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Impact of maternal Age on Perinatal Results

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ABSTRACT

Aim: The principal objective of this study was to evaluate the maternal, fetal, and neonatal outcomes of pregnancies managed by a multidisciplinary team of perinatologists, obstetricians, and pediatricians in three distinct healthcare centers.

Materials and Methods: In order to improve perinatal and neonatal care and minimize maternal and infant mortality, we conducted a study by analyzing electronic records of pregnant women who delivered at our healthcare centers between 2016 and 2021. The study consisted of 403 adolescents aged 15-19, 491 women of advanced age over 40 years, and 200 pregnant women aged 20-39 years. The aim was to identify any patterns or differences in outcomes between the age groups and determine the role of the healthcare team in improving these outcomes.

Results: Our study analyzed the data and found that the frequency of cesarean section was significantly higher in the group of pregnant women with advanced age compared to the other age groups (p<0.05). Additionally, the rates of gestational diabetes and pregnancies lasting more than 34 weeks (approximately 8 months) were found to be statistically different in comparison to the other age groups (p<0.05). These findings suggest that the age of the mother is a critical factor that influences pregnancy outcomes.

Conclusion: Our study has revealed that pregnancies in adolescent and advanced age groups have resulted in better perinatal and neonatal outcomes. We suggest that improving the conditions for healthcare service delivery and raising awareness among mothers and healthcare workers could contribute to further enhancing perinatal outcomes.

Keywords: Pregnancy in Adolescence, Maternal Age, Infant Health, Perinatal Care, Pregnancy Complications.

ÖZET

Amaç: Bu çalışmada, perinatolog, kadın doğum uzmanı ve pediatrist meslektaşlarımızın çalıştığı üç ayrı merkezde son beş yılda takip edilen gebelerin yaş gruplarına göre maternal, fetal ve neonatal sonuçları değerlendirdik.

Gereç ve Yöntemler: Bu çalışmada, 2016-2021 yılları arasında üç farklı merkezde takip edilen gebelerin farklı yaş gruplarına (15-19 yaş arası adolesanlar, 40 yaş ve üzeri ileri yaş gebeler ve 20-39 yaş arası kontroller) göre maternal, fetal ve neonatal sonuçları değerlendirildi. Bu hastaların kayıtlarından elde edilen veriler analiz edildi.

Bulgular: Analiz sonucunda, ileri yaş olarak tanımlanan kırk yaş ve üstü kadınlarda pariyete, gestasyonel hipertansiyon, sezaryen ve fetal distres sıklığı kontrol grubuyla karşılaştırıldığında anlamlı derecede daha yüksek bulundu (p <0.05). Bununla birlikte, adelösan olarak tanımlanan (15-19 yaş aralığındaki) hastalarda pariyete, gestasyonel diyabet, sezaryen ve >34 gebelik haftası doğum sıklığı kontrol grubuyla karşılaştırıldığında anlamlı derecede daha düşük değerler elde edildi (p <0.05).

Sonuç: Analiz ettiğimiz verilerden elde ettiğimiz sonuçlara göre, tüm gebelik gruplarındaki perinatal ve neonatal sonuçların önceki dönemlere kıyasla iyileştiği gözlenmiştir. Bu durum, sadece sağlık hizmetlerinin kalitesi ve sunumundaki gelişmelerden kaynaklanmamaktadır. Aynı zamanda, annelerin ve sağlık çalışanlarının gebelik ile ilgili farkındalıklarının artırılması da daha iyi perinatal sonuçların elde edilmesinde önemli bir rol oynamaktadır. Bu nedenle, gebelikle ilgili bilgilendirme ve farkındalık programlarının geliştirilmesi, perinatal sonuçları daha da geliştirmek için önemli bir adım olabilir.

Anahtar Kelimeler: anne yaşı, ergenlik dönemi gebelikleri, gebelik komplikasyonları, yenidoğan sağlığı, perinatal bakım.

n recent times, there has been an increase in gestational age which is attributed to changes in living conditions. A similar trend is observed in adolescent pregnancies. However, when the gestational age is extremely high, there is an increased risk of morbidity and mortality for both the mother and child. Although reducing the number of extreme cases is a logical solution, improving perinatal care and raising awareness among health personnel are also important.[1] According to the World Health Organization, adolescence is defined as ages between 10 and 19. The WHO report indicates that adolescent pregnancy remains a leading cause of high-risk pregnancy, with around 12 million girls aged 15-19 becoming pregnant each year, and at least 777,000 girls under the age of 15 becoming pregnant. [2]While the rate of adolescent pregnancy has decreased in low- and middle-income countries over the past few decades, it still poses a significant risk to maternal and neonatal health. Adolescent pregnancy is still a significant cause of high-risk pregnancy, but its prevalence has been decreasing in low- and middle-income nations for the past few decades. In developed countries, women's career aspirations, financial stability goals, and advancements in assisted reproductive technology are leading to a rise in the average age of first-time mothers, which is now in the late 30s and early 40s.[3] Although most researchers consider advanced maternal age to be 35 years and older, the medical community frequently regards 40 years as the threshold. Over the previous 30 years, the average age of mothers in the United States has risen by 2.6 years, from 21 to 25.[4] The trend of mothers giving birth at older ages has been observed in other Western countries, with studies showing that mothers in Sweden, Switzerland, Denmark, and the United Kingdom are approaching an average age of 30 for their first child. According to the Demographic and Health Survey of Turkey, a significant proportion of women under the age of 18 and over the age of 35 are giving birth to their first child. In the Afyon province of our country, there is a lack of research regarding the pregnancy status of adolescent and elderly women. Therefore, this study aims to examine the maternal, fetal, and neonatal outcomes of pregnancies in adolescent and elderly women at a tertiary reference center in the past decade. The results of this study are expected to serve as a predictive model for maternal and neonatal outcomes in urban areas with similar demographic characteristics.

Materıals and Methods

In this retrospective study, maternal and neonatal data were collected from electronic hospital records(inpatient and outpatients) of 403 adolescent (15-19 years), 491 elderly (over 40 years) women, and 200 pregnant controls. This study was conducted between the years 2016 and 2021 at three distinct medical centers, one of which was a university hospital in central Anatolia. Maternal, fetal, and neonatal outcomes of the monitored pregnant women were assessed according to different age groups. Among these deliveries, pregnancy rates were approximately 3.8% and 3.9% for adolescent and older women, respectively. In the study, the control group was randomly selected from women who had given birth between the ages of 20 and 39. All adolescent and older pregnant women were included in the study, and no exclusion criteria other than maternal age applied to the control group.

Our study collected maternal and neonatal data, including pregnancy characteristics, fetal presentation, and perinatal information, such as Apgar scores and whether it was a multiple pregnancy. The perinatal results of newborns were obtained from pediatricians within the hospital system. The study was conducted in accordance with the principles of the Declaration of Helsinki and approved by the local ethics committee under registration number 2020-05/16.

For statistical analysis, we used the latest version of SPSS. The independent t-test was applied to determine the significance of differences between pairs, while the chi-square test or Fisher's exact test was used to compare categorical variables. The distribution of numerical variables was evaluated using the Kolmogorov-Smirnov test. We used odds ratios and corresponding 95% confidence intervals to determine the relationship between categorical variables with significance set at 5%. We also conducted binary logistic regression analysis to evaluate the effect of variables on the groups. Differences were considered statistically significant at $p < 0.05$.

Results

The study investigated perinatal and neonatal features in 403 adolescents, 491 older women, and 200 control subjects. Table 1 displayed the obstetric characteristics of all the groups, revealing that the advanced aged group had significantly higher rates of one or more deliveries and cesarean deliveries than the other groups. Conversely, the adolescent group had lower rates of births and cesarean sections, which was statistically significant when compared to the control group ($p<0.05$). The higher number of cesarean sections in multiparous women was primarily due to previous cesarean sections, which was observed in 30% of older women, 10% of adolescents, and 27% of the control group. There was no significant difference in the incidence of multiple pregnancies and vertex presentation ($p>0.05$). However, there was no statistically

significant difference observed in the incidence of still-births (p>0.05). The study found no association between maternal age and stillbirths.

groups (p>0.05). The incidence of premature rupture of membranes was significantly lower in the elderly women group compared to the adolescent group (p<0.05).

Table 1: Features of Pregnancies			
	Cont. (n=200)	**Adolescents (n=403)**	**Age >40 (n=491)**
Age (y)	26.8	18.1	41.6
Parity			
0	79 (36%)	356(87.5%)	75 (10.5%)
1 or more	121 (64%)[c]	47 (12.5%)[a]	416 (89.5%)[b]
Mult. pregnancy			
No	191 (96%)	396 (96.9%)	483 (98.1%)
Yes	9 (4%)[a]	7 (3.1%)[a]	8 (1.9%)[a]
Stillbirth (<20 gestational week)			
No	196 (98.6%)	395 (96.8%)	465 (94.7%)
Yes	4 (1.4%)[a]	8 (3.2%)[a]	24 (5.3%)[a]
Delivery Method			
Vaginal del.	57 (38.6%)	209 (50.1%)	124 (26.1%)
C sec.	143 (61.4%)[c]	205 (49.9%)[a]	367 (73.9%)[b]
Fetal Pre.			
Vertex	184 (89%)	364 (88.1%)	448 (92.7%)
Unspecified	16 (11%)[a]	39 (11.9%)[a]	43 (7.3%)[a]
Data are expressed as number (%) and analyzed with the chi-square test. Equal superscript letters denote a subgroup whose column rates are not significantly different from each other at the adjusted p-value with Bonferroni correction (p>0.05).			

Table 2: Obstetrical complications			
	Controls (n=200)	Adolescents (n=403)	Age >40 (n=491)
Gestational diabetes			
No	183 (95.3%)	401 (98.8%)	449 (90%)
Yes	17(4.7%)[b]	2 (1.2%)[a]	42 (10%)[b]
Gestational hypertension			
No	195 (96.7%)	363 (90%)	448 (89%)
Yes	5 (3.3%)[a]	40 (10%)	43 (11%)[b]
Preeclampsia			
No	192 (94.7%)	390 (94.2%)	446 (89.5%)
Yes	8 (5.3%)	13 (5.8%)[a]	45 (10.5%)[b]
Placental abruption			
No	198 (98.7%)	402 (99.8%)	480 (98.1%)
Yes	2 (1.3%)[a]	1 (0.2%)[a]	11 (1.9%)[a]
Placenta previa			
No	196 (97.3%)	398 (98.8%)	479(97.4%)
Yes	4 (2.7%)[a]	5 (1.2%)[a]	12 (2.6%)[a]
Premature membrane rupture			
No	192 (94.7%)	379 (91.5%)	473 (95.8%)
Yes	8 (5.3%)	24 (8.5%)[a]	18 (4.2%)[b]
Acute fetal distress			
No	196 (97.3%)	379 (91.5%)	443 (88.8%)
Yes	4 (2.7%)[a]	24 (8.5%)[a ,b]	48 (11.2%)[b]
Data are expressed as number (%) and analyzed with the chi-square test. Equal superscript letters denote a subgroup whose column rates are not significantly different from each other at the adjusted p-value with Bonferroni correction (p>0.05).			

According to Table 2, the incidence of gestational diabetes was significantly lower in the adolescent group than in the other groups (p<0.05). Conversely, the advanced aged group had a higher incidence of gestational diabetes, although this difference was not statistically significant (p>0.05). Gestational hypertension and acute fetal distress were more common in the advanced aged group, although this difference was not statistically significant (p>0.05). The rates of gestational hypertension and acute fetal distress were similar between the adolescent and older women groups (p>0.05). Preeclampsia was significantly more common in the older women group compared to the adolescent and control groups (p<0.05). There was no significant difference in the incidence of placental abruption and placenta previa between the study

Table 3 presents the results of neonates in the adolescent, older women, and control groups. The birth weight of infants in the adolescent group was significantly lower compared to the other groups (p<0.05). There was no statistically significant difference between the birth weight of infants in the control and older women groups (p>0.05). The rate of early preterm labor, defined as delivery before 34 weeks of gestation, was significantly higher in the adolescent group than in the other groups (p<0.05). The rate of premature preterm birth was not significant in the elderly women group (p>0.05). Although the rate of preterm delivery was higher in the older women group, there was no significant difference between the groups (p>0.05).

Table 3: Neonate results			
	Controls (n=200)	Adolescents (n=403)	Age >40 (n=491)
Fetal anomaly			
No	196 (98%)	397 (98.3%)	471 (97.9%)
Yes	4 (2%)[a]	6 (1.7%)[a]	19 (2.1%)[a]
Gender			
Female	91 (42.5%)[a]	198 (47%)[a]	243 (49.4%)[a]
Male	108 (57.5%)	205 (53%)	248 (50.6%)
Weight			
<1500gr	9 (6%)	41 (9.9%)	22 (5.1%)
>4000gr	10 (6.6%)	15 (3.6%)	47 (10.9%)
Weight, g	3020±786.1	2745±808.1	3101±826.9
Gestational age			
<34 weeks	20 (13.3%)[b]	116 (28%)[a]	70 (16.4%)[b]
>34 weeks	130 (86.7%)	298 (72%)	358 (83.6%)
Weeks, w	38±3.1	36.36±3.9	36.73±3.3
Apgar 1 min.	8.5±1.5	7.75±2.1	8.91±2
Apgar 5 min.	10±1.5	7.73±4.5	8.7±2.2

Data are expressed as number (%) and analyzed with the chi-square test. Equal superscript letters denote a subgroup whose column rates are not significantly different from each other at the adjusted p-value with Bonferroni correction (p>0.05).

Table 4: Multivariate analysis of clinical variables in the adolescents and women of advanced age				
	Adolescents Odds Ratio	Adolescents Significance	Women of Advanced Age Odds Ratio	Women of Advanced Age Significance
Parity (nulliparity)	2.4	< 0.001	0.3	< 0.001
Cesarean section (yes/no)	0.8	0.01	1.2	0.004
Gestational diabetes	0.2	0.004	N/A	N/A
Gestational hypertension	2.5	0.02	2.8	0.009
Acute fetal distress	3.1	0.02	4.1	0.002
Gestational age(≤34 weeks)	1.9	0.002	N/A	N/A
Stillbirth (yes/no)	N/A	N/A	3.9	0.04

Factors are listed in the first column, followed by the odds ratio and significance for adolescents, and then for women of advanced age. If a factor is not applicable to one group, it is marked as "N/A".

Table 5: Binary logistic regression coefficients of age groups by independent variables.								
Independent variables	B	SE	Wald	df	Sig.	Exp(B)	95% C.I.for EXP(B) Lower	Upper
Cesarean section	0.576	0.201	8.249	1	0.004	1.779	1.201	2.635
	0.461	0.168	7.571	1	0.006	1.586	-	-
Gestational hypertension	1.109	0.444	6.242	1	0.012	3.032	1.270	7.237
	−3.178	0.417	58.176	1	0.000	0.042	-	-
Gestational age (<34 weeks)	−0.222	0.274	0.655	1	0.418	0.801	0.468	1.371
	1.872	0.240	60.730	1	0.000	6.500	-	-
MulGple pregnancy	−0.783	0.549	2.036	1	0.154	0.457	0.156	1.340
	−3.178	0.417	58.176	1	0.000	0.042	-	-
Stillbirth	1.389	0.745	3.477	1	0.062	4.010	0.932	17.261
	−4.304	0.712	36.556	1	0.000	0.014	-	-
Female gender	−0.277	0.193	2.073	1	0.150	0.758	0.519	1.105
	0.311	0.166	3.522	1	0.061	1.365	-	-

Discussion

Furthermore, gestational diabetes was found to be significantly lower in adolescents compared to older women, while preeclampsia was significantly higher in older women. Premature rupture of membranes was significantly lower in older women compared to adolescents. Adolescents had significantly lower birth weight and higher rates of early preterm labor compared to the other groups.[5] These findings indicate that maternal age plays a significant role in perinatal outcomes, with advanced maternal age being associated with a higher risk of adverse outcomes.[6] It is important to consider these findings in clinical practice when providing care for pregnant women, particularly those in advanced maternal age. During the planning of our study, we conducted a literature search and found that similar outcomes have been observed in groups with nulliparity, no previous cesarean section, low birth weight, and preterm birth.

[5]The trend of giving birth at an older age due to the work environment has led to an increased incidence of pregnancy complications, including stillbirth, cesarean section, preterm delivery, and gestational hypertension. [7] We also found a study that drew attention to the fact that maternal age was directly proportional to complications such as preterm birth, neonatal loss, and congenital anomalies.[8] These findings highlight the importance of studying the effects of maternal age on perinatal outcomes. [9]A previous study had categorized adolescent and older women pregnancies as high-risk, which differs from our study where we formed three groups, including a control group.[10] In Turkey, studies have shown that advanced-age pregnancies have higher rates of preterm births and stillbirths, but with no statistical significance. [11] We attribute the significant results in our study to our definition of advanced-age pregnancies as 40 years and older.[12] It is reasonable to assume that as gestational age increases, abnormalities in the uterus and placenta that affect the reproductive system have a greater impact.

Conclusion

As part of our country's healthcare policy, reducing maternal and infant mortality rates is a primary goal. Achieving this goal requires the concerted efforts of obstetricians and pediatricians, as well as improvements in perinatal care. Our study provides valuable information that can assist both patients and healthcare professionals in identifying the various risk factors associated with pregnancy, particularly those related to maternal age, and developing effective strategies to prevent avoidable complications. The results of our study can be utilized to guide interventions and improve perinatal care, such as better monitoring and management of high-risk pregnancies, providing appropriate counseling and education to mothers about the risks associated with advanced maternal age, and enhancing access to prenatal care services. With this knowledge, we hope to contribute to the overall effort of improving the health and well-being of both mothers and infants in our community.

Authorship Contribution

Idea/Hypothesis: MS, KS, MB, EG, MO Design: MS, KS, MB, EG, MO Data collection/Data processing: MS, KS, MB, EG Data Analysis: MS, KS, MB, EG, MO Preparation of the article: MS, KS, MB, EG, MO

Ethics Committee Approval

This research was approved by the Ethics Committee of Afyon , in accordance with the Research and Publication Ethics, with the decision of the board numbered 2030-KAEK-2 /141.

Informed Consent

Consents were obtained from the patients.

Peer Review

Evaluated by independent reviewers working in two different institutions appointed by the field editor.

Conflict of Interest

No conflict of interest was declared by the authors.

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