



RISK FACTORS OF METABOLIC SYNDROME IN PREGNANCY INDUCED HYPERTENSION CASES

T. SUNITHA^{1*}, K.SAMEERA¹ AND G.UMARAMANI¹.

¹*Department of Biochemistry, Katuri Medical College & Hospital, Guntur, INDIA.*

ABSTRACT

Hypertensive disorders complicating pregnancy are common and form great triad along with hemorrhage and infection. They are one of the important causes resulting in maternal and fetal morbidity and mortality. Metabolic syndrome is a combination of medical disorders that, when occurs together, it increases the risk of developing cardiovascular disease and diabetes. In order to know the risk of development of metabolic syndrome in women with PIH, the risk factors for metabolic syndrome like total cholesterol, HDL cholesterol, triglycerides and fasting blood sugar levels of PIH women as compared to their normotensive counterparts have been measured, analyzed and compared with earlier studies. The PIH women group exhibited highly significant increase in fasting blood sugar level, significant increase in total cholesterol and triglyceride levels and an insignificant decrease in HDL cholesterol. These results indicate that there is a significant association of abnormal lipid profiles and increased fasting blood sugar levels in PIH women.

KEYWORDS: *PIH, Pregnancy Induced Hypertension, Metabolic syndrome, Total cholesterol, HDL cholesterol, triglycerides, Fasting blood sugar.*



T. SUNITHA

Department of Biochemistry, Katuri Medical College & Hospital, Guntur, INDIA.

INTRODUCTION

Hypertensive disorders in pregnancy remain one of the most common medical complications during pregnancy. PIH accounts for one of the top five causes of maternal death in the world¹. The reported incidence is about 10% of first pregnancies and in women with chronic hypertension it is about 20-25%². Group of hypertensive disorders that develops due to gravid state constitutes PIH. It includes 3 groups namely gestational hypertension with out edema and proteinuria, preeclampsia and eclampsia with edema and proteinuria. Alteration in lipid profile parameters leads to decrease in the ratio of PGI₂: TXA₂ is responsible for the vasospastic phenomenon seen in kidney, uterus, placenta and brain in PIH^{3, 16}. According to some previous studies, the insulin levels are increased in PIH women when compared to normotensive women showing that these PIH women have increased incidence of insulin resistance^{4, 5, 6, 7, 8}. Metabolic syndrome is defined as central obesity and any two of the following: 1. Raised triglycerides > 150 mg/dL, 2. Reduced HDL cholesterol: < 40 mg/dL in males, < 50 mg/dL in females, 3. Raised blood pressure (BP): systolic BP > 130 or diastolic BP >85 mm Hg, 4. Raised fasting plasma glucose (FPG): >100 mg/dL (5.6 mmol/L)⁹.

From the aforesaid reasons, the present study was conducted to study the known risk factors of metabolic syndrome like TC, HDL-C, TG and fasting blood sugar levels in PIH women and in normotensive women controls. By knowing the association between PIH and Metabolic syndrome preventive measures can be suggested to the at risk pregnant women for

their subsequent pregnancies and also to prevent cardiovascular complications in them.

MATERIALS AND METHODS

The study was carried out on 100 subjects in the age group of 19-26 years who were primis with gestational age between 28 weeks and 36 weeks of which 50 were cases who had hypertension, with or with out proteinuria and edema and 50 were controls who were normotensive. We excluded women having hypertension and hyperlipidemia due to systemic diseases like nephritic syndrome, hypothyroidism, glycogen storage diseases, pancreatitis and Diabetes mellitus. This study was approved by institutional review board and informed consent was obtained from all subjects involved in the study. Under aseptic conditions overnight fasting blood samples (5 ml) were drawn into clot activator tubes from ante-cubital veins of cases and controls. The collected blood was allowed to clot for 30 minutes, and then centrifuged at 2000 g for 15 minutes for clear separation of serum. Total cholesterol, HDL cholesterol, triglycerides and fasting blood sugar levels were estimated immediately after serum was separated using ERBA kits on semi auto analyzer.

STATISTICAL ANALYSIS

The results were expressed as mean \pm SD. p value <0.05 was considered statistically significant. P value <0.01 was considered highly significant. Statistical analysis was performed using SPSS software.

Table 1**Table showing MEAN \pm SD and p values of SBP, DBP and FBS in cases and controls**

PARAMETER	CONTROLS MEAN \pm SD	CASES MEAN \pm SD	p value
SBP	109.92 \pm 1.7173	139.68 \pm 3.9855	<0.001
DBP	69.52 \pm 2.226	89.12 \pm 3.5864	<0.001
FBS(mg/dl)	81 \pm 6.889	92.24 \pm 15.67	<0.001

p value <0.001 is considered highly significant.

Table 2**Table showing MEAN \pm SD and p values of TC, TG and HDL-C in cases and controls**

PARAMETER	CONTROLS	CASES	p value
TC (mg/dl)	159.28 \pm 12.622	187.4 \pm 27.1	<0.05
TG (mg/dl)	109.2 \pm 23.504	127.56 \pm 26.364	<0.05
HDL-C (mg/dl)	42.92 \pm 2.604	41.52 \pm 2.84	>0.05

p value <0.05 is considered significant and p value >0.05 is considered insignificant.

As depicted from tables 1 and 2, when PIH women were compared to normotensive women Systolic blood pressure, diastolic blood pressure were highly significant. Biochemical parameters like fasting blood sugar, total cholesterol, triglycerides significantly increased in PIH women. HDL cholesterol level showed insignificant lowering in their levels.

DISCUSSION

The results presented in this study demonstrated that abnormal lipid profiles and fasting blood sugar levels are significantly associated with PIH.

There is a significant increase in total cholesterol levels in PIH women when compared to controls and it is similar to other reports^{10, 11}. Triglyceride levels are significantly increased in pregnant woman owing to hyperestrogenemia in pregnancy that induces hepatic biosynthesis of triglycerides¹². TG levels rise to a much more significant level in PIH^{13, 14}. In our study HDL-C shows decrease but the change is insignificant. Marked decrease in HDL-C was shown in some studies¹⁵. Dyslipidemia mediated activation of endothelial cells leads to production of endothelial

disturbing factors like lipid peroxides which are responsible for the pathologic changes in PIH.

Increase in fasting blood sugar levels is highly significant in our present study. Previous studies shows that PIH women have great chances of developing insulin resistance^{4, 5, 6, 7, 8}. This could be the reason for insulin resistance in PIH women.

CONCLUSION

In summary the findings reported in the present study suggest that women who develop PIH have chances of developing abnormal lipid profiles and insulin resistance which may make the patient land up into metabolic syndrome in future. We suggest that women with gestational hypertension can be advised to have regular check up of their blood pressures in order to bring them under control. They may be informed about the increased risk for hypertension in subsequent pregnancies and later in life. They may also receive counseling regarding lifestyle modifications to optimize body weight and to have control on lipid and glucose levels in post partum period. Increased awareness of association between insulin resistance and previous gestational hypertension is needed

among healthcare professionals to recognize possible risks among these women for future metabolic syndrome, adult onset diabetes and cardiovascular diseases.

ACKNOWLEDGMENTS

The authors are grateful to the Management, Katuri Medical College, Guntur, India, for providing the facilities to work in the Department of Biochemistry and the Superintendent, Katuri Hospital, Guntur, India, for permitting to collect samples.

REFERENCES

1. Selahattin Kumru, Ahmet Godekmerdan, Selim Kutlu, Zeynep Ozcan. Correlation of maternal serum high-sensitive C-reactive protein levels with biochemical and clinical parameters in preeclampsia, *Eur J Obstet Gynecol Reprod Biol*, 124: 164-167, (2006).
2. Kamath S. Hypertension in pregnancy. *JAPL* 2006; 54: 269–270.
3. Robson SC. Hypertension and renal disease in pregnancy, In: Dewhurst's Textbook of Obstetrics and Gynaecology for postgraduates, Ed.Edmonds DK., 6th edition, Blackwell Science Ltd, New York 1999; 167–169.
4. Sowers JR, Standley PR, Jacober S, Niyogi T, Simpson L. Postpartum abnormalities of carbohydrate and cellular calcium metabolism in pregnancy induced hypertension. *Am J Hypertens*. 1993;6:302-307.
5. Fuh MM, Yin CS, Pei D, Sheu Wh, Jeng Cy, Chen YI, Reaven GM. Resistance to insulin-mediated glucose uptake and hyperinsulinemia, in women who had preeclampsia during pregnancy. *Am J Hypertens*. 1995;8 768-771
6. Laivuori H, Tikkanen MJ, Ylikorkala O. Hyperinsulinemia 17 years after preeclamptic first pregnancy. *J Clin Endocrinol Metabol*. 1996; 81:2908-2911.
7. Kaaja R, Laivuori H, Laakso M, Tikkanen MJ, Ylikorkala O. Evidence of state of increased insulin resistance in preeclampsia. *Metabolism*. 1999; 48: 892-896.
8. Baron AD. Pathogenesis and measurement of insulin resistance in hypertension. *Curr Opin Nephrol Hypertens*. 1994; 3:631-635.
9. IDF | Promoting diabetes care, prevention and a cure worldwide. The IDF consensus worldwide definition of the metabolic syndrome. (URL reference: http://www.idf.org/webdata/docs/MetS_def_update2006.pdf) International Diabetes Federation 2006.
10. Adegoke OA, Iyare EE, Gbenebitse SO. Fasting plasma glucose and cholesterol levels in pregnant Nigerian women. *Niger Postgrad Med J* 2003; 10: 32–36.
11. Hubel CA, Lyall F, Weissfeld L, Gandley RE, Roberts JM. Small low-density lipoproteins and vascular cell adhesion molecule-1 are increased in association with hyperlipidemia in preeclampsia. *Metabolism* 1998; 47(10): 1281–1288.
12. Glueck CJ, Pallet RW, Scheel D. Effects of oestrogenic compounds on triglyceride kinetics. *Metabolism* 1975; 24: 537–545.
13. Enquobahrie DA, Williams MA, Butler CL, Frederick IO, Miller RS, Luthy DA. Maternal plasma lipid concentrations in early pregnancy and risk of preeclampsia. *Am J Hypertens* 2004; 17(7): 574–581.
14. Cekmen MB, Erbagci AB, Balat A, Duman C, Maral H, Ergen K, Osden M, Balat O, KuskayS. Plasma lipid and lipoprotein

- concentrations in pregnancy induced hypertension. Clin Biochem 2003; 36(7): 575–578.
15. Suchanda Sahu, Rebecca Abraham, R. Vedavalli Mary Daniel. Study of lipid profile, lipid peroxidation and vitamin e in pregnancy induced hypertension Indian J Physiol Pharmacol 2009; 53 (4) : 365–369
 16. S.M Awanti, G.A Patil, Bhuvanendranath.H, Santosh Jeevangi, R.B Patil. Protein Thiols in the urine of pre-eclampsia patients. International Journal of Pharma and Bio Sciences Vol 2/issue 4/ oct-dec 2011;112-115.