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ORIGINAL ARTICLE

Determine the Diagnostic Accuracy of High Beta HCG Levels in Predicting Pregnancy Induced Hypertension

ZILLE HUMA[1], SHAGUFTA JABBAR[2], FARIHA ARSHAD[3], SADAF KASHIF[4], RAFIA ALI[5], NAILA KHAWER[6]
[1,2]Assistant Professors, [3,6]Gynaecologists, [5]Medical Officer, Department of Obstetrics & Gynaecology, Social Security Hospital, Lahore
[4]Senior Registrar, Department of Obstetrics & Gynaecology, Fatima Memorial Hospital, Lahore
Correspondence to Dr. Zille Huma, E-mail: dr.hayat1049@gmail.com Cell: 0323-3388876

ABSTRACT

Aim: To determine the diagnostic accuracy of high beta HCG levels (>2 median concentration measured) in predicting pregnancy induced hypertension.
Study design: Cross-sectional analytical study.
Place and duration of study: Department of Obstetrics & Gynaecology, Social Security Hospital, Lahore from 1st January 2021 to 31st December 2021.
Methodology: One hundred and fifty pregnant females at 13-20 weeks of gestation were included. A 3cc blood sample was withdrawn from each women and serum was separated. The serum was stored at -20°C until analysis of β HCG test. This test was analyzed via enzyme-linked immunosorbent assay. The sensitivity of the test was 86.5% and specificity was 96.8%. Each woman was followed till delivery and her status of hypertension which was induced due to pregnancy was observed.
Results: The mean age was 31.5±6.2 years. The value of 2 median concentration measured showed that 23 cases had a value less or equal to 2 while 60 cases were those having a value greater than 2. The diagnostic accuracy of this test was 92.6%. There were 69.8% cases of PIH having beta HCG levels greater than 71000 mIU/ml and six cases with level of beta HCG higher than 100000 mIU/ml.
Conclusion: Pregnancy induced hypertension is significantly associated with higher level of beta HCG and has an efficient diagnostic accuracy.
Key words: Beta HCG, Pregnancy, Hypertension

INTRODUCTION

Pregnancy is a crucial event which requires utmost care for mother and child health. Unfavorable events can be life threatening for mother as well as the new born life. There have been various conditions and complications related with gestation including gestational diabetes, obesity or pregnancy induced hypertension (PIH).[1-4] The PIH is a very unique disease observed only in women in their gestation. This disease has been reported to be affecting more than 12-15% of women all over the globe.[5]

With recent advancement in mother and neonatal health, a great reduction in various infections and diseases have been pronounced globally, however, PIH is one of the lethal diseases still prevailing in various parts of the world[6,7]. An obstetrician requires extra-vigilance in identifying as well as predicting PIH in a pregnant woman. Prediction of PIH has significance in prevention of it from later complications and treatment requiring follow up visits[8].

Various testing facilities have been available for the prediction of PIH. Unfortunately, many of these tests have a low predictive value and do not seem to play a vital role in PIH timely identification. Research had reported that during gestation immunological variation in trophoblast can trigger secretory-responses which further rises beta HCG levels.[9,10] The present study was designed to analyze the role of beta HCG in predicting PIH. This study provided evidence-based significance of beta HCG with PIH for long-term health benefits.

MATERIALS AND METHODS

This cross-sectional analytical study was conducted in Department of Obstetrics & Gynecology, Social Security Hospital Lahore from 1st January 2021 to 31st December 2021. A total of 150 pregnant females at 13-20 weeks of gestation were included. A written informed consent was taken from each participant. This sample size was calculated by using sample size WHO calculator where the incidence of hypertension in pregnant women was considered as 13% and power of test was taken as 80% with 95% confidence of interval and 7% margin of error. Women suffering from chronic hypertension or any other related morbidity were placed in exclusion criteria. The pregnant women from 18-42 years were selected as study participants. A 3cc blood sample was withdrawn from each women and serum was separated. The serum was stored at -20°C until analysis of β HCG test. This test was analyzed via enzyme-linked immunosorbent assay. The sensitivity of the test was 86.5%. Each woman was followed till delivery and her status of hypertension which was induced due to pregnancy was observed. Data regarding variables as age, gestational age, parity and β HCG test results were noted. Any clinical history of pregnancy induced hypertension or preeclampsia was also documented. The multiple of median (MOM) calculation was done through diagnostic median test for, β HCG through already established immulite-2000 HCG method and the test levels were considered increased if the levels were greater than 2MOM. Comparison of β HCG of hypertensive women was later made with 50 normotensive women for better analysis. Pregnancy induced hypertension was defined as hypertension range ≥140/90 mmHg post 20 weeks gestation with/without proteinurea presented in women who were previously normotensive as well as normo-proteinuric women. Data was statistically analyzed through SPSS version 26.0 using chi square test with <0.05 p value as significant.

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RESULTS

The mean age of the patients was 31.5±6.2 years. Most of the women were having an age of 33-42 years with primi parity presented in 52% of the cases (Table 1). Within the total 150 enrolled cases of pregnancy induced hypertensive patients, 4 cases suffered congenital malformations while three were lost during follow ups and seven had spontaneous abortion while three had missed abortion and total number of viable cases left for complete analysis were 83 (Fig. 1).

The value of 2 MOM showed that 23 cases had a value less or equal to 2 while 60 cases were those having a value greater than two with a p value of 0.031 showing the significant variance between mild and severe PIH cases (Table 2).

For diagnostic evaluation of the beta HCG raised in 50 normotensive pregnant women were compared with 83 PIH women for their beta HCG levels. This made an assessment conducted over 133 total cases. The incidence of beta HCG rise was found highest in 51000 to 60000 mIU/ml beta HCG level

followed by 30000-40000 mIU/ml in normotensive patients. Higher levels of beta HCG were nominally reported in normotensive women (Table 3).

However, in PIH women the incidence of beta HCG raised was much higher with a significant number of patients reporting a level higher as 91000 to 100000mIU/ml of beta HCG. There were 69.8% cases of PIH having beta HCG levels greater than 71000mIU/ml and six such cases with a level higher than 100000mIU/ml (Table 4).

Table 1: Distribution of age and parity (n=150)

Characteristics	No.	%
Age (years)		
18-22	26	17.3
23-32	55	36.6
33-42	69	46.0
Parity		
Primi para	78	52.0
Multi para	72	48.0

Table 2: Distribution PIH cases and beta HCG (n=83)

HCG levels (MOM)	PIH		P value
	Mild	Severe	
≤2	10	13	0.031
>2	40	20	

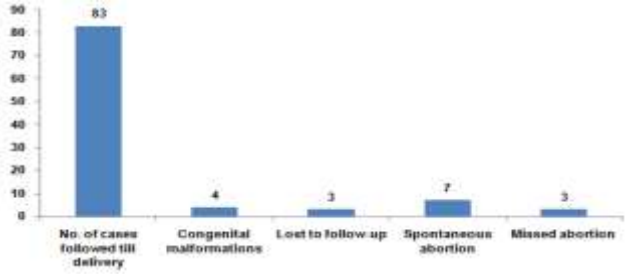
Table 3: Association of beta HCG level and normotensive pregnant women

Beta HCG levels (mIU/ml)	Total Number of cases	Normotensive Incidence of raise
<30,000	4	4 (100%)
30,000–40,000	20	19 (95%)
41,000–50,000	14	13 (92.9%)
51,000–60,000	5	5 (100%)
61,000–70,000	31	8 (25.8%)
71,000–80,000	30	–
81,000–90,000	10	1 (10%)
91,000–1,00,000	13	–
>1,01,000	6	–
Total	133	50 (100%)

Table 4: Associations of high beta HCG levels with PIH severity

Beta HCG levels (mIU/ml)	PIH		P value
	Mild	Severe	
<30,000	--	--	<0.05
30,000–40,000	1 (5%)	--	
41,000–50,000	1 (7.1%)		
51,000–60,000	--	--	
61,000–70,000	23(74.1%)	--	
71,000–80,000	15(50%)	15 (50%)	
81,000–90,000	2(20%)	7 (70%)	
91,000–1,00,000	2 (18.1%)	11 (84.6%)	
>1,01,000	1 (16.66%)	5 (83.33%)	

Fig. 1: Total number of PIH cases and excluded cases



DISCUSSION

The raised level of beta HCG has long been associated with toxemic of pregnancy. Second trimester has been targeted as the most prevalent gestational period which can lead into PIH in women[11]. The current research also found the similar results where PIH women were presented in second trimester. An increased level of beta HCG was observed in majority of the women suffering from PIH with a p value less than 0.001[12,13] Studies have reported an increased level of beta HCG in 83% of PIH women. In this study there were 69.8% cases of PIH having beta HCG levels greater than 71000 mIU/ml.

Desai and Rao[14] reported 68.9% case with increased levels of β HCG >2 MOM. The results were similar to the present study results. The cut off of the 2 MOM for the β HCG was elaborated in literature as <0.96 and 0.95 curve respectively with a sensitivity of 88.5 and hundred percent.[15]

In this study increased levels of beta HCG has been reported to be directly associated with PIH. Using this test can really assist in predicting the PIH at early stages with a higher positive predictive value. Severity of PIH cases was significantly related with ascending beta HCG values[12,16,17]. Jaiswar et al[18] described a positive correlation as well between severity of PIH and beta HCG. Rajesh and Muralidharan[19] conducted a study on normotensive as well as preeclampsia women and it has shown that beta HCG can be a potential predictor in assessing the disordered actions of placental-trophoblast in cases of PIH. The association of endothelin and HCG in preeclampsia women has also been reported to be higher especially in cases of PIH in comparison with normotensive women suggesting functional dysfunction of placental cells in PIH women which consequently damages the endothelial cells.

CONCLUSION

Pregnancy induced hypertension is significantly associated with higher level of beta HCG which might be a potent predictor for identifying this disease and preventing further complications.

Conflict of interest: Nil

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