PRACE ORYGINALNE

położnictwo

Comparison of the risk factors for adverse perinatal outcomes in adolescent age pregnancies and advanced age pregnancies

Porównanie czynników ryzyka niekorzystnych wyników położniczych u młodocianych ciężarnych i ciężarnych w zaawansowanym wieku

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Abstract

Objectives: To evaluate clinical outcomes of pregnancies in adolescent, advanced and reproductive women maternal age.

Materials and methods: A total of 187 pregnant women were included into the study, 51 (27.27 %) were adolescent pregnancies, mean age 17.7±3.3 years (range, 14-18 years), 40 (21.29 %) advanced maternal age pregnancies, mean age 41.4±2.6 years (range, 39-50 years) and 96 (51.33 %), healthy controls, mean age 28.8±4.3 years (range, 19-37 years). The majority of the adolescent pregnant women were nulliparous, while all of the advanced age pregnant women were multiparous (mean gravidity 4.5±2.4; range, 6-12). Mean gravidity of the control group was 3.6± 1.7 (range, 1-12).

Results: There was statistically significant difference among the groups regarding demographic characteristics. According to the Bonferroni method, there was statistically significant difference among the three groups. Adverse fetal features were statistically different among the groups and the odd ratios were higher in the advanced maternal age group. The odds ratios (95% CI) for lower Apgar scores (Apgar score 1 and 5) and low birth weight in adolescent maternal age and advanced maternal age group were as follows: 1.88 (1.27 - 2.78) vs. 2.46 (1.55 - 3.85), 2.17 (1.18 - 4.00) vs. 4.79 (3.02-6.69) and 1.39 (1.14 - 1.68) vs. 3.06 (1.59 - 5.88), respectively. Gestational age at birth showed minimal risk for adolescent age group but no risk was noted in the advanced age group.

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Conclusions: *The present study showed that pregnancies in adolescent maternal age, advanced maternal age and reproductive maternal age are different from each other in terms of clinical characteristics. According to this study advanced maternal age pregnancies are more risky and more likely to have adverse fetal outcome.*

Keywords: **adolescent** / **advanced maternal age** / **adverse perinatal outcome** /

Streszczenie

Cel: *Ocena wyników położniczych u ciężarnych młodocianych oraz w wieku zaawansowanym i reprodukcyjnym.*
Materiał i metody: *Do badania włączono 187 ciężarnych, 51 (27,27%) młodocianych, średnia wieku 17,7±3,3 lat (zakres 14-18 lat), 40 (21,29%) w zaawansowanym wieku, średnia wieku 41,4±2,6 lat (zakres 39-50 lat) i 96 (51,33%) zdrowych ciężarnych stanowiących grupę kontrolną, średnia wieku 28,8±4,3 lat (zakres 19-37 lat). Większość młodocianych ciężarnych była nieródkami, podczas gdy wszystkie starsze ciężarne były wieloródkami (średnia ilość ciąż 4,5±2,4; zakres 6-12). Średnia rodność w grupie kontrolnej wynosiła 3,6±1,7 (zakres 1-12).*
Wyniki: *Znaleziono istotną statystycznie różnicę pomiędzy grupami dotyczącą cech demograficznych. Według metody Bonferroni różnica pomiędzy trzema badanymi grupami była istotna statystycznie. Niekorzystne wyniki położnicze oraz iloraz szans były wyższe u kobiet ciężarnych w zaawansowanym wieku. Ilorazy szans (95%CI) dla niższego wyniku w skali Agar (Agar 1 i 5) oraz niższej masy urodzeniowej w grupie młodocianych i grupie starszych ciężarnych wynosiły odpowiednio: 1,88 (1,27-2,78) vs. 2,46(1,55-3,85), 2,17(1,18-4,00) vs. 4,79 (3,02-6,69) i 1,39 ((1,14-1,68) vs. 3,06 (1,59-5,88). Wiek ciążowy w momencie porodu okazał się minimalnie istotnym czynnikiem ryzyka w grupie młodocianych a w grupie starszych ciężarnych nie obserwowano żadnego ryzyka.*
Wnioski: *Badanie wykazało, że ciąże u młodocianych, u kobiet w starszym wieku oraz w wieku rozrodczym różnią się między sobą pod względem klinicznym. Według naszego badania ciąża u kobiety w starszym wieku jest obarczona większym ryzykiem niekorzystnych wyników położniczych.*

Słowa kluczowe: **młodociana** / **wiek ciężarnej** / **niekorzystny wynik położniczy** /

Introduction

Due to changes in social and cultural habits, adolescent and advanced age pregnancies rates are increasing [1]. Both of these age groups have been considered to have high risk for pregnancy. Adolescent pregnancies were associated with an increased risk of adverse pregnancy outcomes such as preterm delivery, intrauterine growth restriction (IUGR), low birth weight and fetal morbidity and mortality [2]. However, Al-Ramahi reported that adolescent pregnancies had favorable obstetric outcome apart from the higher incidence of preterm labor [3]. Advanced age pregnancies also have become increasingly common as a result of infertility treatments and changing social and demographic trends, especially in the last two decades [4, 5]. In a recent retrospective study showed a significant linear association between advanced maternal age and adverse perinatal outcomes such as IUGR, low birth weight, congenital malformations, and perinatal mortality [6]. In contrast, Kale et al. found no association between advanced maternal age and adverse perinatal outcomes in their work [7].

In this study the authors aimed to determine whether adolescent pregnancies or advanced maternal age pregnancies are more likely to have adverse perinatal outcomes and to compare them with normal pregnancies.

Materials and Methods

Data were obtained at Ergani/Diyarbakir State Hospital, which is situated in a rural part of Turkey, from January 2010 to June 2010. Most of the patients living in this region have low socio-economical status. The incidence of adolescent maternal age as well as advanced maternal age pregnancies is higher than in other parts of Turkey.

A total of 187 patients were included into the study: 51 (27.27%) adolescent women, 40 (21.29 %) advanced age women and 96 reproductive age women who delivered at our obstetric clinic. All patients were Turkish women with no history of tobacco, alcohol and drug use. The factors recorded for each woman included: age, gravidity, initial diagnosis, gestational weeks, delivery mode, fetal birth weight, Apgar scores, perinatal morbidity and mortality. Maternal age was defined for adolescent pregnancies as age between 15-18 years, for advanced maternal age as age ≥ 38 years and for the control group between 19-38 years. Gestational age (weeks) was assessed by ultrasound examination (Schimadzu SDU-1100 color Doppler ultrasound device) or according to the last menstrual period, or both. Prematurity was defined as <37 weeks of gestation; lower birth weight was defined as birth weight <2500 g and lower Apgar scores for 1 minute <4 and for 5 minute <7.

Statistical Analyses

Mean and standard deviation (SD) were calculated for continuous variables. The normality of the variables was analyzed by Kolmogorov–Smirnov test. The mean values of the three groups were analyzed by using one way ANOVA followed Post-Hoc test Bonferroni for multiple comparison. Binary logistic regression methods were used to estimate the odds ratios for dependent variables for both groups respectively (adolescent maternal – control group, old maternal – control group). Variables were included in the backward stepwise procedure. Two-sided p values were considered statistically significant at p<.05. Statistical analyses were carried out by using the statistical packages for SPSS 15.0 for Windows (SPSS Inc., Chicago, IL, USA).

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Table I. The demographic and clinical characteristics of the cases.

	Adolescent maternal age group (n=51)	Advanced maternal age group (n=40)	Control group (n=96)
Gravidity ≤4 (%)	51(100)	10 (25)	70 (72.9)
Age $\overline{x} \pm SD$	17.7±3.3	41.4±2.6	28.8±4.3
Gestational weeks $\overline{x} \pm SD$	36.6±1.8	36.9±1.7	38.1±1.5
Fetal birth weight(g)	2953.5±552.9	3044.5±556.0	3536.9±566.4

Delivery mode
    Spontaneous vaginal delivery (%)
    Cesarean section (%)
	46(90.1)
	5(9.9)
		31(77.5)
		9(22.5)
			50 (52.1)
			46 (47.9)

Apgar scores
    1 min $\overline{x} \pm SD$
    5 min $\overline{x} \pm SD$
	4.9±1.3
	7.4±1.1
		5.0±1.4
		7.5±1.3
			6.5±1.5
			8.4±0.9

Table II. Results of compared the means of three groups by using ANOVA followed Bonferroni test.

Variables	Adolescent maternal age group[a] (n=51) $\overline{x} \pm SD$	Advanced maternal age group[b] (n=40) $\overline{x} \pm SD$	Control group[c] (n=96) $\overline{x} \pm SD$	F[d]	P[d]	Bonferroni Test (p)[e]
Age (years)	17.7±3.3	41.4±2.6	28.8±4.3	449.96	<.001	a-b p<.001[g] a-c p<.001 b-c p<.001
Gravidity	1.0±0.2	4.5±2.4	3.6±1.7	66.34[f]	<.001[f]	
Gestational weeks	36.6±1.8	36.9±1.7	38.1±1.5	16.91	<.001	a-b p<.001[g] a-c p<.001 b-c p<.001
Fetal birth weight (g)	2953.5±552.9	3044.5±556.0	3536.9±566.4	22.24	<.001	a-b p<.001[g] a-c p<.001 b-c p<.001
Apgar score1	4.9±1.3	5.0±1.4	6.5±1.5	27.39	<.001	a-b p<.001[g] a-c p<.001 b-c p<.001
Apgar score5	7.4±1.1	7.5±1.3	8.4±0.9	16.85	<.001	a-b p<.001[g] a-c p<.001 b-c p<.001

[a] Adolescent maternal age group, [b] advanced maternal age group, [c] control group, [d] F and p values were calculated from ANOVA test,
[e] Bonferroni post-hoc test was used after ANOVA test, [f] Chi-square value was calculated by using Kruskal Wallis test,
[g] p value was calculated by using post-hoc test for non-parametric methods that is corrected Mann- Whiyney test using Bonferroni
  correction (for a-b, a-c and b-c p< .0016 accepted to be statistically different according to Bonferroni correction)

Results

During the study period a total of 802 pregnancies were delivered, 51 (27.27 %) adolescent pregnancies with mean age of 17.7±3.3 years (range, 14-18 years), 40 (21.29 %) advanced maternal age pregnancies with mean age of 41.4±2.6 years (range, 39-50 years) and 96 (51.33 %) from the control group with mean age of 28.8±4.3 years (range, 19-37 years). Table 1 shows the demographic and clinical characteristics of the patients. The mean age of adolescent pregnancies was 17.7±3.3 years (range, 15-17 years) and of advanced maternal age pregnancies was 41.4±2.6 years (range, 42-50 years) and 28.8±4.3 years (range,

15-17 years) for the control group. The majority of the adolescent pregnancies were nulliparous, while all of the advanced age pregnancies were multiparous (mean gravidity 4.5±2.5; range, 6-12), mean gravidity of the control group was 3.6±1.7 (range, 1-12). There was a statistically significant difference among the three groups according to the Bonferroni method (Table II).

Mean gestational weeks of the fetuses in adolescent pregnancies, advanced maternal ages and the control group were 36.6±1.8 weeks (range, 33 to 40 weeks), 36.9±1.7 weeks (range, 34 to 40 weeks) and 38.1±1.5 weeks (range, 37 to 40 weeks), respectively.

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Table III. Risk factors for adverse fetal outcomes and comparison with the control groups.

Variables	Adolescent maternal age group *vs* control maternal age group			Advanced maternal age group *vs* control maternal age group		
	Walt	OR (%95 CI)	p	Walt	OR (%95 CI)	p
Apgar score1 ≤3	10.15	1.88 (1.27 – 2.78)	<.001	14.89	2.46 (1.55 – 3.85)	<.001
Apgar score5 ≤5	6.24	2.17 (1.18 – 4.00)	<.001	44.84	4.79 (3.02 – 6.69)	<.001
Fetal birth weight (g)	11.36	1.39 (1.14 – 1.68)	<.001	11.31	3.06 (1.59 – 5.88)	<.001
Gestational weeks	15.14	1.53 (1.23 – 1.90)	<.001	-	-	-

Gestational age of the fetuses <37 weeks was 44% in the adolescent maternal age group and 37.5% in the advanced maternal age group. These findings were statistically significant according to the Bonferroni method. The delivery mode was spontaneous vaginal delivery (SVD) in 46 (90.1%) patients and cesarean section (CS) in 9 (9.9%) patients in adolescents and SVD in 31 (77.5%) and CS 9 (22.5%) in advanced maternal age group. Mean fetal birth weight was 2953.5±552.9g and 3044.5±556.0g in adolescent and advanced maternal age group, respectively. Mean Apgar scores for 1 minute were 4.9±1.3 and 5.0±1.4 and for 5 minute 7.4±1.1 and 7.5±1.3 in adolescent and advanced maternal age group, respectively. All of these parameters were statistically significantly different between the groups. 8 newborns in the adolescent maternal age group and 12 in the advanced maternal age group were referred to the neonatal care unit with low birth weight indication. Other newborns were discharged from the hospital without any complications.

Table III shows the odds ratios and CI 95% of risk variables for adverse perinatal outcomes found with logistic regression method in adolescent maternal age group and advanced maternal age group. According to the model, the odds ratios (95% CI) for lower Apgar scores (Apgar score 1 and 5) and low birth weight in adolescent maternal age and advanced maternal age group were as follows: 1.88 (1.27 – 2.78) vs. 2.46 (1.55 – 3.85), 2.17 (1.18 – 4.00) vs. 4.79 (3.02-6.69) and 1.39 (1.14 – 1.68) vs. 3.06 (1.59 – 5.88), respectively. Gestational age at birth showed minimal risk for the adolescent age group and no risk in the advanced age group.

Discussion

This retrospective study was conducted to compare the perinatal features of pregnancies in adolescent maternal age and advanced maternal age women. The study was carried out in the Southeastern Region, i.e. rural Turkey. Most of the residents living in this region are of lower socioeconomic and educational status. Previous studies reported adolescent maternal age ratio as 3.8 % [1] and advanced maternal age ratio as 1.5 % in the Hong Kong population [5] and 1.19 % in Canada [8].

In our study the rate of adolescent age pregnancies was found to be 6.3 % and 4.9 % of advanced maternal age. This higher ratio of our study depends on the lower socioeconomical status of the population and rurality of our region. To the best of our knowledge this is the first study to evaluate the adolescent maternal age group,

advanced maternal age group and reproductive maternal age group and to compare their characteristics. We found that both the study groups were at adverse fetal outcomes risks (lower Apgar scores, lower birth weight and preterm delivery). Previous studies have focused on the adverse obstetrical outcomes in adolescent maternal age. Lao et al, reported that teenage pregnancies have higher incidence of preterm labor, lower birth weight and cesarean rate [1]. Contrarily, Raatikainen et al., found no evidence for increased risk of preterm delivery, fetal growth restriction, low birth weight, or fetal or perinatal death in teenage mothers [9]. Hidalgo et al reported that adolescent maternal age with lower socio-economic status increase the risk for low birth weight, adverse neonatal outcome and cervicovaginal infections but is not associated with adverse obstetrical outcomes [10]. Advanced maternal age pregnancies have also been determined to have high risk for adverse obstetrical outcomes [4, 11, 12]. Ahromi found the incidences of preeclampsia, gestational hypertension, cesarean delivery, abruptio placenta, preterm delivery, and 5-minute Apgar scores <7 to be significantly higher in the advanced maternal age group in their study [4]. Luke et al reported increased abnormal labor, bleeding during labor and higher cesarean section rate in the advanced maternal age group [11]. Similarly, Jolly et al also showed that complications such as gestational diabetes, placenta previa, cesarean section, postpartum hemorrhage, prematurity, low birth weight and stillbirth have higher frequency among women with advanced maternal age [12]. In contrast, Kale et al reported that advanced maternal age with high parity is not always related with adverse maternal outcomes [7].

In conclusion, the findings of the authors of this study that adolescent maternal age and advanced maternal age with lower socio-economic status increases the risks of adverse fetal outcomes are consistent with reports in literature. However, unlike other studies, we also found the odds ratios of these features: lower Apgar scores (Apgar score 1 and 5) and low birth weight in adolescent maternal age and advanced maternal age group. The most risky parameters were lower Apgar score at 5 minute in both groups, followed by lower birth weight and lower Apgar score at 1 minute. Number of gestational weeks was not a risk factor in advanced maternal age group but minimally increased the risk in adolescent age group. Early marriage and adolescent pregnancy, associated with low socio-economic status and low educational level, usually occur in rural areas whereas the causes of advanced maternal age in rural areas are the re-surfacing femininity and

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the desire to have more children. Obviously, management of age-related specific maternal and fetal problems requires knowledgeable and careful obstetricians so the socio-economic status, educational level and cultural features associated with adolescent pregnancy become changeable parameters. The first two parameters, together with emotional and marital situation are related to advanced maternal age.

Unfortunately, the patients who live in the rural area in most cases are not aware of age-specific maternal and fetal risks. Also, all these negative factors make the work of physicians more challenging. In short, solution lies in improving education, health organization, and socio-economic status of inhabitants of rural areas.

Conflict of Interest Statement
We declare we have no conflict of interest.

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