Perinatal outcomes of adolescent pregnancy: A single-center experience

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Abstract

Aim: To compare the delivery methods and maternal and fetal outcomes of adolescent and adult pregnancies.

Material and Methods: This study enrolled 420 pregnant adolescents aged between 14 and 19 years and 940 pregnant women aged between 20 and 40 years who gave birth in our maternity clinic between January 2010 and December 2014. Their demographic and clinical data were reviewed.

Results: There were no significant differences between the two groups in terms of their birth patterns. The risks for preeclampsia, intrauterine growth retardation (IUGR), and placental abruption increased with decreasing maternal age. The adjusted analyses suggested that adolescent pregnant women were at a significantly increased risk for very preterm birth (adjusted OR = 4.40, [95% CI: 1.90-10.30]) but not late preterm birth (adjusted OR = 0.90, [95% CI: 0.50-1.40])

Conclusions: Adolescent pregnancy is a risk factor for early preterm birth, placental abruption, IUGR, and preeclampsia, with significant potential clinical implications.

Keywords: Cesarean Section; Pre-Eclampsia; Pregnancy In Adolescence; Premature Birth.

INTRODUCTION

Adolescent pregnancy (AP) is an important public health issue. An estimated 16 million adolescents become pregnant each year, representing about 11% of all births worldwide (1). A lack of knowledge of reproductive physiology, contraception methods, pregnancy, and pregnancy outcomes may lead to unintended pregnancies in adolescents. The World Health Organization (WHO) found that pregnancies in adolescents younger than 16 years of age are associated with a four-fold higher level of maternal mortality (compared to pregnancy over the age of 20 years) and in these pregnancies neonatal mortality is also 50% more (2). One of the most common problems of AP is the increased cesarean section rate due to abnormal labor resulting from biological immaturity of the mother (3). AP is also associated with serious complications such as preeclampsia, premature birth, and intrauterine growth retardation (IUGR) (4,5). Therefore, it is important to identify antenatal problems in adolescents and take appropriate precautions. This study investigated

the mode of delivery in a population of Turkish teenage mothers and determined the maternal and fetal outcomes in adolescent pregnancies.

MATERIAL and METHODS

This study was conducted between 1 January 2010 and 31 December 2014 in a referral hospital with more than 12,000 deliveries annually. This retrospective case–control study was approved by the hospital ethics committee (Ethical approval number: 297).

The inclusion criteria was singleton pregnancies that were divided into two groups according to maternal age: AP (study group, maternal age 14–19 years) and adult pregnancies (control group, maternal age 20–40 years).

The exclusion criteria include; maternal age > 40 years, any concomitant systematic disease (pregestational diabetes, chronic hypertension, chronic renal disease) or medical disorders, pregnancies with fetal congenital or chromosomal abnormalities, multi-fetus pregnancies,

macrosomia (fetal weight > 4,500 g) and patients with urinary infection. Gestational age was calculated using both the first day of the last menstrual period (LMP) and confirmed by the first trimester or early second-trimester ultrasonography.

The following clinical data were reviewed: patient body mass index (BMI) [weight (kg)/height × height (m²)], parity, tobacco use, anemia (Hg<11 g/dL), and pregnancy complications (late-term [41 0/7 weeks of gestation through 41 6/7 weeks of gestation], preterm premature rupture of membranes [PPROM], preeclampsia, gestational diabetes mellitus [GDM]), the type of delivery, neonatal birthweight and length of hospital stay. PPROM was diagnosed as rupture of the fetal membranes before the onset of uterine contractions before 37 weeks. Preeclampsia was defined as a pregnancy-specific condition defined by de novo hypertension (greater than 140 mm Hg systolic or 90 mm Hg diastolic) that occurs after 20 weeks of gestation. GDM was diagnosed by screening all patients with a 75 g oral glucose challenge test between 24–28 gestational weeks. Diet and exercise were the first-line treatment. Patients were defined as GDM-A1 when the glucose levels were controlled within the normal levels using diet therapy and GDM-A2 when insulin therapy was required to regulate the blood glucose level.

We also recorded obstetric, fetal, and maternal outcomes. The evaluated obstetric features included the cesarean rate, abnormal labor, malpresentation, placental abruption, cord presentation, IUGR (estimated fetal weight <3rd percentile according to gestational age), and intrauterine fetal death (any intrauterine fetal death after the 24th week of gestation.). Abnormal labor was diagnosed as active-phase arrest in the first stage of labor women ≥6 cm of dilation with ruptured membranes who fail to progress despite 4 h of adequate uterine activity, or at least 6 h of oxytocin administration with inadequate uterine activity and no cervical change and arrest of labor in the second stage, at least 2 h of pushing in multiparous women and at least 3 h of pushing in nulliparous women. These women all underwent caesarean delivery. Birth weights < 1500, 1500–2500, >4500 g were defined as very low birth weight (VLBW), low birth weight (LBW), and macrosomia, respectively. Prematurity was classified as early preterm (delivery before 32 weeks) and late-preterm (delivery at 32–36 weeks). Fetal complications included a 5-min Apgar score below 7 and Meconium-stained amniotic fluid.

Maternal complications included third- or fourth-degree vaginal tearing, episiotomy hematomas, retained placenta, intrapartum chorioamnionitis (fever > 38°C, increased vaginal temperature, uterine sensitivity, or fetal heart rate > 160 beats/min), and postpartum endometritis (fever > 38°C, uterine sensitivity, and a purulent, foul-smelling vaginal discharge over the first 24 h).

Statistical Analysis

The statistical software Statistical Package for the Social Sciences, version 17.0, SPSS Inc, New York, USA (SPSS) was used for all data analysis. The Kolmogorov–Smirnov test was used to assess the normality of the data distributions. The independent t-test was used to compare normally distributed data and the Mann–Whitney U-test to compare non-normally distributed data. Categorical variables were compared using the chi-square test and continuous variables with Fisher's exact test. A p-value <0.05 was considered to reflect statistical significance. Unadjusted logistic regression analysis was performed, and odds ratios (ORs) and their 95% confidence intervals (95% CIs) were calculated for the main outcome. p < 0.15 was used in the unadjusted analysis. To examine the role of confounding factors in the relationship between maternal age and pregnancy outcome, multivariable logistic regression analysis was performed. Thus, adjusted odds ratios and 95% confidence intervals were calculated for maternal age and potential confounding factors in relation to pregnancy outcome.

RESULTS

We retrospectively analyzed data from 420 pregnant adolescents and 940 pregnant adults in Sisli Etfal Research and Training Hospital. The mean age of adolescents was 18.1± 1.0 (range 14–19) years and the mean age of the adults was 27.9± 5.2 (range 20–40) years. Presence of smoking and anemia were more common in adolescents; no other demographic features were found to be significantly different between two groups (Table 1). Table 2 summarizes the perinatal outcomes. Adolescents had a significantly greater rate of abnormal labor when was compared with adults. We found no between-group differences in the cesarean section rate. The incidences of preeclampsia, IUGR, and placental abruption were higher in adolescent pregnancies.

Table 3 shows the neonatal outcomes. In adolescents, the 5th minute APGAR score below 7 and the presence of meconium were statistically significant. In adolescents, preterm birth rates below 32 weeks are significantly higher. The mean fetal proportions of VLBW, LBW, and normal-birth-weight infants and proportion of late preterm births (32–36 weeks) were similar in both groups.

In terms of maternal outcomes, episiotomy hematomas were more common in adolescent mothers; we found no other between-group differences (Table 4).

Table 1. Demographic Data			
	Adolescent (14-19) n:420	Adult (20-40) n:940	P Value
Mean age (n) (±SD)	18.1± 1.0	27.9± 5.2	<0.001
BMI (kg/m2) (±SD)	29.3±15.1	29.1 ± 2.0	0.718
Gest. Age (week) (±SD)	36.4± 2.1	38.4± 0.9	0.435
Smoker (n) (%)	65 (15.5)	80 (8.5)	<0.001
Parity (n) (±SD)	0.2±0.4	0.3±0.4	0.618
Anemia (Hg<10)(n) (%)	86 (20.5)	103(11)	<0.001

Number: n.　Kilogram: kg.　Squaremeter: m²
±SD: Standard deviation　OR: odds ratio
P value<0.05 statisticallysignificant.
Gest. Age: Gestational Age
Hg: Hemogram

Table 2. Perinatal outcomes of groups

	Adolescent (14-19) n:420	Adult (20-40) n:940	P Value	OR	Adj. OR	Adj. P
Fetal death (n) (%)	3(0.7)	4(0.4)	0.462	1.6(0.3-7.4)		
C/S rate (n) (%)	144(34.3)	367(39)	0.094	0.8(0.7-1)		
Abnormal labor (n) (%)	23(5.5)	22(2.3)	0.003	2.3(1.3-4.1)	2.1(1.2-4.2)	0.009
Malpresentation (n) (%)	25 (6)	36 (3.8)	0.081	1.5(0.9-2.5)	1.6(1.0-2.6)	0.075
Breech (n) (%)	21(5)	30(3.2)	0.105	1.5(0.9-2.7)		
Transverse posture (n) (%)	3 (0.7)	4(0.4)	0.492	1.6(0.3-7.4)		
Placental abruption (n) (%)	7 (1.7)	2(0.2)	0.002	7.8(1.6-37.5)	6.2(1.9-23.5)	0.003
Cord presentation (n) (%)	4 (1)	5(0.5)	0.377	1.7(0.4-6.6)		
Late-term (n) (%)	21(5)	62(6.6)	0.256	0.7(0.4-1.2)		
PPROM(n) (%)	79(18.8)	177(18.8)	0.993	0.9(0.7-1.2)		
Preeclampsia(n) (%)	4(1)	27(2.9)	0.028	0.3(0.1-0.9)		
GDM	3(0.7)	18(1.9)	0.097	0.3(0.1-1.2)		
IUGR (n) (%)	18(4.3)	17(1.8)	0.008	2.3(1.2-4.5)	1.9(1.1-3.7)	0.009
Hospital stay (n) (±SD)	1.8±1.1	1.7±0.9	0.328	-		

Number: n
±SD: Standard deviation   OR: odds ratio n:number
P value<0.05 statistically significant.
C/S: Cesarean
PPROM:Preterm premature rupture of membranes
GDM:Gestational diabetes mellitus
IUGR: Intrauterine growth retardation
All ORs were adjusted for anemia, smoking, guatr, epilepsi and preeclampsia

Table 3. Fetal Outcomes

	Adolescent (14-19) n:420	Adult (20-40) n:940	P Value	OR	Adj. OR	Adj. P
Neonatal birthweight (gr) (±SD)	3155±502	3212±558	0.065	-		
<1500 (gr) (%)	7(1.7)	19(2.0)	0.659	0.8(0.3-1.9)		
1500-2500 (gr) (%)	46(10.9)	76(8.0)	-	-		
2500< (gr) (%)	360 (85.7)	788 (83.8)	-	-		
4000-4500 (gr) (%)	7(1.6)	56(5.9)	-	-		
32-36 week (n) (%)	21 (5)	52(5.5)	0.688	0.9(0.5-1.4)		
<32 week (n) (%)	16 (3.8)	8(0.9)	<0.001	4.4(1.9-10.3)	4.0(1.6-11.2)	0.001
Meconium-stained amniotic fluid (n) (%)	4 (1)	1(0.1)	0.017	8.9(1.0-79.8)	7.1(1.1-49.8)	0.03
5.min APGAR (< 7) (n) (%)	21 (5)	5(0.5)	<0.001	9.4(3.5-24.7)	8.8(3.9-21.4)	0.001

±SD: Standard deviation   OR:odds ratio
P value<0.05 statisticallysignificant.
Minute: min. Number: n
All ORs were adjusted for anemia, smooking, guatr, epilepsi and preeclampsia

Table 4. Maternal Outcomes

	Adolescent (14-19) n:420	Adult (20-40) n:940	P Value	OR
3rd degree desure (±SD)	2(0.5)	5(0.5)	0.894	1.0(0.9-1.1)
4th degree desure	1(0.2)	2(0.2)	0.927	1.0(0.9-1.0)
Retained placenta	7(1.7)	15(1.6)	0.924	0.9(0.9-1.0)
Chorioamnionitis	5(1,2)	11(1.2)	0.974	1.0(0.9-1.0)
Endometritis	6(1.4)	14(1.5)	0.931	1.0(0.9-1.0)
Episiotomy hematoma (n)(%)	3(0.7)	-	0.009	

Number. n
±SD: Standard deviation   OR: odds ratio n:number
P value<0.05 statisticallysignificant

DISCUSSION

The type of delivery in AP was similar to that in adults, although abnormal labor was a significantly more frequent indication for cesarean section. The incidences of risky conditions such as preeclampsia, IUGR, early preterm birth, and placental abruption were higher in AP.

In Turkey, 6% of women who are aged between 15–19 years become pregnant and the fertility rate is 0.35% (6). Similar studies in Turkey's major hospitals (7,10,20) showed that adolescent pregnancy increases obstetric complication rates. It would be best to prevent these pregnancies, but it is necessary to clarify the problems in these pregnancies and develop appropriate follow-up protocols. It is essential to reduce the negative outcomes of AP (7).

Anemia is a serious problem in pregnant adolescents worldwide (8). The persistence of anemia despite medical treatment is attributable to low pre-pregnancy iron levels and low consumption of iron-rich foods (e.g., red meat). This situation is connected to the poor compliance of adolescents taking oral iron supplementation during antenatal follow-up. Unlike previous studies (9,10), we found that smoking is significantly higher in pregnant adolescents when compared with adults (15.5%; p<0.001).

There is conflicting evidence regarding the risk for preeclampsia in adolescents. Several similar studies have reported that the incidence of preeclampsia is significantly higher in adolescents (4,11). However, a recent Thai study with 11.000 pregnant adolescents found that the risk for preeclampsia was similar to that of adults (7). Our antenatal unit follows APs closely; however, the cause of preeclampsia is multifactorial and prenatal care alone may not be a protective measure. While the study methodologies differ between demographic data, it is also important to control for potential confounders such as parity, smoking, and substance use. When adjusted for these factors, we observed an increased risk for preeclampsia due to smoking. IUGR was also more common among our adolescents, as noted in several other studies (12). This is due to the facts that many adolescents smoke, many are coming from a low socioeconomic status, and many are young at the time of their first delivery. Note that the fetal features of preeclampsia include IUGR. Nutritional deficiency may also negatively affect fetal growth in adolescents with anemia. The incidence of placental abruption was also significantly higher in the AP group than in the adult group (p=0.002). Although the etiology is still unclear, the incidence was higher in the AP group. It is also more common in those over 35 years of age, probably due to the increased risk for preeclampsia and smoking.

The cesarean section rate did not differ significantly between the two groups, similar to some previous studies (7,13,14). Some studies associated the high cesarean section rate in AP with adolescent pelvic immaturity (15). Conde-Agudelo et al., (16) suggested that better

myometrial function and greater connective tissue elasticity contribute to the higher vaginal delivery rates in younger women. We also associate vaginal delivery by adolescents with good cervical compliance. In some studies, vaginal delivery was linked to small infants (4). However, we found no significant between-group differences in fetal weight. In addition, we did not include macrosomic infants because of the presence of a direct cesarean indication.

The indications for cesarean section are as important as the cesarean rate. The diagnosis of abnormal labor was associated with cesarean section similar to other studies (3). It may reflect biological immaturity. The pelvic dimensions are crucial in the labor process. A digital vaginal examination during labor is still the gold standard used to diagnose abnormal labor or whether labor is progressing (17); however, it is highly operator-dependent and therefore is unreliable (18).

Many studies have suggested that the preterm delivery risk is significantly greater in adolescents (7,19), but its reason is not clear. Greater cervical bleeding or increased level of prostaglandins, which can be produced by the immature uterus, may be the responsible factors. Some authors consider lower maternal age as a risk factor for preterm labor (20). The genital and urinary tract infections seen in adolescents with an alkaline vaginal flora may increase the risk further. We excluded patients with a urinary infection at the beginning of our study to decrease this confounding effect. The fetal features of preeclampsia include preterm birth. Our study's superiority to previously reported works is that the odds ratio (OR) for early preterm birth (<32 weeks) in the adolescent group was 4.4 (1.9–10.3); the OR for late preterm birth (32–36 weeks) was 0.9 (0.5–1.4) and it was not significantly different from adults. This means that the main problem in preterm pregnancy is birth before 32 weeks. We cannot explain why Meconium-stained amniotic fluid and 5-min Apgar scores less than 7 were more common in infants of the adolescent mothers, and attribute this result to chance.

This study was performed in a tertiary hospital in which we gave medical care to 30,000 pregnant women annually, including approximately 200 adolescents. Our physicians are very experienced with juvenile pregnancies. Furthermore, all files were reviewed by our specialist physicians. Nevertheless, our work had some limitations. The study was retrospective and the age of the adolescents was not subcategorized as early or late adolescence. In addition, because of affecting from the prospective wide participation study of Jacobsson et al. (21), we choosed patients to adult group from the 20-40 age group not from 20-35. The progression of the age of childbearing in developed countries and the fact that the birth rates between 35-40 years of age significantly increased with the help of ARTs (22); are the reasons for the evaluation of advanced maternal age as above 40 years.

CONCLUSION

Despite these limitations, it is clear that age below 19 years is not the primary cause of the increased cesarean section rate. The risks for early preterm delivery, placental abruption, IUGR, and preeclampsia increase after the first trimester in these patients, who require careful follow-up and screening. Therefor the gestational age below 19 should be taken as a high-risk pregnancy. This study may not reflect the findings of other countries, and multicenter prospective trials are needed to obtain more accurate results and conclusions.

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