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POINT OF VIEW

E.S. Mikhaylin, L.A. Ivanova, M.M. Shilo

# THE EFFECT OF PREGNANT AGE ON THE PROBABILITY OF THE OCCURRENCE OF COMPLICATIONS DURING PREGNANCY AND CHILDBIRTH

**ABSTRACT**

Until now, there has not been a consensus in the literature as to what plays a leading role in the occurrence of complications of pregnancy and childbirth in minors: biological immaturity or social risk factors. **The aim of this work** was to determine the influence of the age of the pregnant woman on the probability of complications of pregnancy and childbirth.

**Materials and methods.** Minors pregnant women surveyed (n=483) observed and gave birth in SPbGPU "Maternity hospital № 10" in 2004-2014 [1 group 13-15 years (n=49); 2 group - 16-17 years (n=434)]. The comparison group consisted of 110 women of middle reproductive age. Medical and social aspects of the life and behavior of patients were assessed by analyzing unified specially designed questionnaires. Statistical analysis of obtained data was performed using the programs STATISTICA V. 7.0 (Statsoft Inc., Tulsa, USA) and SPSS 19 (SPSS: An IBM Company, USA). Multivariate statistical analysis was performed using logistic regression for dichotomously dependent variables. In addition to age group indicators, the following control (independent) variables were used to separate the effect of age from other factors in the construction of regressions: age of menarche; the age of sexual activity; the period of registration in the women's consultation.

**Results.** In minors 13-15 years, compared with women of average reproductive age, significantly higher was the chance of occurrence of early rupture of membranes (OR=13,2; 95% CI: 2,1-81,9; p<0.01) and the implementation of perineotomy (OR=8,3; 95% CI: 2,6-27,0; p<0.01), and significantly lower the chances of occurrence polyhydramnios (OR=0,2; 95% CI: 0.1 to 0.6; p<0.01). In minors 16-17 years, compared with women of middle reproductive age, significantly higher were the chances of occurrence of chronic placenta insufficiency with hemodynamic disorders during pregnancy (OR=2,5; 95% CI: 1,3-5,0; p<0,05), premature (OR=3,3; 95% CI: 1,2-9,0; p<0,05) and early (OR=12,5; 95% CI: 2,7-57,1; p<0,01) rupture of membranes and production of perineotomy (or=2,6;% CI: 1,3-5,1; p<0.01) during childbirth, and significantly lower chances of occurrence of polyhydramnios (OR=0,1; 95% CI: 0,1-0,3; p<0,01).

**Conclusion.** The results confirm the literature data on the complicated course of pregnancy and childbirth in minors. Moreover, it is likely that the morpho-functional immaturity of the reproductive system, as well as other body systems, homeostasis systems of minors pregnant women is most important, and adverse social factors are the background to which the work of the systems and organs is imposed on the limit of their functional capabilities with a rapid ability to decompensate.

**Keywords:** age of childbirth, childbirth in minors, pregnancy in minors.

**Introduction.** In 2016, In Russ. Federation women gave birth to 51 thousand children less than in 2015, which may be the beginning of the second "Russian cross". Another very important fact is of particular concern: in 2016, 175 thousand fewer marriages were registered than in 2015 [2, 5]. Therefore, every pregnancy is a value for the family and society. Though small, but important segment in a cohort of women in labor occupy minors.

In Russia, 30-40 thousand minors give birth every year [2, 5].

Until now, there is no consensus in the literature on what plays a leading role in the occurrence of complications of pregnancy and childbirth in minors: biological immaturity or social risk factors [1, 4, 6].

There are also conflicting opinions as to whether the frequency and severity of complications of pregnancy, childbirth and the postpartum period increases with the decrease in the age of the minor [1, 3, 7].

**The aim of this work** was to determine the influence of the age of the preg-

nant woman on the probability of complications of pregnancy and childbirth.

**Materials and methods of research.** Minors pregnant women surveyed (n=483) observed and gave birth in SPbGPU "Maternity hospital № 10" in 2004-2014 [1 group 13-15 years (n=49); group 2 – 16-17 years (n=434)]. The comparison group consisted of 110 women of middle reproductive age. Medical and social aspects of life and behavior of patients were evaluated by analyzing unified specially designed questionnaires. The questionnaire contained 52 questions combined into four blocks: living conditions; presence of bad habits; peculiarities of sexual behavior (reproductive attitudes); satisfaction from visiting a medical organization. 17 patients of group 1, 127 patients of group 2 and 110 women from the comparison group were surveyed. Statistical analysis of obtained data was performed using the programs STATISTICA V. 7.0 (Statsoft Inc., Tulsa, USA) and SPSS 19 (SPSS: An IBM Company, USA). To determine the significance of differences in quantitative traits we used Student t-test, Mann-Whitney U-test (nonparametric analog of Student t-test). The chi-square Pearson ($\chi 2$) or Fisher (F) criterion was used to determine the reliability of differences in qualitative characteristics in two or more groups. Multivariate statistical analysis was performed using logistic regression for dichotomously dependent variables. The model for multivariate analysis included factors and complications of pregnancy and childbirth, between which statistically significant differences were found in the course of univariate analysis between groups. Logistic regression was used to explain the effect of age on dichotomously dependent variables (that is, 0/1 values). Accordingly, in this case, the dependent variables were binary indicators of the presence of the following diseases and features of the course of pregnancy and childbirth: anemia of pregnant women; preeclampsia; chronic placental insufficiency with hemodynamic disorders; polyhydramnios; oligohydramnios; premature rupture of membranes; early rupture of membranes; fetal distress; rapid delivery; perineotomy. In the construction of regressions, in addition to indicators of age groups, the following control (independent) variables were used to separate the effect of age from other factors: the age of menarche; the age of the beginning of sexual life; the period of registration in the women's consultation.

**The results of the study and their discussion.**

As a result of the study, it was found that at the time of pregnancy, every second 16-17-year-old minor (44.8%) and every fifth woman of middle reproductive age (20.9%) did not work or study ($p<0.001$).

Minors aged 16-17 were 1.6 times less likely to be married (35.4%) ($p>0.05$) than women of average reproductive age (55.4%). 16-17-year-olds lived in "civil marriage" 1.8 times more often (45.7%) ($p<0.01$) than women of middle reproductive age (25.5%). 13-15-year-olds were single 3.7 times more often (70.6%) ($p<0.001$) than 16-17-year-olds (18.9%) and women of middle reproductive age (19.1%).

Minors aged 13-15 started smoking 6.3 (11.3±0.7 years) ($p<0.001$) and 16-17-year-olds 5.2 years earlier (12.4±0.8 years) ($p<0.001$) than women of middle reproductive age (17.6±1.0 years). During pregnancy, 13-15-year-olds continued smoking in 4.8 times more often (35.3%) ($p<0.001$), and 16-17-year-olds were 4.0 times more likely (29.1%) ($p<0.001$) than women of middle reproductive age (7.3%).

During pregnancy, minors aged 16-17 continued to drink alcohol significantly more often (3.9%) ($p<0.05$) than women of middle reproductive age (0%), which is consistent with the data of the authors who considered alcoholization to be the most common scenario of early sexual contacts [4]. Minors aged 13-15 years grew in single-parent families 1.5 times more often (47.1%) ($p>0.05$), and minors aged 16-17 years – 1.9 times more often (59.8%) ($p<0.001$) than women of middle reproductive age (30.9%). The number of children in parental families was significantly higher in minors of both groups (2.2±0.7 and 2.3±0.9 respectively) ($p<0.05$) than in women of average reproductive age (1.8±0.7).

Before pregnancy, 13-15-year-olds lived in a communal apartment in 6.6 (11.8%) ($p<0.05$), and 16-17-year-olds were 3.9 times more likely (7.1%) ($p<0.05$) than women of middle reproductive age (1.8%). Respectively, 5.9% and 5.5% of minors of both groups lived in an orphanage before pregnancy.

The current sexual partner was the father of a child at 1.8 (52.9%) ($p>0.05$) at 13-15 years of age and 1.4 times less (67.7%) ($p>0.05$) at 16-17 years of age than women of middle reproductive age (93.6%).

Our results are generally consistent with those of other authors who also pointed to a low social-economic standard of living and the chance of early pregnancy in minors [4,5].

The results of the study are mainly consistent with the literature data on the higher incidence of complications of pregnancy and childbirth in minors than in women of middle reproductive age [6, 7].

Threatening abortion was observed in 13-15 years in 2.1 (36.7%) ($p<0.01$), and in 16-17 years in 1.9 times more often (32.9%) ($p<0.05$) than in women of middle reproductive age (17.3%). Preterm birth was detected in minors aged 13-15 years 2.0 times more often (8.2%) ($p<0.05$) than in minors aged 16-17 years (4.1%), and 2.3 times more often ($p<0.05$) than in women of middle reproductive age (3.6%).

The frequency of preeclampsia was higher in 13-15 years in 4.1 (10.2%) ($p<0.05$), and in 16-17 years in 3.9 times (11.1%) ($p<0.05$) than in women of middle reproductive age (2.7%), which is also consistent with the data of a number of researchers who showed in their works that in pregnancy in minors preeclampsia was more common than in women of middle reproductive age [3.6].

Chronic placenta failure with hemodynamic disturbances were observed in juvenile 13-15 years in 2.2 times more often (14.3%) ($p<0.05$), and minors 16-17 years – 1.7 times more often (11.1%) ($p<0.05$) than women of middle reproductive age (6.4%).

Premature discharge of amniotic fluid was observed in minors aged 16-17 years 1.9 times more often (17.1%) ($p<0.05$) than in women of middle reproductive age (9.1%). Early amniotic outflow was found at 13-15 years in 2.0 (36.8%) ($p<0.05$), and at 16-17 years in 1.5 times more often (28.1%) ($p<0.05$) than in women of middle reproductive age (18.2%), which corresponds to the results of other researchers indicating a higher rate of untimely amniotic outflow in minors [6, 7].

The rate of rapid labor was 3.8 times higher in 13-15-year-olds (10.2%) ($p<0.05$) and 4.2 times higher in 16-17-year-olds (11.3%) ($p<0.01$), compared with women of middle reproductive age (2.7%), which corresponds to the results of other researchers who also found a high rate of rapid labor in minors [3.6].

Fetal distress was detected at 13-15 years of age 3.0 times more frequently (12.2%) ($p<0.05$) than at 16-17 years of age (4.1%), and 3.4 times more frequently ($p<0.05$) than in women of middle reproductive age (3.6%).

Chorioamnionitis was observed in minors aged 13-15 years 2.2 times more

often (2.0%) (p<0.05), and in minors aged 16-17 years – 2.0 times more often (1.8%) (p<0.05) than in women of middle reproductive age (0.9%).

There were no statistically significant differences between the groups in the frequency of other complications of labor (p>0.05), which is at odds with the data of the authors who noted more frequent development of weakness of labor and more frequent occurrence of postpartum bleeding and maternal injuries in minors [3,6].

The frequency of cesarean section operations was 18.4%, 18.7% and 22.7%, respectively (p>0.05). Of them was planned 44.4%, 39.5% and 44.0% of transactions, respectively (p>0.05); the emergency - 56.6% and 60.6% and 56,0% of transactions, respectively (p>0.05). Indications to planned cesarean section were: scoliosis with retroconversion, spine fracture history, and various options of contracted pelvis, hereditary cerebellar ataxia of Pierre Marie, myopia with peripheral chorioretinal dystrophy and other diseases, as well as – foot fetal presentation. The indications for emergency delivery were: the lack of effect of therapy of pre-eclampsia, fetal distress, clinical mismatch between the head of the fetus and the pelvis of the mother, the presence of uterine inertia, prolapsed umbilical cord loops.

The frequency of the imposition of an obstetric forceps made in groups of 2.0%, 1.6% and 0.9%, respectively (p>0.05). Vacuum extraction of the fetus was conducted of a minor 13-15 years old were 2.3 times more often (4.1 percent) (p<0.05) than women of average reproductive age (1.8 percent). In both groups of minors, the perineotomy rate in childbirth was significantly higher (34.7% and 29.0%, respectively) (p<0.05) than in women of middle reproductive age (17.3%).

The construction of a series of logistic regressions allowed to establish that the age group of patients statistically significantly affects the probability of occurrence of a number of features of the course of pregnancy and childbirth.

Table 1 presents an assessment of the impact of age on the probability of occurrence of features of pregnancy and childbirth.

Interpreting all the values of the odds ratio and paying attention to their statistical reliability, we can conclude that minors 13-15 years, compared with women of middle reproductive age, significantly higher were the chances of early rupture of membranes (OR=13,2; 95% CI: 2,1-81,9; p<0,01) and perineotomy (OR=8,3; 95% CI: 2,6-27,0; p<0,01), and significantly lower the chances of occurrence of polyhydramnios (OR=0,2; 95% CI: 2,0). 0.1-0.6; p<0.01).

In minors 16-17 years, compared with women of middle reproductive age, significantly higher were the chances of occurrence of chronic placenta failure with hemodynamic disorders during pregnancy (OR=2,5; 95% CI: 1,3-5,0; p<0,05), premature (OR=3,3; 95% CI: 1,2-9,0; p<0,05) and early (OR=12,5; 95% CI: 2,7-57,1; p<0,01) rupture of membranes and production of perineotomy (or=2,6;% CI: 1,3-5,1; p<0.01) during childbirth, and significantly lower chances of occurrence of polyhydramnios (OR=0,1; 95% CI: 0,1-0,3; p<0,01).

There is no consensus in the literature as to whether the minor age is the cause of obstetric and perinatal complications in itself [3], or the high incidence of complications is not directly due to the age of the primiparous, and the most important are social risk factors [6, 7].

The ability of a woman to bear and give birth to a healthy child is determined by many factors, the most important of which are the biological maturity of the organs and systems of the body [8]. Juvenile age is the most important stage in the formation of the reproductive and neuroendocrine systems, which causes a high incidence of complications and adverse pregnancy outcomes [9]. It is shown that unplanned pregnancy at a minor age is associated with a higher incidence of obstetric complications during pregnancy and childbirth, perinatal and maternal mortality, fetal growth retardation with subsequent developmental disorders of the child [10].

**Conclusion.** Thus our results confirm the literature data on the complicated course of pregnancy and childbirth in minors. Moreover, it is likely that the morpho-functional immaturity of the reproductive system, as well as other body systems, homeostasis systems of minors pregnant women is most important, and adverse social factors are the background to which the work of the systems and organs is imposed on the limit of their functional capabilities with a rapid ability to decompensate.

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**Assessment of the influence of age on the probability of occurrence of features of the course of pregnancy and childbirth**

| Complication | Complication 13-15 years (compared to women of average reproductive age) | | | | 16-17 years (compared to women of average reproductive age) | | | |
|---|---|---|---|---|---|---|---|---|
| | Odds ratio (OR) | Confidence 95% interval (CI) | | p | Odds ratio (OR) | Confidence 95% interval (CI) | | p |
| | | min | max | | | min | max | |
| Chronic placenta insufficiency with hemodynamic disturbances | 1,3 | 0,4 | 4,5 | p>0,05 | 2,5 | 1,3 | 5,0 | p<0,05 |
| Polyhydramnios | 0,2 | 0,1 | 0,6 | p<0,01 | 0,1 | 0,1 | 0,3 | p<0,01 |
| Premature rupture of membranes | 0,7 | 0,1 | 7,3 | p>0,05 | 3,3 | 1,2 | 9,0 | p<0,05 |
| Early rupture of membranes | 13,2 | 2,1 | 81,9 | p<0,01 | 12,5 | 2,7 | 57,1 | p<0,01 |
| Perineotomy | 8,3 | 2,6 | 27,0 | p<0,01 | 2,6 | 1,3 | 5,1 | p<0,01 |

Note-statistically significant differences were found between the groups

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CASE STUDY

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# TAKAYASU ARTERITIS: ASSOCIATIONS WITH HEMOCOAGULATION GENES POLYMORPHYSM

**ABSTRACT**

Takayasu arteritis (TA) is a systemic vasculitis (SV) subset with chronic granulomatous arteritis predominantly affecting the aorta and its main branches. Cardiovascular events are the leading cause of death in TA patients. The high incidence of cardiovascular events cannot be explained entirely by inflammatory vascular wall lesions. Thrombophilia genes polymorphism has been discussed as another factor of thrombotic events in TA.

The **aim** of the current paper is to demonstrate thrombophilia genes polymorphism identification relevance to better assess the propensity to thrombotic complications in TA patients.

**Methods:** three clinical cases of verified TA are presented. All had vascular complications. Thrombophilia genes polymorphism, MRI and angiograms assessment were performed.

According to the results of genotyping, the patients were given recommendations on lifestyle modification, further laboratory studies, followed by consultation with the doctor of the rheology laboratory and hemostasis for the selection of personalized therapy with antiplatelet agents or anticoagulants.

The presented cases reflect the undoubted relevance of genetic research. Further research is needed into the specific features of thrombophilic gene polymorphism in patients with Takayasu arteritis.

**Keywords:** Takayasu's arteritis, thrombophilia genes, polymorphism.

## Introduction

Takayasu arteritis (TA) is a systemic vasculitis (SV) subset with chronic granulomatous arteritis primarily affecting the aorta and its main branches [4]. The disease has been reported to occur more often in females [15]. Cardiovascular events are the leading cause of death in TA patients [10]. TA patients have a higher incidence of cardiovascular diseases than in the general population and a significantly higher risk of vascular events on the Score scale at the time of the establishment of the disease in comparison with the general population [6].

Currently, the study of thrombophilia markers is an actual problem. A number of studies have proved the role of polymorphisms of thrombophilia genes and the risk of thrombotic complications in children and young people [3.5], in pregnant women [1, 2].

## Clinical case 1

Subject N., a Caucasian female born in 1972. Swelling and pain in the ankle joints occurred in 1998 at the age of 26 a few days after acute cystitis symptoms onset. Small joints of the hands and knee were gradually involved. Non-steroidal anti-inflammatory drugs (NSAIDs) administration had a short-term effect. During 2002-2003 a subfebrile fever was persisting. In April 2005 the subject was regarded as having a chronic course urogenic reactive arthritis. At the same time, a systolic murmur on the right subclavian artery, radial arteries pulse asymmetry,