

A COMPARATIVE STUDY TO EVALUATE THE ASSOCIATION BETWEEN SERUM LIPID PROFILE OF WOMEN WITH HYPERTENSIVE DISORDER OF PREGNANCY AND NORMOTENSIVE PREGNANCY

Rajeshwari K¹, Achala G S², Swathi Nayak C V³, ⁴Pradeep M R

¹Associate professor, Department of Obstetrics and Gynaecology, Chamarajanagar Institute of Medical Sciences, Yadapura Village, Chamarajanagar, India.

²Assistant Professor, Department of Obstetrics and Gynaecology, Sri Devaraj Urs Medical College, Kolar, India.

³Assistant Professor, Department of Obstetrics and Gynaecology, Chamarajanagar Institute of Medical Sciences, Yadapura Village, Chamarajanagar, India.

⁴Professor and HOD, Department of Obstetrics and Gynaecology, Chamarajanagar Institute of Medical Sciences, Yadapura Village, Chamarajanagar, India.

Received Date: 10/12/2023

Acceptance Date: 28/12/2023

Corresponding Author:

Dr. Swathi Nayak C V, Assistant Professor, Department of Obstetrics and Gynaecology, Chamarajanagar Institute of Medical Sciences, Yadapura Village, Chamarajanagar, India.

Email: swathinaayak10@gmail.com

Abstract

Background: Hypertensive disorders of pregnancy constitute one of the members of deadly triad of maternal death – along with hemorrhage and infection. It is postulated that the alteration of lipid metabolism may play a key role in the development of symptoms of PE and eclampsia. **Materials and methods:** It is a prospective case-control study. 50 normotensive pregnant women were selected as controls and 50 pregnant women with hypertensive disorders of pregnancy were selected as cases as per inclusion and exclusion criteria. A 5ml of fasting venous blood Samples were collected and lipid profile was done. **Objective:** To evaluate the association between serum lipid profile of women with hypertensive disorder of pregnancy and normotensive pregnancy. **Results:** There was significant rise in the values of Serum Triglycerides(TG), Low density Lipoprotein-C(LDL-C), Very Low Density Lipoprotein-C(VLDL-C) in the hypertensive disorder of pregnancy group compared to normotensive group. **Conclusion:** Pregnant women with hypertensive disorder of pregnancy have deranged serum lipid profile when compared to normotensive pregnant women. Dyslipidaemia play certain role in the pathogenesis of hypertensive disorder of pregnancy. Lipid profile can be used as a tool for the detection and management of Hypertensive disorder of pregnancy.

Key words: Lipid profile, Hypertensive disorder of pregnancy, Normotensive, pre eclampsia.

Introduction

Hypertensive disorders of pregnancy constitute one of the members of deadly triad of maternal death – along with hemorrhage and infection- that contributes greatly to maternal morbidity and mortality¹ and also causes risks to the fetus like IUGR, IUD, Preterm labor etc. In India, the prevalence of Hypertensive disorder of pregnancy (HDP) is 7.8% with pre- eclampsia in 5.4% of the study population². The exact etiology of Hypertensive disorders of pregnancy is not clear. Tests like Mean Arterial Pressure (MAP), Uterine Artery Pulsatility Index (UtAPI), Pregnancy associated Plasma Protein A (PAPP-A) and Placental Growth Factor (PIGF) showed limited value as screening tests³. The pathophysiological events resulting in Hypertensive disorders of pregnancy begin early in gestation, and precede the onset of the clinical features⁴. Several theories have been proposed to explain pathophysiology of Hypertensive disorders of pregnancy in which oxidative stress is most widely accepted theory. Oxidative stress is linked with lipid abnormalities and endothelial dysfunction. Early pregnancy dyslipidemia is associated with an increased risk of PE⁵. It is postulated that the alteration of lipid metabolism may play a key role in the development of symptoms of PE and eclampsia.

The present study was designed to evaluate the estimation of serum lipid profile as a good predictive indicator for Hypertensive disorders of pregnancy.

Materials and Methods

This study was conducted in the Department of Obstetrics and Gynecology, Chamarajanagar Institute of Medical Sciences, Chamarajanagar, Karnataka. This study was approved by the Institutional Ethical Committee. Duration of the study was 6 months from June 2023 to November 2023. It is a prospective case-control study. Among the pregnant women of greater than 32 weeks of gestational age attending OBG department, at CIMS hospital for antenatal checkup, 50 normotensive pregnant women were selected as controls and 50 pregnant women with hypertensive disorders of pregnancy were selected as cases. Informed consent was taken from all individuals who are included in the study.

The Inclusion criteria for cases were pregnant women with hypertensive disorder of pregnancy (gestational hypertension/ Pre-eclampsia/ Eclampsia) with gestational age >32 weeks with live singleton pregnancy and with no other medical co-morbidities except hypertensive disorder of pregnancy. The Inclusion criteria for controls were normotensive pregnant women with gestational age >32 weeks with live singleton pregnancy and with no other medical co-morbidities. Exclusion criteria were pregnant women who did not give consent for the study, multiple gestation, gestational age <32 weeks, individual with any other medical comorbidities.

All the cases and controls were instructed for 8-12 hours of fasting and not to eat fat rich food the night before and venous blood sampling was taken for analysis. A 5ml of venous blood Samples were collected by venipuncture and analyzed for serum triglycerides (TGs) via GPO-PAP method, Total Cholesterol (TC) via enzymatic method in autoanalyzer, High density lipoprotein-cholesterol (HDL-C) via Phosphotungstic acid method, very low density lipoprotein- cholesterol (VLDL-C) via TG/5 formula and Low density lipoprotein – cholesterol (LDL-C) via Friedewald equation $LDL=TC-(HDL+TG)$. The collected data

was recorded in a predefined format in spread sheet (MS Excel 2007, Microsoft Inc. Redmond, Washington, USA). Statistical analysis was done using Chi-square test and Student's t-test at 95% confidence interval to correctly ascertain the clinical applicability of the present study.

Results

On comparing the demographic and clinical characters between the Controls (normotensive group) and the cases (HDP group), the mean age for the controls was 24.2 \pm 4.6 years and cases was 25.8 \pm 4.6 years. There was statistically significant difference in Systolic Blood Pressure and Diastolic Blood Pressure between the cases and control groups.

Table 1: Demographic and clinical characteristics of controls and cases

Parameters	Controls -Normotensive	Cases - HDP*	P Value
Rural	34	33	Chi-square test - 0.832
Urban	16	17	
Primigravida	28	32	Chi-square test – 0.414
Multigravida	22	18	
Urine albumin present	2	16	Chi-square test – 0.003
Urine albumin absent	48	34	
Age (in years)	24.2 \pm 4.6	25.8 \pm 4.6	0.092
Gestational Age	37.7 \pm 1.8	36.9 \pm 1.8	0.023
Body Mass Index	24.6 \pm 2.5	25.7 \pm 2.7	0.030
Systolic Blood Pressure	117.4 \pm 6.5	152.5 \pm 10.7	0.0005
Diastolic Blood Pressure	74.2 \pm 6.1	95.4 \pm 7.2	0.0005

*HDP – Hypertensive disorder of pregnancy

Table 2: Lipid profile of controls and cases

SI No	Investigations	Normotensive(n=50)	HDP (n=50)	p - Value
1.	S. Cholesterol	209.6 \pm 39.4	230 \pm 62.3	0.49
2.	S.TG	198.1 \pm 56.1	250.9 \pm 61.8	0.0005*
3.	HDL-C	58 \pm 13.1	63.6 \pm 17.5	0.71
4.	LDL-C	64.4 \pm 26.2	94.8 \pm 48.9	0.0002*
5.	VLDL-C	38.3 \pm 12.7	51.5 \pm 17.4	0.0005*

*statistically significant

The serum Cholesterol level in control group (normotensive group) 209.6 \pm 39.4 mg/dl and in study group (HDP group) 230 \pm 62.3 mg/dl. Rise in the Serum Cholesterol levels in the cases study group (HDP group) is statistically insignificant. The serum TG level in control group (normotensive group) 198.1 \pm 56.1 mg/dl and in study group (HDP group) 250.9 \pm 61.8mg/dl. The increase in the level of S.TG in study group (HDP group) was found to be highly significant with p value 0.0005. The HDL-C level was 58 \pm 13.1 mg/dl in the control group (normotensive group) and 63.6 \pm 17.5 mg/dl in study group (HDP group). The difference between two groups was statistically not significant. The LDL-C level was 64.4 \pm

26.2 mg/dl in the control group (normotensive group) and 94.8+/-48.9 mg/dl in study group (HDP group). The LDL-C showed significant rise in HDP group with p value of 0.0002. The VLDL-C level in control group (normotensive group) was 38.3+/-12.7 mg/dl and in study group (HDP group) was 51.5+/-17.4 mg/dl. The rise in VLDL-C level in HDP group was statistically significant (p value 0.0005)

Discussion

The exact etiology of Pre-Eclampsia is unknown. Among many theories proposed, endothelial dysfunction is one of the important etiology. Abnormal lipid metabolism is known to cause endothelial dysfunction. It is known fact that lipid metabolism is markedly changed during pregnancy and dyslipidemia involved in the pathogenesis of Hypertensive disorder of pregnancy.⁸In individuals with HDP, serum lipoproteins level increase almost 2 times higher than in normotensive pregnant individual.

In this study, we observed an association between maternal dyslipidemia and hypertensive disorder of pregnancy. In our study, pregnant women with HDP had statistically significant increased level of serum triglycerides, LDL-C and VLDL-C concentrations as compared to normotensive pregnant women. **In the study conducted by Blessy PPS *et al.*⁶ in 2015, it showed a significant rise in TC, TG, LDL and VLDL. HDL-C showed a significant decrease in hypertensive women compared to normal pregnant women. LDL: HDL and TG:HDL ratios were higher in PIH group. In the study conducted by Dev K *et al.*⁷ in 2016, they found that total cholesterol, low density lipoprotein, very low-density lipoprotein, triglycerides were increased in pregnancy induced hypertension when compared to normal pregnancy, which is statistically significant. LDL-C, VLDL-C carries cholesterol to the peripheral tissue where as HDL-C carries cholesterol from peripheral tissues to the liver. Increased plasma cholesterol, hypertriglyceridemia, increased LDL-C, increased VLDL-C and decreased HDL-C are known to cause cardiovascular disease, hypertension, diabetes and metabolic syndrome.^{9,10,11}Higher levels of HDL-C have protective effect against hypertension and cardiovascular disease.¹⁰**

Conclusion

Based on the findings of our study we can conclude that, pregnant women with hypertensive disorder of pregnancy have deranged serum lipid profile when compared to normotensive pregnant women. Hence we can say that dyslipidaemia might play certain role in the pathogenesis of hypertensive disorder of pregnancy. Lipid profile can be used as a tool for the detection and management of hypertensive disorder of pregnancy.

References

1. Cunningham, F. G., Leveno, K. J., Bloom, S. L., Spong, C. Y., Dashe, J. S., Hoffman, B. L., Casey, B.M., Sheffield, J. S. (2014). Williams obstetrics (24th edition.). New York: McGraw-Hill Education.
2. Upadya, Madhusudan; Rao, Sumesh T. Hypertensive disorders in pregnancy. Indian Journal of Anaesthesia 62(9):p 675-681, September 2018. | DOI: 10.4103/ija.IJA_475_18
3. Skråstad RB, Hov GG, Blaas HG, Romundstad PR, Salvesen KÅ. A prospective study of screening for hypertensive disorders of pregnancy at 11-13 weeks in a Scandinavian

- population. *Acta Obstet Gynecol Scand.* 2014 Dec;93(12):1238-47. doi: 10.1111/aogs.12479. Epub 2014 Sep 17. PMID: 25146367.
4. Levine RJ, Lam C, Qian C, Yu KF, Maynard SE, Sachs BP, *et al.* Soluble endoglin and other circulating antiangiogenic factors in preeclampsia. *N Engl J Med.* 2006;355:992-1005.
 5. Caren G, Solomon, Seely EW. Preeclampsia-searching for cause. *New Eng J Med* 2004;350(7):641-2.
 6. Blessy PPS *et al.* *Int J Reprod Contracept Obstet Gynecol.* 2019 May;8(5):2071-2075 www.ijrcog.org
 7. Dev K *et al.* *Int J Reprod Contracept Obstet Gynecol.* 2019 Dec;8(12):4939-4945 www.ijrcog.org
 8. Gohil JT, Patel PK, Gupta P: Estimation of lipid profile in subjects of preeclampsia. *Journal of obstetrics and gynaecology of India* 2011, 61(4):399–403. pmid:22851820
 9. Talayero BG, Sacks FM: The role of triglycerides in atherosclerosis. *Curr Cardiol Rep* 2011, 13(6):544–552. pmid:21968696
 10. Flaquer A, Rospleszcz S, Reischl E, Zeilinger S, Prokisch H, Meitinger T, *et al.*: Mitochondrial GWA Analysis of Lipid Profile Identifies Genetic Variants to Be Associated with HDL Cholesterol and Triglyceride Levels. *PloS one* 2015, 10(5):e0126294. pmid:25945934
 11. Busso D, Rigotti A: Blood lipids during pregnancy: A progressively appreciated subject in basic and clinical research. *Atherosclerosis* 2018, 276:163–165. pmid:30001810.