, Chandrakant M, Punam V,= *et al*. Study of serum lipid profile in pregnancy induced hypertension. *Indian J Appres* 2016; 5446-8.
14. Das S, Char D, Sarkar S *et al*. Comparision of lipid profiles in normal pregnancy and in preeclampsia: a case control study. *J Dental Med Sci* 2013; 11: 53-8.
15. Enquobahrie DA, Williams MA, Butler CL *et al*. Maternal plasma lipid concentrations in early pregnancy and risk of preeclampsia. *Am J Hypertens* 2004; 17: 574-81.

16. Cekmen MB, Erhagci AB, Balat A *et al*. Plasma lipid and lipoprotein concentrations in pregnancy induced hypertension. *Clin Biochem* 2003; 36: 575-8.

17. Lorentzen B, Endresen M, Clausen T, Henkrisen T. Fasting serum free fatty acids and triglycerides are increased before 20 wks of gestation in women who later develop preeclampsia. *Hypertens pregnancy* 1994; 13: 103-9.

18. Clausen T, Djurvic S, Henkrisen T. Dyslipidemia in early second trimester is mainly a feature of women with early onset preeclampsia. *Br J Obset Gynaecol* 2001; 108: 1081-7.

19. Wladimiroff JW, Van den Elzen HJ, Cohen-Overbeek TE, De Bruijin AJ, Grobee DE. Serum lipids in pregnancy and risk of preeclampsia. *Br J Obstet Gynaecol* 1996; 103: 117-22.

20. W orld Health Organisation. The world health report 2005: Make every mother and child count. Geneva: World Health Organisation; 2005

21. Lima VJ, Andrade CR, Ruschi G N, Sass N. Serum lipid levels in pregnancies complicated by preeclampsia. *Sao Paulo Med J* 2011; 129(2): 72-3.

22. De J, Mukhopadhyay AK, Saha PK. Study of Serum lipid profile in pregnancy induced hypertension. *Indian J Clin Biochem* 2006; 21: 165-8.

23. Das S, Char D, Sarkar S *et al*. Comparison of lipid profile in normal pregnancy and in preeclampsia: a case control study. *J Dental Med Sci* 2013; 11: 53-5.

24. Enquobahrie DA, Williams MA, Butler CA *et al*. Maternal plasma lipiconcentrations in early pregnancy and risk of preeclampsia. *Am J Hypertens* 2004; 17: 574-81.

25. Cekmen MB, Erhagci AB, Balat A *et al*. Plasma lipid and lipoprotein concentrations in pregnancy induced hypertension. *Clin Biochem* 2003; 36: 575-8.

26. Ray JG, Diamond P, Singh G, Bell CM. Brief overveiw of maternal triglyceride as the risk factor for preeclampsia. *Br J Obstet Gynaecol* 2006; 113: 379-86.

27. Ziaei S, Bonab KM, Kazemnejad A. Serum lipid levels at 28-32 weeks gestation and hypertensive disorders. *Hypertens Pregnancy* 2006; 25: 3-10.