International Journal of Clinical Obstetrics and Gynaecology

ISSN (P): 2522-6614
ISSN (E): 2522-6622

www.gynaecologyjournal.com
2023; 7(2): 103-106
Received: 10-12-2022
Accepted: 12-01-2023

**Dr. Prafullita**
Department of Orthopaedics, Shri. B. M. Patil Medical College, Vijaypur, BLDE University, Karnataka, India

**Dr. Meenakshi Samariya**
Associate Professor, Department of Orthopaedics, Shri. B. M. Patil Medical College, Vijaypur, BLDE University, Karnataka, India

**Dr. Anil Samariya**
Department of Orthopaedics, Shri. B. M. Patil Medical College, Vijaypur, BLDE University, Karnataka, India

**Corresponding Author:**
**Dr. Prafullita**
Department of Orthopaedics, Shri. B. M. Patil Medical College, Vijaypur, BLDE University, Karnataka, India

# Study of serum beta HCG and liver function test in hypertensive disorder of pregnancy

**Dr. Prafullita, Dr. Meenakshi Samariya and Dr. Anil Samariya**

**DOI:** https://doi.org/10.33545/gynae.2023.v7.i2b.1293

**Abstract**
**Introduction:** One of the most prevalent medical conditions during pregnancy is hypertensive disorders of pregnancy (HDP), which is also one of the leading causes of maternal and perinatal morbidity and mortality globally. This study was carried out to correlate the elevated liver function test (LFT) and serum beta HCG observed in the early second trimester with the increased maternal and foetal morbidity and mortality associated with HDP.
**Material and method:** The Rajkiya Manila chikitchalay JLN Medical college Ajmer's department of obstetrics and gynaecology conducted this hospital-based observational study. 375 pregnant women with a gestational period longer than 20 weeks were used in the correlation study between LFT and beta HCG and HDP, with 250 pregnant women with HDP serving as the study group and 125 pregnant women without hypertension serving as controls. Serum-HCG levels and LFT were tested and their levels in the two groups were compared.
**Results:** In the 25-year-old age group and younger, severe pre-eclampsia was observed. In hypertension cases, the likelihood of developing severe preeclampsia was 78%. The incidence was 88 percent in patients with elevated LFTs. The maternal mean serum levels of Beta-HCG in the HDP study group (51161.08±30038.21 IU/L) were greater than those in the control group with normal blood pressure (17603.23±16748.21 IU/L). The mean blood levels of non-severe preeclampsia were 36417.32±23876.74 IU/L and severe preeclampsia were 60030.34±28771.31 IU/L. Higher amounts were seen in early-onset preeclamptic moms compared to late-onset preeclamptic mothers, which was statistically significant ($p$<0.001). 32077 IU/L was the cut-off mark for beta-HCG with a sensitivity of 65% and a specificity of 86% for predicting HDP.
**Conclusions:** HDP women have greater serum levels of beta-HCG than normotensive women. Increased severity of hypertensive disorders during pregnancy is linked to higher levels of beta-HCG. Due to its low sensitivity and difficulties in determining the cut-off value, serum beta-HCG has limited application as a diagnostic test. In contrast to severe pre-eclampsia with normal LFTs, detection of elevated LFTs in cases of severe pre-eclampsia is a risk group linked to a higher rate of feto-maternal problems.

**Keywords:** Eclampsia, hypertensive disorders of pregnancy, preeclampsia, serum β-HCG, LFTs

## Introduction

One of the most exciting unresolved issues in obstetrics is hypertensive disorders of pregnancy (HDP). Despite decades of extensive research, it is still unclear how pregnancy causes or worsens hypertension [1]. While morbidity and mortality from hypertension diseases have decreased as a result of advances in obstetrical and neonatal care, our capacity to forecast the illness has not considerably improved [2]. 7.8% of pregnant women in India had hypertensive disorders of pregnancy, and 5.4% of those had preeclampsia. In industrialised nations, eclampsia complicates about 1 in every 2000 delivery, but the incidence ranges from 1 in 100 to 1 in 1700 cases in developing nations.

Preeclampsia was once referred to as "the disease of hypotheses" yet great advances have been made thanks to studies in the last ten years. The placental vascular remodelling with inadequate trophoblastic invasion is one of the suggested etiologies of HDP. Numerous studies have suggested that increased serum beta HCG production may be caused by placental hypoxia [3, 4]. *In vitro* trophoblastic cell culture that was developed under hypoxic conditions served as the proof. Serum beta HCG levels were also elevated in the presence of placental anomalies like villitis, infarction, ischemic alterations and intervillous thrombosis [5]. The intrauterine growth restriction observed in severe types of hypertensive disorders of pregnancy was caused by the compromised spiral artery vasculature and subsequently decreased blood flow in the placental villi.

As it is postulated that preeclampsia is a trophoblastic disorder and beta HCG is secreted from the trophoblasts, it has become essential to understand this disease, to investigate the pathologic and secretory reaction of the placenta. In comparison to straightforward singleton pregnancies, twin and molar pregnancies produce higher amounts of beta HCG and are linked to higher rates of preeclampsia [4]. This study was conducted to ascertain the relationship between maternal serum beta-HCG levels and liver function test with hypertensive disorders of pregnancy for its prediction. Preeclampsia is a problem that is common in our society and the leading cause of maternal mortality, nearly reaching an extent of 28.8% in Jharkhand [6, 7].

**Parity**
A two to three-fold rise in incidence was noted among nulliparous women, according to Hansen. The high probability of primigravida developing pregnancy-induced hypertension was confirmed by Sibai and his association.

**Age**
According to Spellacy's analysis, women at either end of the reproductive age range are more prone to developing preeclampsia. The greatest risk factor for both preeclampsia and eclampsia was maternal age 20 years old.

**Family history**
Adams and Layson's research on the pregnancy's family implications. Preeclampsia incidence discrepancies between racial groups may really be accounted by variations in mother height, weight (including underweight and overweight), age, and potential social class. Hamilton noted that having twins increases your risk of developing eclampsia. Preeclampsia. Prevalence of preeclampsia and eclampsia in twin pregnancy is high, reaching up to 29%. According to Pricilla White, diabetes mellitus increases the risk of eclampsia. Seitz acknowledged that preeclampsia can occasionally coexist with persistent hypertension.

**Method**
After receiving approval from the ethical committee, this hospital-based observational study was carried out in the obstetrics and gynaecology department of Rajkiya Manila Chikitchayal of JLN Medical College Ajmer from 1 April 2022 to 31 December 2012 for a period of 9 months. This study involved 375 pregnant women, divided into 125 normotensive women and instances of 250 pregnant women with hypertension disorders of pregnancy. LFT and serum beta-HCG levels were assessed in both groups and compared.

**Inclusion criteria**
**Study group:** 250 pregnant women with gestational ages greater than 20 weeks who met the requirements for one of the three categories listed below were included in this study;

- Pregnant women with a gestational age of more than 20 weeks with blood pressure readings of 140 mmHg systolic and 90 mmHg diastolic without proteinuria are said to have gestational hypertension.
- **Preeclampsia (non-severe and severe):** Pregnant women with gestational hypertension who have proteinuria and impending symptoms such epigastric pain, headache, thrombocytopenia, altered renal function testing, raised liver enzymes and pulmonary oedema.
- **Eclampsia:** Seizures in preeclamptic women.

**Control group:** This included 125 pregnant women who were normotensive and had blood pressure readings of 140 mmHg systolic and 90 mmHg diastolic with gestational ages more than 20 weeks.

**Exclusion criteria**
Pregnant women more than 20 weeks of gestation with

- Multiple pregnancy
- Gestational diabetes mellitus
- Medical disease like chronic hypertension, chronicrenal disease, chronic liver disease, cardiac disease, SLE or haematological disorders.
- All patients with present or recent past history of liver diseases like jaundice, viral hepatitis, hepatobiliary, alcoholic liver diseases etc.
- All patients taking hepatotoxic drugs like anti tuberculous drugs, anti-convulsant drugs.

To confirm the aforementioned inclusion and exclusion criteria, a full evaluation was conducted, including a thorough history and physical examination (general and systemic). After discussing the protocol for measuring blood pressure, collecting urine samples for proteinuria, and collecting blood samples for serum-HCG and LFT, a written informed consent was obtained.

**Investigation**
Complete hemogram: Hb%, blood grouping and Rh typing, screening test, HBs Ag, platelet count, random blood sugar.

**LFTs**

- AST/ALT/ALP
- Total and direct bilirubin
- AG ratio
- LDH

**Serum beta HCG**
**Biochemical analysis**
The amount of -HCG in the blood was determined using a solid-phase, two-site chemiluminescence immunoassay (CLIA). The Immulite 1000 analyser, which is based on an enzyme amplified chemiluminescent immunoassay, was employed by the authors [8].

**Results**
There were 42 (20%) patients with gestational hypertension, 50 (20%) with non-severe preeclampsia, 99 (39.6%) with severe preeclampsia, and 59 (23.6%) with antepartum eclampsia out of the 250 hypertensive women in the study group. In the study group, women with hypertension had a mean age of 23.82 years, which was statistically similar to the mean age of normotensive mothers in the control group of 23.78 years.
Table 1 demonstrates that there was a statistically significant difference in the parity of mothers (p 0.05), with more primigravida in the study (hypertensive) group than in the control (normotensive) group.

**Table 1:** Comparison between study group (hypertensive) and control (normotensive) mothers' group in respect to parity

| Gravida | Normotensive | Hypertensive |
|---|---|---|
| Primi | 43.2% | 55.2% |
| Multi | 56.8% | 44.8% |

(P= 0.028414)

The difference between the mean serum -HCG levels of severe preeclamptic women (60030.34±28771.31 IU/L) and non-severe preeclamptic mothers (36417.32±23876.74 IU/L) was statistically significant (p0.001), according to Table 2.

**Table 2:** Comparison of serum β-HCG between non-severe preeclamptic and severe preeclamptic mothers

| B-HCG(IU/L) | Non-Severe Preeclampsia | Severe Preeclampsia |
|---|---|---|
| Mean | 36417.32 | 60030.34 |
| SD | 23876.74 | 28771.31 |
| Median | 32476.50 | 68089 |

($p$<0.001)

Table 3 compares the -HCG levels of the study group and the control group based on parity. The difference in -HCG levels between the study's hypertensive moms and the control mothers who were primigravida was statistically significant (p 0.001). The difference was also statistically significant (p 0.001) among multigravida, with greater levels of -HCG in mothers with hypertension. There was no discernible change in the -HCG levels between primi and multigravida in the control group (normotensives) ($p$>0.05). In the study group of hypertensives, there was a statistically significant difference (p0.05) between the HCG levels of primi and multigravida patients, with greater levels in the primigravida patients.

**Table 3:** Comparison of serum levels of β-HCG in primigravida and multigravida women

| S. BHCG (IU/L) | Primigravida | | Muligravida | |
|---|---|---|---|---|
| | Normotensive | Hypertensive | Normotensive | Hypertensive |
| Mean | 18057.13 | 52875.15 | 17027.8 | 49049.1 |
| SD | 16722.87 | 29661.77 | 16691.06 | 30496 |
| Median | 13959.5 | 55394.6 | 10420 | 45019 |

(P= <0.001)

LFTs were present in individuals in the hypertensive group who were 20 years or older (14 percent), 21-25 years (26 percent), 26-30 years (18 percent) and 31-35 years (14 percent) (10 percent).

**Table 4:** Comparison of LFTs in different age groups

| Age | Normotensive | | Hypertensive | |
|---|---|---|---|---|
| | Normal | Raised | Normal | Raised |
| <20 year | 96% | 4% | 86% | 14% |
| 21-25 year | 92% | 8% | 74% | 26% |
| 26-30 year | 97% | 3% | 82% | 18% |
| 31-35 year | 98% | 2% | 90% | 10% |

($p$<0.05)

In overall study group number of primi gravid were 50% and multi were 44%. In raised LFTs group primi gravid were 73% and multi were 27%.

**Table 5:** Parity and LFTs

| Parity | Normotensive | | Hypertensive | |
|---|---|---|---|---|
| | Normal | Raised | Normal | Raised |
| Primi | 95% | 5% | 32% | 68% |
| Multi | 97% | 3% | 76% | 24% |

In the whole study group, there were 50% of primigravid women and 44% of multigravid women. Primi gravid were 73 percent and multiple were 27 percent in the group of increased LFTs.

**Table 6:** LFT in Severe Preeclampsia and Eclampsia

| Status | Normal LFT | Raised LFT |
|---|---|---|
| Severe Preeclampsia | 78% | 88% |
| Eclampsia | 56% | 74% |

## Discussion

According to WHO evaluations, hypertensive disorders during pregnancy are said to be the cause of 16% of maternal mortality in affluent nations. This percentage is higher than three other major causes, including haemorrhage (13%) abortion (8%), and sepsis (4%). (2 percent). Over half of the 16 percent of maternal mortality attributable to hypertension disorders may have been avoided. In industrialised nations, about 1 in 2000 deliveries are complicated by eclampsia, whereas the incidence in developing nations is believed to be between 1 in 100 and 1 in 1700 instances [2].

This study was a sincere attempt to develop a test for the early detection and prediction of the severity of hypertensive disorders of pregnancy (HDP). This study was conducted to ascertain the relationship between elevated maternal serum -HCG levels and raised LFT with Hypertensive Disorders of Pregnancy, to compare the serum -HCG levels and raised LFT between pregnant women with HDP and pregnant women without hypertension, and to determine the relationship between elevated maternal serum -HCG levels and raised LFT with preeclampsia severity.

There was no statistically significant difference in the mean age between the two groups, which was determined to be equivalent at 23.78 years for the control group and 23.82 years for the study group. Studies by Begum Z *et al*., [9] Basirat *et al*., [10] Choudhury *et al*., [8] also show similar results with no significant correlation of maternal age between the hypertensive and normotensive groups. 10-12 However, Mujawar *et al*., observed that maternal age was significantly different between the groups ($p$<0.05) with mean age of 26.4±4.48 years in the control group and 23.6±4.16 years in the preeclampsia group.

The study group had 55.2 percent primigravida and 44.8 percent multigravida women, while the control group had 43.2 percent primigravida and 56.8 percent multigravida women. This difference in parity was statistically significant (p 0.05). Similar results were seen in the study by Kaur G *et al*., where the occurrence of PIH was more among primigravida with 17% developing PIH and 7.14% among multigravida but there was no statistically significant association [11]. In the study by Begum Z *et al*., there was no significant difference between the 2 groups with respect to parity [9].

In hypertensive women, the mean -HCG was 51161.0830038.21 IU/L, while in normotensive mothers, it was 17603.2616748.21 IU/L (p 0.001). Additionally, it was noted that severe preeclamptic mothers' mean -HCG levels (60030.3428771.31 IU/L) were greater than those of non-severe preeclamptic mothers' (36417.3223876.74 IU/L) (p 0.001). Similar results were noted in the studies by Begum Z *et al*., [9] Mujawar *et al*., with higher levels of serum β-HCG levels in the case group of preeclampsia.

## Conclusion

In contrast to severe pre-eclampsia with normal LFTs, detection of elevated LFTs in cases of severe pre-eclampsia is a risk group linked to a higher rate of feto-maternal problems. To reduce complications and mortality, these cases require special attention, including early discovery and referral to a higher centre with better NICU facilities.

In comparison to normotensive women, those with hypertensive disorders of pregnancy had greater serum levels of HCG. In addition, the levels are higher in patients with severe preeclampsia when compared to those who do not have the condition, and in primigravid hypertension women as compared to multi-gravid hypertensive women. Additionally, it has been

noted that patients of early-onset preeclampsia have higher serum levels of HCG. Therefore, measuring serum -HCG levels may aid in the early detection of HDP and may also be used as a gauge of the disease's severity.

## Reference


1. Sajith M, Nimbargi V, Modi A, Sumariya R, Pawar A. Incidence of pregnancy induced hypertension and prescription pattern of antihypertensive drugs in pregnancy. International Journal of Advances in Scientific Research. Published online April 1, 2014. Accessed February 24, 2023. https://www.semanticscholar.org/paper/Incidence-of-pregnancy-induced-hypertension-and-of-Sajith-Nimbargi/1a4930a841ad287f013a0cd555347f85f55796ae
2. Roiz-Hernández J, De J Cabello-Martínez J, Fernández-Mejía M. Human chorionic gonadotropin levels between 16 and 21 weeks of pregnancy and prediction of pre-eclampsia. Int J Gynaecol Obstet. 2006;92(2):101-105. Doi: 10.1016/j.ijgo.2005.10.002
3. Redman CW. Platelets and the beginnings of preeclampsia. N Engl. J Med. 1990;323(7):478-480. Doi: 10.1056/NEJM199008163230710
4. Long PA, Oats JN. Preeclampsia in twin pregnancy-severity and pathogenesis. Aust. N Z J Obstet. Gynaecol. 1987;27(1):1-5. Doi: 10.1111/j.1479-828x.1987.tb00920.x
5. Gökdeniz R. Elevated Serum b-HCG Levels in Severe Preeclampsia. Turkish Journal of Medical Sciences. Published online March 20, 2000. Accessed February 24, 2023. https://www.semanticscholar.org/paper/Elevated-Serum-b-HCG-Levels-in-Severe-Preeclampsia-G%C3%B6kdeniz/a9623a6694c04bdbd33bf3072f008c5746fba201
6. Curry SL, Hammond CB, Tyrey L, Creasman WT, Parker RT. Hydatidiform mole: diagnosis, management, and long-term followup of 347 patients. Obstet Gynecol. 1975;45(1):1-8.
7. Kumari AMV. Association between maternal serum beta human chorionic gonadotropin levels and hypertensive disorders of pregnancy. International Journal of Reproduction, Contraception, Obstetrics and Gynecology. 2020;9(8):3157-3164. Doi: 10.18203/2320-1770.ijrcog20203052
8. Choudhury KM, Das M, Ghosh (Sarkar) S, Bhattacharya D, Ghosh TK. Value of Serum beta-HCG in Pathogenesis of Pre-Eclampsia. Journal of Clinical Gynecology and Obstetrics. 2012;1(4-5):71-75. doi: 10.4021/jcgo.v1i4-5.57
9. Begum Z, Ara I, Tanira S, Keya KA. The association between serum betahuman Chorionic gonadotropin and Preeclampsia. Journal of Dhaka Medical College. 2014;23(1):89-93. doi:10.3329/jdmc.v23i1.22701
10. Basirat Z, Barat S, Hajiahmadi M. Serum beta human chorionic gonadotropin levels and preeclampsia. Saudi Med J. 2006;27(7):1001-1004.
11. Kaur G, Jain V, Mehta S, Himani S. Prediction of PIH by Maternal Serum Beta HCG Levels in the Second Trimester (13-20 Weeks) of Pregnancy. J Obstet Gynaecol India. 2012;62(1):32-34. Doi: 10.1007/s13224-012-0151-y


**How to Cite This Article**
Prafullita, S Meenakshi, S Anil. Study of serum beta HCG and liver function test in hypertensive disorder of pregnancy. International Journal of Clinical Obstetrics and Gynaecology**.** 2023;7(2):103-106.