European Journal of Molecular & Clinical Medicine

ISSN 2515-8260 Volume 08, Issue 04, 2021

ORIGINAL RESEARCH

Maternal serum alpha-feto-protein as a predictor of the pregnancy outcome

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ABSTRACT

Background: Elevated levels of maternal serum alpha-fetoprotein are associated with pregnancy complicated by Pre-eclampsia, placental abruption, placental infections, chronic villositis, low birth weight and preterm labor. The present study investigated the possibility that maternal serum alpha-feto-protein can be used to predict the pregnancy outcome as a routine test.

Materials & Methods: 250 patients in the Postgraduate Department of Gynaecology and Obstetrics, Lalla Ded Hospital, Government Medical College Srinagar, over a period of one year were assessed for maternal serum alpha-fetoprotein by human serum by microplate immuno-enzymometric assay by EIA-AFP kit.

Results: Age group 20-23 years had 31, 24-27 years had 80, 28-31 years had 104 and 32-35 years had 35 patients. The mean of the maternal serum alphafeto protein (overall) was 65.32+33.95. The mean of the maternal serum alphafeto protein in pregnancies with normal outcome was 53.47+25.65. The mean of the maternal serum alphafeto protein in pregnancies with adverse outcome was 92.96+34.99. 4 (1.6%) patients out of 250 developed low- lying placenta. 2 out of 4 had raised values of maternal serum alpha-fetoprotein. 6 patients out of 250 had still birth. 4 out of 6 had raised values of maternal serum alpha-fetoprotein. 19 (7.6%) patients out of 250 had low birth weight babies. 18 had raised values of maternal serum alpha-fetoprotein. 12 (4.8%) patients out of 250 had intrauterine growth retardation (IUGR) of babies. 11 had raised values of maternal serum alpha-fetoprotein.

Conclusion: There is no relation between preterm rupture of membranes, low lying placenta and still birth with raised levels of maternal serum alpha-fetoprotein. It is easily done and is cost effective.

Key words: Maternal serum alpha-fetoprotein, Pregnancy, Women

INTRODUCTION

Anatomical lesions of the placenta such as damaged placental villi or abnormal rupture of vessels passing through the basal plate, as occurs in placenta accreta, may underlie unexplained elevated levels of alpha-fetoprotein which could be associated with perinatal loss, pre-eclampsia and intrauterine growth restriction.[1] Previous studies have found that elevated levels of maternal serum alpha-fetoprotein are associated with pregnancy complicated by Pre-eclampsia, placental abruption, placental infections, chronic villositis, low birth weight and preterm labor.[2]

A Hypertensive disorder such as Pre-eclampsia is a multisystem disorder specific to pregnant women. It remains one of the most important causes of maternal and fetal mortality and morbidity in developed countries. It has been proposed that pre-eclampsia and placental abnormalities are associated with a break down in the placental barrier, resulting in an increase in the diffusion of alpha-fetoprotein into the maternal serum. Using a threshold of 2MOM, elevated Alpha-fetoprotein in the mid trimester has been shown to be associated with 2.2 to 3.3 fold increased risk of developing pre-eclampsia.[3]

Preterm delivery is the leading cause of perinatal death and handicap in children and the vast majority of mortality and morbidity relates to early delivery before 34 weeks which occurs in about (2%) of singleton pregnancy.[4] Several studies reported that elevated maternal serum levels of Alpha-fetoprotein during the second trimester are associated with increased risk of subsequent preterm delivery.[5] Elevated maternal serum alpha-fetoprotein is associated with placenta praevia. The combination of a second or third trimester placenta praevia and an unexplained elevated maternal serum alpha-fetoprotein may be associated with an increased risk of abnormal placental adherence including placenta accreta, increta and percreta.[6] The present study investigated the possibility that maternal serum alpha-feto-protein can be used to predict the pregnancy outcome as a routine test.

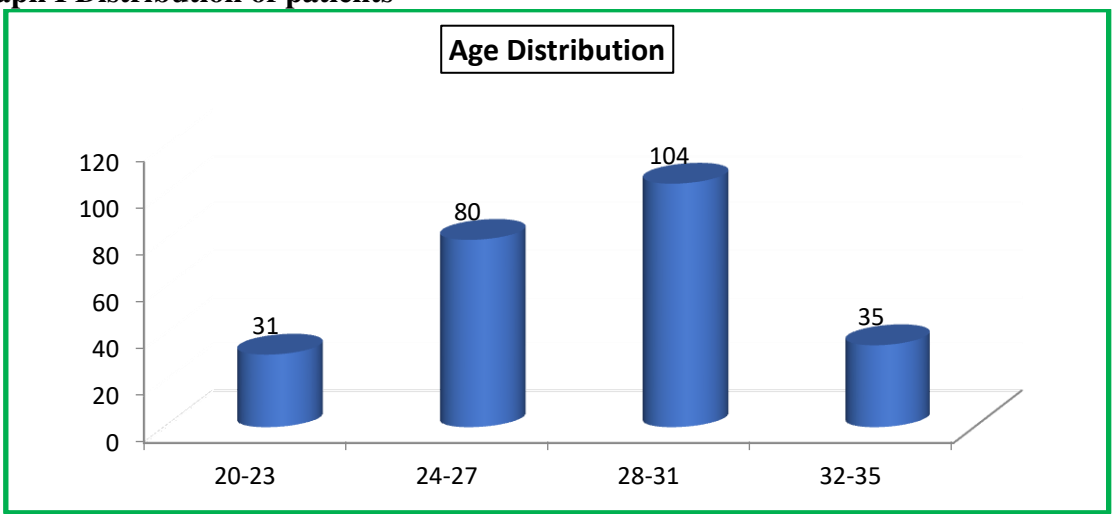
MATERIALS & METHODS

The present study was conducted on 250 patients in the Postgraduate Department of Gynaecology and Obstetrics, Lalla Ded Hospital, Government Medical College Srinagar, over a period of one year. Inclusion criteria comprised of age 20-35 years old, having single viable fetus appropriate for gestational age and with gestational age (14-22 weeks) as ascertained by last menstrual period. Exclusion Criteria were women having multiple pregnancy, anatomically abnormal fetus when assessed by ultrasound and at delivery, uncertain gestational age and last menstrual period, patients having molar pregnancy, patients having low lying placenta documented by ultrasonography and patients having chronic hypertension or diabetes.

4ml of blood was collected for the estimation of maternal serum alpha-feto-protein. Maternal serum alpha-fetoprotein was measured in human serum by microplate immuno-enzymometric assay by EIA-AFP kit. The “EIA – AFP” is a one-step immunoassay based on principle of sandwich” method. The assay system utilizes a high affinity and specificity monoclonal antibody (enzyme conjugated and immobilized) directed against a distinct antigenic determinant on the intact alpha-feto protein molecule. The test sample is allowed to react simultaneously with the two antibodies, resulting in the alpha-feto protein molecules being sandwiched between the solid phase and enzyme linked antibodies. After incubation, the wells are washed with washing solution to remove unbound labeled antibodies. A solution of tetramethyl benzidine (TMB) substrate is added and incubated, resulting in the development of blue color. The color development is stopped with the addition of stopping reagent, changing the color to yellow. The color intensity of the test sample is directly proportional to the concentration of alpha-feto protein. Results were studied statistically.

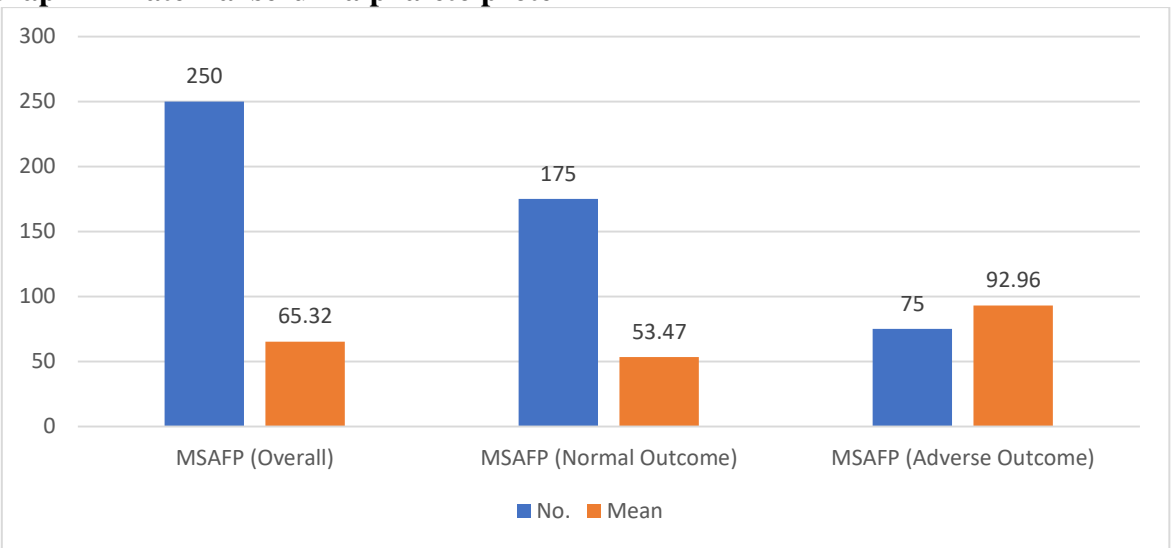
RESULTS

Graph I Distribution of patients



Graph I shows that age group 20-23 years had 31, 24-27 years had 80, 28-31 years had 104 and 32-35 years had 35 patients.

Graph II Maternal serum alphafeto protein



Graph II shows that mean of the maternal serum alphafeto protein (overall) was 65.32+33.95. The mean of the maternal serum alphafeto protein in pregnancies with normal outcome was 53.47+25.65. The mean of the maternal serum alphafeto protein in pregnancies with adverse outcome was 92.96+34.99.

Table III Low lying placenta in the studied patients

Alpha-fetoprotein	Low Lying Placenta					
	Yes		No		Total	
	Count	%age	Count	%age	Count	%age
Normal	2	50.0	181	73.6	183	73.2
Raised	2	50.0	65	26.4	67	26.8
Total	4	100%	246	100%	250	100%
$P-value = 0.626$ (*NotSig.*)						

Table III shows that 4 (1.6%) patients out of 250 developed low lying placenta. 2 out of 4 had raised values of maternal serum alpha-fetoprotein.

Table IV Still birth in the studied patients

Alpha-fetoprotein	Still Birth					
	Yes		No		Total	
	Count	%age	Count	%age	Count	%age
Normal	2	33.3	181	74.2	183	73.2
Raised	4	66.7	63	25.8	67	26.8
Total	6	100%	244	100%	250	100%
$\boldsymbol{P-value = 0.078}$ $(\boldsymbol{NotSig.})$						

Table IV shows that 6 patients out of 250 had still birth. 4 out of 6 had raised values of maternal serum alpha-fetoprotein.

Table V Still birth in the studied patients

Alpha-fetoprotein	Low Birth Weight					
	Yes		No		Total	
	Count	%age	Count	%age	Count	%age
Normal	1	5.3	182	78.8	183	73.2
Raised	18	94.7	49	21.2	67	26.8
Total	19	100%	231	100%	250	100%
$\boldsymbol{P-value} < 0.001$ $(Sig.)$						

Table V shows that 19 (7.6%) patients out of 250 had low birth weight babies. 18 had raised values of maternal serum alpha-fetoprotein.

Table VI Intrauterine growth retardation (IUGR) in the studied patients

Alpha-fetoprotein	Intrauterine growth retardation (IUGR)					
	Yes		No		Total	
	Count	%age	Count	%age	Count	%age
Normal	1	8.3	182	76.5	183	73.2
Raised	11	91.7	56	23.5	67	26.8
Total	12	100%	238	100%	250	100%
$\boldsymbol{P-value} < 0.001$ $(\boldsymbol{Sig.})$						

Table VI shows that 12 (4.8%) patients out of 250 had intrauterine growth retardation (IUGR) of babies. 11 had raised values of maternal serum alpha-fetoprotein.

DISCUSSION

An unexplained elevated level of maternal serum alpha-fetoprotein in the second trimester of pregnancy is associated with an increased risk of intrauterine death. There is a highly significant association between elevated maternal serum alpha-fetoprotein and subsequent low birth weight.[7] Maternal serum alpha-fetoprotein values can be categorized as low, normal and high based upon population and gestational age-specific normalized values.Maternal serum Alpha-fetoprotein is a valued screening test for both neural tube defects and biochemical screening for Down's syndrome.[8] Now, it is also being used as a predictor for adverse pregnancy outcome like pre-eclampsia, preterm labor, oligohydramnios, placental abruption and intrauterine death.[9] Maternal serum alpha-fetoprotein screening provides an important adjunctive tool for early identification of women at increased risk of obstetric complication and adverse fetal outcome.[10,11] The present study investigated the possibility

that maternal serum alpha-feto-protein can be used to predict the pregnancy outcome as a routine test.

We found that age group 20-23 years had 31, 24-27 years had 80, 28-31 years had 104 and 32-35 years had 35 patients. The mean of the maternal serum alphafeto protein (overall) was 65.32+33.95. The mean of the maternal serum alphafeto protein in pregnancies with normal outcome was 53.47+25.65. The mean of the maternal serum alphafeto protein in pregnancies with adverse outcome was 92.96+34.99. Rebecca et al[12] found that 5.7% women developed pre-eclampsia. Women with MSAFP >2.0 Multiples of the Median (MoM) were significantly more likely to develop pre-eclampsia ($p < 0.00001$) compared to women with MSAFP < 2.0 MoM and they concluded that unexplained elevated MSAFP in the second trimester was strongly associated with a subsequent risk of pre-eclampsia.

We observed that 4 (1.6%) patients out of 250 developed low lying placenta. 2 out of 4 had raised values of maternal serum alpha-fetoprotein.We found that 6 patients out of 250 had still birth. 4 out of 6 had raised values of maternal serum alpha-fetoprotein.We found that 19 (7.6%) patients out of 250 had low birth weight babies. 18 had raised values of maternal serum alpha-fetoprotein. 12 (4.8%) patients out of 250 had intrauterine growth retardation (IUGR) of babies. 11 had raised values of maternal serum alpha-fetoprotein. Anatomical lesions of the placenta such as damaged placental villi or abnormal rupture of vessels passing through the basal plate, as occurs in placenta accreta, may underlie unexplained elevated levels of alpha-fetoprotein which could be associated with perinatal loss, pre-eclampsia and intrauterine growth restriction.[13]Measurable concentrations appear in the maternal serum beginning at the end of the first trimester reaching a maximum level during the second trimester.[14] Maternal serum alpha-fetoprotein levels normally rise during pregnancy from a normal non pregnant level of 0-20ngm/ml to a mean level of 250ngm/ml at 32 weeks. Normal level of maternal serum alpha-fetoprotein is dependent on many factors like race, weight and gestational age.[15]

CONCLUSION

Authors found that there is no relation between preterm rupture of membranes, low lying placenta and still birth with raised levels of maternal serum alpha-fetoprotein. It is easily done and is cost effective. However further studies need to be done to make it a routine test to predict adverse pregnancy outcome.

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