

# Changes in the function of the fetoplacental complex under the influence of the hepatitis B virus

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The leading clinical syndrome in pregnant women with HBV-infection is placental dysfunction, which is due to morphological and functional changes in the placenta and manifests itself as a violation of the state of the fetus and its development.

*The objective:* of the study was to eliminate perinatal and obstetric complications in pregnant women with HBV-infection based on the detection of echoscopic deviations of the fetoplacental complex.

*Materials and methods.* 228 women were examined in the period of 30–34 weeks of gestation: the basic group (146 pregnant women with HBV-infection) and the control group (82 pregnant women without HBV-infection).

*Results.* The most common symptom of ultrasound in pregnant women with hepatitis B was thickening myometrium, as changes in the thickness and structure of the placenta. It is necessary to note the presence of low attachment of the placenta in women with HBV-infection. In women of the basic group, asymmetric form of the fetal growth retardation was diagnosed in 21,23±3,38% women of the basic group, subcompensated respiratory movements – 34,93±3,95% and subcompensated fetal activity – 41,10±4,07%, as well as a violation of fetal tones – 30,14±3,80%, with a reliability of  $p < 0,05$  compared with the control group. In the presence of HBV-infection, ultrasound changes were particularly demonstrative from such indicators as premature placenta maturation to grade 1 – in 37,57±4,01%; myometrium pathology in the placental zone – 44,52±4,11%; the combination of thinning or thickening with premature ripening – 47,26±4,13%; polyhydramnios – 52,74±4,13% and oligohydramnios – 25,34±3,60% ( $p < 0,05$ ).

*Conclusion.* Thus, placental dysfunction in pregnant women with HBV-infection develops under the influence of various factors, the leading of which is the virus of hepatitis B.

*Key words:* hepatitis B, HBV-infection, pregnancy, placenta.

Recently, the number of pregnant women with HBV-infection has increased significantly, including Ukraine. Increasing the frequency of HBsAg detection in pregnant women is a particular concern for obstetricians and the infectious diseases doctors, primarily due to significant adverse affects the course of pregnancy, childbirth, perinatal loss, and vertical transmission of hepatitis B pathogen from mother to child [3, 4, 5, 6]. According to the clinical orders of the Ministry of Health of Ukraine, pregnant women are screened for the detection of HBsAg, but those with positive results are often limited to measures aimed at preventing the vertical transmission of the virus, and do not pay sufficient attention to the evaluation of the violation of the function of the fetoplacental complex. More attention is paid to laboratory monitoring of liver function, but critically evaluation of the function of the placenta is not checked enough. In such pregnant women, in addition to changes in the hepatobiliary system, there are violations of the functions of the fetoplacental complex [1].

The leading clinical syndrome is placental dysfunction, which is due to morphological and functional changes in the placenta, manifests itself as a violation of the state of the fetus and its de-

velopment. The problem of placental dysfunction, which is based on the violation of compensatory and adaptive mechanisms, is relevant, due to its negative influence on the fetus and the numerous complications of childbirth, high perinatal mortality and the presence of neuro-psychiatric disorders in children [2].

An urgent method for evaluating the work of the fetoplacental complex remains an ultrasound examination. In this regard, it is possible to assume a significant frequency of changes in the hormonal function of the fetoplacental complex of this contingent in pregnant women and the deviation in echoscope research, which will enable to identify and develop the algorithms for effective diagnosis and prevention of complications.

The objective: of the study was to eliminate perinatal and obstetric complications in pregnant women with HBV-infection based on the detection of echoscopic deviations of the fetoplacental complex.

## MATERIALS AND METHODS

228 women were examined in the period of 30-34 weeks of gestation. The basic group consisted of 146 pregnant women with HBV-infection, and 82 pregnant women with negative markers of viral hepatitis B were included in the control group. HBV-infection was diagnosed in laboratory conditions using the immune-enzyme method, the pregnant women with positive HBsAg formed basic group. All women in the basic group were consulted by the infectious disease doctor and they did not need antiviral therapy. Clinical examination was carried out on the basis of Ivano-Frankivsk Clinical Maternity Hospital (Ivano-Frankivsk, Ukraine).

For the study of the functional state of the fetoplacental complex, the main functional indicators were assessed: clinical (uterine and fetal growth dynamics), echographic (main fetal size, placental status and amount of amniotic fluid). Echoscopic examination of the fetus and placenta was performed on a VOLUSON 730 EXPERT device in real time.

Criteria for the inclusion of pregnant women in the study were: history of HIV-infection, verified by the detection of specific markers of HBV infection (the positive HBsAg), absence of other diseases of the hepatobiliary system. All women with HBV-infection were consulted by an infectious disease doctor and they did not need antiviral therapy and had a negative result of the polymerase chain reaction to the subject of DNA detection of the hepatitis B virus.

Computer programs based on Microsoft Excel (calculation of relative values, their errors, t-test) were developed. Part of the tasks was calculated using licensed statistical packages of Microsoft Excel, including descriptive statistics programs. The reliability of the obtained indicators was confirmed by calculating the error ( $\pm m$ ) for the relative values of the well-known formula. The probability of the difference in the data in the comparable groups, taking into account the large number of observations and the proximity as a result of this to the normal distribution, was proved on the basis of the calculation of the coefficient t (Student) and the determination of the accuracy error-free prediction table (p). The difference was considered to be significant at  $p < 0.05$ .

Table 1

Parameters of ultrasound examination in pregnant women of both groups, abs., (M±m) %

Indicator of ultrasound examination	Basic group (n=146)	Control group (n=82)
Hypertonus of myometrium	46 (31,51±3,84) *	-
Localization of the placenta:		
– on the anterior wall	34 (23,29±3,50)	22 (26,83±4,89)
– on the posterior wall	97 (66,44±3,91)	45 (54,88±5,50)
– laterally	-	5 (6,10±2,64)
– near the fundus	15 (10,27±2,51)	10 (12,20±3,61)
Low placentation	42 (28,77±3,75)*	3 (3,66±2,07)
Placental thickness:		
– normal indicators	91 (62,33±4,01) *	72 (87,80±3,61)
– more than normal indicators	10 (6,85±2,09)	5 (6,10±2,64)
– less than normal indicators	45 (30,82±3,82)*	5 (6,10±2,64)
Changes in placental structure	32 (21,92±3,42)*	5 (6,10±2,64)

Note: \* – probability of the difference of indicator relative to control group (p<0,05).

Table 2

Echography of the placenta and volume of amniotic fluid in 30-34 weeks of pregnancy, abs., (M±m) %

Indicator of ultrasound examination	Basic group (n=146)	Control group (n=82)
The structure of the placenta:		
– maturation is ahead of I degree gestational age	55 (37,57±4,01) †	-
– pathology of myometrium in the zone of placentation	65 (44,52±4,11) †	-
– a combination of thinning or thickening with premature maturation	69 (47,26±4,13) †	-
Volume of amniotic fluid:		
– polyhydramnios	77 (52,74±4,13) †	3 (3,66±2,07)
– oligohydramnios	37 (25,34±3,60) †	-

Note: \* – probability of the difference of indicator relative to control group (p<0,05).

### RESULTS OF THE RESEARCH AND THEIR DISCUSSION

The results of clinical observations of the complicated pregnancy, childbirth, and postpartum period in women with HBV infection, raise the question of possible mechanisms for influencing the viral infection to the state of the fetoplacental complex. The diversity of the functions of the placenta and their disorders in the etiopathogenesis of many pathological conditions of the fetus and infant has led to the study of the physical parameters of the placenta, which was detected by ultrasound scanning.

Determination of localization of the placenta in the uterine cavity in women of the basic group did not reveal any significant differences in the location of the placenta in comparison with controls. Indirect signs of placental insufficiency may be the thickness of the placenta, which is detected by ultrasound examination. We have noted the decrease in the thickness of the placenta in each fifth case with viral hepatitis in the history, which is much more frequent than in the control group. Reducing the thickness of the placenta can be explained, first, by the presence of placental retardation, more pronounced changes in blood circulation, violation of trophic functions and hypoxia, which is observed in pregnant women with HBV-infection.

The most common symptom of ultrasound in pregnant women with hepatitis B was thickening of myometrium, as changes in the thickness and structure of the placenta. It is necessary to note about the early formation of hypotension, which was confirmed by the presence of low attachment of the placenta in women with HBV-infection (Table 1).

Functional evaluation of the fetal condition was carried out according to the following parameters: fetometry of the fetus, the nature of respiratory movements, motor activity and fetal tone.

In the 30–34 weeks of pregnancy in women of the control group, changes in the echographic parameters of the functional state of the fetus were absent. In contrast, in patients with vi-

ral hepatitis B, they were characterized by significant disorders. Thus, asymmetric form of the fetal growth retardation was diagnosed in 31 (21,23±3,38%) women of the basic group, subcompensated respiratory movements – 51 (34,93±3,95%) and subcompensated fetal activity – 60 (41,10±4,07%), as well as a violation of fetal tones – 44 (30,14±3,80%), with a reliability of p<0.05 compared with the control group. Prognostically very unfavorable was the presence in rare cases of decompensated forms of respiratory movements and motor activity of the fetus.

As is known, the indirect sign of placental dysfunction is the thickness of the placenta, which is detected by ultrasound. The reduction in the thickness of the placenta was noted by us in every third case of viral hepatitis in the history, which is much more frequent than in the control group. The decrease in the thickness of the placenta was explained by the presence of placental retardation, more pronounced changes in blood circulation, violation of trophic functions and hypoxia, which is observed in pregnant women with HBV-infection.

When evaluating the echographic indicators of the placenta and volume of amniotic fluid in 30–34 weeks, changes in the control group were absent. In the presence of HBV infection, ultrasound changes were particularly demonstrative from such indicators as premature placenta maturation to grade 1 – in 37,57±4,01%; myometrium pathology in the placental zone – 44,52±4,11%; the combination of thinning or thickening with premature ripening – 47,26±4,13%; polyhydramnios – 52,74±4,13% and oligohydramnios – 25,34±3,60%.

In the presence of viral hepatitis, echographic signs of compensated and subcompensated placental insufficiency were much more frequent, and the decompensated form was diagnosed only in 8 (5,48±1,88%) pregnant women.

As the results of clinical trials performed in pregnant women with hepatitis B virus are often marked placental dysfunction markers, their timely diagnosis will allow to begin adequate

treatment and prevent the development of obstetric and perinatal complications.

### CONCLUSIONS

Thus, placental dysfunction in pregnant women with HBV-

#### Изменения функции фетоплацентарного комплекса под влиянием вируса гепатита В Н.Я. Курташ, Л.В. Пахаренко

Ведущим клиническим синдромом у беременных с HBV-инфекцией является дисфункция плаценты, которая обусловлена морфофункциональными изменениями в плаценте и проявляется нарушением состояния плода и его развития.

**Цель исследования:** диагностика перинатальных и акушерских осложнений у беременных с HBV-инфекцией на основе выявления эхоскопических отклонений фетоплацентарного комплекса.

**Материалы и методы.** Было обследовано 228 женщин в 30–34 нед беременности: основная группа – 146 беременных с HBV-инфекцией и контрольная группа – 82 беременные без HBV-инфекции.

**Результаты.** Наиболее частым симптомом при проведении УЗИ у беременных с гепатитом В было утолщение миометрия, а также изменение толщины и структуры плаценты. Необходимо отметить наличие низкой плацентации у женщин с HBV-инфекцией. У женщин основной группы асимметричную форму задержки развития плода диагностировано у 21,23±3,38%, субкомпенсированные дыхательные движения – у 34,93±3,95%, субкомпенсированную активность плода – у 41,10±4,07%, а также нарушение его тонуса – у 30,14±3,80% с достоверностью  $p < 0,05$  по сравнению с контрольной группой. При наличии HBV-инфекции ультразвуковые изменения были особенно показательными: преждевременное созревание плаценты 1-й степени выявлено у 37,57±4,01%; патологию миометрия в плацентарной зоне – у 44,52±4,11%; сочетание истончения или утолщения с преждевременным созреванием – у 47,26±4,13%; многоводие – у 52,74±4,13% и маловодие – у 25,34±3,60% ( $p < 0,05$ ).

**Заключение.** Таким образом, дисфункция плаценты, обнаруженная у беременных с HBV-инфекцией, развивается под влиянием различных факторов, основным из которых является вирус гепатита В.

**Ключевые слова:** гепатит В, HBV-инфекция, беременность, плацента.

infection develops under the influence of various factors, the leading of which is the viral infection with hepatitis B. The results should be taken into account when developing an algorithm for diagnosis, treatment and prophylactic measures in pregnant women with HBV-infection.

#### Зміни функції фетоплацентарного комплексу під впливом вірусу гепатиту В Н.Я. Курташ, Л.В. Пахаренко

Провідним клінічним синдромом у вагітних з HBV-інфекцією є плацентарна дисфункція, яка зумовлена морфологічними і функціональними змінами плаценти і проявляється порушенням стану плода і його розвитку.

**Мета дослідження:** діагностика перинатальних та акушерських ускладнень у вагітних з HBV-інфекцією на підставі виявлення ехоскопічних відхилень фетоплацентарного комплексу.

**Матеріали та методи.** Було обстежено 228 жінок у 30–34 тиж вагітності: основна група – 146 вагітних з HBV-інфекцією та контрольна група – 82 вагітні без HBV-інфекції.

**Результати.** Найбільш поширеним ультразвуковим симптомом у вагітних з гепатитом В було потовщення міометрія, зміни товщини і структури плаценти. Необхідно відзначити наявність низького прикріплення плаценти у жінок з HBV-інфекцією. У жінок основної групи асиметричну форму затримки розвитку плода діагностовано у 21,23±3,38%, субкомпенсовані дихальні рухи – у 34,93±3,95%, субкомпенсовану активність плода – у 41,10±4,07%, а також порушення його тонусу – у 30,14±3,80% за достовірності  $p < 0,05$  порівняно з контрольною групою. За наявності інфекції HBV зміни ультразвукової картини були особливо показовими: дострокове дозрівання плаценти 1-го ступеня виявлено у 37,57±4,01%; патологию міометрія у плацентарній зоні – у 44,52±4,11%; поєднання стоншення або потовщення з передчасним дозріванням – у 47,26±4,13%; багатоводдя – у 52,74±4,13% і маловоддя – у 25,34±3,60% ( $p < 0,05$ ).

**Заключення.** Отже, плацентарна дисфункція, виявлена у вагітних з HBV-інфекцією, розвивається під впливом різних факторів, основним з яких є вірус гепатиту В.

**Ключові слова:** гепатит В, HBV-інфекція, вагітність, плацента.

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