

## ORIGINAL RESEARCH

# To study serum ALFA FETO protein in the early second trimester as predictors of pregnancy induced hypertension

<sup>1</sup>Dr. Shivangi Rajput, <sup>2</sup>Dr. Jusmita Dutta, <sup>3</sup>Dr. Gaurav Saxena, <sup>4</sup>Dr. Konika Jain

<sup>1</sup>Tutor, Department of Biochemistry, Government Medical College, Ratlam, Madhya Pradesh, India

<sup>2</sup>Professor, Department of Biochemistry, LN Medical College and Research Center, Bhopal, Madhya Pradesh, India

<sup>3</sup>Associate Professor, Department of Microbiology, Government Medical College, Ratlam, Madhya Pradesh, India

<sup>4</sup>Senior Resident, Department of Community Medicine, Government Medical College, Ratlam, Madhya Pradesh, India

### Corresponding Author

Dr. Konika Jain

Senior Resident, Department of Community Medicine, Government Medical College, Ratlam, Madhya Pradesh, India (Email id: konicajain2412@gmail.com)

Received: 12 March, 2023

Accepted: 18 April, 2023

### ABSTRACT

**Introduction:** Pregnancy-induced hypertension is one of the familiar medical problems faced during pregnancy. ] Approximately 13% of women with elevated maternal serum  $\alpha$ -fetoprotein (MSAFP) developed PE compared with 1% of the women with normal MSAFP. The aim of study is to estimate Serum alpha feto protein in early second trimester as predictors of pregnancy induced hypertension.

**Method:** A cross sectional study was conducted among the pregnant females who were in their second trimester attending the OPD clinic in Department of Obstetrics & Gynaecology, JK hospital, LNMC & RC, Bhopal for a period from Jan 2019 to June 2020. About 150 pregnant women were included in study considering inclusion and exclusion criteria. Data collected and entered in excel sheet and was analysed in epiinfo software using appropriate software.

**Result:** It was observed that maximum number of pregnant women was in the 26-30 years age group 52%. It was observed that maximum number were 17-18 weeks of gestation and maximum number were of Primigravida 39.3%. It was also observed that Sensitivity of 80% and specificity of 85.45% and a positive predictive value of 66.6% and a negative predictive value of 92.1%

**Conclusion:** The present study confirmed the value of second trimester maternal serum AFP levels as predictors of PIH. This study provides evidence that elevated second-trimester MS-AFP is associated with increased risk of pregnancy induced hypertension.

**Key words:** Pregnancy induced hypertension, Alfa feto protein, second trimester

---

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-Non Commercial-Share Alike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

---

### Introduction

Pregnancy-induced hypertension is one of the familiar medical problems faced during pregnancy. Cunningham *et al.*<sup>1</sup> describe hypertension in pregnancy as a major cause of maternal and perinatal morbidity, complicating 5-10% of all pregnancies worldwide whereas pregnancy-induced hypertension has been identified in 3.9% of all pregnancies. The management of pregnancy-induced hypertension in pregnancy depends on early diagnosis, thorough prenatal monitoring, and prompt intervention. Various biological, pharmacological, and biophysical markers

linked to the pathophysiology of pre-eclampsia have been proposed over the past 20 years as a way to forecast its onset. There are currently no screening methods that are dependable, affordable, and reproducible, and the pathophysiologic mechanism of pregnancy-induced hypertension is still not fully understood<sup>2</sup>. Alpha-fetoprotein is a glycoprotein produced by the fetal liver and gastrointestinal tract. Up to the third month, most fetal production arises from the yolk sac. Maternal serum alpha-fetoprotein (MSAFP) is influenced by a combination of fetal production, clearance through fetal kidney and any

perturbation of the placental interface between the fetus and the mother<sup>3</sup>. Approximately 13% of women with elevated maternal serum  $\alpha$ -fetoprotein (MSAFP) developed PE compared with 1% of the women with normal MSAF<sup>4</sup>. Peripheral vasoconstriction secondary to maternal systemic inflammation is sufficient for the development of PE-induced hypertension<sup>5</sup>. The null hypothesis for our study is that there is no relationship between second trimester maternal serum alpha fetoprotein and the subsequent development of preeclampsia. The aim of study is to estimate Serum alpha fetoprotein in early second trimester as predictors of pregnancy induced hypertension

### Methodology

A cross sectional study was conducted among the pregnant females who were in their second trimester attending the OPD clinic in Department of Obstetrics & Gynaecology, JK hospital, LNMC & RC, Bhopal for a period from Jan 2019 to June 2020. Woman with singleton pregnancy visiting Obs and Gynae OPD/IPD of the hospital during their second trimester (13-20 weeks) of pregnancy were enrolled in the study. The study design was prospective observational study and sample size was 150. A 5 ml of venous blood sample was collected and tests were carried out. Estimation of serum alfa fetoprotein level was done by enzyme-linked fluorescence immunoassay. Inclusion Criteria: All pregnant women in their second trimester (13 - 20 weeks) above 18 years and below 40 years of age with informed consent having

singleton pregnancy confirmed by Ultrasonography and who were previously normotensive and non proteinuria.

Exclusion Criteria: All pregnant woman having age less than 18 and more than 40 years, multiple pregnancy, episode Of Chronic Hypertension, Gestational trophoblastic diseases in present or previous pregnancy, Down syndrome/any congenital anomalies, Pregnancy associated with Germ cell tumours.

After data collection, it was entered in an Excel worksheet. All data analysis was done with the help of Epi Info software version 7. The continuous quantitative data were summarized as mean and standard deviation, while discrete (categorical) data in numbers and percentage (%). The categorical variables were compared by Pearson correlation and ROC curve. A p-value <0.05 was considered as significant and the value < 0.001 was considered highly significant.

### Result

It was observed that maximum number of pregnant women was in the 26-30 years age group 52% followed by 21-25 years age group as seen in table 1. The mean age of women in pregnancy-induced hypertension group was 26.13 $\pm$ 3.4079 years and in normotensive group, it was 25.1875 $\pm$ 2.9726 years. As the age advances, incidence of pregnancy-induced hypertension increases.

**Table 1: Age distribution.**

Age groups	N	Percentage (%)
<20	23	15.3
21-25	35	23.3
26-30	78	52.0
>30	14	9.3
Total	150	100.0

It was observed that maximum number were of Primigravida, 39.3%, closely followed by Gravida-2

38.7% followed by Gravida-3 group 15.3% followed by more than Gravida-4 group 17.5% as seen in table 2.

**Table 2: Distribution of cases in respect to their gravid.**

Gravida	N	Percentage (%)
Primi	59	39.3
G2	58	38.7
G3	23	15.3
G4 and above	10	17.5
Total	150	100

On observing the patients with respect to period of gestation in weeks completed, it was observed that maximum number were 17-18 weeks of gestation

45.3% followed by 13-16 weeks gestation 28% followed by 19-20 weeks gestation 26.7%.

**Table 3: Distribution of cases according to period of gestation.**

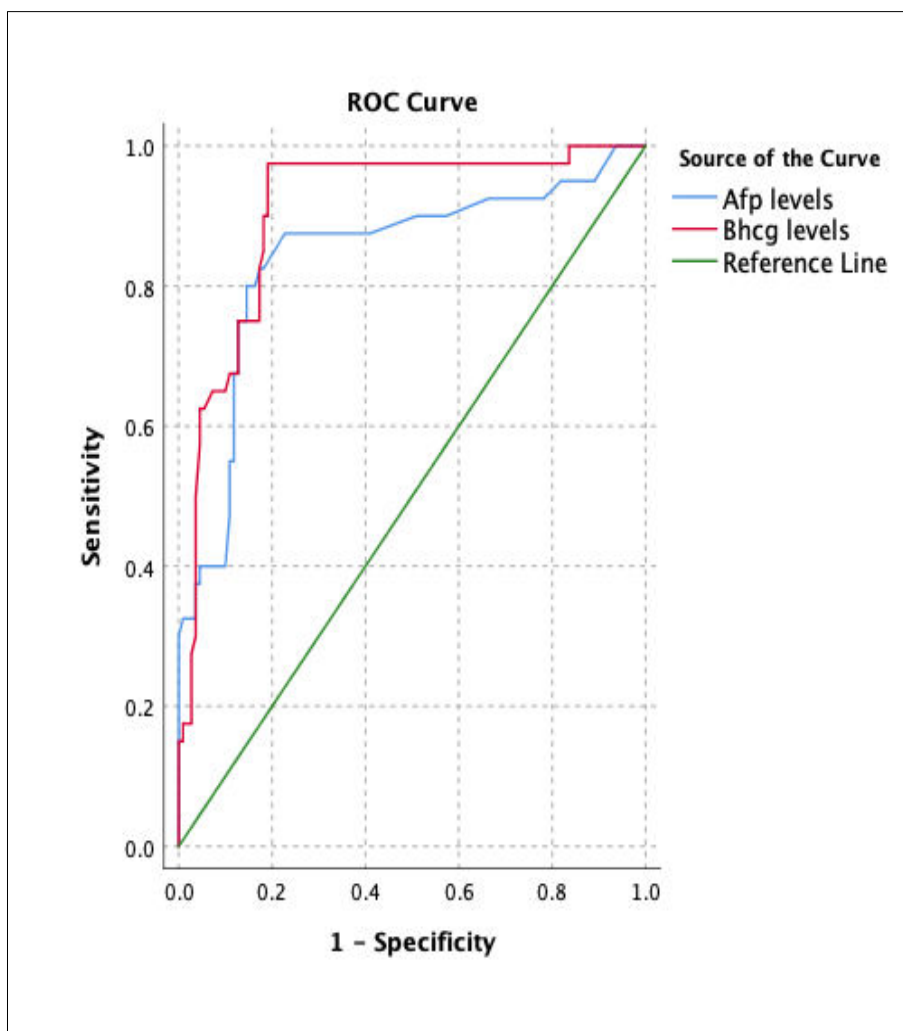
Period of gestation (weeks)	N	Percentage
13-16	42	28.0
17-18	68	45.3
19-20	40	26.7
Total	150	100

It was observed that there was significant association between level of serum alpha-fetoprotein and PIH (<0.001). About 8 pregnant women having AFP level <3.23 develop PIH and 32 pregnant women develop

PIH having AFP levels > 3.23 as seen in table 4. It was also observed that Sensitivity of 80% and specificity of 85.45% and a positive predictive value of 66.6% and a negative predictive value of 92.1%

**Table 4: Pearson chi square test between AFP levels and PIH**

		PIH		Total	
		Absent	Present		
Afp group	<3.23	94	8	102	
	>3.23	16	32	48	
Total		110	40	150	
		Pearson Chi-Square	57.754a	P value	<0.001



**Fig1: Receiver operator characteristic curve**

**Discussion**

Hypertensive disorders of pregnancy are one of the most common complications of pregnancy and affects up to 8% of all gestation<sup>6</sup>. The exact mechanism of

pregnancy-induced hypertension is unknown, no standards for prediction exist, and most facets of management are unclear, so management of pregnancy-induced hypertension remains challenging

and controversial. Present study was conducted to analyse relationship of maternal serum alpha fetoprotein levels during second trimester and subsequent development of hypertension. Our study also analysed the association of high levels of serum AFP with severity of hypertensive disorders in pregnancy.

In our study Serum maternal AFP as a predictor of PIH has got a sensitivity of 80% and specificity of 85.4%. In other studies with maternal serum alpha fetoprotein as predictor of hypertensive disorders of pregnancy like previous studies study has got a sensitivity of 91.5% and specificity of 21% only<sup>7</sup>. Fourteen of the studies used 2.0 MoM as the elevated AFP level, while eight studies used 2.5 MoM as the cut-off value. While in our study we used 3.23 MoM<sup>8</sup>.

### Conclusion

The present study confirmed the value of second trimester maternal serum AFP levels as predictors of PIH. This study provides evidence that elevated second-trimester MS-AFP is associated with increased risk of pregnancy induced hypertension.

**Funding:** No funding sources

**Conflict of interest:** None declared

**Ethical approval:** The study was approved by the Institutional Ethics Committee

### Reference

1. Cunningham FG, Leveno KJ, Bloom SL, Pregnancy hypertension. In: Kenneth J, *et al.*, editors. Williams obstetrics. 23. New York: McGraw-Hill; c2010. p. 706
2. Yadav K, Aggarwal S, Verma K. Serum  $\beta$ hCG and Lipid Profile in Early Second Trimester as Predictors of Pregnancy-Induced Hypertension. J Obstet Gynaecol India. 2014 Jun;64(3):169-74. DOI: 10.1007/s13224-013-0490-3. Epub 2013 Dec 17. PMID: 24966499; PMCID: PMC4061328.
3. Allen R, Marleen S, Velauthar L, Harrington K, Aquilina J. Improved Early Prediction of Preterm Pre-Eclampsia by Combining Second Trimester Maternal Serum Alpha-Fetoprotein and Uterine Artery Doppler. Journal Of Clinical Gynecology And Obstetrics. 2014;3(1):22-29.
4. Walters BNJ, Lao T, Smith V, Swiet M.  $\alpha$ -Fetoprotein elevation and proteinuric pre-eclampsia. Int J Obstet Gynaecol. 1985;92:341-344.
5. Armaly Z, Jadaon JE, Jabbour A, Abassi ZA. Preeclampsia: novel mechanisms and potential therapeutic approaches. Front Physiol. 2018;9:973.
6. Sibai BM. Diagnosis and management of gestational hypertension and preeclampsia. Obstet Gynecol; c2005. p. 110-121.

7. Keikkala E, Vuorela P, Laivuori H, *et al.* First trimester hyperglycosylated human chorionic gonadotropin in serum a marker of early-onset preeclampsia. Placenta. 2013;34:1059-1065.
8. Başbuğ D, Başbuğ A, Gülerman C. Is unexplained elevated maternal serum alpha-fetoprotein still important predictor for adverse pregnancy outcome? Ginekol Pol. 2017;88(6):325-330. DOI:10.5603/GP.a2017.0061. PMID: 28727133.