Carbonic **Anyhdrnse Activity in Amniotic**: **Fluid of Various Gestational Ages**

DEĞİŞİK GEBELİK HAFTALARINDA AMNIOTİK SIVI KARBONİK ANHİDRAZ. AKTİVİTESİ

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ABSTRACT

Carbonic anhydrase enzyme activities oj gravidas at various gestational ages have been measured. The increase between lite first group (20-28 weeks of gestational age) and die second group (28-36 weeks of gestational agel was significant followed by a significand decrease towards term. Carbonic anhydrase activity can be used as an indicator of a number of anienatcd. complications including respiratory distress syndrome because of its dour relation with secretion and the ceils responsible for secretion especially surfactant producing tvpe II pneumocytes.

Key Words: Carbonic anhydrase. Amniotic **fluid**

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ÖZET

Karbonik anhidraz aktivitesi değişik gebelik haftalarında ölçüldü. Birinci (20-28 gebelik haftası) ve ikinci gnıp (28-36 gebelik haftası) arasındaki artışı hemen doğru anlamlı Mşüş izlemektedir. Karbonik anhidraz aktivitesi sekresvon ve sekresvondan sorumlu özellikle surfakıan üreten tıp II pndmosiller yakın ilişkisinden dolayı, respiratuvar distres sendroımı d a lı i i bir çok aılenatl komplikasyonun tanısında kllantlahilir.

Anahtar Kelimeler: Karbonik **anhidraz.** Amman mayii

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Up to date, various investigations have been made on several components of amniotic fluid in order to follow the intrauterine growth of the fetus 11,2,3). Besides, a number of biochemical tests in amniotic fluid are still being used for determination of antenatal complications (4,5). First in 1952 Berfcnslram showed that carbonic anhydrase is an enzyme playing an important role in balancing the acid-base stalus (9,7). Recent studies have revealed that carbonic anhydrase is also a component ol cpithcls of fetal lung functioning in secretory process (8), Determination of the esterase activity of carbonic anhydrase is a simple and rapid test, fn order lo bring attention to the fact that carbonic anhydrase activity could also be used as a predictor of respiratory distress syndrome together with parameters like L/S (lechitin/sphingomyelin ratio), O.D. (optical density) and PCi (phosphalidiyl glycerol). Because of its role in lung secretory process we aimed to investigate the activity of carbonic anhydrase in amniotic fluid of different ages of pregnancy to present a preliminary report related lo carbonic anhydrase activity in amniotic fluid.

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MATERIAL AND METHODS

The first group consisted of 10 amniotic fluid samples obtained *by* transabdominal amniocentesis

al 20-28 weeks of gestational age. The second group consisted of 14 samples obtained cither by amniocentesis or vaginally from premature labour cases. Twenty-one term pregnancies formed the third group from wieh amniotic fluid samples were obtained vaginally avoding contamination of bood or meconium. Such samples were excluded.

Carbonic anhydrase determinations were performed by the esterase method proposed by Kopler an Armstrong (9,10). P-nitrophenyl acetate was prepared freshly at the time of assay (5.43 nig p-nitrophenyl acetate dissolved in 0.3 ml acetone and the volume completed to 10 ml by distilled water). One milliliter of p-nitrophenyl acetate was added to f.8 ml of sodium phosphate buffer. With 0.02 ml of amniotic fluid sample, the readings were done at 348 Nm against blank (1.8 ml sodium phosphate buffer, f ml p-nitrophenyl acetate and 0.2 ml distilled water). For each sample, and the rusults were calculated in accordance with the amount of product formation by the enzyme in one minute (a = e.1. c). The rusults were given as units per gram protein. Protein determinations were done by Lowry method (11). Statistics were done with student's test.

RESULT

We observed a significant increase in carbonic anhydrase activity between our first and the second groups ($p<0.05$) while there was a significant decrease between the second and the third groups ($p < 0.05$) (Table 1 and 2).

Tablo 1. Carbonic anydrase activities between the first and the second group (lU/gr prot)

	No of Samples	Mean	sld.dev
First group	10	7.44	0.77
Second group	14	16.67	1.64

(**t** =5.09, **p**< 0.05

Tablo 2. Same values between the second and the third groups

	No of Samples	Mean	sld.dev
Second group	14	16.67	1.64
Third group	21	11.50	0.76

(**t** = 5.09, **p**< 0.05

DISCUSSION

In intrauterine life fetal lungs are full of fluid secreted by the lungs. In experimental studies it has been shown that the fluid has a high chloride and low bicarbonate content pointing out that carbonic anhydrase plays a significant role in thes process (8). The existence of carbonic anhydrase enzyme in preterm fetal lungs have been shown by Berfenstram et al and later studies have revealed that this activity is in close relation with the fluid secretion and volume where it increases with the progress of pregnancy (6). This fact supports the role of carbonic anhydrase fluid secretion because in another study where carbonic anhydrase was inhibited by aeetolamide fluid secretion of the lungs also decreased in a ratio of 04.5% and this was accompanied by a fall in chloride concentration (12).

It is a obvious that amniotic fluid and lung fluid arc in close relation with each other during pregnancy. It has been reported that type II pneumoeytes responsible for secretion increase in number with proceeding pregnancy (13). As this number increases it seems possible that the activity of the enzyme also increases with the number of the cells. Thus we have found the activity of first group significantly lower than the second group.

Significant decreases were observed between the second and the third groups. This fall could be due to the reduced amount of amniotic fluid towards term and there are also reports on the reduced number of secretory cells just before and after delivery. Thus decreases in carbonic anhydrase activity of amniotic lluid could be due to the decrease in the number of secretory cells.

We concluded that amniotic lluid carbonic anhydrase measurements could be a tool for several antenatal diagnoses csfecially if carried of with L/S, optical density and phosphatidyl glycerol deter minations, because it's rapid, reliable and cheap as an antenatal diagnostic procedure.

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