DOI: 10.38095/2181-466X-20221042-1-75--78 УДК 618.346-07/4:618.346-074:577

BIOCHEMICAL STUDIES OF AMNIOTIC FLUID DURING PREMATURE AND PHYSIOLOGICAL BIRTH

N. N. Shavazi
Samarkand state medical university, Samarkand, Uzbekistan

Key words: preterm birth, amniotic fluid, biochemistry, threatened miscarriage.
Tayanch so'zlar: erta tug'ish, amniotik suyuqlik, biokimyo, homila tushish havfi
Ключевые слова: преждевременные роды, амниотическая жидкость, биохимия, угроза прерывания

A total of 142 laboring women were under our observation in inpatient settings. All pregnant women underwent a comprehensive clinical examination on admission to the hospital. Biochemical parameters of AF showed that its protein content ranged from 2.2 to 3.8 g/l. With increasing gestational age towards delivery the concentration of protein in AF gradually increased. The results of studies of bilirubin content in the AF showed that the level of total bilirubin ranged from 4.8 to 22.9, with an average of 10.5±1.6 total bilirubin, including direct 3.7±0.1 and bound 6.9±0.2. Physical and chemical and biochemical parameters of AF were subject to statistically significant changes depending on the term of labor and the intrauterine state of the fetus in labor. Changes in creatinine and urea concentrations in AF in late labor are the most indicative, which may be of diagnostic value.

MUDDATIDAN OLDIN VA FIZIOLOGIK TUG'RUQDA AMNIOTIK SUYUQLIKNING BIOKIMYOVIY TEKSHIRISHDAGI FARQI VA AHAMIYATINI

N. N. Shavazi
Samarqand davlat tibbiyot universiteti, Samarqand, O‘zbekiston

Bizning nazoratimiz ostida kasalxona sharoitda 142 nafar tug‘ruq davridagi ayollar kuzatildi. Barcha homilador ayollar kasalxonaga yotqizilganidan keyin keng qamrovli klinik tekshiruvdan o'tkazildi. AF ning biokimyoviy ko'rsatkichlari undagi oqsil miqdori 2,2 dan 3,8 g/l gacha bo'lganligini ko'rsatdi. Homiladorlik muddatining oshishi bilan AFdagi oqsil miqdori asta-sekin o'sib boradi. AF ning fizik-kimyoviy va biokimyoviy ko'rsatkichlari tug'ruq muddati va tug'ruq vaqtida homilaning holatiga qarab statistik jihatdan muhim o'zgarishlarga duch keladi. Eng ko'p ko'rsatkichlar diagnostik ahamiyatga ega bo'lishi mumkin bo'lgan kechikgan tug'ruq paytida AFdagi kreatinin va karbamid miqdorining o'zgarishidir.

БИОХИМИЧЕСКИЕ ИССЛЕДОВАНИЯ АМНИОТИЧЕСКОЙ ЖИДКОСТИ ПРИ ПРЕЖДЕВРЕМЕННЫХ И ФИЗИОЛОГИЧЕСКИХ РОДАХ

Н. Н. Шавази
Самаркандский государственный медицинский университет, Самарканд, Узбекистан

Под нашим наблюдением в стационарных условиях находились 142 роженицы. Всем беременным проводили комплексное клиническое обследование при поступлении в стационар. Биохимические показатели АЖ показали, что содержание белка в ней колебалось в пределах 2,2 – 3,8 г/л. С увеличением срока гестации к родам концентрация белка в АЖ постепенно увеличивается. Результаты исследований содержания билирубина в АЖ показали, что уровень общего билирубина колебался в пределах от 4,8 до 22,9, при этом средний уровень общего билирубина составил 10,5±1,6, в том числе прямого 3,7±0,1 и связанного – 6,9±0,2. Физико-химические и биохимические параметры АЖ подвержены статистически достоверным изменениям в зависимости от срока родов и внутриутробного состояния плода в родах. Наиболее показательными являются изменения концентрации креатинина и мочевины в АЖ при запоздалых родах, что может иметь диагностическое значение.

Relevance: Perinatal losses are predominantly due to adverse outcomes of pregnancy and delivery under various conditions [1]. Most published studies focus on the detection and treatment of fetal homeostasis abnormalities in pregnancy, while the period of delivery is often overlooked [2-4]. Fetal homeostasis is formed by the uterine-placental complex, which, along with providing fetal blood flow, produces amniotic fluid surrounding the fetus during pregnancy and the first period of labor. There are numerous publications on the physicochemical and biological parameters of amniotic fluid and its influence on fetal formation during pregnancy [6, 7]. However, changes in the above features of amniotic fluid during labor and their significance for the fetus have been little studied.

The amount of amniotic fluid surrounding the fetus changes significantly during pregnancy and during its complications. With the introduction of ultrasound diagnostics (ultrasound) in ob-

stetric practice, it has become possible to determine the amount of amniotic fluid, as well as to extract amniotic fluid by amniocentesis under the control of ultrasound. However, amniocentesis in pregnancy is associated with a high risk of pregnancy termination, damage to the integrity of the fetal bladder and the risk of fetal trauma.

The aim of the study: was to investigate the diagnostic value of clinical and laboratory examination of AF in preterm and physiological labor.

Materials and methods: There were 142 laboring women under our observation under inpatient conditions, who were admitted for delivery to the Regional Perinatal Complex and 1 maternity unit. All those examined were admitted with the onset of labor. Women with multiple pregnancies, pelvic presentation of the fetus, fetal anomalies, and antenatal fetal death were excluded from the total number. The mAFority of those examined were of active reproductive age. The mean age of the subjects was 24.9±0.3 years. Of the total number of those examined, almost half (48.6%) were first-born and the rest were second-born. Of the total number of women admitted to labor, the predominant majority gave birth at gestational age 38-41 weeks (59.9%). A delayed delivery occurred in 19.7% of women, and the remaining 20.4% of women delivered prematurely at 22-37 weeks gestation (19.8%). In assessing the clinical course of pregnancy, it should be noted that more than half of the women had early gestosis (57%), almost every fourth woman in labor (14.1%) had a history of threatened miscarriage, and every eighth woman had a history of threatened premature labor (12.7%). A total of 218 pregnancy complications were recorded in 142 women in labor, i.e., some women had several complications, 1.5 per woman. The obstetric anamnesis of the 73 women examined was complicated only in 28.8%, mostly by non-pregnancy, induced termination of pregnancy, stillbirths, and hemorrhages. Only 29 women out of 142 (20.4%) reported a history of any gynecological diseases, most often inflammatory processes of the reproductive system.

All pregnant women underwent a comprehensive clinical examination on admission to the hospital, which included the study of life history, including medical history, the study of the course of pregnancy, and standard laboratory and functional tests. Echographic, cardiotocographic, and Doppler methods were included in the set of additional studies. The amount of amniotic fluid was determined by two methods: determining the maximum vertical pocket (MVP) and the amniotic fluid index (AFI) [1].

FWS was collected for laboratory examination at the end of the first period of labor during spontaneous opening of the fetal bladder or amniotomy. At the same time several tubes were used to take BL for determination of hormones, urea and creatinine, bilirubin, glucose, protein, PH, which were determined according to conventional methods [5]. Of the total number of women examined, 32 women in labor were tested for cortisol, estradiol, and placental lactogen in AF by enzyme immunoassay.

The results of the study of biochemical parameters of AF showed that its protein content ranged from 2.2 to 3.8 g/l. With the increase of gestational age to delivery the concentration of protein in AF gradually increases. There are statistically significant differences in the protein content of AF in term labor compared with preterm and delayed labor ($p < 0.05$). It was also found that there is a slight increase in protein concentration in premature labor and a significant increase in delayed labor. In a large-volume labor protein concentration remained at 2.5-3.3 g/l. Thus, the increase in protein content in AF is associated to a greater extent with the term of gestation and to a lesser extent with the amount of AF. These data convincingly prove that low water content is not a simple thickening of amniotic fluid concentration, but a complex metabolic process, which requires detailed studies of all possible parameters of amniotic fluid.

The mean urea concentrations in the AF were 3.8±0.1 μmol/l, with variations from 2.2 to 9.9 μmol/l. From the data presented, we can note that urea concentration also increased in term labor compared to preterm labor ($p<0.05$), reaching a maximum in late labor. The significance of the difference was high ($p<0.001$). There was a direct correlation between protein and urea values, though the correlation was not high ($r=0.72$). The urea content remained within the normal range

in women with abundant amniotic fluid, but it depended on the presence of obstetric pathology in those with little amniotic fluid. Urea content in labor was highest at all gestational periods in chronic fetal hypoxia, especially against the background of preeclampsia, SOPP with cord compression. The highest urea values were observed in late labor complicated by obstetric pathology. The creatinine content in the AF averaged 125.5±7.3 μmol/l (99.9-207.1). Its concentration gradually increased: from 101.11±1.29 μmol/L in preterm labor to 133.36±5.8 in term labor, reaching 198.25±4.07 μmol/L in late labor. These differences were significant ($p<0.001$).

Creatinine values were in direct correlation with urea values ($r=0.77$) and changed in a similar sequence as urea values.

The opposite trend was observed in the content of sugar in AF. Thus, in preterm labor the AG sugar content was maximal and reached 0.99 mol/L, although it fluctuated within the normal range; in term labor it slightly decreased, but had no significant differences (0.88 mol/L). In delayed labor, the concentration of sugar in the AF decreased to 0.61 mol/L. At the same time, there was a significant difference in the concentration of sugar in the AF compared to that in term labor ($p<0.05$). It should be noted that in case of abundant or low water, sugar concentration did not undergo special changes and fluctuated within the normal range. However, this index increased sharply in the presence of fetal macrosomia (71%), especially due to maternal diabetes mellitus (one case). The spirometer determination of AF density showed that this index was elevated only in late labor. In urgent and preterm birth the density of AF remained within the normal range (0.5-0.9). The meconium content in the AF was significantly higher in late labor, slightly lower in preterm labor, and ranged from 0.5 to 45.7%. In our study, meconium in the AF was found in 40 women in labor (28.1%). The occurrence of meconium in the AF was found to be equally frequent both in the presence of fetal distress (50%) and without it (50%).

To differentiate between respiratory and metabolic acidosis, the ph of amniotic fluid was determined. The mean values of acidity of amniotic fluid (PH) ranged from 6.9 to 7.8 with mean values of 7.2±0.09. PH acidity values also had statistically significant differences at different delivery times. Thus, the frequency of PH decrease less than 7.0 increased in both preterm and delayed labor. In the latter case, the difference was statistically significant ($p<0.01$). At the same time, the level of acidity in low fertility was significantly lower in all terms of labor than in other cases. The study of amniotic fluid showed that its acidity level correlated with heart rate only in fetal distress and hypoxia ($r=0.68$; $p<0.05$). In all other cases, there was no clear correlation between amniotic fluid PH and cardiotocogram (CTG).

The results of bilirubin tests in amniotic fluid showed that total bilirubin ranged from 4.8 to 22.9, with an average level of 10.5±1.6, including direct bilirubin 3.7±0.1 and bound bilirubin 6.9±0.2. Bilirubin levels increased significantly in the presence of intrauterine infection (4 cases), development of conjugation jaundice of the newborn, and fetal hepatitis (1 case). In most cases, elevated bilirubin levels in the AF were indicative of chronic fetal hypoxia and when the AF was stained with meconium. The latter findings suggest the fact that fetal fecal secretions have entered the amniotic fluid. In addition, increased levels of total and bound bilirubin were indicative of distressed fetal liver function. A study of the hormonal status of AF during labor showed that estradiol content during labor ranged from 30-180 ng/mL. A significant difference was found between the contents of this hormone in the AF at the birth of boys and girls. Thus, at the birth of girls, the estradiol index reached 21.4±2.3 ng/mL, whereas at the birth of boys, the average estradiol index was at 16.5±2.3 ng/mL. Although the difference found was not significant ($p>0.05$), this fact indicates the involvement of the fetus in the production of AF. Meanwhile, the level of estradiol in the AF at birth of boys and girls was equally significantly increased in the presence of obstetric pathology, such as weakness of labor activity combined with fetal distress ($p<0.05$).

A similar pattern was observed in the cortisol content in the AF. Cortisol values in the AF at delivery ranged from 200-450 nmol/ml. At the birth of girls, the mean cortisol level was 180.4±8.4 nmol/mL and at the birth of boys 265.4±10.2 nmol/mL, also indicating fetal involvement in the production of AF. A direct correlation ($r=0.64$; $p<0.05$) was found between the two hormones. Es-

tradiol (e2), as well as cortisol (k), significantly increased during the pathological course of labor, indicating intrauterine fetal distress ($p<0.01$). The correlation of e2 and k levels with other parameters of AF and fetal state in labor was revealed. Thus, the e2 index was in direct correlation with Dopplerometry blood flow resistance indices, namely systole-diastolic ratio and resistance index ($r=0.64$). Estradiol and cortisol levels increased naturally with decreased PH of AF ($r=>0.71$; $p<0.01$) and with decreased basal fetal heart rate on CTG ($r=>0.69$). The data of determination of placental lactogen (PL) levels revealed quite opposite trends.

The mean level of the hormone in AF after the onset of labor was within 6.7±0.09 ng/ml with variations from 0.04 to 19 ng/ml. PL values were inversely related to estradiol and cortisol values, although this relationship was not significant. Placental lactogen levels significantly decreased during chronic fetal distress, especially during fetal birth with developmental delay, and sharply increased during acute distress, especially during large fetal birth ($p<0.01$).

The level of PL was in direct correlation with the level of Ph AF and the Apgar score of the newborn ($r=0.71$; $p<0.01$). Hormone levels in AF with the onset of labor were independent of gestational age, number of AF, age and maternal parity. IAF was inversely correlated with creatinine and urea levels only in the presence of small gravidity ($r=>0.78$; $p<0.05$), which accompanied a pregnancy that was carried to term but not prolonged. These parameters were unchanged in multiviscosity. The most adverse outcomes for the fetus were observed when the amount of amniotic fluid decreased after 38 weeks of pregnancy, combined with changes in biochemical parameters of amniotic fluid in labor, such as Ph below 7.0 and elevated creatinine or urea levels, suggesting intrauterine fetal distress.

Conclusion: thus, the results of our studies showed that physico-chemical and biochemical parameters of Aqueous are subjected to statistically reliable changes depending on the term of labor and intrauterine state of the fetus in labor. Changes in creatinine and urea concentrations in the AF in late labor are the most indicative, which may be of diagnostic value. The combination of these signs with decreased acidity and increased density of AF in late labor, as well as the presence of meconium in it indicates impaired fetal metabolism and the need for timely correction of the detected abnormalities. The clinical application of the above parameters of AF in labor has important diagnostic significance in physiological and pathological pregnancy and labor

References:

1. Babamuradova Z. B., Shodikulova G. Z. Study of the Effectiveness of the Use of Monoclonal Antibodies in Rheumatological Diseases //Annals of the Romanian Society for Cell Biology. – 2021. – С. 3802-3805.
2. Khudoyarova D. et al. Prospects of magnesia therapy for severe preeclampsy in pregnant women //Turkish Journal of Physiotherapy and Rehabilitation. – Т. 32. – С. 2.
3. Zikrievna S. G., Bakhtiyarovna B. Z. Occurrence of clinical options of undifferentiated connective tissue dysplasia in Uzbek population //International Journal of Psychosocial Rehabilitation. – 2020. – Т. 24. – №. 2. – С. 1347-1359.
4. Мельник Е. В., Малолеткина О. Л., Шилкина Е. В. Биохимические параметры околоплодных вод при дистрессе плода в родах //Журнал акушерства и женских болезней. – 2016. – Т. 65. – №. 5. – С. 33-40.
5. Мочалова М. Н., Мудров В. А., Мудров А. А. Роль состава околоплодных вод в структуре перинатальной патологии //Журнал акушерства и женских болезней. – 2019. – Т. 68. – №. 2. – С. 95-108.
6. Погорелова Т. Н. и др. Информативность содержания и свойств белков-маркеров молекулярно-клеточных процессов в околоплодных водах для оценки состояния фетоплацентарного комплекса //Rossiiskii Vestnik Akushera-Ginekologa. – 2018. – Т. 18. – №. 1.
7. Рустамова Ш. Б., Худоярова Д. Р., Элтазарова Г. Ш. Особенности течения беременности и исход родов на фоне цервицита шейки матки //Достижения науки и образования. – 2019. – №. 13 (54). – С. 70-72.
8. Л. В. Саркисова, Д. Э. Насретдинова Взаимосвязь биохимических и гемодинамических показателей при преждевременных родах // Вестник врача, № 2 (99), 2021. С.89-94. DOI: 10.38095/2181-466X-2021992-89-94
9. Султанов С. Н. и др. Способ лечения железодефицитных анемий у беременных. – 1990.
10. Худоярова Д. Р. и др. Диагностика и ранняя реабилитация бесплодия трубно-перитонеального происхождения //Достижения науки и образования. – 2020. – №. 8 (62). – С. 62-64.
11. Н. Н. Шавази Профилактика преждевременных родов, современная диагностика и медикаментозная терапия // Вестник врача, № 3, 2019. С.122-124.
12. Эшкабилов Т. Ж. и др. Анализ перинатальной смертности в Самаркандской области республики Узбекистан //Здоровье, демография, экология финно-угорских народов Health, demography, ecology of finno-ugric peoples. – 2014. – С. 36.