

# PREDICTION OF PREGNANCY OUTCOME IN THREATENED ABORTION CASES BY MATERNAL SERUM ALPHA FETOPROTEIN LEVEL\*

By

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## SUMMARY

Maternal serum alpha-fetoprotein (AFP) level was studied in 30 cases of threatened abortion and 20 cases of uncomplicated pregnancy between 6 to 24 weeks of gestation. Maternal serum AFP level was found to be  $> 50$  ng/ml in 43.3% of cases of threatened abortion as compared to none in the control group. Level above 50 ng/ml of maternal serum AFP was found in 25.0% of first trimester and 55.5% of second trimester of pregnancy. A majority of (92.3%) of cases with AFP level above 50 ng/ml and 5.8% of cases with AFP level below 50 ng/ml have aborted. In the first trimester of pregnancy 66.7% of cases with AFP level above 50 ng/ml and 11.2% cases with AFP level below 50 ng/ml have aborted. In second trimester all the cases with high maternal serum level have aborted. So it is evident that a raised maternal serum AFP value can help in the prediction of pregnancy outcome in threatened abortion with a definite better predictive value in second trimester of pregnancy.

## Introduction

Elevated levels of AFP in amniotic fluid are associated with high levels in maternal serum (Brock *et al*, 1973; Leek *et al*, 1973). Further maternal serum AFP levels have been found to be above the nonpregnant level in 30 per cent of threatened abortion cases (Seppala and Ruoslahti, 1972). The increased maternal serum AFP level during abortion evi-

dently originates from fetal blood (Seppala and Ruoslahti, 1972).

The present study was aimed at:

1. To find out the maternal serum AFP level in threatened abortion cases as well as in early uncomplicated cases.
2. To evaluate the prognostic value of AFP determination in patients of threatened abortion.
3. To see if there is any significance of high or low level of AFP with the outcome of pregnancy in cases of threatened abortion.

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## Material and Methods

The present study was carried out in the department of Obstetrics & Gynaecology.

cology and Pathology, Mahatma Gandhi Institute of Medical Sciences, Sevagram during the period from June 1986 to March 1987. The study comprised of 30 cases of threatened abortion who had pregnancy of 6 to 24 weeks of gestation and presented with vaginal bleeding. Twenty cases of uncomplicated pregnancy of same gestation period were taken as control.

A detailed work up of each patient was carried out according to a well designed proforma. Ten millilitre of blood was collected from each case and equally distributed in EDTA and plain bulb. The former sample was subjected for haemoglobin, blood group (both A B O & Rh typing), and the later was centrifuged and serum was separated and kept frozen until tested. Diagnosis of pregnancy was established by thorough clinical examination with history.

Detection of AFP in serum was carried out by reversed passive haemagglutination (RPHA) technique (a semi-quantitative method) using serodia AFP Kit of Fuji Zoki Pharmaceuticals Co. Ltd., Japan (Code No. PD 601, Lot No. UR 70707). RPHA gives positive result when the sera contains minimum of 50 ng/ml of AFP. All positive seras were further diluted and tested till it became negative. Then the calculation was done as follows

Serum AFP in ng/ml =  $2.5 \times$  highest

serum dilution. Then patients were followed for the outcome of the pregnancy.

### Observations

Agewise distribution of cases are shown in Table I. There were 12 (40%) cases of first trimester and 18 (60%) of second trimester of pregnancy in study group as compared to 8 (40%) and 12 (60%) cases in control group respectively. An increased alpha fetoprotein level of  $> 50$  ng/ml (100 ng/ml to 800 ng/ml) was detected in 13 (43.3%) cases of threatened abortion as against none in the control group. In the first trimester, alpha fetoprotein level was found to be increased in 3 (25%) and in the second trimester it was increased in 10 (55.5%) (Table II & III). Table IV shows the increased AFP level and outcome of pregnancy in study group.

TABLE II

*Distribution of Cases with Increased Level of AFP in Study and Control Group in First Trimester of Pregnancy*

Cases	Total No. of cases	AFP level (>50 ng/ml)	
		Percentage	Percentage
Threatened abortion	12	3	25.0
Control	8	0	0

TABLE I

*Agewise Distribution of Cases in Study and Control Group*

Age distribution (years)	Threatened abortion		Control	
	No. of cases	Percentage	No. of cases	Percentage
<20	4	13.3	5	25.0
20-25	20	66.6	12	60.0
>25	6	20.1	3	15.0
Total	30	100.0	20	100.0

TABLE III  
Distribution of Cases with Increased AFP Level in Study and Control Group in Second Trimester of Pregnancy

	Total No. of cases	AFP level (>50 ng/ml)	Percentage
Threatened abortion	18	10	55.5
Control	12	—	—

TABLE IV  
Correlation of Increased AFP Level and Pregnancy Outcome in Study Group (n = 30)

AFP level ng/ml	No. of cases	Aborted		Continued	
		No. of cases	Percentage	No. of cases	Percentage
>50	13	12	92.3	1	7.7
<50	17	1	5.8	16	94.2

Of the 3 cases with increased AFP level in first trimester of pregnancy, 2 (66.7%) aborted and 8 (88.9%) of the remaining 9 cases in whom AFP level was not increased continued pregnancy and only 1 (11.1%) case aborted (Table V).

In this study, 10 cases of second trimester of pregnancy showed increased alpha fetoprotein level and all of them aborted. Remaining 8 cases who did not show increased AFP level, continued the pregnancy (Table VI).

TABLE V  
Correlation of AFP Level and Pregnancy Outcome in First Trimester in Study Group

AFP level (ng/ml)	No. of cases	Aborted		Continued	
		No. of cases	Percentage	No. of cases	Percentage
>50	3	2	66.7	1	33.3
<50	9	1	11.1	8	88.9

TABLE VI  
Correlation of Increased AFP Level and Pregnancy Outcome in Second Trimester of Pregnancy in Study Group

AFP level (ng/ml)	No. of cases	Aborted		Continued	
		No. of cases	Percentage	No. of cases	Percentage
>50	10	10	100.0	0	0
<50	8	—	—	8	100.0

### Examination of Abortus

Of the 10 cases who aborted, 1 had twins and 1 had triplets. Out of these 13 abortuses, 9 were female and 4 male. One abortus was anencephalic which was diagnosed after the patient aborted.

### Discussion

Alpha fetoprotein is produced by fetal liver, yolk sac and to some extent by fetal gastrointestinal tract (Giltin and Boesman, 1967) and circulates in fetal blood. Fetal serum AFP reaches a maximum concentration at about 12 to 16 weeks with a mean value of 2,79,000/ng/ml at 13 weeks of gestation.

In the present study, maternal serum AFP was high  $> 50$  ng/ml in 43.3 per cent of cases in the study group as against none in the control. Abortion, both therapeutic and spontaneous may result in transplacental haemorrhage (Matthews and Matthews, 1969). Several studies have confirmed fetomaternal haemorrhage across the placental barrier causing rise in maternal serum AFP levels (Lele *et al*, 1982, Norgaard-Pedersen *et al*, 1975).

In the first trimester 25.0 per cent of cases had high levels ( $> 50$  ng/ml) of maternal serum AFP. In an uncontrolled study, none of the cases of threatened abortion of first trimester pregnancy had high levels of maternal serum AFP in the series of Seppala and Ruoslahti (1972). Available literature does not show any further study on maternal serum AFP in different trimesters of pregnancy specially in the first trimester.

In the second trimester of pregnancy, high level of maternal serum AFP was found in 55.5 per cent of cases. Seppala and Ruoslahti (1972) have reported high

maternal serum AFP level only in 20.8 per cent of cases in second trimester of pregnancy. It appears that high maternal serum level in more number of cases in this study could be due to increased feto-maternal haemorrhage both in first and second trimester of pregnancy.

In the present study, 92.3 per cent of cases with increased serum AFP level and 5.8 per cent of cases without increased AFP levels have aborted (Table IV). Similarly Seppala and Ruoslahti (1972), have reported an abnormally high levels of AFP in maternal serum in 5 cases and all of them (100%) aborted. In the same study, 5 cases had abnormally low levels of AFP, amongst whom 3 (60%) aborted. Garoff and Seppala (1975) have reported abortion in 4 (80%) of the 5 cases who had high levels of serum AFP. The elevated levels of maternal serum AFP, in both trimesters can be due to increased transplacental haemorrhage because of placental separation (Lele *et al*, 1982), or disturbed fetal development (Garoff and Seppala, 1975) or fetal death (Seppala and Ruoslahti, 1972). As this study did not confirm fetal death or disturbed fetal development by ultrasonography, this might be due to combination of both the factors. However on examination of abortuses showed one case of anencephaly.

Trimesterwise analysis of the cases, in relation to AFP levels and outcome of pregnancy has shown abortion in first trimester of pregnancy in 66.7 per cent of the total cases with high level of maternal serum AFP and only in 11.1 per cent in rest of the cases (Table V). Thus, the optimal week or weeks for detectable maternal serum AFP seems to be much before 13 weeks but not 14th to 16th week as has been reported by other workers (Brock *et al*, 1974). But, more

data is needed before a firm conclusion can be drawn. In first trimester where the alpha fetoprotein was not raised still abortion occurred can be associated with blighted ovum. Interestingly all the cases who had increased serum AFP level in second trimester of pregnancy had aborted. In the remaining cases, where AFP level was not raised, the pregnancy continued beyond 28 weeks of gestation. Similarly Seppala and Ruoslahti (1972) reported abortion in all the cases with high maternal serum AFP levels and continuation of pregnancy in 83% of rest of the cases.

Amongst the aborted cases, one case each had twin, triplets and anencephaly. All the three cases had remarkably high serum AFP levels. Reports on increased levels of maternal serum AFP levels in anencephaly and multiple pregnancy in early trimester have been confirmed (Brock *et al*, 1975).

References

1. Brock, D. J. H., Bolton, A. E. and Monaghan, J. M.: Lancet 2: 923-924, 1973.
2. Brock, D. J. H., Bolton, A. E. and Scrimgeour, J. B.: Lancet 1: 767-769, 1974.
3. Brock, D. J. H., Scrimgeour, J. B., Bolton, A. E., Wald, N., Peto, R. and Barker, S.: Defects, Lancet 2: 195-196, 1975.
4. Garoff, L. and Seppala, M.: Am. J. Obstet. Gynec. 121: 257, 1975.
5. Giltin, D. and Boesman, M.: Invest. 46: 1010, 1967.
6. Leek, A. E., Ruoss, C. F., Kitan, M. J. and Chard, T.: Lancet, 2: 385, 1973.
7. Lele, A. S., Carmody, P. J., Hurd, M. E. and O'Leary, J. A.: Obstet. Gynec. 58: 227, 1982.
8. Matthews, C. D., Matthews, A. E. B.: Lancet, 1: 694, 1969.
9. Norgaard-Petersen, B. and Gaede, P.: Scand. J. Immunol. 4: 19, 1975.
10. Seppala, M. and Ruoslahti, E.: Brit. J. 4: 769, 1972.