

ORIGINAL ARTICLE

SIGNIFICANCE OF LIPID PROFILE IN ANTENATAL PATIENTS FOR EARLY DIAGNOSIS OF PREECLAMPSIA

Fiza Ali Khan, Tallat Naz*, Arfa Azhar**, Fatima Abid*, Noorunnisa Memon*,
Tariq Kamal Jafri*

Department of Obstetrics and Gynaecology, Unit 2, Dr. Ruth KM Pfau, Civil Hospital, Karachi, *Department of Physiology, Sindh Medical College, Jinnah Sindh Medical University, Karachi. **Department of Biological and Biomedical Sciences, Agha Khan University Hospital, Karachi, Pakistan

Background: Preeclampsia is a pregnancy disorder identified by the inception of elevated blood pressure in addition to the presence of major quantity of protein in the urine. The aim of this study was to determine the importance of lipid profile in antenatal patients presenting with hypertriglyceridemia for early diagnosis of preeclampsia at the time of delivery at tertiary care hospital located in Karachi. **Methods:** This cross-sectional research was done from 1st April to 1st October 2018, at Department of Obstetrics and Gynaecology, JPMC, Karachi. A total of 105 antenatal patients with age limit 18–40 years, single viable pregnancy with gestational age 20th to 40th week were included. Data was analyzed using SPSS-20; Mean±SD, frequencies and percentages were calculated. Chi-square and *t*-tests were applied as per requirement of data, and $p \leq 0.05$ was considered as significant. **Results:** The mean age of the subjects was 29.67±5.13 with parity 1.21±0.67 and the gestational period 34.67±3.53 weeks. The mean value of serum Triglyceride was 285±40 mg/dL (201–372 mg/dL). The frequency of preeclampsia in hypertriglyceridemia subjects was 15 (14.29%) and that of eclampsia was 2 (13.33%). The age of mother, foetal age, parity as well as level of triglycerides in blood serum has influence on incidence of preeclampsia and its outcomes. **Conclusion:** Our results signify the importance of fasting lipid profile in screening antenatal patients for early diagnosis and prevention of future complications in the mother as well as the child.

Keywords: Hypertriglyceridemia, Preeclampsia, Eclampsia, Lipid profile, Antenatal, Pregnancy

Pak J Physiol 2019;15(4):24–6

INTRODUCTION

Preeclampsia is a pregnancy disorder characterized by incidence of hypertension (systolic blood pressure ≥ 140 mmHg and diastolic blood pressure ≥ 90 mmHg on at least two occasions 4 hours apart after 20 weeks of gestation but before the onset of labour, or postpartum) along with considerable proteinuria in an otherwise healthy expecting woman on or after the 20th week of gestation.¹ On its occurrence, the stage becomes evident following 20 weeks of pregnancy.² The advanced stage of the disease may be characterized by red blood cell collapse, a lowered blood platelet count, damaged liver function, kidney abnormality, inflammation, breathing difficulty due to lung fluid, as well as visual disorders.³ The dangers and threats for the mother as well as the baby increase immensely with the occurrence of Preeclampsia.⁴ The delay in treatment of preeclampsia can lead to an advanced stage known as eclampsia resulting in seizures.⁵

Preeclampsia influences approximately 8–10% of the pregnancies and is a foremost reason of maternal death, resulting in an anticipated 60,000 maternal in addition to 900,000 perinatal deaths, worldwide each year.⁶ Though extensive studies have been conducted, exact pathophysiological features of this disease are not clear. Preeclampsia is identified by placental hypoxia⁷ and the endothelial dysfunction is accountable (with

reference to hypoxia), that occurs due to disturbance of lipoprotein metabolism particularly triglyceride rich lipoproteins.⁸ Furthermore, the irregular lipid profiles lead to oxidative stress as well as vascular dysfunction in preeclampsia.⁹ The atherogenic small low-density lipoproteins (LDL) in addition to the vascular cell adhesion molecules (VCAM) are augmented in hyperlipidemia in preeclampsia.¹⁰ Pregnancy is closely associated with physiological hyperlipidemia where the circulating volumes of triglycerides as well as cholesterol levels markedly increased.¹¹ Women suffering from preeclampsia showed change in the serum lipids profile towards dyslipidemia.¹²

Preeclamptic women's profiles display an increased volume of small size low density lipoproteins, a decrease in high density lipoprotein along with an increase in serum free fatty acids. The actuality that the subjects having preeclampsia demonstrated dyslipidemia, exemplified by elevated levels of triglycerides in addition to VLDL, specifies that there are linked edges between preeclampsia as well as the endothelial lesions.¹³ Quantification of serum triglycerides has a verified prognostic value in preeclampsia, which can be utilized as a useful tool lessening the danger of preeclampsia along with its complications by timely prediction of the disease. This study was aimed to identify the frequency of preeclampsia in hypertensive pregnant women and to

understand the importance of lipid profile of antenatal patients with regard to preeclampsia. This approach may help in taking appropriate clinical measures as well as life style modifications to curtail the mother and child morbidity as well as mortality at earlier stages.

MATERIAL AND METHODS

It was a descriptive, cross-sectional study, conducted at Obstetrics and Gynaecology Ward No. 9, Jinnah Postgraduate Medical Centre, Karachi, from 1st April to 1st October 2018. The sample size was 105, calculated at 7.2% occurrence of preeclampsia in hypertriglyceridemic subjects¹⁴, with level of significance as 95%, margin of error at 5%, ($\alpha=0.05$). Consecutive non-probability sampling technique was used for data collection.

Subject with age group 18–40 years, with their foetal gestational age limit 20–40 weeks, single foetus, and with laboratory finding indicative of hypertriglyceridemia were included in this study. Subjects with twin pregnancy, multiple gestations, continuous hypertension, ischemic heart disorders, diabetes mellitus, renal or autoimmune disorders, hepatic dysfunctions, as well as those who were taking medicine that might alter lipid levels, or those who were taking diuretics were excluded from this study.

A total of 2,310 patients were admitted to Gynaecology Ward-9 during the study period, 618 from them were assessed for serum triglycerides. From them 105 subjects with hypertriglyceridemia were included in the study after taking their consent to participate in the study. They were then observed for positive symptoms of preeclampsia. Urine dipstick test was performed for proteinuria. Constant monitoring of blood pressure was also done to see any increase in blood pressure. Data was analyzed using SPSS-20. Maternal characteristics were compared by using the chi-square test for categorical variables and Student's *t*-test for continuous variables.

RESULTS

The Mean age of subjects was 29.67±5.13 years (Range: 19–40 years), the mean gestational age was 34.67±3.53 weeks (Range: 20–39 weeks), whereas, the mean value of serum triglycerides was observed to be 285±40 mg/dL (Range: 201–372 mg/dL). The mean value for systolic blood pressure was 172±20 mmHg and the diastolic blood pressure was 100±06 mmHg (Ranges from 140/95 to 210/110 mmHg), as shown in Table-1.

Spot urine dipstick test for proteinuria in hypertriglyceridemia patients showed that 15 (14.29%) subjects were positive for proteinuria, (Table-2). These patients also showed to have high blood pressure and were identified as positive cases of preeclampsia. This study was continued along with regular assessment for various maternal and foetal

abnormalities in these 15 patients till they had deliveries.

The incidence of preeclampsia was higher in patients with extremely high levels of serum triglycerides (301–400 mg/dL) as compared to those having slightly increased serum triglycerides (201–300 mg/dL), the differences were statistically significant ($p<0.05$).

Table-1: Descriptive statistics (n=105)

Parameters	Mean±SD
Age (Years)	29.67±5.13
Gestational age (Weeks)	34.67±3.53
Systolic blood pressure	172±20
Diastolic blood pressure	100±06
Serum triglycerides (mg/dL)	285±40

Table-2: Frequency of preeclampsia in patients with hypertriglyceridemia

Variables	Serum triglycerides (mg/dL)		<i>p</i>
	201–300 (n=34)	301–400 (n=71)	
Preeclampsia (n=15)	3 (8.82%)	12 (16.9%)	0.030

DISCUSSION

Preeclampsia causes difficulties in about 5% of all pregnancies worldwide. It is a major cause of maternal and foetal morbidity and mortality.¹⁵ The increased levels of serum lipids especially triglycerides is associated with the incidence of preeclampsia. Preeclampsia was developed in 14.29% of hypertriglyceridemia patients in our study, which is consistent with previous similar studies where the frequency ranges from 12.2% to 19%.¹⁰ The liver and brain of the mothers get affected in preeclampsia¹⁶, and pathological assessment of the liver showed the evidence of periportal and sinusoidal fibrin that may lead to haemorrhage and necrosis in advanced stages.¹⁷

Previously, the relationship between levels of serum lipids including serum cholesterol, LDL, HDL, and triglycerides, with pregnancy-associated diseases including preeclampsia were studied. The results showed that preeclamptic women had high levels of serum triglyceride as compare to normal pregnancies.¹⁸ Data from Amsterdam Born Children and their Development (ABCD) study also showed positive association between preeclampsia and the levels of overall cholesterol and triglycerides during initial stages of pregnancy. That study suggested that by investigating the lipid profile and emphasis on reducing triglyceride serum volumes in pregnant women will reduce the risk of hypertensive difficulties during pregnancy as well as undesirable delivery outcome.¹⁹ Lipid metabolism contributes in pathophysiological disturbance in triglycerides and HDL-cholesterol levels, delayed triglycerides clearance and high blood pressure. All of them increased the risk of preeclampsia and eclampsia.²⁰ Measuring the serum lipid level in initial stages of

pregnancy serve as a screening tool to identify dyslipidemia and risk of developing preeclampsia.²¹⁻²³

In the present study, the incidence of preeclampsia was not very high. It might be because this study was conducted in a government tertiary care hospital in the heart of the city which is not representing a community-based data. Physicians must give due attention to estimation of serum lipid profile to reduce dangerous health conditions both for the mother and the foetus. Preeclampsia is just not a hypertensive state of pregnancy but also a deadly disease²⁴ which can eventually cause death of the mother and the child in advanced stages.

CONCLUSION

Present study highlighted the significance of lipids, in particular the serum triglycerides, playing an important part in the development of preeclampsia in pregnant patients.

RECOMMENDATION

1. Checking of lipid profile of all antenatal patients for the most appropriate preventive measures to be taken for safety and health of the mother and child.
2. It is also recommended that pregnant women identified with increased serum triglyceride levels should be further examined for preeclampsia.

REFERENCES

1. Roberts LM, Davis GK, Homer CS. Pregnancy with gestational hypertension or preeclampsia: A qualitative exploration of women's experiences. *Midwifery*. 2017;46:17-23.
2. Al-Jameil N, Aziz Khan F, Fareed Khan M, Tabassum H. A brief overview of preeclampsia. *J Clin Med Res* 2014;6(1):1-7.
3. Nomura Y, John RM, Janssen AB, Davey C, Finik J, Buthmann J, *et al.* Neurodevelopmental consequences in offspring of mothers with preeclampsia during pregnancy: underlying biological mechanism via imprinting genes. *Arch Gynecol Obstet* 2017;295(6):1319-29.
4. Xiong X, Demianczuk NN, Saunders LD, Wang FL, Fraser WD. Impact of preeclampsia and gestational hypertension on birth weight by gestational age. *Am J Epidemiol* 2002;155(3):203-9.
5. Mammaro A, Carrara S, Cavaliere A, Ermito S, Dinatale A, Pappalardo EM, *et al.* Hypertensive disorders of pregnancy. *J Prenat Med* 2009;3(1):1-5.
6. Jeyabalan A. Epidemiology of preeclampsia: impact of obesity. *Nutr Rev* 2013;71(Suppl 1):S18-25.
7. Soleymanlou N, Jurisica I, Nevo O, Ietta F, Zhang X, Zamudio S, *et al.* Molecular evidence of placental hypoxia in preeclampsia. *J Clin Endocrinol Metab* 2005;90(7):4299-308.
8. Lamarca B. Endothelial dysfunction. An important mediator in the Pathophysiology of Hypertension during Preeclampsia. *Minerva Ginecol* 2012;64(4):309-20.
9. Chavda B, Trivedi RS, Sakariya K, Sorani A, Machhar P, Savalia C. A comparative study of serum triglyceride between preeclamptic primigravida and normal primigravida. *Int J Basic Appl Physiol* 2018;7(1):137-40.
10. Gohil JT, Patel PK, Gupta P. Estimation of lipid profile in subjects of preeclampsia. *J Obstet Gynaecol India* 2011;61(4):399-403.
11. Karim KMR, Parvin F, Ali L. Glycemic and Lipidemic Status in Different Trimester of Pregnancy. *Bangladesh J Nutr* 2009-10;22-23:53-60.
12. Sharami SH, Tangestani A, Faraji R, Zahiri Z, Amiri A. Role of dyslipidemia in preeclamptic overweight pregnant women. *Iran J Reprod Med* 2012;10(2):105-12.
13. Lima VJ, Andrade CR, Ruschi GE, Sass N. Serum lipid levels in pregnancies complicated by preeclampsia. *Sao Paulo Med J* 2011;129(2):73-6.
14. Siddiqui I. Maternal Serum Lipids in Women with Pre-eclampsia. *Ann Med Health Sci Res* 2014;4(4):638-41.
15. Sircar M, Thadhani R, Karumanchi SA. Pathogenesis of preeclampsia. *Current opinion in nephrology and hypertension*. 2015;24(2):131-8.
16. Powe CE, Levine RJ, Karumanchi SA. Preeclampsia, a disease of the maternal endothelium: the role of antiangiogenic factors and implications for later cardiovascular disease. *Circulation* 2011;123:2856-69.
17. Hammoud GM, Ibdah JA. Preeclampsia-induced Liver Dysfunction, HELLP syndrome, and acute fatty liver of pregnancy. *Clin Liver Dis (Hoboken)* 2014;4(3):69-73.
18. Ghodke B, Pusukuru R, Mehta V. Association of lipid profile in pregnancy with preeclampsia, gestational diabetes mellitus, and preterm delivery. *Cureus* 2017;9(7):e1420.
19. Vrijkotte TG, Krukiener N, Hutten BA, Vollebregt KC, van Eijsden M, Twickler MB. Maternal lipid profile during early pregnancy and pregnancy complications and outcomes: the ABCD study. *J Clin Endocrinol Metab* 2012;97(11):3917-25.
20. Islam N, Chowdhury M, Kibria G, Akhter S. Study of serum lipid profile in pre-eclampsia and eclampsia. *Faridpur Med Col J* 2010;5(2):56-9.
21. Adank MC, Benschop L, Peterbroers KR, Smak Gregoor AM, Kors AW, Mulder MT, *et al.* Is maternal lipid profile in early pregnancy associated with pregnancy complications and blood pressure in pregnancy and long term postpartum? *Am J Obstet Gynecol* 2019;221(2):150.e1-150. e13.
22. El Khouly NI, Sanad ZF, Saleh SA, Shabana AA, Elhalaby AF, Badr EE. Value of first-trimester serum lipid profile in early prediction of preeclampsia and its severity: A prospective cohort study. *Hypertension in pregnancy*. 2016;35(1):73-81.
23. Nazli R, Akhter T, Sher N, Haider J, Khan MA, Aslam H. Comparison of maternal serum lipoproteins in normal pregnancy and primiparous patients with eclampsia. *Pak J Med Sci* 2016;32(4):1026-9.
24. Anthony J, Damasceno A, Ojiii D. Hypertensive disorders of pregnancy: what the physician needs to know. *Cardiovas J Afr* 2016;27(2):104-10.

Address or Correspondence:

Ms Tallat Naz, Instructor, Department of Physiology, Sindh Medical College, Jinnah Sindh Medical University, Karachi, Pakistan. **Cell:** +92-346-3814724

Postal address: Flat 104, Omema Pride, F.B Area, BL- 21, Rashid Minhas Road, Karachi.

Email: tallatnaz2002@yahoo.com

Received: 30 Apr 2019

Reviewed: 30 Jan 2020

Accepted: 4 Feb 2020