COMPARISON OF PERINATAL AND NEONATAL OUTCOMES OF VERY ADVANCED MATERNAL AGED PREGNANTS AND EARLY ADOLESCENT PREGNANT WOMEN

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ABSTRACT Aims: In recent years, very early pregnancies and very advanced pregnancies have increased. In our study, we aimed to compare these groups in terms of maternal and fetal risks. **Materials and Methods:** This study retrospectively were compared the perinatal outcomes of women of reproductive age in 80 early adolescent pregnant (16 years and younger) and 67 older pregnant women (45 years and older) followed in Siirt Training and Research Hospital between 2017 and 2021 in Siirt Training and Research Hospital (Siirt, Turkey). In cases gravida, parity, hemogram, biochemistry, urine, week of birth, fetal weight, gender, APGAR 1-5. min, mode of delivery (vaginal delivery/ cesarean section), miscarriage, neonatal death, premature rupture of membranes (PROM), premature birth, placental ablation, fetal distress, intrauterine death, gestational diabetes mellitus (GDM), preeclampsia, surmaturation, polyhydramnios , oligohydramnios, presentation anomaly, multiple pregnancy, intrauterine growth retardation (IUGR), postpartum hemorrhage, placenta previa, maternal and fetal outcomes in three pregnant groups were evaluated. **Results:** Normal spontaneous vaginal delivery (NSVD)/Cesarean section (C/S)" parameter was found to be significantly higher in pregnant women aged 45 and above, while it was found to be significantly lower in the group aged 16 and below($p<0.0001$). Spontaneous abortion, on the other hand, was not found significantly in the 16-year-old and younger group compared to the other groups, while it was significantly higher in pregnant women aged 45 and above($p<0.0001$).The incidence of GDM was significantly higher in pregnant women aged 45 and over, but it was not determined in pregnant women aged 16 and younger ($p=0.003$). The incidence of preeclampsia was also found to be significantly higher in pregnant women aged 45 and over ($p<0.0001$). The incidence of polyhydramnios was significantly higher in the risky pregnant group than in the control group ($p=0.015$). The incidence of presentation anomaly was found to be significantly higher in pregnant women aged 45 and over ($p=0.012$). No statistically significant difference was found in other parameters. **Conclusion:** Both early adolescent pregnancies and very advanced age pregnancies have their own problems. The obstetrician should be aware of these in his approach to both groups.

KEYWORDS Age, pregnancy, adolescent, perinatal, fetal

Introduction

Maternal age is an important factor in pregnancy-related complications and adverse obstetric and perinatal outcomes (1). In recent years, increase in the frequency of adolescent or advanced age pregnancies has become an important social problem. Approximately 11% of births in the world each year consist of adolescent pregnant women aged 15-19, while in developing countries 15-20% of all pregnancies are adolescents and 14% are pregnants over 35 years of age (2-4). In Turkey, according to the 2018 data of the Turkey Demographic and Health Survey (TNSA), 4% of births occur at adolescence, although there are variations according to regions (5).

Pregnancies among adolescents are classified as females up to 15 years of age and females older than 16 years. Adolescents up to the age of 15 are considered to be at high risk for adverse

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maternal, obstetric and neonatal outcomes (6). Adolescent pregnancies are among high-risk pregnancies. There is an increased risk of pregnancy-related hypertension, gestational diabetes, anemia, preterm premature rupture of membranes, especially in preterm birth, IUGR and low birth weight babies. It can result with significant social, health and educational problems in terms of maternal and fetal conditions (7-9).

Today, the effects of maternal age on the development and results of diseases related to the prolongation of the average human lifespan have also changed (10). There is a worldwide tendency to postpone childbearing to advanced ages (11). While advanced maternal age is generally accepted as 35 years and above, very advanced maternal age is defined as 40 or 45 years old (12, 13). Although the evidence is limited, pregnancy after age 45, hypertensive disorders, gestational diabetes, cesarean section (13), placenta previa (13), bleeding (14), low birth weight (13), preterm birth (13) and stillbirth (15) has been associated with an increased risk of adverse maternal and perinatal outcomes. The available evidence also indicates that adverse pregnancy outcomes among women aged 45 years and older are greater than those experienced by women of less advanced maternal age (35–39 years) (15, 16). Discussions about advanced maternal age and perinatal outcomes of early adolescent pregnancies and neonatal outcomes are still ongoing. In these discussions, pregnancies vary according to age, demographic characteristics, education level, country or region and socio- economic status. Due to these reasons, it was aimed to compare the perinatal and neonatal outcomes of very advanced maternal age pregnants and early adolescent pregnancies by taking the criteria of 16 years and younger pregnancies, which are considered to be the most risky pregnancies, and 45, which is a very advanced maternal age.

Materials and Methods

This study was carried out in a tertiary center with an annual average number of births of 3500 between 2017-2021 in Siirt Training and Research Hospital (Siirt, Turkey). The study was approved by the institutional ethics committee with the number "2022/01.04". The study was performed according to the standards of the Declaration of Helsinki. **Clinical Trial Registration Number: NCT05484869 (02/08/2022)**

This study retrospectively were compared the perinatal outcomes of women of reproductive age in 80 early adolescent pregnant (16 years and younger) and 67 older pregnant women (45 years and older) followed in Siirt Training and Research Hospital between 2017 and 2021 in Siirt Training and Research Hospital (Siirt, Turkey). In cases gravida, parity, hemogram, biochemistry, urine, week of birth, fetal weight, gender, APGAR 1-5. min, mode of delivery (vaginal delivery/ cesarean section), miscarriage, neonatal death, premature rupture of membranes (PROM), premature birth, placental ablation, fetal distress, intrauterine death, gestational diabetes mellitus (GDM), preeclampsia, surmaturation, polyhydramnios , oligohydramnios, presentation anomaly, multiple pregnancy, intrauterine growth retardation (IUGR), postpartum hemorrhage, placenta previa, maternal and fetal outcomes in three pregnant groups were evaluated. Gestational week was determined by first trimester ultrasound or, if ultrasound could not be performed, with the last known menstrual period. Maternal characteristics, perinatal and neonatal outcomes were obtained from the hospital database and patient records. Patients with pre- existing renal and cardiac hypertensive diseases and pregestational diabetes mellitus were excluded from the study as exclusion criteria.

In cases, gravida, parity, hemogram, biochemistry, urine, week of birth, fetal weight, gender, APGAR 1-5. min, type of delivery (vaginal delivery/ cesarean section), abortion, neonatal death, premature rupture of membranes (PROM), preterm labor, ablatio placentae, fetal distress, intrauterine death, gestational diabetes mellitus (GDM), preeclampsia, surmaturation, polyhydramnios, oligohydramnios, presentation anomaly, multiple pregnancy, intrauterine growth retardation (IUGR), postpartum hemorrhage, placenta previa were compared in terms of maternal and fetal outcomes in three pregnant groups.

Spontaneous abortion was defined as non-interventionous spontaneous abortion.(17) Missed abortion was considered as uterine evacuation non-starting yet despite the embryo/fetus losing its vitality in the uterus. Neonatal death was defined as infant death occurring within 365 days of birth. Premature rupture of membranes (PROM) was evaluated as the opening of fetal membranes before 37 weeks of gestation. (18) Preterm labor and deliveries between 20 0/7 and 36 6/7 weeks of gestation were defined as premature birth. Placental abruption was defined as partial (partial abruption) or complete (complete abruption) separation of the placenta from the place where it was attached to the uterus before the birth of the baby, after the 20th week of pregnancy. Fetal distress was accepted as fetal oxygen deficiency, acidosis, asphyxia, and was defined as fetal distress by NST. Intrauterine fetal death is 500 g in a normally developing fetus after 20 weeks of gestation or if the gestational week is unknown. It was evaluated as intrauterine loss of fetus with birth weight above.(19) GDM was diagnosed in pregnant women with a 1st glucose value of 140-180 mg/dl in a 50-g glucose screening test at 24-28 gestational weeks, when 2 of 4 glucose reference values in the 100-g glucose OGTT were exceeded in diagnostic test. (20) Regardless of the gestational week, the pregnant women in the risky group were diagnosed with GDM by directly performing OGTT with 75 g glucose without a pre-screening test. Patients with preeclampsia complying with the current recommendations of the American College of Obstetricians and Gynecologist(ACOG) were included (21). Surmaturation was considered as the initiation of labor despite the completion of the 42nd week of gestation. Polyhydramnios was defined as 2000 ml or more of amniotic fluid. Oligohydramnios was defined as 500 ml or more of amniotic fluid. (22)

Anomaly of presentation was evaluated as the areas of the fetal head other than the occiput, entering the birth canal with the forehead, face, breech or shoulder. IUGR was defined as an ultrasound-estimated fetal weight less than the 10th percentile or a measurement of abdominal circumference <10% for gestational age. Postpartum hemorrhage (PPH) was defined as an estimated >500ml of bleeding from the female genital tract in the first 24 hours after delivery. Placenta previa was defined as complete or partial coverage of the internal os of the cervix with placenta.(23)

Statistical methods

Statistical analyzes were performed with IBM® SPSS® 26 (SPSS Inc., Chicago, IL, USA) software. The conformity of the variables to the normal distribution was examined using analytical methods (Kolmogorov-Smirnov/Shapiro¬Wilk tests). Descriptive analyzes were given by using mean±standard deviation for normally distributed variables. Descriptive statistics were made by giving frequency and percentage values of categorical variables. Pearson's or Fisher's Exact Chi Square tests were used to compare categorical variables. One-Way ANOVA and

Kruskal-Wallis test were used for comparing pregnant groups and after post hoc Bonferroni and Tamhane's T2 (equal variance not assumed) test was used. Cases with a P-value below 0.05 were considered statistically significant.

Results

297 pregnant women at different ages were included in the study. In the study, in which risk groups and control groups were formed, a total of 147 pregnant patients, including pregnant women aged 16 and under (n=80), and pregnant women aged 45 and over (n=67), were included in the risk group. In the normal pregnant group, 150 pregnant women were included in the study.

In Table 1, the gravida and parity parameters were found to be statistically different between the groups, and the value of these parameters in pregnancy over 45 years of age was found to be significantly higher than the other groups. In addition, White Blood Cell (WBC) and Alanineaminotransferase (ALT) parameters were found to be significantly lower in the 45 and older pregnant group compared to the other groups. Glucose parameter was found to be significantly higher in the pregnant group aged 45 and over compared to the other groups. Creatine parameter was found to be significantly higher in pregnant women aged 16 and below. Oral glucose tolerance test (OGTT) 1st hour measurements were found to be significantly higher in pregnant women aged 45 and above, while no significance was observed in OGTT 2nd measurements, while OGTT 3rd measurements were found to be significantly lower in pregnant women aged 45 and above.

In Table 2, the categorical clinical findings of the normal and risky pregnant groups were compared and a statistically significant difference was found in the "Normal spontaneous vaginal delivery (NSVD)/Ceserean-section (C/S)" parameter. While this value was found to be significantly higher in pregnant women aged 45 and above, it was found to be significantly lower in the group aged 16 and below. Spontaneous abortion, on the other hand, was not found significantly in the 16-year-old and younger group compared to the other groups, while it was significantly higher in pregnant women aged 45 and above. No statistically significant difference was found in other parameters.

In Table 3, the incidence of GDM was significantly higher in pregnant women aged 45 and over, but it was not determined in pregnant women aged 16 and younger. The incidence of preeclampsia was also found to be significantly higher in pregnant women aged 45 and over. The incidence of polyhydramnios was significantly higher in the risky pregnant group than in the control group. The incidence of presentation anomaly was found to be significantly higher in pregnant women aged 45 and over. No statistically significant difference was found in other parameters.

Discussion

Studies conducted in recent years have shown that an increase in maternal age is associated with an increase in intrauterine growth retardation, abortion, stillbirth, genetic anomalies, non-chromosomal congenital anomalies, and neonatal mortality (11, 24-26). Although the risk of preterm birth increases in pregnancies over the age of 35, there was no difference in terms of morbidity and mortality with preterm babies of younger mothers (27). While similar results were found in this study, no difference was found between the groups in terms of preterm birth risk. We estimate that this is due to the different study populations and numbers.

Adolescent pregnancies are encountered with a rate of 18.4% in Latin American countries, 14% in African countries south of the Sahara Desert, and 2% in Europe (28-30). According to the Turkey Demographic and Health Survey, 12.1% of women in Turkey have their first birth under the age of 18 (31). Topçuoğlu et al. (32) found the birth rate under the age of 18 to be 2.5% and Çakır et al. (33) found the rate of adolescent pregnant women to be 2.9%. In this study, our early adolescent pregnancy rate was 2.29%, which is consistent with the studies.

The rate of CS is increasing rapidly worldwide nowadays. The cesarean delivery rate recommended by the World Health Organization (WHO) is 10-15% of total deliveries (34). Since the bone pelvis in adolescents has not yet completed its development and is smaller compared to adults, it has been found that the rates of interventional delivery and cesarean section are higher in adolescents (4). Cesarean section rates of adolescent pregnancies are reported at different rates in the literature (33, 35-37). The rate of cesarean section is higher in advanced age mothers due to reasons such as pregnancy-related hypertension, preeclampsia, gestational diabetes, multiple pregnancy, cesarean section history in previous pregnancies, and fetal distress that increases with advancing age (33, 38). In this study, our adolescent cesarean section rate was 13.8%, which is in line with the WHO recommendation. Our CS rate was 41.8% in the very advanced maternal age group and 34.7% in the control group. This is because we are a tertiary center with a high rate of CS, and we have cases with risky pregnancies and concomitant diseases.

In 2016, 38.7% of births in Spain consisted of mothers over the age of 35 and 8.39% were mothers over the age of 40 (39). Currently around 0.1-0.2% of births in Australia are to women aged 45 and over (40), and this trend is likely to continue as newer technologies become available. In this study, we found a pregnancy rate of 1.91% for those aged 45 and above. This rate may increase due to the socioeconomic status, the increase in assisted reproductive techniques and the desire for pregnancy at an advanced age.

In studies, increased preeclampsia (33) and eclampsia risk were found to be significantly higher in adolescent pregnancies (4). Preeclampsia is also associated with lower birth weight as it negatively affects intrauterine growth (41). Cakir et al. (33) found low birth weight rates to be higher in adolescent pregnant women. In this study, while the risk of preeclampsia was higher than in very advanced maternal age adolescent pregnant women, no significant difference was found in terms of IUGR. This difference is due to the difference in adolescent age, the low number of cases, and the difference in advanced maternal age.

In addition to the fact that adolescents have not completed their development sufficiently, increased metabolism during pregnancy, inadequate antenatal care, low socio-economic and educational levels, many studies have found a relationship between adolescent pregnant women and newborns with low birth weight compared to their birth weeks (33, 35, 42, 43). On the contrary, WHO data showed that low birth weight (<2500 g) infant birth rates were similar in both groups (4). However, studies have shown that the probability of giving birth to a premature and SGA baby increases with increasing maternal age (32, 38, 39). On the contrary, Topçuoğlu et al. (32) found no increase in the rate of low birth weight in the adolescent and elderly mother groups compared to the control group. In this study, no significant difference was found between the groups in terms of

IUGR. Different age groups, number of cases and demographic characteristics are different.

Kirbas et al. reported a significantly higher rate of premature birth in adolescent pregnant women (4, 43). However, Çakır et al. (33) found premature birth rate in adolescent pregnant women as similar to the control group. We estimate that this is due to the fact that the control group is very close to the adolescent age group and is limited to only 20 years old.

In three different studies in which adolescent pregnant women were compared with control group pregnant women, it was reported that babies born from both groups had the same Apgar scores (33, 36). On the contrary, Omar et al. reported that adolescent pregnant women were associated with low Apgar scores (42). In this study, no difference was found between the three groups in terms of Apgar scores, which was consistent with these studies. Neonatal mortality rates does not increase in adolescent pregnancies in many studies (4, 33, 41, 43). In this study, similar results were found in terms of neonatal mortality and intrauterine mortality ($p>0.05$).

12According to Çakır et al., preeclampsia, intrauterine growth retardation, low birth weight and hypoglycemia, which are associated with increased cesarean section rate and adverse newborn outcomes, are more common in adolescent pregnant women (33). In contrast, a prospective population-based study in 7 countries (46) found that adolescent pregnancy was not associated with worse maternal outcomes, but with rather worse perinatal outcomes, particularly in younger adolescents. In this study, the rate of CS in adolescents was consistent with WHO recommendations and perinatal and neonatal outcomes were found to be more risky than in very advanced maternal age adolescents.

Kahveci et al., showed that advanced maternal age is an important risk factor for gestational diabetes mellitus, gestational hypertension, preeclampsia, preterm delivery, spontaneous late preterm delivery and cesarean section (47). However, Carolan et al., (48) also showed that women aged 45 years and older had higher rates of pregnancy and perinatal complications compared to women aged 30-34 years. Similar results are determined in this study as well. GDM, preeclampsia, polyhydramnios, presentation anomaly frequency and CS were found to be significantly higher compared to the very advanced maternal age adolescent group ($p<0.05$). However, no difference was found in terms of newborn weight, IUGR, preterm labor and PROM. Differences in these results may be due to the number of cases in the study and the distribution of cases in groups.

Unwanted pregnancies result in unsafe abortion in 14% of adolescents aged 15-19 years in low-income countries. According to WHO data, 3 million adolescents have unsafe abortions annually (49). According to Kaya et al. (44), although the number of patients who had abortion under 20 weeks was 12 (11.5%, 12/104), 1 case (1.3%) was detected in this study. In the study of Kaya et al., adolescent births carry maternal and neonatal risks. It is clear that obstetric complications are high in adolescence, especially in early adolescence (50). On the contrary, in another study, no increase in maternal and neonatal mortality and morbidity was observed in the adolescent pregnant population with adequate antenatal care, except for a lower birth weight (38). In this study, advanced age pregnancies were found to be more risky in terms of adverse pregnancy outcomes compared to adolescent pregnancies. However, early adolescent pregnancies pose a social problem for both maternal age and the responsibility of the newborn.

In the study conducted in Turkey by İmir et al., it was found that complications such as malpresentation, PROM, preterm birth, and eclampsia were more common in the adolescent pregnant group (51). Topçuoğlu et al. (32) was found this rate to be 14.5% and was observed that the advanced age pregnant group was prone to pregnancy complications. In this study, the pregnancy rate of 45 years and older was 22.6%, and it was determined that advanced maternal age was prone to pregnancy complications. Babies of adolescent mothers are exposed to problems related to prematurity at a higher rate. However, it has been observed that adolescent or advanced maternal age does not have a negative effect on the early-term outcomes of the newborn in the presence of adequate antenatal care and delivery in an appropriate center (32).

The limitations of this study are retrospectivity, being tertiary centered, including small number of cases, lack of neonatal early and late results, including early adolescent group, and very advanced material group. The strength of the study is that the study isw comparing the perinatal outcomes, neonatal outcomes and laboratory values of the most risky early adolescent and very advanced maternal age groups.

As a result, very advanced age pregnancies were found more risky in terms of adverse pregnancy outcomes than adolescent pregnancies. To reduce the negative perinatal outcomes, it is important to conduct management of early adolescent and especially very advanced age pregnancies in the place where the perinatology department is located.

Ethics Declarations

Ethics approval and consent to participate

The study was approved by the Siirt University ethics committee in Turkey. (2022/01.04). The study was performed according to the standards of the Declaration of Helsinki. Written informed consent was obtained from the adolescent pregnant women under the age of 16 who participated in this study by the patient's legal guardian/close relative. Data is obtained from The Siirt Training and Research Hospital obstetrics and Gynecology clinic, the women gave informed consent that their data in The Siirt Training and Research Hospital obstetrics and Gynecology can be used in research.

Written informed consent was obtained from the adolescent pregnant women under the age of 16 who participated in this study by the patient's legal guardian/close relative.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests and there are not any financial competing interests.

Availability of data and materials

The detailed datasets used and analyzed during the current study are available from the corresponding and first authors. Data share link: *Aksin, Serif. Comparison of Perinatal and Neonatal Outcomes of Very Advanced Maternal Aged Pregnants and Early Adolescent Pregnant Women. Ann Arbor, MI: Inter-university Consortium for Political and Social Research [distributor], 2022-08-01. https://doi.org/10.3886/E176701V1*

Table 1 Comparison of clinical findings among pregnant groups.

Variables	*Group 1 (n=80)*	*Group 2 (n=67)*	*Group 3 (n=150)*	*P value*
Parity, n	*1,1±0,3*	*7,4±2,8*	*3,5±1,8*	***<0.0001***
Birth Week, week	*38,8±1,5*	*38,2±2,0*	*38,9±2,0*	*0,052*
Fetal Weight, gr	*3061,9±446,4*	*3194,7±609,7*	*3094,0±508,0*	*0,271*
APGAR 1. min.	*7,8±0,8*	*7,7±1,2*	*7,9±0,7*	*0,189*
APGAR 5. min.	*8,9±0,5*	*8,8±1,2*	*8,9±0,8*	*0,461*
WBC, K/uL	*13,6±4,6*	*12,3±2,6**	*13,1±3,6*	*0,062*
Lymphocyte, % #	*12,8±6,1*	*13,6±10,7*	*14,0±9,6*	*0,652*
Neutrophil, %	*80,8±6,5*	*80,3±6,5*	*79,2±10,1*	*0,348*
Neutrophil/Lymphocyte Ratio #	*8,4±5,7*	*8,2±5,2*	*8,0±5,5*	*0,847*
Hemoglobin, mg/dL	*11,1±1,4*	*11,3±3,2*	*10,9±1,9*	*0,349*
Hematocrit, %	*34,6±4,0*	*34,2±5,1*	*34,2±4,4*	*0,829*
Platelet, K/uL	*232,0±73,8*	*213,9±56,8*	*230,6±70,6*	*0,196*
Glucose, mg/dL	*86,7±16,4*	*97,1±27,3*	*84,7±17,0*	***0,0001***
Urea, mg/dL	*18,2±5,8*	*16,7±5,6*	*17,1±7,4*	*0,316*
Creatinine, mg/dL	*0,62±0,61***	*0,64±0,12*	*0,60±0,09*	*0,074*
AST, U/L	*25,5±8,6*	*24,3±8,8*	*26,1±10,9*	*0,455*
ALT, U/L	*16,9±8,0*	*15,8±4,6**	*16,4±11,2*	*0,091*
LDH, U/L	*243,5±61,5*	*247,4±79,5*	*255,3±88,1*	*0,531*
CRP, mg/dL	*10,7±23,9*	*7,5±7,5*	*6,5±7,8*	*0,145*
OGTT 1. hour#	*85,0±21,2 (n=23)*	*122,5±57,3 (n=13)**	*78,9±15,8 (n=45)*	***<0,0001***
OGTT 2. hour#	*126,5±36,4 (n=23)*	*132,5±51,6 (n=12)*	*128,8±38,2 (n=46)*	*0,909*
OGTT 3. hour#	*91,7±17,9 (n=9)*	*80,3±29,6 (n=4)**	*108,6±25,6 (n=28)*	***0,045***

AST: Aspartataminotransferase, ALT: Alanineaminotransferase, CRP: C-reactive protein, White Blood Cell (WBC), LDH (Lactate dehydrogenase), OGTT: oral glucose tolerance test. One-way ANOVA and # Kruskal-Wallis test were used for comparing groups and after post hoc Bonferroni and Tamhane's T2 (Equalvariance not assumed) test was used. p<0.05 was considered significant.

Table 2 Comparison of categorical clinical findings among pregnant groups.

Variables	*Subgroup*	*Group 1 n (%)*	*Group 2 n (%)*	*Group 3 n (%)*	*P value*
NSVD-C/S	*No*	*69(86.3)nvd*	*39(58.2) nvd*	*98(65.3) nvd*	***<0.0001***
	Yes	*11(13.8) cs*	*28(41.8)*cs*	*52(34.7)cs*	
Spontaneous Abort	*0*	*80(100)*	*39(58.2)**	*105(70.0)***	***<0.0001***
	1	*0(0)*	*11(16.4)*	*29(19.3)*	
	2	*0(0)*	*9(13.4)*	*11(7.3)*	
	3	*0(0)*	*4(6.0)*	*3(2.0)*	
	4	*0(0)*	*1(1.5)*	*1(0.7)*	
	5	*0(0)*	*2(3.0)*	*1(0.7)*	
	6	*0(0)*	*1(1.5)*	*0(0)*	
Missed abort	*0*	*79(98.8)*	*65(97.0)*	*149(99.3)*	*0.368*
	1	*0(0)*	*1(1.5)*	*0(0)*	
	2	*1(1.3)*	*1(1.5)*	*0(0)*	
	5	*0(0)*	*0(0)*	*1(0.7)*	
Gender	*0 male*	*49(61.3)*	*36(53.7)*	*52(36.4)*	***0.001***
	1 female	*31(38.8)*	*31(46.3)*	*91(63.6)**	
Neonatal Death	*No*	*79(98.8)*	*67(100)*	*149(100)*	*0.258*
	Yes	*1(1.3)*	*0(0)*	*0(0)*	
PROM	*No*	*69(86.3)*	*63(94.0)*	*136(90.7)*	*0.277*
	Yes	*11(13.8)*	*4(6.0)*	*14(9.3)*	
Preterm Action	*No*	*71(88.8)*	*55(82.1)*	*131(87.3)*	*0.460*
	Yes	*9(11.3)*	*12(17.9)*	*19(12.7)*	
Placenta detachment	*No*	*80(100)*	*67(100)*	*148(98.7)*	*0.373*
	Yes	*0(0)*	*0(0)*	*2(1.3)*	
Fetal Distress	*No*	*78(97.5)*	*63(94.0)*	*148(98.7)*	*0.148*
	Yes	*2(2.5)*	*4(6.0)*	*2(1.3)*	
Intrauterine Death	*No*	*80(100)*	*66(98.5)*	*148(99.3)*	*0.546*
	Yes	*0(0)*	*1(1.5)*	*1(0.7)*	

NSVD: Normal spontane vaginal delivery, C/S: Ceserean- section , PROM:Premature rupture of membranes. Pearson's and Fisher's Exact ChiSquare test was used and p<0.05 was considered significant.

Table 3 Comparison of categorical clinical and biochemical findings among pregnant groups.

Variables	*Subgroup*	*Group 1 (n, %)*	*Group 2 (n, %)*	*Group 3 (n, %)*	*P value*
GDM	*No*	*80(100)*	*59(88.1)*	*144(96.0)*	*0.003*
	Yes	*0(0)*	*8(11.9)**	*6(4.0)*	
Preeclampsia	*No*	*78(97.5)*	*57(85.1)*	*146(97.3)*	***<0.0001***
	Yes	*2(2.5)*	*10(14.9)**	*4(2.7)*	
Surmaturation	*No*	*78(97.5)*	*66(98.5)*	*141(94.0)*	*0.213*
	Yes	*2(2.5)*	*1(1.5)*	*9(6.0)*	
Polyhydramnios	*No*	*78(97.5)*	*63(94.0)*	*150(100)*	***0.015***
	Yes	*2(2.5)*	*4(6.0)**	*0(0)*	
Oligohydramnios	*No*	*75(93.8)*	*62(92.5)*	*140(93.3)*	*0.957*
	Yes	*5(6.3)*	*5(7.5)*	*10(6.7)*	
Presentation Anomaly	*No*	*78(97.5)*	*57(86.4)*	*143(95.3)*	***0.012***
	Yes	*2(2.5)*	*9(13.6)**	*7(4.7)*	
Multiple pregnancy	*No*	*80(100)*	*65(97.0)*	*149(99.3)*	*0.165*
	Yes	*0(0)*	*2(3.0)*	*1(0.7)*	
IUGR	*No*	*78(97.5)*	*66(98.5)*	*147(98.0)*	*0.910*
	Yes	*2(2.5)*	*1(1.5)*	*3(2.0)*	
Postpartum Bleeding	*No*	*80(100)*	*66(98.5)*	*149(99.3)*	*0.545*
	Yes	*0(0)*	*1(1.5)*	*1(0.7)*	
Placenta previa	*No*	*80(100)*	*66(98.5)*	*149(99.3)*	*0.545*
	Yes	*0(0)*	*1(1.5)*	*1(0.7)*	
Spot urinalysis	*0*	*63(78.8)*	*57(85.1)*	*136(90.7)*	*0.306*
	1	*14(17.5)*	*9(13.4)*	*11(7.3)*	
	2	*2(2.5)*	*1(1.5)*	*2(1.3)*	
	3	*1(1.3)*	*0(0)*	*1(0.7)*	

GDM : Gestational diabettes mellitus , IUGR:Intrauterine growth restriction Pearson's and Fisher's Exact ChiSquare test was used and p<0.05 was considered significant.

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Contributions

Mehmet Yılmaz: Data collection, writing.
Şerif Aksin: Writing material method, data analysis and statistics.
Deniz Balsak: Hypothesis and design.
Fazıl Avcı: Writing the introduction and discussion.
Yasmin Aboalhasan: Data collection, writing ethics committee document.

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