ORIGINAL RESEARCH

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Comparison of Maternal and Perinatal Outcomes Between Adolescent and Adult Twin Pregnancies: Retrospective Study

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ABSTRACT Objective: The aim of this study is to compare the maternal and perinatal outcomes of twin adolescent pregnancies and twin adult pregnancies. **Material and Methods:** A study was conducted on twin pregnancies delivered between 2014 and 2019 in tertiary hospital. Twin pregnancies between 10 and 19 years old were classified as the adolescent group (study group) and 20 and 34 years old were classified as the control group. **Results:** Our study included 54 adolescent twin pregnancies and 818 control group twin pregnancies. The adolescent group delivering approximately 1 week earlier compared with the control group (p=0.023). The adolescent group had approximately 2.3 times higher risk in terms of moderate preterm (28–34 weeks) [OR, 2.34; 95% [CI], 1.34–4.09; p=0.002]. Anemia was significantly higher in adolescents (p=0.039). When 105 live newborns from the adolescent group were compared with 1601 newborns from the control group, the birth weight of the newborns in the adolescent group was 191 g less on average, their height was 1.3 cm shorter on average, and their head circumference was 1 cm smaller on average (p=0.001, p=0.002, and p=0.002, respectively). The adolescent newborns had an approximately 3.1 times increased prevalence of LBW [OR, 3.13; 95% [CI], 1.73–5.65; p<0.001). The fifth-minute APGAR scores were lower in newborns from the adolescent group (p=0.026). Moreover, the need for neonatal intensive care was higher in the adolescent group (p=0.033). **Conclusion:** Adolescent twin pregnancies should be considered at high risk because of obstetric complications and poor pregnancy outcomes.

Keywords: Adolescent pregnancy; teenage pregnancy; twin pregnancy; adverse outcomes; maternal outcomes; perinatal outcomes

Adolescence is the transitional period from childhood to adulthood and defined by the World Health Organization (WHO) as the period between ages 10 and 19 years.[1] According to WHO, adolescents represent approximately one-fifth of the world's population, and 85% live in developing countries.[2] In 2013, the mean fertility rate of adolescents from the age group 15-19 years was 45.8‰ worldwide.[3] According to the data of Turkey Demographic and Health Survey 2013, 16% of all women in our country belong to the 15-19-year age group, with a fertility rate of 31‰.[4]

Especially in developing countries, young individuals do not have sufficient knowledge about their characteristics, body functions, or reproductive characteristics. Despite this, the time of first sexual intercourse tends to shift toward earlier ages, and adolescent pregnancies become widespread among adolescents without sufficient knowledge regarding reproductive characteristics, contraception methods, or pregnancy.[5]

One of the most important features of adolescence is rapid development of physical, psychological, and social characteristics. Therefore, adolescent pregnancies are risky because maternal development is incomplete, and the metabolic, hemodynamic, and psychological conditions that occur during pregnancy coincide with their physical, psychological, and social development. Adolescent pregnancies are associated with preterm labor, maternal anemia, increased

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cesarean deliveries, low birth weight (LBW), low APGAR score, and increased need for neonatal intensive care.[1,6,7] Although adolescent pregnancy is already risky, multiple pregnancy may increase these risks even more. Multiple pregnancies are typically observed in advanced age with the increase use of assisted reproductive techniques.[8] Thus, the prevalence of multiple pregnancy in adolescents is very low. As far as we know, this study is the first study in Turkey that compares maternal, obstetrical and neonatal outcome of adolescent twin pregnancies with twin pregnancies of a control group.

MATERIAL AND METHODS

A study was conducted on twin pregnancies delivered between 2014 and 2019 in University of Health Sciences Tepecik Training and Research Hospital. Data were obtained from the hospital data management system, hospital archive, and newborn birth cards. Among these pregnancies, those with chromosomal and/or congenital anomalies, births before 20 weeks and/or with weight <500 g, in vitro fertilization pregnancies, pregnancies with monitored fetal growth retardation, pregnant women with any previously known chronic systemic disease (endocrinologic, cardiovascular, autoimmune, oncologic), and those whose information is unavailable and/or missing were excluded. Twin pregnancies between 10 and 19 years old were classified as the adolescent group (study group). Twin pregnancies between 20 and 34 years old were classified as the control group.

To determine the gestational age, our center mainly used the last menstrual period (LMP) or dating according to the first trimester crown-rump length measurement for those who were unsure of their LMP. Chorionicity was determined during ultrasound evaluation in the first or early second trimester.

Pregnancies <37 weeks were defined and grouped as preterm, pregnancies between 34-37 weeks as late preterm, pregnancies between 28-34 weeks as moderate preterm, and pregnancies at week 28 as severe preterm.[9] Premature rupture of membranes (PROM) referred to premature rupture of membranes before 37 weeks of gestation.[10] According to the measured neonatal weight, newborns below 2,500 g were considered as LBW, and those below 1,500 g as very LBW.

Diagnosis of gestational hypertension was based on American College of Obstetricians and Gynecologists 2019 and systolic pressure of 140 mm Hg or more or diastolic blood pressure of 90 mm Hg or more on two occasions at least 4 hours apart after 20 weeks of gestation in a woman with a previously normal blood pressure or systolic blood pressure of 160 mm Hg or more or diastolic blood pressure of 110 mm Hg or more.[11] All of the subjects underwent a two step or one step gestational diabetes mellitus (GDM) screening between 24 and 28 weeks of gestation. A positive 50-g glucose challenge test (GCT) is defined as a glucose level one hour after glucose challenge of at least 140 mg/dL. Women who had a positive 50-g GCT were advised to follow a normal diet 3 days before 100-g oral glucose tolerance test (OGTT). GDM was diagnosed if there were two or more abnormal values with a 100-g OGTT performed according to the criteria identified by Carpenter and Coustan.[12] Some pregnant women were tested one step 75-g OGTT according to International Association of Diabetes and Pregnancy Study Groups criteria.[13] Hemoglobin levels were evaluated at admission for delivery and <11 g/dL was accepted anemia.

During the study, the Helsinki Declaration was followed and Ethics Committee of Health Sciences University İzmir Tepecik Health Practice Research Center Non-interventional approved this study (approval number: 2019/16-27, date: 13.11.2019).

STATISTICAL ANALYSIS

Statistical Package for the Social Sciences 22.0 (IBM Corporation, Armonk, New York, USA) was used to analyze data, taking the significance level as $p<0.05$ in all analyzes. Normality distribution of variables was evaluated according to the Kolmogorov-Smirnov test. Student's t-test was used for parametric variables and the data were given as mean±standard deviation. In the case of non-parametric variables, Mann-Whitney U test was used and the data were given as median±(minimum, maximum). For categorical variables, chi-square test was used and odds ratio (OR) [95% confidence interval (CI)] calculations were made.

RESULTS

Our study included 54 adolescent twin pregnancies between 10 and 19 years old (study group) and 818 twin pregnancies between 20 and 34 years old (control group) that meet study criteria. Table 1 shows the demographic data. The age of the pregnant women was 18 years (range, 14-19 years) and 27 years (range, 20-34 years) in the adolescent and control groups, respectively (p<0.001). The parity and number of repeated cesarean sections in the control group were higher than those in the adolescent group (p<0.001 and p<0.001, respectively). Considering the gestational age, the adolescent and control groups delivered at 33.8±3.3 and 34.6±3.2 weeks, respectively, with the adolescent group delivering approximately 1 week earlier compared with the control group (p=0.023). No significant difference was found between the groups in terms of chorionicity, fetal sex, stillbirth, and maternal body mass index (Table 1).

The prevalence of hypertensive disorders was observed in 7.4% in all twin pregnancies. When the two groups were compared, 5 (9.2%) and 60 (7.3%) pregnant women in the adolescent and control groups, respectively, had gestational hypertension, and no significant difference was found between the groups. In our study, the prevalence of gestational diabetes was observed in 4.2% in all twin pregnancies. Although 1 (1.8%) and 36 (4.4%) pregnant women in the adolescent and control groups, respectively, had gestational diabetes, no significant difference was found between the groups. Antepartum anemia was observed in 23 (42.6%) and 240 (29.3%) pregnant women in the adolescent and control groups, respectively, and the prevalence of anemia was significantly higher in adolescents (p=0.039). No statistically significant difference was seen between the groups in terms of preterm labor (<37 weeks), late preterm labor (34-37 weeks), and advanced preterm labor (28 weeks), whereas the adolescent group had approximately 2.3 times higher risk in terms of moderate preterm (28-34 weeks) [OR, 2.34; 95% CI, 1.34-4.09; p=0.002]. Both groups were statistically similar in terms of PROM (Table 2).

When 105 live newborns from the adolescent group were compared with 1601 newborns from the

TABLE 1: Characteristics of pregnancies compared by maternal age.

	Adolescent Group 10-19 years (n=54)	Control Group 20-34 years (n=818)	p value
Age (year) median (minimum, maximum)	18 (14-19)	27 (20-34)	**<0.001**
Parity, n (%)			
Nulliparous	53 (98.1)	598 (73.1)	**<0.001**
Multiparous	1 (1.9)	220 (26.9)	
Delivery type, n (%)			0.528
Vaginal delivery	2 (3.7)	47 (5.7)	
Cesarean section	52 (96.3)	771 (94.3)	
Cesarean type, n (%)			**<0.001**
Primary C-section	52 (100)	600 (77.8)	
Repeated C-section	0	171 (22.2)	
Gestational age at delivery (mean±SD)	33.8±3.3	34.6±3.2	**0.023**
Chorionicity, n (%)			0.062
Monochorionic twin	23 (42.6)	455 (55.6)	
Dichorionic twin	31 (57.4)	363 (44.4)	
Gender, n (%)			0.076
Male	42 (38.9)[a]	840 (51.3)[b]	
Female	66 (61.1)[a]	796 (48.7)[b]	
Stillbirth, n (%)	3 (2.7)[a]	35 (2.1)	0.659
BMI (mean±SD) (kg/m^2)	22.8±2.5	23.5±3.1	0.679

[a]108 fetuses; [b]1,636 fetuses; SD: Standard deviation; BMI: Body mass index.

TABLE 2: Antepartum complications of pregnancies compared by maternal age.

	Adolescent Group 0-19 years (n=54)	Control Group 20-34 years (n=818)	OR 95% CI	p value
Hypertensive disorders of pregnancy, n (%)	5 (9.2)	60 (7.3)	1.29 (0.5-3.36)	0.602
Gestational diabetes, n (%)	1 (1.8)	36 (4.4)	0.41 (0.06-3.05)	0.368
Anemia [Hb<11 (g/dL)], n (%)	23 (42.6)	240 (29.3)	1.79 (1.02-3.13)	**0.039**
Preterm delivery prevalence (<37 weeks), n (%)	46 (85.2)	609 (74.3)	1.97 (0.92-4.25)	0.077
Advanced preterm (<28 weeks), n (%)	2 (3.7)	38 (4.6)	0.79 (0.19-3.36)	0.748
Moderate preterm (28-34 weeks), n (%)	25 (46.2)	220 (26.8)	2.34 (1.34-4.09)	**0.002**
Late preterm (34-37 weeks), n (%)	19 (35.2)	351 (42.9)	0.72 (0.41-1.28)	0.266
PROM, n (%)	14 (25.9)	167 (20.4)	1.36 (0.73-6.52)	0.333

OR: Odds ratio; CI: Confidence interval; Hb: Hemoglobin; PROM: Premature rupture of membrane.

TABLE 3: Antepartum complications of pregnancies compared by maternal age.

	Adolescent Group 10-19 years (n=105)	Control Group 20-34 years (n=1601)	OR 95% CI	p value
Birth weight (g) (mean±SD)	1,980.1±530	2,171.5±580.6	-	**0.001**
Head circumference (cm) (mean±SD)	30.9±2.4	31.7±2.7	-	**0.002**
Height (cm) (mean±SD)	43±4.2	44.3±4.2	-	**0.002**
LBW (<2,500 g), n (%)	92 (87.6)	1,110 (69.3)	3.13 (1.73-5.65)	**<0.001**
VLBW (<1,500 g), n (%)	16 (15.2)	191 (11.9)	1.33 (0.76-2.31)	0.314
APGAR score <7 at 1st minute, n (%)	59 (56.1)	780 (48.7)	1.43 (0.97-2.13)	0.138
APGAR score <7 at 5th minute, n (%)	29 (27.6)	301 (18.8)	1.65 (1.06-2.57)	**0.026**
NICU admission, n (%)	79 (75.2)	1,042 (65)	1.63 (1.03-2.57)	**0.033**

OR: Odds ratio; CI: Confidence interval; SD: Standard deviation; LBW: Low birth weight; VLBW: Very low birth weight; NICU: Neonatal intensive care unit.

control group, the birth weight of the newborns in the adolescent group was 191 g less on average, their height was 1.3 cm shorter on average, and their head circumference was 1 cm smaller on average (p=0.001, p=0.002, and p=0.002, respectively). When live newborns were grouped according to birth weight, those from the adolescent group had an approximately 3.1 times increased incidence of LBW [OR, 3.13; 95% CI, 1.73-5.65; p<0.001]. The first-minute APGAR scores were similar between the groups, whereas the fifth-minute APGAR scores were lower in newborns from the adolescent group (p=0.026). Moreover, the need for neonatal intensive care was higher in the adolescent group (p=0.033) (Table 3).

DISCUSSION

In Turkey, 41% of women aged 25-49 years are married before the age of 20.[4] In Turkey, marriage is seen as the beginning of a period socially accepted for childbearing. The age of first marriage has a significant impact on births. Women who marry at an earlier age have a higher probability of being pregnant for a longer period on average, which subsequently causes more births as age increases. In our study, the age of pregnant women in the adolescent and control groups was 18 years (range, 14-19 years) and 27 years (range, 20-34 years), respectively, and the parity number was higher in the control group as expected (p<0.001 and p<0.001, respectively). In our study, the adolescent and control groups were similar in terms of vaginal and cesarean delivery rates, which may be because cesarean delivery is often preferred in twin pregnancies. All 52 adolescent pregnant women (100%) delivered by primary cesarean section, whereas only 22.2% of pregnant women in the control group delivered by primary cesarean section, and the difference was significant (p<0.001).

In our study, newborn weight, height, and head circumference measurements were significantly lower in the adolescent group (p=0.001, p=0.002, and p=0.002, respectively). Studies conducted with adolescent twin pregnancies in the literature are limited. In other studies, only newborn weights were investigated, and no difference was found between the groups in terms of newborn weight.[14,15] Adolescence is the period when the individuals are interested in their own physical appearance the most. Adolescence is the period when the individuals are interested in their own physical appearance the most. During adolescence, the daily caloric, vitamin, and mineral needs increase.[16] However, in this age group, dieting is a frequently observed, and for this purpose, individuals adopt unhealthy methods, such as fasting, medication, and vomiting.[16-18] Furthermore, in case of adolescent pregnancy, there is a competition for sharing nutrients between the mother whose neither growth nor development is complete and her baby. Additionally, prenatal care remains insufficient depending on the socioeconomic and cultural structure of the adolescent.[19,20] Considering all these conditions, the result we found seems reasonable.

In our study, the prevalence of hypertensive disorders was observed in 7.4% in all twin pregnancies. In the literature, the frequency in twins has a wide range between 6.4% and 11.8%.[21,22] In terms of hypertensive diseases in pregnancy, Blake and Lee and Robson et al. did not find a significant difference in adolescent and normal age group twin pregnancies, which was similar to our study.[14,15] In the general population, besides the publications reporting that gestational hypertension is common in adolescents, publications reported no significant difference.[23] This may be because gestational hypertension is multifactorial. The etiology of hypertensive disorders in pregnancy remains to be identified because the investigation for their etiology has led to an infinite number of hypotheses that encompass practically all maternal and fetal organs.[11,23] Its physiopathology has not been totally elucidated, and it is no different in the adolescent patient than in the rest of the affected population.[23]

In our study, the prevalence of gestational diabetes was observed in 7.4% in all twin pregnancies. In the literature, the frequency ranges from 3.9% to 8.4%.[24] Gestational diabetes is rarer in young women, and its prevalence increases with age.[25] Pancreatic B cell function and insulin sensitivity decrease with age. The literature includes studies suggesting that gestational diabetes is less common in adolescent singleton pregnancies.[26] Twin pregnancy is a risk factor in itself for gestational diabetes.[27,28] Our study was conducted on adolescent twin pregnancies. Although the prevalence of gestational diabetes was higher in the control group in our study, the results were not statistically significant [OR, 0.41; 95% CI, 0.06-3.05; p=0.368]. The combination of young age and twin pregnancy may contribute to this outcome.

Anemia is another condition that can complicate adolescent pregnancies. Iron deficiency is the most common nutritional deficiency in pregnant adolescents with low socioeconomic level.[29] An adolescent is an individual whose development is not yet complete, so the increasing iron need during pregnancy makes the situation more serious.[30] Studies suggest that anemia is more common in adolescent pregnancies compared with adult pregnancies.[31-33] Consistent with the literature, we found a higher incidence of anemia in the adolescent group compared to the control group (p=0.039).

Both twin and adolescent pregnancy are risk factors for preterm birth.[1,6,7,34] Considering the gestational age, our study found that adolescent pregnant women delivered 1 week earlier on average (p=0.023). In terms of preterm delivery, the literature included three more studies on adolescent twin pregnancies.[14,15,35] In the study of Blake and Lee involving 50 adolescent pregnant women with twins, no significant difference was found between the adolescent and control groups in terms of preterm labor (<37 weeks).[14] Robson et al. studied 29 adolescent twin pregnancies and investigated preterm labor (<37 weeks), advanced preterm labor (28-32 weeks), and very advanced preterm labor (28 weeks).[15] Their study found that adolescent twin pregnancies had a higher risk only in terms of very advanced preterm labor (<28 weeks). Branum classified deliveries at <33 weeks as very preterm births and found this rate significantly higher in adolescent twin pregnancies.[35]

Our study found that the adolescent twin group was at significantly higher risk in terms of moderate preterm labor (28-34 weeks) (p=0.002). Our study showed that approximately half of the twins in the adolescent group were delivered after moderate preterm labor.

According to our study, being an adolescent increases the risk of LBW babies approximately 3.1 times [OR, 3.13; 95% CI, 1.73-5.65; p<0.001]. At the same time, the risk of APGAR score <7 at minute 5 1.6 times [OR, 1.65; 95% CI, 1.06-2.57; p=0.026], and the intensive care need of the newborn 1.6 times [OR, 1.63; 95% CI, 1.03-2.57; p=0.033]. In their study with adolescent twin pregnancies, Robson et al. could not find any significant difference between groups.[15]

Our study is a retrospective study. We could not reach the socioeconomic data of our patients clearly. These were the limitations of our study. However, we kept our patient selection criteria very strict. Furthermore, since we are a tertiary reference hospital with almost 10,000 births per year, we see many cases in daily practice and we tried to include all these cases in our study.

CONCLUSION

In conclusion, adolescent twin pregnancies are at risk for shorter gestational age, preterm labor, anemia, lower birth weight, height, and head circumference, low fifth-minute APGAR score, increased need for neonatal intensive care. Adolescent twin pregnancies should be considered high risk because of obstetric complications and poor pregnancy outcomes.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: *Burak Bayraktar, Miyase Gizem Bayraktar;* ***Design:*** *Burak Bayraktar, Miyase Gizem Bayraktar, Meriç Balıkoğlu;* ***Control/Supervision:*** *Burak Bayraktar, Miyase Gizem Bayraktar;* ***Data Collection and/or Processing:*** *Burak Bayraktar, Miyase Gizem Bayraktar, Meriç Balıkoğlu;* ***Analysis and/or Interpretation:*** *Burak Bayraktar, Miyase Gizem Bayraktar, Meriç Balıkoğlu, Murat Alan;* ***Literature Review:*** *Burak Bayraktar, Miyase Gizem Bayraktar, Meriç Balıkoğlu, Murat Alan;* ***Critical Review:*** *Burak Bayraktar, Miyase Gizem Bayraktar, Meriç Balıkoğlu, Murat Alan.*

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