

# A Comparative Analysis of Serum Homocysteine in Normal Pregnancies, Pre Eclampsia and Eclampsia

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**Abstract:** *Background:* Hypertensive disorders of pregnancy form one among the deadly triad with hemorrhage and infection, contributing to maternal morbidity and mortality. Measurement of serum homocysteine levels is useful in predicting preeclampsia thereby reducing its complications. *The Objective of this study is to study the relationship between the levels of serum homocysteine in normal pregnancy and pregnancy complicated by preeclampsia and eclampsia. Methods:* This is a prospective study done in 160 antenatal patients with preeclampsia, eclampsia and normal pregnancies, attending the Department of OBG, Coimbatore medical college and hospital over a period of one year from march 2019 to march 2020. *Results:* In our study, preeclampsia and eclampsia is common in primigravida. Mild preeclampsia did not develop any complications and CVT is commonly seen in severe preeclampsia (26.3%) and eclampsia (20%). serum homocysteine levels are indicators of severity in preeclampsia and eclampsia. *Conclusion:* This study shows that Hyperhomocysteinemia is a predictor of preeclampsia and eclampsia. Therefore serum homocysteine level estimation can be included as a routine in antenatal care management in all hospitals.

**Keywords:** Serum Homocysteine, Preeclampsia, Eclampsia

## 1. Introduction

Hypertensive disorders of pregnancy complicate 5 - 10 percent of pregnancies and form one among the deadly triad with haemorrhage and infection, contributing to maternal morbidity and mortality. According to WHO, maternal deaths due to hypertensive disorders in developed countries is 16%.

Pre clampsia is still regarded as “a disease of theories”. The central pathophysiology in the development of pre clampsia is endothelial dysfunction. Women having higher levels of homocysteine have higher risk of developing pre clampsia. {7, 8}

### Homocysteine

Homocysteine is a sulphur containing amino acid needed for the growth of cells and tissues in the body. It is synthesized from methionine.

### Sources of Homocysteine

Homocysteine is not obtained from diet but from methionine which is found in dairy products like milk, cheese and yoghurt.

- Fish and meat.
- Egg.
- Vegetables like onions, garlic, broccoli, spinach.
- Nuts and seeds like sunflower seeds, cashews, sesame seeds and pistachio.

Homocysteine levels are regulated by Genetic factor, Age, Nutritional factors, Pregnancy.

The levels of homocysteine are lower in women than in men and increases with age<sup>{1}</sup>. This is due to oestrogen lowering effect of homocysteine levels<sup>{2}</sup> in women and increase in homocysteine levels with increasing age is due to decreased kidney function<sup>{9}</sup>.

### Serum Homocysteine Levels<sup>{4}</sup>

Non pregnant adult - 4.4 to 10.8 mmol/L

First trimester – 3.34 to 11 mmol/L

Second trimester–2.0 to 26.9 mmol/L

Third trimester–3.2 to 21.4 mmol/L

### Homocysteine concentrations in plasma<sup>{8}</sup>

Normal < 10 – 12 micromoles/litre

Moderate 12 – 30 micromoles/litre

Intermediate >30 - 100 micromoles/litre

Severe >100 micromoles/litre

### Homocysteine levels and complications of pregnancy: <sup>{4}</sup>

Normally maternal levels of serum homocysteine decreases as gestational age increases. It may be due to physiological pregnancy response or maybe due to decreased albumin, increased estrogen, hemodilution occurring as a result of increase in plasma volume and increased methionine demand by mother and foetus. Another proposed mechanism is fetal utilization.

Increase in homocysteine levels in pregnant women is associated with preeclampsia, eclampsia, HELLP syndrome, deep vein thrombosis, IUGR, prematurity, LBW, neural tube defects and recurrent miscarriages<sup>{2, 3}</sup>.

This study is done in a developing country like India at Coimbatore medical college hospital to find out the association of hyperhomocysteinemia and preeclampsia, eclampsia<sup>{9, 10}</sup> with the objective of preventing preeclampsia and eclampsia by monitoring Sr. homocysteine as a part of routine antenatal check up.

## 2. Methods

The present study entitled “A Comparative analysis of serum Homocysteine in normal pregnancies, pre eclampsia and eclampsia” was conducted in the Department of Obstetrics and Gynaecology at Coimbatore medical college and

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hospital during the period of one year from march 2019 to march 2020. Each patient was informed about her inclusion criteria and participation in this study and her informed consent was taken.

**Inclusion criteria:**

- Booked antenatal women 21 - 35 years of age
- Gestational age 34 - 40 weeks

**Exclusion Criteria**

- Diabetes mellitus
- Essential Hypertension
- Recurrent pregnancy loss
- Liver disease
- Multiple pregnancies
- Severe Anaemia
- Smoking and tobacco chewers
- Pregnancy with APLA syndrome
- Polyhydraminos
- Thyroid disorders

A detailed history including patient’s age race, parity, socioeconomic status menstrual, medical history, obstetric, past, dietary and treatment history noted.

Comparison of means between the groups was done using Unpaired ‘t’ test. Non - parametric data was analysed using Pearson ‘s chi - square/ Mann Whitney U TEST. A P value of<0.05 was taken as statistically significant. The final data was presented in the form of tables and graphs.

**3. Results**

In our study comparing the levels of serum homocysteine levels in normal pregnant mothers and mothers who were complicated by preeclampsia, eclampsia. 73.8 % of patients in this study belong to 21 - 30 ys of age.48.8 % in this study are primigravida, 38.1 % are second gravida and 13.1% are gravida 3 or more.41.9 % are in 34 - 36 weeks of gestation and 58.1% are in 37 - 40 weeks of gestation.7.5% have BMI greater than 30 and 92.5 % have BMI less than 30.71.4% of mild preeclampsia, 89.5 % of severe preeclampsia and 77.5% of eclampsia is seen in 21 - 30 yrs of age.81% of mild preeclampsia, 68.4 % of severe eclampsia and 75% of eclampsia is seen in primigravida.35.7% of preeclamptics had past history of preeclampsia. Eclampsia occurred in 100% of those with past history of eclampsia. Mild preeclamptics did not develop any complications. In our study, CVT is more commonly seen in severe preeclampsia (26.3%) and eclampsia (20%). Serum homocysteine levels are indicators of severity in pre eclampsia and eclampsia.

**Table 1:** Distribution of Patients According to Serum Homocysteine Levels and Risk Factor

Risk factor	Mean	N	Std. Deviation	P value
Mild Preeclampsia	12.9 467	31	1.4583	0.000**
Severe Preeclampsia	16.2 779	39	.52248	
Eclampsia	18.7 338	50	1.6188	
No risk factor/ Normal pregnancy	5.94 67	40	.41856	

**Table 2:** Distribution of Patients According to Serum Homocysteine Levels and Maternal Complications

Maternal Complications	Mean	N	Std. deviation	P-value
Renal failure	11.8982	11	6.10805	0.000*
HELLP	17.5033	6	2.06152	
CVT	18.9585	13	2.19650	
DIVC	8.5350	2	.07778	
Pulmonary Complications	20.1750	2	2.62337	
Shock	6.9500	1	.	
PPH	6.7500	1	.	
Sepsis	7.0500	1	.	
Maternal death	8.9500	1	.	
No complications	10.4761	122	5.00589	

**4. Discussion**

Importance of serum homocysteine levels has been described in 1960s by Dr. Kilmer McCully. Increased homocysteine levels is a risk factor for endothelial dysfunction and vascular disease.

In pregnant woman, increased homocysteine level is likely to injure the vascular endothelium. Vascular changes caused by homocysteine are similar to that seen in preeclampsia and eclampsia.

The association between increased levels of homocysteine and preeclampsia has been suggested by Dekker et al. The relationship has been shown in early pregnancy by Cotter et al, 2<sup>nd</sup> trimester by Sorensen et al and 3<sup>rd</sup> trimester by Sanchez et al.

In our study maximum number of patients belong to 20 - 30 years of age (73.8%). In a study done by Mozammel Hoque et al, all patients were in 20 - 30 years of age. In our study, 48.8% of patients are primigravida and all patients belong to 30 - 40 weeks of gestation. In author’s study (Qureshi et al) 32 - 40 weeks of gestational age was included.

In our study, the severity of preeclampsia is directly related to hyper homocystenemia with mean homocysteine levels being 12.94 micro mol/L in mild preeclampsia, 16.2 micro mol/L in severe preeclampsia and 5.94 micro mol/L in Normal pregnancies with p value being 0.000, similar to author’s study (Khosrowbeygi et al) where the homocystiene levels are 11.49 +/- 1.19 micro mol/L in mild preeclampsia, 17.4+/- 2.7 micro mol /L in severe preeclampsia and 6.38 +/- 0.3 micro mol /L in normal pregnancies with p value 0.000.

In our study homocysteine levels are increased in pre eclampsia and eclampsia but levels in eclampsia are higher (18.7 micro mol/L) than in severe eclampsia (16.2 micro mol/L) similar to author’s study (Mozammel Hoque et al) where levels in eclampsia are 10.57 +/- 3.39 micro mol /L and in pre eclampsia it is 9.54 +/- 3.21 micro mol /L.

**5. Conclusion**

Measurement of serum homocysteine levels must be included in routine ante natal care management in our hospital. Severity of the disease can be interpreted by the levels of homocysteine. Homocysteine levels can be lowered

by supplementation with B complex vitamins and folic acid as supported by studies in review of literature there by preventing maternal and fetal complications.

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