

Can Adolescent Pregnancy Be Associated with Adverse Maternal and Infant Health Outcomes?

Adölesan Gebelikler Olumsuz Anne ve Bebek Sağlığı Sonuçlarıyla İlişkilendirilebilir mi?

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Abstract

Background: This study aimed to evaluate maternal and perinatal outcomes in adolescent pregnancies.

Materials and Methods: Adolescents aged 10 to 19 years and their newborns, who delivered at the Gynecology and Obstetrics Clinic of Mardin Education and Research Hospital between 2022 and 2024, were included in the study. Data were retrospectively analyzed from patient files and the hospital database. Outcomes were grouped as maternal and neonatal complications.

Results: Neonatal and maternal complication rates were significantly higher in the adolescent group compared to the adult group. Adolescents experienced increased rates of anemia, eclampsia, and preeclampsia. Neonatal complications, including intrauterine growth restriction (IUGR) and transient tachypnea of the newborn, were also more common in the adolescent group. The 1st and 5th minute Apgar scores of infants born to adolescents were significantly lower.

Conclusions: This study confirms that adolescent pregnancies are associated with a higher risk of adverse maternal and neonatal outcomes. Anemia and hypertensive disorders are more commonly observed during pregnancy, especially in adolescents. Their newborns are more likely to have low Apgar scores, intrauterine growth restriction, and transient tachypnea of the newborn. These findings underscore the importance of prioritizing public health interventions aimed at reducing adolescent pregnancy rates and providing comprehensive support to young mothers and their infants.

Keywords: Adolescent pregnancy, Neonatal complications, Maternal complications

Öz

Amaç: Bu çalışmanın amacı, adölesan gebeliklerde maternal ve perinatal sonuçları değerlendirmektir.

Materyal ve Metod: Bu çalışmaya, 2022 ile 2024 yılları arasında Mardin Eğitim ve Araştırma Hastanesi Kadın Hastalıkları ve Doğum Kliniği'nde doğum yapan 10 ila 19 yaş arası adölesanlar ve yenidoğan bebekleri dahil edildi. Veriler hasta dosyaları ve hastane veri tabanından retrospektif olarak analiz edildi. Bulgular, maternal ve neonatal komplikasyonlar olarak iki grupta değerlendirildi.

Bulgular: Neonatal ve maternal komplikasyon oranları adölesan grubunda erişkin gruba kıyasla anlamlı derecede daha yüksek bulundu. Adölesanlarda anemi, eklampsi ve preeklampsi oranlarında artış gözlemlendi. İntrauterin gelişme geriliği (IUGR) ve yenidoğanın geçici takipnesi gibi neonatal komplikasyonlar da adölesan grubunda daha sık görüldü. Adölesanlardan doğan bebeklerin 1. ve 5. dakika Apgar skorları anlamlı olarak daha düşüktü.

Sonuç: Bu çalışma, adölesan gebeliklerin, olumsuz maternal ve neonatal sonuçlar açısından daha yüksek risk taşıdığını doğrulamaktadır. Özellikle anemi ve hipertansif bozukluklar adölesan gebeliklerde daha yaygın olarak gözlemlenmektedir. Bu bireylerin bebeklerinde düşük Apgar skoru, intrauterin gelişme geriliği ve yenidoğanın geçici takipnesi gibi komplikasyonlar daha sık görülmektedir. Elde edilen bulgular, adölesan gebelik oranlarını azaltmaya yönelik halk sağlığı müdahalelerinin önemini ve genç anneler ile bebeklerine kapsamlı destek sağlanmasının gerekliliğini vurgulamaktadır.

Anahtar Kelimeler: Adölesan gebelik, Neonatal komplikasyonlar, Maternal komplikasyonlar

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Introduction

Adolescent pregnancy, defined as pregnancies occurring in girls between the ages of 10 and 19 (1), is a serious global public health issue impacting both developed and developing nations. According to World Health Organization data, nearly 11% of all births occur in individuals younger than 20 years of age (2). While a significant decrease (11.6%) in adolescent fertility rates has been observed globally over the last quarter-century, the number of pregnancies and births among this age group remains high, with approximately 21 million women aged 15-19 becoming pregnant in developing countries (3). Currently, two critical factors appear to contribute to the prevalence of adolescent pregnancies: early age at menarche and a decreasing age of onset of sexual activity (4). Socioeconomic conditions also play a significant role. Adolescence, the transitional period from childhood to adulthood, is marked by profound physiological, anatomical, and psychological changes. Many adolescents are not physically or mentally prepared for pregnancy and childbirth. Giving birth during this stage has serious negative consequences for both maternal and infant health (5).

From a medical perspective, adolescent pregnancies are associated with adverse maternal outcomes such as hypertensive disorders of pregnancy, anemia, gestational diabetes, high rates of birth complications, and increased maternal mortality (6). Neonatal outcomes are similarly concerning, with increased rates of low birth weight, preterm birth, low Apgar scores, high birth trauma rates, and, most critically, increased infant mortality rates (7). However, there are also studies reporting that adolescent pregnancies do not increase the risk of adverse birth outcomes (8).

The socioeconomic and political development of a country is directly linked to the health of its adolescents and children. Therefore, understanding the multifaceted issue of adolescent pregnancy and its negative consequences is essential for developing and implementing effective prevention policies. This study aimed to evaluate the maternal and perinatal outcomes of adolescent pregnancies and deliveries by comparing them with a control group.

Materials and Methods

In this study, we analyzed maternal and perinatal outcomes of adolescent pregnancies and deliveries. The case group consisted of 99 adolescents aged 10 to 19 years and their newborns, who delivered at the Gynecology and Obstetrics Clinic of Mardin Education and Research Hospital between 2022 and 2024. Ethical approval was obtained for this study from the Mardin Artuklu University Non-Interventional Clinical Research Ethics Committee (Date: 10.09.2024, Decision number: 2024/9-4).

The control group included 104 adults aged 20 to 35 years and their newborns who gave birth during the same period. All adolescents meeting the inclusion criteria were included in the study and similar number of adult groups was formed. Data were collected and classified retrospectively from the hospital database and patient files. We used a data collection

form specifically designed for this study. Maternal data included maternal age, gravidity, parity, gestational week, mode of delivery, and any maternal complications. Infant data included birth weight, length, head circumference, 1st and 5th minute Apgar scores, and perinatal complications.

Inclusion criteria were:

- Maternal age between 10 and 19 years
- Fetal age greater than 20 weeks
- Fetal weight greater than 500 grams
- Written informed consent obtained

Exclusion criteria were:

- Incomplete data entry in the database
- Presence of other serious maternal health problems (e.g., cancer, diabetes, hypertension, renal failure)

Statistical analysis

SPSS 15.0 for Windows program was used for statistical analysis. Descriptive statistics were given as number and percentage for categorical variables and mean, standard deviation, minimum, maximum, median for numerical variables. The proportions in the groups were compared with the chi-square test. Comparisons of numerical variables in two independent groups were performed with Mann Whitney U test because the normal distribution condition was not met. Alpha significance level was accepted as $p < 0.05$.

Results

Age, gravidity and parity of the adolescent group were statistically significantly lower than the adult group ($p < 0.001$ for all). There was no statistically significant difference in mode of delivery, infant weight, height and head circumference between the adolescent and adult groups ($p = 0.054$ $p = 0.085$ $p = 0.092$). The 1st minute-5th minute Apgar score of the infants of the adolescent group was statistically significantly lower than the adult group ($p = 0.002$ $p < 0.001$) Table (1).

The newborn complication rate of the adolescent group was statistically significantly higher than the adult group ($p < 0.001$). Neonatal complications were 7.18 times higher in adolescents compared to adults. The rates of IUGR and transient tachypnea of the newborn among neonatal complications were statistically significantly higher in the adolescent group compared to the adult group ($p < 0.001$). Intrauterine growth restriction (IUGR) was 6.98 times more common, and transient tachypnea of the newborn was 3.51 times more frequent in the adolescent group.

The maternal complication rate of the adolescent group was statistically significantly higher than the adult group ($p < 0.001$). The rate of maternal complications was 6.62 times higher in adolescents compared to adults. The rates of anemia, eclampsia and pre-eclampsia among the maternal complications were statistically significantly higher than the adult group ($p = 0.017$ $p = 0.012$ $p = 0.004$). Anemia was 3.78 times higher and pre-eclampsia was 5.55 times higher in adolescents compared to adults. Eclampsia was present only in the adolescent group Table (2).

Table 1. Maternal demographic data and newborn characteristics

	Adolescent Group (10-19 years) (n=99)	Adult Group (22-34 years) (n=104)	p
Mother Characteristics			
Age Mean.±SD Min-Max (Median)	16,3±1,4 11-19 (17)	27,6±3,7 22-34 (27)	<0,001*
Gravidity Mean.±SD Min-Max (Median)	1,6±0,7 1-3 (1)	2,7±1,5 1-6 (2)	<0,001*
Parity Mean.±SD Min-Max (Median)	1,2±0,4 1-3 (1)	2,2±1,2 1-6 (2)	<0,001*
Mode of Delivery Vaginal delivery n (%) Caesarean section	76 (76,8) 23 (23,2)	67 (64,4) 37 (35,6)	0,054#
Baby Characteristics			
Gestational Week Mean.±SD Min-Max (Median)	38,4±2,3 26-42 (39)	37,6±1,7 29-42 (38)	0,062*
Weight Mean.±SD Min-Max (Median)	2949,2±618,4 760-4280 (3050)	3118,2±483,5 1250-4500 (3132,5)	0,085*
Height Mean.±SD Min-Max (Median)	49,0±2,8 34-54 (50)	49,5±2,4 29-53 (50)	0,092*
Head Circumference Mean±SD Min-Max (Median)	34,1±1,8 23-37 (35)	34,4±1,4 25-37 (35)	0,345*
Apgar1st minute Mean.±SD Min-Max (Median)	7,5±1,3 0-8 (8)	7,9±0,6 4-9 (8)	0,002*
Apgar5th minute Mean±SD Min-Max (Median)	9,2±1,5 0-10 (10)	9,9±0,6 6-10 (10)	<0,001*

SD: Standart Deviation, Min: Minumum, Max: Maximum, n: number, *:Mann Whitney U Test, #Chi square Test

Table 2. Comparison of maternal and neonatal complications between groups

		Adolescent Group n (%)	Adult Group n (%)	p#	OR (%95 CI)
Newborn Complications	Yes	61 (61,6)	19 (18,3)	<0,001	7,18 (3,78-13,64)
	No	38 (38,4)	85 (81,7)		
	IUGR	17 (17,2)	3 (2,9)	0,001	6,98 (1,98-24,64)
	IUMF	1 (1,0)	0 (0,0)	0,488	-
	Congenital anomaly	1 (1,0)	1 (1,0)	1,000	1,05 (0,07-17,04)
	Neonatal death	2 (2,0)	0 (0,0)	0,237	-
	Prematurity	8 (8,1)	2 (1,9)	0,054	4,48 (0,93-21,66)
	Respiratory distress syndrome	6 (6,1)	2 (1,9)	0,162	3,29 (0,65-16,71)
	SGA	6 (6,1)	4 (3,9)	0,530	1,61 (0,44-5,90)
Maternal Complications	Transient tachypnea of the newborn	20 (20,2)	7 (6,7)	0,005	3,51 (1,41-8,72)
	Yes	62 (62,6)	21 (20,2)	<0,001	6,62 (3,53-12,42)
	No	37 (37,4)	83 (79,8)		
	Anemia	13 (13,1)	4 (3,9)	0,017	3,78 (1,19-12,02)
	Eclampsia	6 (6,1)	0 (0,0)	0,012	-
	PROM	5 (5,1)	2 (1,9)	0,270	2,71 (0,51-14,32)
	GDM	7 (7,1)	3 (2,9)	0,205	2,56 (0,64-10,20)
	Postpartum hemorrhage	11 (11,1)	5 (4,8)	0,096	2,48 (0,83-7,40)
	Preeclampsia	14 (14,1)	3 (2,9)	0,004	5,55 (1,54-19,94)
	Preterm labor	4 (4,0)	4 (3,9)	1,000	1,05 (0,26-4,33)
	Cervical insufficiency	2 (2,0)	0 (0,0)	0,237	-

IUGR: İntrauterin Growth Restriction, IUMF: İntrauterin Mort Fetüs, SGA: Small for Gestational Age, PROM: Premature rupture of membranes, GDM: Gestational Diabetes Mellitus, n: number, %: percentage

Discussion

Adolescent pregnancy, which has garnered significant attention in the last century, refers to pregnancies occurring in girls between 10 and 19 years of age (2). While its prevalence varies across regions, it remains a global health problem, posing a

considerable health burden worldwide. Consequently, this population is considered high-risk and requires prioritized interventions. Strategies aimed at preventing adolescent pregnancy should be prioritized within public health programs globally (9).

Considering its prevalence, it is reported that approximately 11% of births worldwide are to adolescent mothers, and more than 90% of these occur in low- and middle-income countries (3). In Sub-Saharan Africa, teenage pregnancies remain unacceptably high at 19.3%, with rates as high as 44.3% in Congo, 39.4% in Angola, 38% in Gabon, and 38.9% in Liberia (10). The rate in the United States in 2022 was reported as 3.9% (11). In Turkey, according to the 2018 Turkey Demographic and Health Survey (TDHS) data, 4% of births occur during adolescence, although regional differences exist (12).

Adolescent pregnancy carries substantial sociocultural, financial, and medical consequences, directly impacting public health and well-being. This study focused on evaluating the medical dimension of this issue, specifically in terms of maternal and infant health. Our findings align with those of Maheshwari et al., who revealed a higher prevalence of adverse maternal and fetal outcomes in adolescent pregnancies (5). Similarly, many studies support our findings (13,14). However, some studies report different results: the risk of adverse events such as preeclampsia, placental abruption, placenta previa, fetal distress, premature labor, shoulder dystocia, perineal lacerations, birth trauma, congenital malformations, postpartum hemorrhage, maternal death, stillbirth, maternal and neonatal intensive care unit admission, and neonatal death was not found to be higher in adolescents (8). These conflicting results may be explained by the complex interaction of several factors, including differences in sample size, quality of medical care, access to prenatal care, residence in rural areas, the level of education of pregnant women and their families, as well as ethnic, religious, social, and cultural backgrounds. Some studies have minimized these confounding factors by comparing sisters who gave birth for the first time at different ages, and have shown that maternal and fetal outcomes are more strongly influenced by family history than by maternal age (15). It remains unclear whether adverse pregnancy outcomes among adolescent mothers are primarily due to biological and anatomical immaturity or to low socioeconomic conditions. More extensive research with larger populations is needed to make more definitive conclusions. Since no adjustments were made for potential confounding factors in our study, the results cannot be considered causal.

Regarding maternal outcomes, the unique anatomy and physiology of adolescence can contribute to complications. The absence of a regular ovulatory cycle due to an underdeveloped uterus and immature ovaries may lead to defective decidualization. This can result in the remodeling of spiral arteries, abnormal deep placentation, and ultimately preeclampsia. A comprehensive study spanning 50 years and encompassing a large adolescent population across 30 countries found the overall prevalence of preeclampsia/eclampsia to be 6.7% (16). Adolescence is characterized by rapid growth, leading to increased iron requirements. Pregnancy may further elevate these needs, making adolescents more susceptible to iron deficiency and anemia. A cross-sectional study reported a 41.27% prevalence of anemia among pregnant adolescents aged 10-

19 years (17). From another perspective; adolescent pregnancy is common in populations with low socioeconomic status, and poverty and nutritional deficiencies may have contributed to the increased rate of anemia.

Premature rupture of membranes (PROM) and preterm premature rupture of membranes (PPROM), which have complex etiologies, may be more common in adolescents. This can be attributed to factors such as an immature uterus and cervix, as well as uncontrolled increases in interleukins and prostaglandins (18). Similarly, incomplete anatomical development may increase the risk of preterm labor and cervical insufficiency in adolescents, potentially leading to a higher incidence of postpartum hemorrhage (19). However, our study did not find significant differences in these parameters between adolescent and adult mothers.

Turning to neonatal outcomes, Apgar scoring is a crucial component of the initial postpartum newborn examination. Ogawa et al. conducted a multicenter cross-sectional study in Japan between 2005 and 2011, involving 30,831 women with singleton pregnancies under the age of 25. They found that low Apgar scores were significantly more prevalent among infants born to adolescent mothers compared to those born to women aged 20-24 years (20). Infants of adolescent mothers may be at higher risk for intrauterine growth restriction (IUGR), low birth weight, and preterm birth. Prematurity can further contribute to severe respiratory distress in newborns (19). In our study, transient tachypnea of the newborn was frequently observed in the adolescent group. Respiratory status is a component of the Apgar score, contributing to the lower scores observed in this group. Considering the possibility that pregnant adolescents receive less and lower-quality prenatal care or do not have access to well-equipped centers for childbirth, it can be inferred that this situation, along with low maternal age, may have contributed to the lower Apgar scores.

It is hypothesized that competition for resources between the adolescent mother's own growth needs and those of the developing fetus may hinder fetal development, leading to IUGR and small for gestational age (SGA) newborns (21). Consistent with existing literature, our study showed that adolescent pregnancies may be associated with IUGR, but the underlying mechanisms and multifactorial effects have not yet been fully elucidated.

Adolescents may be more prone to preterm birth due to gynecological immaturity, including a short cervix (25 mm), small uterine volume, and increased susceptibility to subclinical infections (22). Another study reported a higher risk of stillbirth and neonatal death in adolescent pregnancies compared to adult pregnancies (23). However, our study did not find significant differences in these specific parameters.

Regarding mode of delivery, a controversial topic, it has been suggested that the risk of fetal failure to progress or cephalopelvic disproportion is higher in adolescents due to an immature pelvis (24). However, our findings align with other studies indicating that adolescents may be more likely to have vaginal deliveries (14,25).

Limitations

This study has several limitations. Firstly, its retrospective design, relying on previously recorded data, may lead to potential data incompleteness and recording errors. Additionally, the limited sample size may restrict the generalizability of the findings and hinder the detection of rare maternal or perinatal complications. Furthermore, the lack of comprehensive evaluation of all possible variables and confounding factors related to adolescent pregnancy constitutes a significant limitation in interpreting the results. This issue particularly complicates the disentanglement of effects from socioeconomic status, educational level, and access to healthcare services.

Conclusion

This article provides a detailed examination of the potential complications associated with adolescent pregnancies based on current literature. Adolescent pregnancies can have serious adverse effects on maternal health, including preeclampsia, eclampsia, premature rupture of membranes, anemia, postpartum hemorrhage, and preterm labor. Additionally, the incidence of significant neonatal complications such as preterm birth, low birth weight, neonatal respiratory distress (including respiratory distress syndrome or transient tachypnea of the newborn), low Apgar scores, stillbirth, and neonatal mortality is increased. These findings underscore that adolescent pregnancies represent a critical public health concern affecting both maternal and neonatal outcomes. Given the limitations of the existing literature and the high-risk profile of this population, it is imperative to conduct more comprehensive, multicenter, prospective studies with larger sample sizes to develop effective intervention strategies aimed at reducing maternal and neonatal morbidity and mortality. Furthermore, multidisciplinary research that evaluates potential confounding factors such as socioeconomic status, cultural influences, and access to healthcare services will contribute significantly to mitigating the adverse effects of adolescent pregnancies.

Ethical Approval: Approval was obtained from the Mardin Artuklu University Non-Interventional Clinical Research Ethics Committee (Date: 10.09.2024, Decision number: 2024/9-4).

Author Contributions:

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Design : E.S., S.Y.

Data acquisition: E.S., Ö.T., S.Y.

Analysis and interpretation: E.S., Ö.T., S.Y.

Writing manuscript: Ö.T., E.S.

Critical revision of manuscript: S.Y.

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