



Ischemia-modified albumin levels in maternal blood complicated by fetal distress

©Serhat Ege*

Science Healty University Gazi Yasargil Training and Research Hospital, Diyarbakir, Turkey

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Abstract

Aim: Identifying patients with FD during the prenatal period or during delivery will help us intervene early. Therefore, we aimed at evaluating the maternal IMA status in pregnancies complicated by FD and comparing the results with those of healthy pregnancies.

Materials and Methods: One hundred and twenty patients beyond the 34th week of pregnancy were included in the study, and they were divided into two groups. Group 1 (study group) included 60 patients who were diagnosed with fetal distress had to have a cesarean section due to the Fetal distress indication according to the NST; group 2 (control group) comprised 60 patients who showed no signs of Fetal distress or any other disease and had an elective C/S due to previous C/S.

Results: There was no significant difference between the groups in terms of BMI, birth weight, maternal age, gravidity and parity. IMA concentrations were found to be lower in group 2 patients compared with group 1 patients ($p < 0.001$).

Conclusion: Increased maternal IMA levels in the intrauterine fetal distress justify the need for maternal follow-up with IMA. Although studies on the value of IMA are still few in its use in perinatology practice, we think that more studies should be done in this field



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Introduction

Cardiotocography (CTG) is widely used in non-invasive evaluation of fetal oxygenation. The main purpose of monitoring fetal heart rate (FHR) is to identify hypoxemic fetuses and prevent possible complications. Since the fetal brain is affected by the function of the fetal heart, it causes recurrent late slows due to bradycardia or myocardial depression in response to changes in hypoxemia and acidemia [1, 2].

Fetal distress (FD) reveals the imbalance in the production of reactive oxygen species (ROS) in relation to oxidative stress (OS) in fetal and maternal blood [3,4]. The production of this radical can cause N-terminal structural changes in albumin, thus producing ischaemic-modified albumin (IMA). Although IMA, the marker of OS, was initially studied in patients with myocardial ischaemia, it has been shown to be useful for the evaluation of patients with various diseases [5].

Identifying patients with FD during the prenatal period or during delivery will help us intervene early. Therefore, we aimed at evaluating the maternal IMA status in pregnancies complicated by FD and comparing the results with

those of healthy pregnancies.

Materials and Methods

One hundred and twenty patients beyond the 34th week of pregnancy were included in the study, and they were divided into two groups. Group 1 (study group) included 60 patients who were diagnosed with fetal distress had to have a cesarean section due to the Fetal distress indication according to the NST; group 2 (control group) comprised 60 patients who showed no signs of Fetal distress or any other disease and had an elective C/S due to previous C/S. Fetal bradycardias, continuous atypical variable deceleration, loss of variability were evaluated by the attending physician and patients with FD were identified [6]. Blood pressure was measured, and the following parameters were included in the study: Maternal age, week of pregnancy, birth weight, parity, body mass index (BMI).

The exclusion criterion composed of complicated pregnancies (preeclampsia, gestational diabetes mellitus, intrauterine growth retardation, fetal congenital malformation, oligohydramnios, placenta previa), any history of cardiac symptoms and smoking and alcohol addicts and multiple pregnancies. Pregnancy week was determined by evaluating ultrasonography and menstrual cycle.

Blood from patients was centrifuged at 4.000 rpm for 10

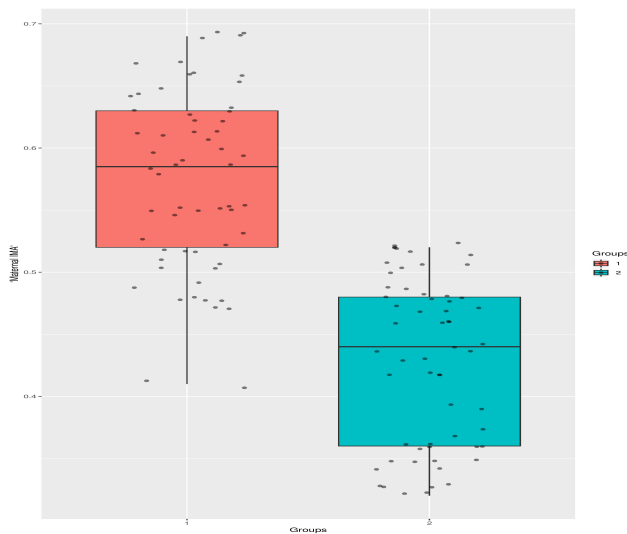
*Corresponding author:

Email address: serhatege782@gmail.com (©Serhat Ege)

Table 1. Demographic and laboratory results and comparison of the two groups

	Group 1 Fetal Distress n=60	Group 2 Control Group n=60	P value
Age (years) (mean±)	25.32 ± 2.73	25.33 ± 2.84	0.97
BMI (kg/m ²) (mean±)	23.7 ± 1.08	23.8 ± 0.8	0.57
Birth Weight (g)	3058± 282	3064 ± 338	0.91
Gravidity	2.22 ± 1.45	2.15 ± 1.34	0.79
IMA(ABSU)	0.57 ± 0.07	0.43 ± 0.07	0.0001

Data are mean ± standart deviation BMI: Body mass index, IMA: Ischemic modified albumin, ABSU: Absorbance units

**Figure 1.** The difference between the groups in terms of BMI.

minutes and stored at -80°C until IMA assessment. IMA levels were determined based on the rapid colorimetric method of the albumin cobalt binding test developed by Bar-Or et al. [7].

Statistical analysis

The average plus / minus standard deviation in the presentation of numerical variables is shown. Comparative evaluations between groups (control against the case) were used kator2 test for categorical variables, either Student's t-test or Mann-Whitney U test for continuous variables. The differences were considered significant at $p < 0.05$.

Results

One hundred and twenty patients beyond the 34th week of pregnancy were included in the study,. There was no significant difference between the groups in terms of BMI, birth weight, maternal age, gravidity and parity. IMA concentrations were found to be lower in group 2 patients compared with group 1 patients ($p < 0.001$) (Figure 1).

Discussion

In this study, we examined OS-related changes in patients who were at least 34 weeks pregnant and had to have a

cesarean section due to FD. The results of the study revealed that the IMA was in favor of OS in the pregnant women with fetal distress compared with the healthy pregnant women.

Hydroxyls occur during oxygen use and this plays an important role in the formation of FD. ROS, which occurs in ischemia / reperfusion imbalance, causes changes in the album and thus produces IMA [8, 9]. Çağlar et al. [10], was found no statistically significant difference in IMA levels of CS groups. Gugliucci et al. [11] found higher IMA values in pregnant women with FD in maternal and cord blood. Fetal tissue ischemia may be responsible for high IMA levels in the FD group. In this study, unlike Çağlar et al., IMA was found to be significantly higher in patients with FD compared to the control group. This shows that hydroxyl radicals increase in the lack of oxygen and contribute to the production of IMA.

The effect of anesthesia type on cord blood IMA levels was reported in two studies with different results. In the first study, the cord blood of anesthesia did not give a significant result on IMA levels, while the second reported a significant increase in cord blood IMA levels in newborns under general anesthesia [12, 13]. In this study, samples were taken before anesthesia. In this study, all patients were operated under spinal anesthesia in order not to affect the type of anesthesia.

Kim et al. [14] reported that IMA levels did not differ between patients with non-ischaeic chest pain and ischaemic chest pain. Therefore, they suggested that serum IMA levels were not statistically significant in the evaluation of patients with acute chest pain in clinical practice. Based on this evidence, IMA can be considered as a non-specific marker and can be elevated in patients undergoing OS depending on various clinical conditions. The limiting aspect of the present study is that IMA can give high results and adversely affect follow-up in patients admitted to the clinic because other diseases that elevate OS cannot be differentiated.

Conclusion

Increased maternal IMA levels in the intrauterine fetal distress justify the need for maternal follow-up with IMA. Although studies on the value of IMA are still few in its use in perinatology practice, we think that more studies should be done in this field.

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