

SHORT COMMUNICATION

RADIAL IMMUNO DIFFUSION ESTIMATION OF MATERNAL
SERUM ALPHA FETO-PROTEIN IN NORMAL PREGNANCY
AND PREGNANCY-INDUCED HYPERTENSION

P. P. GUPTA AND R. K. SRIVASTAVA

Department of Pharmacology and Therapeutics,

AND

SADHNA GUPTA AND KUSUM GUPTA

*Department of Obstetrics and Gynaecology,
S. N. Medical College, Agra - 282 002*

(Received on September 10, 1987)

Summary : Maternal Serum Alphafeto Protein (AFP) levels were measured in maternal serum of normal pregnancy & pregnancy induced hypertension (PIH) by using M-partigen immuno diffusion plates. A total of 80 cases (30 normal pregnancy and 50 of PIH) were taken for study. AFP levels were significantly lower in pre-eclamptic and eclamptic pregnancies as compared to normal pregnancy. Strong positive correlation between gestational age and maternal AFP levels was observed in normal pregnancy. While in PIH no significant positive or negative relationship was found. Observations suggest that estimation of maternal serum AFP may help in early detection of PIH.

Key words : alpha feto protein (AFP) pregnancy induced hypertension (PIH)
normal pregnancy single radial immuno diffusion estimation

INTRODUCTION

Alphafetoprotein (AFP) is an oncofeto protein and its concentration in maternal serum during normal pregnancy rises from 15 $\mu\text{g/l}$ at conception to 150 $\mu\text{g/l}$ at 12-16 weeks and 500 $\mu\text{g/l}$ at term. Although variations from normal levels of maternal serum, AFP has been found useful in detection of various types of abnormal pregnancies (4,6), but the significance of AFP

in pregnancy induced hypertension (PIH) is not well established. Keeping this in mind, in the present study maternal serum AFP estimation was done by single radial immuno diffusion method to assess and correlate the diagnostic role of maternal serum AFP levels in PIH in relation to normal pregnancy.

MATERIAL AND METHODS

The study was carried out on 80 cases (50 of PIH and 30 of normal pregnancies) admitted (during the period of April 1984 to March 1985) in Obstetrical wards of S. N. Hospital, Agra. The patients were divided into three groups :

- Group 1. : It included 30 cases of normal pregnancy with equal number (10) from each trimester.
- Group 2. : It contained 28 cases of pre-eclampsia.
- Group 3. : It had 22 cases of eclampsia.

Gestational age of group-2 and group-3 cases was between 24-40 weeks.

Criteria for selection of cases :

For Group 1. : (Normal pregnancy) : Healthy females having single pregnancy with no family history of diabetes, hypertension and with no previous history of liver disease, birth of still born and/or congenitally abnormal baby were selected. In these cases presence of jaundice, Rh incompatibility between husband and wife, congenital anomalies of fetus, essential hypertension and renal disease were also excluded.

For Group 2. : (pre-eclamptic pregnancy) : Besides fulfilling the criteria for group-1, these females were having pregnancy of more than 20 weeks, blood pressure more than 130/90 mm Hg, edema and/or albuminuria.

For Group 3. : (eclamptic pregnancy) : Pre-eclamptic females who had one or more convulsions/or prolonged coma in addition to above criteria, were included in this group.

A complete general and obstetrical examination was done alongwith relevant investigations to include the patients in the study according to above criteria.

Estimation of maternal serum AFP level was performed by single radial immuno diffusion method (3) using M-Partigen AFP immuno diffusion plates obtained from M/s Behringwerkey, W. Germany. AFP standard was used to get a reference curve (standard kit No. 7). The concentration of AFP was read directly on the slope line. AFP levels in different conditions were compared and analysed.

RESULTS

The observations of maternal serum AFP level estimation are summarized in Table I, II and III. Mean (\pm S. D.) maternal serum AFP level in group-1 (normal preg.) was 83.9 (36.1) ng/ml during first trimester, 226.6 (17.9) ng/ml during second trimester and 382 (95.6) ng/ml during third trimester. These levels were found to be increased linearly according to the duration of pregnancy.

TABLE I : Trimester wise AFP values in normal pregnaacy and mean values of AFP in different groups.*

Trimester of pregnancy	No. of cases n=30	AFP level in nano gm/ml	
		Mean	S. D.
Ist trimester	10	83.9	36.1
IIInd trimester	10	226.6	17.9
IIIrd trimester	10	382.0	95.6

*Mean AFP values (\pm S.D.) in ng/ml in Group-1 (normal preg.), group-2 (pre-eclampsia) and group-3 (eclampsia) were 230.0 (136.6), 168.0 (108.7) and 102.7 (96.1) respectively.

TABLE II : Maternal AFP level in Normal and Toxaemic pregnancies (PIH).

Maternal serum AFP level (nano gm/ml)	Number of cases		
	Group-1 (Normal Preg.)	Group-2 (Pre-eclampsia)	Group-3 (Eclampsia)
0-100	6	6	10
101-200	5	15	7
201-300	11	3	5
301-400	5	4	—
401-500	3	—	—
Total	30	28	22

— AFP level V/s Pre-eclampsia. $X^2=10.85$ at 3 d. f., $P=<0.05$,

— AFP level V/s Eclampsia. $X^2=8.46$ at 2 d. f., $P=<0.05$,

— AFP level V/s Toxaemia (Pre-eclampsia + Eclampsia). $X^2=12.62$ at 2 d. f., $P=<0.01$.

(No significant difference was present between pre-eclamptic and eclamptic patients— $X^2=3.57$; d. f.=2; $P=>0.05$).

TABLE III : Gestational age and Maternal AFP level.

Period of gestation (Weeks)	Group	No. of cases	Maternal serum AFP level (nano gm/ml)				
			0-100	101-200	201-300	301-400	401-
6-12	1. (Normal Preg.)	10	6	4	—	—	—
	2. (Pre-eclampsia)	—	—	—	—	—	—
	3. (Eclampsia)	—	—	—	—	—	—
13-24	1. (Normal Preg.)	10	—	1	9	—	—
	2. (Pre-eclampsia)	2*	1	1	—	—	—
	3. (Eclampsia)	2*	—	2	—	—	—
25-32	1. (Normal Preg.)	8	—	—	2	4	2
	2. (Pre-eclampsia)	3	—	2	—	1	—
	3. (Eclampsia)	10	4	3	3	—	—
33-40	1. (Normal Preg.)	2	—	—	—	1	1
	2. (Pre-eclampsia)	23	5	12	3	3	—
	3. (Eclampsia)	10	6	2	2	—	—

Coefficient of correlation (r) between AFP level and gestational age—

(a) For Normal Pregnancy. $r=0.88$; $t=10.09$ at 28 d. f.; $P=<0.01$

(b) For Pre-eclampsia. $r=0.09$; $t=0.49$ at 26 d. f.; $P=>0.05$

(c) For Eclampsia $0.r=18$; $t=0.86$ at 20 d. f.; $P=>0.05$

* These cases were having gestational age of 24 weeks.

On statistical analysis it was found that maternal serum AFP levels were significantly lower in group 2-pre-eclamptic and group 3-eclamptic patients as compared to group 1-normal pregnancy cases (AFP level v/s preeclampsia $X^2=10.85$; d. f.=3; $P=<0.05$ and AFP level v/s eclampsia $X^2=8.46$; d. f.=2; $P=<0.05$). But no significant difference was present in AFP levels between pre-eclamptic and eclamptic patients ($X^2=3.57$; d. f.=2; $P=>0.05$).

Assessment of relationship between maternal serum AFP level and gestational age was done by calculating co-efficient of correlation (r). The observations of our study showed a strong positive association between maternal AFP level and gestational age in normal pregnancy ($r=0.88$) while no significant positive or negative relationship was observed in pre-eclamptic ($r=0.09$) and eclamptic ($r=0.18$) patients.

DISCUSSION

Alpha feto protein or fetoglobulin have no corresponding compound in the adult. Maternal serum AFP level is regulated by fetal AFP concentration, gestational age and associated pregnancy disorders like Rh isoimmunization, vesicular mole etc. (6,7). In PIH Seppala (5) has reported maternal serum AFP above the normal median in only 35% of cases. Rodeck (4) reported the maternal AFP levels less than 5th percentile in 16% cases in PIH as compared to 5% in normal pregnancy. Our study showed lower maternal serum AFP levels in both conditions of PIH (Pre-eclampsia and eclampsia) which were significant as compared to normal pregnancy. Similar results have also been reported by other workers (1,2,8). In these studies (8) rise of maternal AFP in occasional patients was found which could only be a result of admixture of maternal and fetal blood during parturition as suggested by these authors. Lower concentration of maternal AFP can be explained by the decreased transfer of AFP from fetus to mother as PIH is characterized by reduced uteroplacental circulation due to vasoconstriction and small sized placenta.

In the past very limited work has been done to find out any association between gestational age and maternal serum AFP levels during pregnancy. We observed strong positive correlation between gestational age and maternal AFP levels in normal pregnancy. While in PIH no significant positive or negative relationship was present. It indicates that maternal serum AFP levels in PIH do not depend on the gestational age.

It is suggested that estimation of maternal serum AFP concentration may help in early detection of pregnancy induced hypertension. This will be valuable in improving management and prognosis in cases of PIH.

REFERENCES

1. Bennett, M. J., Solymar, A, C. Turnbull, H. S. Cubla and N. J. Wald. Pregnancy associated with low maternal serum AFP. *Amer. J. Obst. & Gynaec.*, **135** : 545, 1979.
2. Coheen, H., H. Graham and H. L. Lau. Alpha-1-feto protein in pregnancy. *Amer. J. Obst. & Gynaec.*, **115** : 881, 1973.
3. Mancini, G., A. O. Carbonara and J. P. Heremans. Immuno-Chemical quantitation of antigen by single Radial-Immunodiffusion. *Jr. Immuno. Chem.*, **2** ; 235, 1965.
4. Rodeck, C. H., H. Campbell and S. Biswas. Maternal serum AFP in normal and complicated pregnancies *Br. J. Obst. & Gynaec.*, **83** : 24, 1976.
5. Seppala, M. Foetal pathophysiology of human Alpha Feto Protein. *Ann. N. Y. Acad. Sc.*, **259** : 59, 1975.
6. Seppala, M., K. D. Bagshawe and E. Ruoslahti. Radio Immuno Assay of Alpha feto protein : A contribution to the diagnosis of Choriocarcinoma and hydatiform mole. *Int. J. Cancer*, **10** : 478, 1972.
7. Seppala, M. and E. Ruoslahti. AFP in Rh. immunized pregnancies. *Obst. & Gynaec.*, **42** : 613, 1973.
8. Talib, V. H., A. Madan, R. T. Madan and S. R. Khurana. Alpha Foeto protein (AFP) in High Risk Pregnancies. *Jr. Obst. & Gynaec. India.*, **36** : 265, 1986.