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Mid Trimester Maternal Serum Beta HCG and Maternal Serum Alpha Feto Protein as A Predictor for Hypertensive Disorders in Pregnancy

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ABSTRACT

Hypertensive disorders, infection, and bleeding form a lethal combination that still accounts for the majority of maternal deaths. The goal of this study is to see if higher mid trimester maternal serum beta human chorionic gonadotropin and maternal serum alpha feto protein are linked to the development of gestational hypertension, preeclampsia and eclampsia later in pregnancy in normotensive and non-protein uric women. According to the findings, maternal serum alpha fetoprotein is a better predictor of pregnancy than maternal serum beta human chorionic gonadotropin

Key words: Hypertensive disorder, Maternal serum, Preeclampsia

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INTRODUCTION

Preeclampsia is a complex, multi-system hypertension disease of pregnancy with no recognised cause [1]. Preeclampsia is a pregnancy related condition that affects numerous systems and is characterised by hypertension and proteinuria after 20 weeks of gestation [2]. In Tamilnadu, the prevalence is estimated to be around 20%. After twenty weeks of gestation, late development of high blood pressure and proteinuria are diagnostic criteria for preeclampsia [3].

After twenty weeks of gestation, a pregnant women with systolic blood pressure of 140 mmHg and a diastolic blood pressure of 90 mmHg, Proteinuria of 3 g or more in a 24 hour urine collection or 1+ or above on a urine dipstick test is considered preeclampsia [4]. Severe preeclampsia is defined as a systolic blood pressure of 160 mmHg or higher and a diastolic blood pressure of 110 mmHg or higher. Proteinuria in severe preeclampsia is defined as 5 g or more of protein in a 24 hour urine sample or 2+ or more on a urine dipstick test [5].

MATERIALS AND METHODS

Study design: Prospective observational study.

Study population: Women attending the ANC OPD at a random gestational age of 13–24 weeks, regardless of parity, were chosen at random.

Sample size: Sample size=200.

Inclusion criteria: Singleton pregnant women between 13 to 24 weeks of gestation who are not hypertensive or protein uric.

Exclusion criteria:

- Multiple pregnancy
- Molar pregnancy
- Previous history of hypertension or diabetes mellitus
- Chromosomal abnormality in current or previous pregnancy

Study tool: Pre-designed, Pre-tested validated semi-structured preformat was used to record the findings and the confidentiality of the data and results had been assured to the patients.

Statistical analysis: The master chart was created using microsoft excel. SPSS 20.0 version software was used to analyse the data collected. Statistical tests for categorical variables, descriptive statistics were provided as frequencies and percentages. The *Chi-square* test was used. As statistically significant, a two-sided p value was used. Along with the flow diagrams, the results were presented in relevant Tables 1-13.

RESULTS

Table 1: Distribution of age among the study participants (N=200).

S.no	Age	Frequency	Percentage
1	18-20	12	6
2	21-25	64	32
3	26-30	68	34
4	31-35	52	26
5	36-40	4	2

Mean age of the study participants were 26.99 ± 4.62 years with a range of minimum 19 years and a maximum of 39 years. The majority of them (34%) were between the ages of 26 and 30, followed by those between the ages of 21 and 25 (32%).

Table 2: Distribution of Parity among the study participants (N=200).

S.no	Parity	Frequency	Percentage
1	Primi	110	55
2	Multi	90	45

According to parity, the bulk of them were Primi (55%) and 45% had two or more gravida.

Table 3: Distribution of AFP values among the study participants (N=200).

S.no	AFP (ng/ml)	Frequency	Percentage
1	Nov-50	54	27
2	51-100	73	36.5
3	101-150	63	31.5
4	151-200	3	1.5
5	201-250	3	1.5
6	251-300	4	2

In this study the research subject's mean alpha fetoprotein levels were 112.0273.62 ng/ml, with a range of 11 to 300 ng/ml.

Table 4: Distribution of beta HCG values among the study participants (N=200).

S.no	Beta HCG (ng/ml)	Frequency	Percentage
1	<30,000	9	4.5
2	30,000-40,0000	65	32.5
3	41,000-50,000	64	32
4	51,000-60,000	21	10.5
5	61,000-70,000	12	6
6	71,000-80,000	5	2.5
7	81,000-90,000	10	5
8	91,000-1,00,000	7	3.5
9	>1,01,000	7	3.5

In this study, the research subjects' mean Beta HCG levels were 5241725330.93 units, with a range of 20311 to 199275 units.

Table 5: Distribution of HCG in MOM among the study participants (N=200).

S.no	HCG (MOM)	Frequency	Percentage
1	<2	140	70%
2	>2	60	30%

Majority of them had MOM HCG levels less than two of about 70%.

Table 6: Distribution of AFP (MOM) among the study participants (N=200).

S.no	MOM AFP	Frequency	Percentage
1	<2	190	95
2	>2	10	5

Majority of them had AFP MOM levels less than two of about 95%.

Table 7: Distribution of outcome among the study participants (N=200).

S.no	Outcome	Frequency	Percentage
1	Gestational hypertension	5	2.5
2	Mild preeclampsia	6	3
3	Severe preeclampsia	1	0.5
4	Normotensive	188	94

Around 94% of study participants are hypertensive, with mild preeclampsia accounting for 3%, gestational hypertension accounting for 2.5% and severe preeclampsia accounting for 0.5%.

Table 8: Serum maternal AFP as a predictor of PIH (N=200).

S.no	AFP (MOM)	PIH Present	PIH Absent
1	>2	10 (5%)	0 (0%)
2	<2	2 (1%)	188 (100%)

Table 9: AFP-related sensitivity, specificity and PPVs and NPVs.

Statistic	Value	95% CI
Sensitivity	83.30%	67.98% to 91.24%
Specificity	100.00%	97.59% to 100.00%
Positive predictive value	100%	-
Negative predictive value	94%	90.29% to 96.80%
Accuracy	99%	93.63% to 99.92%

Table 10: Serum beta HCG as a predictor of PIH (N=200).

S.no	HCG (MOM)	PIH Present	PIH Absent
1	>2	8 (4%)	52 (26%)
2	<2	4 (2%)	136 (68%)

Table 11: HCG- related sensitivity, specificity and PPVs and NPVs.

Statistic	Value	95% CI
Sensitivity	66.67%	57.77% to 76.60%
Specificity	72.34%	65.02% to 79.76%
Positive predictive value	13.30%	12.84% to 29.62%
Negative predictive value	97.14%	90.51% to 98.07%
Accuracy	72%	70.54% to 82.64%

Table 12: Combined Serum beta HCG and maternal AFP as a predictor of PIH (N=200).

S.no	Combined AFP+ beta HCG	PIH Present	PIH Absent
1	>2	10 (83.4)	0 (0)
2	<2	2 (16.6)	188 (100)

Table 13: HCG and maternal AFP- related sensitivity, specificity and PPVs and NPVs.

Statistic	Value	95% CI
Sensitivity	83.30%	67.98% to 91.24%
Specificity	100.00%	97.59% to 100.00%
Positive predictive value	100%	-
Negative predictive value	94%	90.29% to 96.80%
Accuracy	99%	92.63% to 99.92%

DISCUSSION

The average age of the study participants was 18.654.00 weeks, with a range of 14 weeks to 28 weeks. The majority of them were between the ages of 14 and 17 weeks (46.5%), followed by 18 and 21 years (26.5%). According to parity, the majority of them were primi (55%) and 45% had gravida two or more, which was similar to earlier research [6]. Around 94% of study participants are hypertensive, with 3% having mild preeclampsia, 2.5% having gestational hypertension, and 0.5% having severe preeclampsia. In our study Serum beta HCG as a predictor of PIH has got a sensitivity of 66.67% and specificity of 72.34%. In other studies with second trimester maternal serum beta HCG values for predicting hypertensive disorders of pregnancy like Kaur, et al. study has got a sensitivity of 90.91% and specificity of 97.44% [7]. Serum maternal AFP as a predictor of PIH. In our study Serum maternal AFP as a predictor of PIH has got a sensitivity of 83.3% and specificity of 100%. In other studies with maternal serum alpha fetoprotein as predictor of hypertensive disorders of I pregnancy like previous studies study has got a sensitivity of 91.5% and specificity of 21% only [8]. In the last 20 years, the link between unexplained elevated AFP and/or HCG and poor prenatal outcomes has been established. Unexpectedly high AFP levels have been linked to preterm labour, IUGR, preeclampsia, and foetal mortality. On the other side, it was discovered that high maternal HCG levels in the second trimester were linked to preeclampsia and higher foetal death rates. We found serum maternal AFP and beta HCG to be significant predictors of pregnancy induced hypertension in our study as well.

CONCLUSION

In this study we attempted to predict pregnancy induced hypertensive disorders with mid trimester alpha fetoprotein and beta HCG levels. Maternal serum alpha feto protein as a predictor of PIH has got a sensitivity of 100% and specificity of 98.9%; maternal serum beta HCG as a predictor of PIH has got a sensitivity of 72.7% and specificity 98.4%. Comparing both maternal serum alpha feto proteins is a better predictor than maternal serum beta human chorionic gonadotropin.

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