

Premature and preterm premature rupture of membranes in adolescent compared to adult pregnancy

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ABSTRACT

Aim To compare the prevalence of premature rupture of membranes (PROM) and preterm premature rupture of membranes (PPROM) between adolescent and adult pregnancies, and the influence of gestational age and adolescent pregnancy on the frequency of occurrence of PROM and PPRM.

Methods This prospective study included 300 pregnant patients, 13 to 35 years of age, divided into two groups. The first group consisted of 150 pregnant women aged 13-19 (experimental group) and the second group consisted of 150 pregnant women aged 20-35 (control group).

Results There was a statistically significant higher incidence of both PPRM and PROM in the group of adolescent pregnant women compared to adult pregnant women ($p < 0.000001$). Preterm delivery with PPRM was significantly more common in the group of adolescent pregnant women ($p < 0.004$). Term delivery with PROM was statistically significantly more common in the adolescent pregnancy group than in the adult pregnancy group ($p < 0.001$). Term delivery with PROM was statistically significantly more common than preterm delivery with PPRM in the group of adolescent pregnant women ($p < 0.0001$).

Conclusion Adolescent pregnancy has a greater impact on the frequency of PROM and PPRM.

Key words: fetal membranes, gestation, teenagers

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INTRODUCTION

Adolescence is a dynamic transitional period between childhood and adulthood. This period not only invokes complex anatomical and physiological changes within a person, but also spawns psychological and social changes. The World Health Organization (WHO) defines an adolescent period from 10 to 19 years of age. According to a WHO report, about 16 million adolescent girls between the age of 15 and 19 and 2.5 million girls under 16 years of age give birth each year in developing regions (1).

Adolescent pregnancies are associated with adverse maternal and fetal outcomes including preeclampsia, preterm birth, premature rupture of membranes (PROM) and preterm premature rupture of membranes (PPROM), low birth weight, fetal growth restriction, congenital malformations and perinatal mortality compared to adult pregnancies (2-4). However, frequency of PROM and PPRM between the adolescent and adult pregnancies are not consistent throughout literature and have become a cause for debate. The PPRM complicates 2–4% of all singleton and 7–20% of twin pregnancies and is associated with 30–40% of preterm deliveries (4-6). Some large cohort studies and meta analyses show that adverse outcomes such as preterm birth and preeclampsia are not increased within this population, while other studies have completely opposite results (2,5,6). It is inconclusive whether a young gynaecological age and biological immaturity alone are the cause of adverse outcomes or if the risk is based on other factors such as socioeconomic status (7,8).

Biological immaturity could have a role in increasing the risk of adverse perinatal outcomes: conception within two years after menarche and the effect of a girl getting pregnant before her own growth has ceased (7). Immaturity of the uterine or cervical blood supply may predispose adolescent pregnant women to subclinical infection, an increase in interleukins and prostaglandin production, amnio choriodecidual inflammation, and a consequent increase in the incidence of PPRM and preterm delivery (7).

In Bosnia and Herzegovina limited data are available for adolescent pregnancies and their obstetrical and neonatal outcomes.

The aim of this study is to compare the prevalence of PROM and PPRM between the adolescent pregnancies and adult pregnancies, and the influence of gestational age and adolescent pregnancy on the frequency of the occurrence of PROM and PPRM.

PATIENTS AND METHODS

Patients and study design

This prospective study included 300 pregnant women (13 to 35 years of age) attended to the University Clinical Center Tuzla, Clinic for Gynaecology and Obstetrics during the period between January 2011 and December 2014. Inclusion criteria were: healthy women at the beginning of pregnancy, who developed the complications PROM and PPRM during the pregnancy.

Women with pathological conditions before pregnancies (genital and extragenital diseases), multiple pregnancies, women who had maternal age over 35 years during a follow-up, pregnancies less than 24 weeks of gestation and pregnancies with fetal abnormalities were excluded.

Premature rupture of membranes (PROM) is defined as spontaneous rupture prior to the onset of uterine contraction, >1 hour before the onset of labour (9-12). Spontaneous membrane rupture occurred before 37 weeks of gestation referred as preterm premature rupture of membranes (PPROM) (13,14).

Women were divided into two groups: the first group consisted of 150 adolescent pregnant women aged 13-19 (experimental group) and the second group consisted of 150 adult pregnant women aged 20-35 (control group).

Our study received ethical approval from the Research Ethical Committee of the University Clinical Centre and School of Medicine, University of Tuzla, Bosnia and Herzegovina. All patients signed informed consents.

Methods

Data on the course of pregnancy and childbirth were collected on the basis of available medical documentation (pregnancy booklet, mother's disease history, partograms), age of mothers, number of controls in a pregnancy, mother's parity and order of birth.

The exact gestational age of pregnancy was determined according to the last menstrual period of pregnant women with a regular menstrual cycle, and after delivery, the assessment of the external characteristics of newborns.

Statistical analysis

The t-test (statistical comparison test), the χ^2 test (frequency comparison test), and the z-test (proportional test) were used. The data is expressed using percentages. Statistically significant difference was set to less than 5%.

RESULTS

The study included 300 patients, 150 (50%) adolescent pregnant women, and 150 (50%) adult pregnant women. Overall prevalence of both PPROM and PROM of 34.33% (103 out of 300) was found.

Among 300 women preterm delivery with PPROM was noticed in 20 (out of 300; 6.67%), and six (out of 300; 2.00%) in adolescent and adult pregnancy group, respectively ($p < 0.004$); term delivery with PROM was noticed in 51 (17.00%) and 26 (8.67%) in adolescent pregnancy and adult pregnancies, respectively ($p < 0.001$) (Table 1).

Table 1. Connection of premature rupture membranes (PROM) and preterm premature rupture membranes (PPROM) with gestational age and adolescent pregnancy

Gestational age	No (%) of women		Total
	Adolescent pregnancy	Adult pregnancy	
Preterm delivery (with PPROM)	20 (13.33)	6 (4.00)	26 (8.67)
Term delivery (with PROM)	51 (34.00)	26 (17.33)	77 (25.67)
Term delivery without PROM/PPROM	79 (52.67)	118 (78.67)	197 (65.67)
Total	150 (100)	150 (100)	300 (100)

Higher specific overall group prevalence of both PPROM and PROM in the adolescent group comparing to adult group was found: 47.33% (71 out of 150) and 21.33% (32 out of 150), respectively.

In the group of 150 adolescent pregnant women, 20 (13.33%) had preterm delivery with PPROM and 51 (34.00%) had term delivery with PROM. In the group of 150 adult pregnant women, six (4.00%) had preterm delivery with PPROM, and 26 (17.33%) had term delivery with PROM. There was statistically significantly higher prevalence

of PPROM and PROM as well in the group of adolescent pregnant women compared to adult pregnant women ($p < 0.000001$) (Table 1).

The term delivery with PROM was statistically significantly more common in the group of adolescent pregnant women compared to adult pregnant women, regardless of term and preterm pregnancy ($p < 0.000001$).

Investigating the impact of adolescent pregnancy and gestational age on PPROM/ PROM pregnancies, 51 (out of 71; 71.83%) term delivery with PROM in adolescent pregnancy and 26 (out of 32; 81.25%) term delivery with PROM in adult pregnancies was found, suggesting significantly more frequent term delivery with PROM than preterm pregnancy with PPROM in the adolescent and adult pregnancy group ($p < 0.0001$ and $p < 0.0003$), respectively). Considering both groups of pregnant women, term pregnancy with PROM was statistically significantly more represented ($p < 0.00001$) (Table 1).

DISCUSSION

Aslan ÇetİN et al. reported higher incidents of preterm birth, PROM and fetal growth restriction (IUGR) in the adolescent group compared to the adult group (2). In our study, PROM was represented with 39.44% of total complications in the adolescent pregnancy group, compared to 21.33% in the control group, which is almost double the appearance of this complication in adolescent pregnant women. In a Turkish study 3.2% of the adolescent pregnancies had PROM while only 1.6% of the adult group had PROM, which is a significantly lower prevalence than in our study (2). In the subgroup analysis of singleton-nulliparous pregnancies, the prevalence of PROM was also significantly higher in the adolescent group (3.6% vs. 1.9%), which correlates with the data from our study (2).

In a systematic review Azevedo et al. reported an average 4.2% (1.1-20.2%) frequency of PROM in pregnant adolescents, suggesting that nutritional deficiencies may play an important role in this complication (5). Bildircin et al. reported in their study prevalence of PROM 3.2%, and PPROM 5.5% in the adolescence group, respectively (15), unlike our study, where a higher frequency of PROM than PPROM was found.

Canadian researchers reported a higher risk of PPRM and preeclampsia in adolescents (14). They reported higher prevalence of PROM and PPRM in adolescents (3.4% and 1.4%) compared to adults (3.2% and 1.2%) (14), which is similar to our study. In the United Kingdom study there was a lower prevalence of PROM in the adolescent group compared to the adult women (4.5% vs. 5.9%) respectively, which is contrary to the results of our study (16). In an Israeli study PROM was associated with older maternal age than in two teenage groups (11.1% vs. 9.3% vs. 6.3%), which is contrary to the results of our study (17).

Mahavarkar et al. reported non-significant difference in prevalence of PPRM between adolescent and adult pregnant women (6% vs. 8%), respectively (18). Similar results have been shown in a study of Soyosal et al. without significant difference of PROM prevalence between adolescent and adult pregnant women (5% vs. 8.2%), which is contrary to our results (19).

Studies report a significant increase in prevalence of preterm birth, low birth weight of infants, a higher percentage of anaemia, pyelonephritis, gestational diabetes in adolescent pregnant women (16-21). The predisposing factors for PROM include infections, smoking cigarettes, adolescence associated with low socioeconomic status, nutritional deficiency, lower body mass index, low number of prenatal visits, late initiation of prenatal care, inappropriate prenatal care, and other factors, such as marital status, low level of education and poverty (3-5, 8).

Despite decreasing rates, adolescent pregnancy continues to be an important health and social problem in B&H as well as all over the world (15,16,21). Adolescent pregnancy was significantly associated with increased risk of central nervous system anomalies, gastrointestinal anomalies and musculoskeletal/integumental ano-

malies, because of late initiation of antenatal care, poor diet and periconceptional folic acid supplementation, illicit drug use, alcohol and smoking (19, 22-24).

In our study we found that preterm and term PROM represent almost double higher occurrence of this complication in adolescent pregnancies compared to the adult one. Once it has established significance, it is also needed to examine in more detail the association of PROM with adolescent pregnancy and gestational age, and determine whether the occurrence of PROM affects adolescent pregnancies (PROM) or gestation age (PPROM).

A very small number of authors in available literature included both PROM and PPRM that we analysed in this research, so our results are only consistent with some data from those studies (2).

Some of the limitations of the our study include a relatively small sample size in examined groups, limited access to socioeconomic status data of patients and inclusion of single-centre. This is the first prospective study in Bosnia and Herzegovina relating to preterm rupture of membranes in adolescent pregnancy. Further research is required to determine biological mechanisms that increase prevalence of premature rupture of membranes in the adolescent age.

In conclusion, adolescent pregnancy has a greater impact on the frequency of PROM and PPRM compared to the gestational age. Because of that future research is necessary to investigate the influence of adolescent pregnancy as a potential risk factor for PROM and PPRM.

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TRANSPARENCY DECLARATION

Conflict of interest: None to declare.

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