



A Comparative Study to Assess the Role of Serum Homocysteine Level in Hypertensive Disorder of Pregnancy

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Abstract

Hypertension is an established and widespread medical condition during pregnancy. It is the third imperative cause of death in pregnancy as well as perinatal and maternal morbidities. Blood pressure serves as a biomarker for the disease hypertension. Hyperhomocysteinemia could result from a genetic defect on enzyme participating in homocysteine synthesis and metabolism or it could be because of deficiency of folic acid, vitamin B6, B12. The vascular changes induced by homocysteine are similar to those associated with PET and include endothelial dysfunction.

Study design: Case control study

Study place: Department of Obstetrics and Gynecology, SMS Medical College, Jaipur.

Study population and sample size: Total sample size taken is 100 (50 patients per group).

Group A: Patient with blood pressure $\geq 140/90$ mm of Hg.

Group B: Patient with blood pressure $\leq 140/90$ mm of Hg.

Result: The mean serum homocysteine level is significantly higher in group A as compared to that in group B.

Conclusion: From this study, we have come to the conclusion that serum homocysteine level is significantly elevated in women with hypertension and that serum homocysteine level has positive correlation with blood pressure.

Keywords: Serum homocysteine, PET

INTRODUCTION

Hypertension is an established and widespread medical condition during pregnancy^[1]. It is the third imperative cause of death in pregnancy as well as perinatal and maternal morbidities^[2]. Blood pressure serves as a biomarker for the disease hypertension^[3]. It is the systolic blood pressure of 140 mm Hg and diastolic blood pressure of 90 mm Hg defines hypertension^[4].

Hyperhomocysteinemia could result from a genetic defect on enzyme participating in homocysteine synthesis and metabolism or it could be because of deficiency of folic acid, vitamin B6, B12. The vascular changes induced by homocysteine are similar to those associated with PET and include endothelial dysfunction^[5].

Level of maternal serum homocysteine normally decreases with gestation, either due to a physiological response to the pregnancy, increase in estrogen^[6]. Elevated level of homocysteine is associated with number of placenta mediated diseases^[7].

Homocysteine metabolism requires the participation of folate as well as vitamin B₁₂ and vitamin B₆ coenzymes. Reduction of homocysteine level in plasma requires its supplementation in pregnancy^[8].

Therefore, this study is conducted to determine level of homocysteine in maternal serum in normotensive singleton pregnancies and women with preeclampsia and whether there is an association between serum level of homocysteine and hypertensive disorder of pregnancy.

AIM & OBJECTIVES

- To assess the association between serum level of homocysteine and hypertensive disorder of pregnancy.

OBJECTIVES

- To measure maternal serum level of homocysteine in women with hypertensive disorder of pregnancy.
- To measure maternal serum level of homocysteine in normotensive pregnant women.
- To evaluate the association between this marker and hypertensive disorder of pregnancy

STUDY POPULATION AND SAMPLE SIZE

Total sample size taken is 100 (50 patients per group).

- Group A: Patient with blood pressure $\geq 140/90$ mm of Hg.
- Group B: Patient with blood pressure $\leq 140/90$ mm of Hg.

INCLUSION CRITERIA

- Pregnancy ≥ 20 weeks with blood pressure $\geq 140/90$.
- Live fetus
- Singleton pregnancy

EXCLUSION CRITERIA

- Women in active labor or with rupture of membrane
- Sign of infection
- Women with essential hypertension, cardiovascular or renal disease, diabetes mellitus or chorionic disease.

MATERIAL & METHODS

The women who were fulfilling the inclusion criteria were grouped into two as mentioned. Demographic data was collected about each participant; these were included age, height, weight, smoking habit, ethnicity and parity. Routine checkup was done including blood pressure and they were subjected for routine investigations, like complete blood count and ABO Rh group, urine analysis, serum bilirubin, SGOT, SGPT, blood sugar, serum urea, uric acid and creatinine, serum electrolyte, coagulation profile, USG, serum homocysteine.

SAMPLE COLLECTION

Sampling was done as soon as possible. Venous blood samples were collected in test tube with aseptic precautions. Within 1 hour of collection samples were centrifuged at 3000 rpm for 5 min. Serum was separated and collected in polythene tube with cork. The sera with no sign of hemolysis are used for the analysis of total circulating homocysteine. Serum levels of homocysteine were recorded.

OBSERVATION AND RESULT

Table 1:-Distribution is according to Age and obstetric code.

Age(years)		Group A(n=50)	Group B(n=50)	Total
	≤ 25	27 (54%)	25 (50%)	52 (52%)
	> 25	23 (46%)	25 (50%)	48 (48%)
Gravida	Primi gravida	18 (36%)	16 (32%)	34 (34%)
	Multi gravida	32 (64%)	34 (68%)	66 (66%)

Table 2:-Comparison of blood pressure (mmHg) between group A and B.

Blood pressure(mmHg)	Group A(n=50)	Group B(n=50)	Total	P value
Systolic blood pressure(mmHg)				
Mean \pm SD	161.8 \pm 18.48	119.6 \pm 6.69	140.7 \pm 25.32	<.0001
Range	140-200	110-130	110-200	
Diastolic blood pressure(mmHg)				
Mean \pm SD	107.64 \pm 12.65	77.42 \pm 4.45	92.53 \pm 17.88	<.0001
Range	90-130	70-81	70-130	

Table 3:-Comparison of serum homocysteine(μ mol/L) between group A and B.

Serum homocysteine(μ mol/L)	Group A(n=50)	Group B(n=50)	Total	P value
Mean \pm SD	14.37 \pm 6.02	11.08 \pm 4.44	12.73 \pm 5.52	0.002
Range	6.22-28.27	5.72-18.48	5.72-28.27	

Table 1 shows the average age of women in this study is 25.43 years, with minimum age 20 years and maximum age 31 years in both groups. The average age of the women in group A is 25.34 years and in group B is 25.52 years. There is no statistically significant difference in mean age of both the groups. Maximum numbers of cases in both groups are multigravida, comprising 66% of the study population.

Table 2 shows the mean systolic blood pressure in group A and group B is 161.8 mm of Hg and 119.6 mm of Hg respectively. The mean diastolic blood pressure in group A and group B is 107.64 mm of Hg and 77.42 mm of Hg respectively. There is statistically significant difference in mean blood pressure between both the groups.

Table 3 shows mean serum homocysteine level in both the groups. The mean serum homocysteine level is 14.37 μ mol/L and 11.08 μ mol/L in group-A, group-B respectively. The mean serum homocysteine level is significantly higher in group A as compared to that in group B.

DISCUSSION

In the present study the average age of women is 25.43 years, with minimum age 20 years and maximum age 31 years in both the groups. The average age of the women in group A is 25.34 years and in group B is 25.52 years. Singh Urmila et al (2009)^[9] in their study found that, mean age of women in the normotensive group was 28.03 \pm 3.84 years, whereas in study group I and II (mild and severe preeclampsia) it was 25.06 \pm 2.80 and 25.67 \pm 3.40 years respectively, which was not significant statistically. In the Metin Ingec et al (2005)^[10] study, the mean age was in control group 26.4 \pm 5.4 years, in mild preeclampsia group 25.2 \pm 3.4 years and in severe preeclampsia group it was 24.8 \pm 3.4 years, that was statistically not significant ($P > 0.07$).

Maximum numbers of cases in both groups are multigravida, comprising 66% of the study population. The Metin Ingec et al (2005)^[10] study showed percentage of primiparous women in normotensive group, mild preeclamptic group and in severe preeclamptic group was 29.4%, 34.4% and 28.0% respectively. Sharma V et al (2019)^[11] conduct a prospective randomized controlled clinical trial of 50 patients. Out of 50 patients, it was found that there were, 22(44%) cases were primigravida whereas 28(56%) cases were above primigravida.

The mean systolic blood pressure in group A and group B is 161.8 mm of Hg and 119.6 mm of Hg respectively. The mean diastolic blood pressure in group A and group B is 107.64 mm of Hg and 77.42 mm of Hg respectively. There is statistically significant difference in mean blood pressure between both the groups. Sunita Ghike et al (2011)^[12] conducted a study on 60 pregnant women and she concluded that serum homocysteine levels were significantly elevated in women with PET compared with control group and strong correlation may exist between serum homocysteine levels and severity of pre-eclampsia. Ganji V, Kafai MR (2004)^[13] found systolic blood pressure was positively associated with serum homocysteine levels.

The mean serum homocysteine level is 14.37 μ mol/L and 11.08 μ mol/L in group-A, group-B respectively. The independent t test indicated that mean serum homocysteine level is significantly higher in group A as compared to that in group B. Our observations are in consonance with Robert W. Power et al (1998)^[14] and Rajkovic, Aleksandar et al (1999)^[15] studies, in which mean homocysteine levels were greater in pre-eclampsia than normotensive controls ($P < 0.01$). Ingec M, Borekci B et al (2005)^[10] observed that the plasma levels of homocysteine in women with severe pre-eclampsia (16.7 \pm 10.1 μ mol/L) and eclampsia (16.5 \pm 9.6 μ mol/L) were significantly higher than those in mild pre-eclampsia (7.7 \pm 2.4 μ mol/L) and controls (6.7 \pm 1.6 μ mol/L) ($p < 0.0001$) although homocysteine were not significantly different between mild pre-eclampsia and controls. Yardanur G. Acilmis et al (2010)^[6] observed that homocysteine levels

in both maternal and fetal serum were significantly higher in the severe pre-eclampsia group compared to mild pre-eclampsia and control groups but no significant difference was found between mild pre-eclampsia and control groups.

CONCLUSION

From this study, we have come to the conclusion that serum homocysteine level is significantly elevated in women with hypertension and that serum homocysteine level has positive correlation with blood pressure. This study recommends that a multicentric study with large population is needed to support the hypothesis that hyperhomocysteinemia is associated with hypertension.

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