

Original Paper

# A Comparative Study on Adverse Pregnancy Outcomes in Pregnant Women With Different Age

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## ABSTRACT

**Introduction:** Delayed childbearing is increasing. Increased maternal age has been associated with increased risk of pregnancy complications. On the other hand, the adolescent pregnancy has traditionally been considered high-risk, especially in developing countries.

**Objective:** This study aimed to compare the adverse pregnancy outcomes in different age groups of pregnant women.

**Materials and Methods:** The analytical study with cross-sectional design was conducted on 345 pregnant women referred to one of the maternity hospitals in Rasht, Iran in 2018 who were selected by sequential sampling method. They were followed from gestational age >37 weeks until delivery in 3 groups: <19 years, 19-35 years and >35 years. The data collection tool was a two-part researcher-made questionnaire which surveys demographic, fertility, and socioeconomic information and adverse maternal and neonatal outcomes. The collected data were analyzed using descriptive and inferential statistics (Chi-square test, Fisher's exact test, Kruskal-Wallis test, ANOVA, Bonferroni test, Spearman correlation test, and multiple linear regression analysis).

**Results:** The highest prevalence of maternal diabetes mellitus (29.7%) and cesarean section (72.46%) were reported in the age group >35 years. The highest frequency of premature rupture of membranes (18.8%) and abnormal fetal presentation (13.8%) were reported in age groups <19 years and 19-35 years, respectively. Among maternal outcomes, maternal diabetes, abnormal fetal presentation, premature rupture of membranes and delivery by cesarean section were significantly different between three groups ( $P < 0.05$ ). There was a significant difference between maternal age and neonatal outcomes in ages groups <19 years and 19-35 years ( $P < 0.05$ ). Multiple linear regression model showed that the maternal age <19 years was a predictor of adverse neonatal outcomes. The group <19 years reported more adverse outcomes than the age group 19-35 years ( $\beta = 0.282$ , 95% CI: 0.002-0.561,  $P = 0.049$ ).

**Conclusion:** All age groups of pregnant women faced some pregnancy outcomes. Due to Iran's new plan to encourage childbearing, prenatal screening, and receiving more prenatal care, we recommend pregnant women to participate in childbirth preparation training courses.

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## Highlights

- One of the risk factors for pregnancy is maternal age.
- Women, who are at reproductive age (19-35 years), face some complications that need to be addressed.
- By detecting abnormalities before and during pregnancy and providing care during pregnancy, mortality and morbidity rate can be minimized.
- According to the WHO report on pregnancy in adolescents, age alone is not a risk factor; education and social status are associated factors.

## Plain Language Summary

One of the risk factors for pregnancy is maternal age. Women, who are at reproductive age (19-35 years), face some complications that need to be addressed. Age at first pregnancy has increased for many reasons. The pregnancy and childbirth are among the special events in women's life and their families. This is a period associated with physiological and natural changes and, if accompanied by risk factors, can cause maternal death. One of the risk factors for pregnancy is the mother's age. The present study aimed to compare the adverse pregnancy outcomes between different age groups of pregnant women. The result showed that giving birth at age >35 years or <19 years were associated with some pregnancy outcomes. The maternal age <19 years was a predictor of adverse neonatal outcomes and the age group <19 had more adverse outcomes than the age group 19-35 years.

## Introduction

**T**he pregnancy and childbirth are among the special events in women's life and their families [1]. It is a period associated with physiological changes. If accompanied by risk factors, it can cause maternal death [2]. One of the risk factors for pregnancy is the mother's age [3]. The women who are at reproductive age (19-35 years) face some problems that need to be addressed [4]. In modern societies, the number of women with delayed childbearing has greatly increased in recent decades [5]. In other words, the age of first pregnancy has now increased for many reasons. Factors such as long-term education, job preference, birth control by effective contraceptive methods, heavy working conditions, and economic problems have led to delay in pregnancy. Employment leads to high self-esteem, authority, and independence in women and changes in the family; therefore, the lack of maternal time reduces fertility and the desire for having more children [6].

According to the Centers for Disease Control (CDC) and Prevention, the proportion of first birth in women aged 35 years and older is about 8-fold higher and 15% of pregnancies after age of 35 years are now pregnant

[4]. A woman with pregnancy after the age of 35 years can be worried about her reproductive age [7]. Pregnancy, especially for the first time at the age of 35 years, is considered as a high-risk pregnancy when the risk of complications increases, especially in older women with chronic illness or those who are physically weak, but the risk is lower in women with physical problem with no medical reason [4].

Another important age group in any community is adolescence [8]. According to the CDC report in 2015, 22.3% of newborns out of every 1000 are in this age group [9]. One of the reasons of adolescent pregnancy is its cultural and economic consequences such as poverty and illiteracy [10]. According to a report by the World Health Organization (WHO) on pregnancy in adolescents, age alone is not a risk factor; the education and social status are also effective [6]. The contradictory results in several studies have raised doubts about the consequences of pregnancy in adolescents and young adults. In Khalil et al.'s study, maternal age (>35 years) was significantly correlated with adverse pregnancy outcomes such as abortion, Small for Gestational Age (SGA), Large for Gestational Age (LGA), preeclampsia and cesarean section, compared with those with pregnancy at age < 35 years, but not with stillbirth, gestational hypertension, and spontaneous preterm delivery [11].

Another study reported no significant differences in distribution of mode of delivery, antenatal complications, cesarean section indications, perinatal mortality rate, and early neonatal complications between mothers aged <17 years and those aged 20-24 years [12]. In the study by Narukhutrachai et al., women aged <20 years had a higher vaginal delivery rate despite observing a number of outcomes such as postpartum delivery and a 5-min Apgar score <7, and complications such as abnormal sedation, intrauterine growth restriction and postpartum hemorrhage were lower in them than in the age group of 20-34 years [13].

Given that the identification of disorders and complications caused by pregnancy at different ages can improve the treatment, and considering contradictory results in other countries and lack of related study in Iran, it is essential to increase community awareness of the pregnancy outcomes and provide proper care services to pregnant women. In this regard, this study aimed to determine pregnancy outcomes in pregnant women with different age.

## Materials and Methods

This analytical study with a cross-sectional design was conducted on pregnant women referred to one of the maternity hospitals in Rasht, Iran from November 2017 to May 2018. The sample size was determined 345 considering 95% confidence level, 90% test power and distribution of pregnancy-induced hypertension (in adolescents)=0.057 reported by Zahiri et al. [14]. They were selected using sequential sampling method. The number required for each age group was also determined according to Zahiri et al. [14], as 69 in the age group <19 years, 138 in the age group 19-35 years, and 138 in the group >35 years. Pregnant women were followed from gestational age>37 weeks until delivery. Before their information was recorded, verbal informed consent was obtained from them. Inclusion criteria were: willingness to participate in the study, ability to have verbal communication and answer the questions.

In order to collect data, a two-part researcher-made questionnaire was used. The first part is for collecting demographic, fertility, and socioeconomic information through an interview. The second part surveys the adverse maternal and neonatal outcomes in pregnancy by checking maternal outcomes (gestational diabetes mellitus, preeclampsia, eclampsia, hypertension, preterm birth, post-term birth, multiple pregnancy, abnormal fetal presentation, shoulder dystocia, uterine rupture, uterine atony, fast childbirth, prolonged second pregnancy stage, active labor, placenta previa, placental abruption, recur-

rent abortion, late-term abortion, premature rupture of membranes, hydatidiform mole, ectopic pregnancy, anemia, and cesarean section) and neonatal outcomes (stillbirth, intrauterine growth retardation, low birthweight, macrosomia, neonatal resuscitation, 1- and 5-minute Apgar scores, meconium aspiration, congenital anomalies, fetal fracture, fetal death, RH in compatibility) through medical records. The history of pre-pregnancy disease was also surveyed by interviewing the mothers and observing their delivery records. To determine the validity of the instrument, the opinions of 10 faculty members of the Department of Obstetrics and Gynecology and the School of Nursing & Midwifery at Guilan University of Medical Sciences were used. Due to the nature of the instrument, there was no need to determine its reliability.

Questionnaires were completed when the condition of the mothers were stable. The answers to the adverse neonatal outcomes were given as "Yes" or "No". In the end, the data were entered into the SPSS v. 21 software for analysis. Fisher's exact test and chi-square test was to compare demographic, fertility, and socioeconomic variables; Kruskal-Wallis test, ANOVA, and Bonferroni post hoc test to compare adverse maternal and neonatal outcomes; Spearman correlation test to determine the correlation between variables; and multiple linear regression analysis to assess the relationship between maternal age and adverse maternal/neonatal outcomes. The  $P<0.05$  was considered as significance level.

## Results

The majority of mothers had a high school diploma (37.1%), and were housewives (94.5%) with a family income of 200-1250\$ (55.4%). The majority had a history of infertility over 35 years (20.3%). The prevalence of unwanted/unexpected pregnancy was higher in the group <19 years (46.4%). The difference in infertility prevalence ( $P=0.001$ ), participation in prenatal care classes ( $P=0.001$ ) and vaccination ( $P=0.006$ ) in three age groups were statistically significant. Among the adverse maternal outcomes, diabetes ( $P=0.001$ ), abnormal fetal presentation ( $P=0.019$ ), premature rupture of membranes ( $P=0.057$ , Borderline) and cesarean delivery ( $P=0.001$ ) were significantly different between groups (Table 1), such that the prevalence of gestational diabetes was higher in the group >35 years (29.7%) and lower in the group under <19 years (0%). Among the adverse neonatal outcomes, fetal death between three groups and intrauterine growth retardation between the groups <19 years and 19-35 years were significantly different ( $P<0.05$ ). The prevalence of fetal death in the group <19 and >35 years old was 0%; it was reported only in the age

**Table 1.** Comparing the prevalence of adverse maternal outcomes between study groups

| Variables                      | No. (%)   |             |             | Sig.* |
|--------------------------------|-----------|-------------|-------------|-------|
|                                | <19 Years | 19-35 Years | >35 Years   |       |
| Gestational Diabetes           | 0 (0)     | 22 (15.9)   | 41 (29.7)   | 0.001 |
| Preeclampsia                   | 12 (17.4) | 25 (18.1)   | 32 (23.2)   | 0.478 |
| Eclampsia                      | 0 (0)     | 0 (0)       | 1 (0.7)     | 0.471 |
| Hypertension                   | 0 (0)     | 1 (0.7)     | 3 (2.2)     | 0.602 |
| Preterm birth                  | 13 (18.8) | 27 (19.6)   | 18 (13.0)   | 0.308 |
| Post-term birth                | 0 (0)     | 0 (0)       | 1 (7)       | 0.471 |
| Anemia                         | 33 (47.8) | 47 (34.1)   | 50 (36.2)   | 0.141 |
| Placental abruption            | 0 (0.0)   | 0 (.0)      | 2 (1.4)     | 0.170 |
| Placenta previa                | 0 (1.4)   | 1 (0.7)     | 4 (2.9)     | 0.377 |
| Abnormal fetal presentation    | 5 (7.2)   | 19 (13.8)   | 6 (4.3)     | 0.019 |
| Shoulder dystocia              | 0 (0)     | 0 (0)       | 1 (0.7)     | 0.471 |
| Multiple pregnancy             | 3 (4.3)   | 17 (12.3)   | 10 (7.2)    | 0.117 |
| Prolong second stage           | 6 (8.7)   | 7 (5.1)     | 7 (5.1)     | 0.515 |
| Uterine rupture                | 0 (0)     | 0 (0)       | 1 (0.7)     | 0.471 |
| Premature rupture of membranes | 13 (18.8) | 14 (10.0)   | 11 (8.0)    | 0.057 |
| Ectopic pregnancy              | 0 (0)     | 3 (2.2)     | 5 (3.6)     | 0.261 |
| Recurrent abortion             | 0 (.0)    | 0 (0)       | 2 (1.4)     | 0.221 |
| Late-term abortion             | 1 (1.4)   | 5 (3.6)     | 2 (1.4)     | 0.422 |
| Cesarean section               | 28 (40.6) | 96 (70)     | 100 (72.46) | 0.001 |

\* Fisher's exact test

group of 19-35 years (3.6%), which is significant according to Fisher's exact test results (Table 2).

Comparing the prevalence of adverse maternal and neonatal outcomes in the three groups, results showed no statistically significant difference between the number of adverse neonatal outcomes and total adverse pregnancy outcomes, but the difference in the number of adverse maternal outcomes between the three groups was statistically significant ( $P=0.026$ ). Based on Bonferroni test results, the number of adverse maternal outcomes was significantly different between the age groups <19 and 19-35 years ( $P=0.024$ ) and between the age groups <19 and >35 years ( $P=0.009$ ). There was no significant difference in the number of adverse maternal outcomes between the two groups of 19-35 and >35 years.

Regarding the relationship between maternal age and maternal outcomes, multiple linear regression model showed that gestational age ( $P=0.002$ ), participation in prenatal care classes ( $P=0.001$ ), infertility ( $P=0.006$ ), and mothers' age ( $P=0.014$ ) were the predictors of adverse maternal outcomes. Regarding the relationship between maternal age and neonatal outcomes, gestational age ( $P=0.001$ ), infertility ( $P=0.001$ ), participation in prenatal care classes ( $P=0.004$ ) and mothers' age in the age group <19 years ( $P=0.049$ ) were the predictors of neonatal outcomes. Regarding the relationship between maternal age and overall pregnancy outcomes (Table 3), only gestational age ( $P=0.001$ ), infertility ( $P=0.001$ ), place of residence ( $P=0.007$ ) and husband education had a significant relationship with overall pregnancy outcomes ( $P=0.01$ ). With the increase in hus-

**Table 2.** Comparing the prevalence of adverse neonatal outcomes between study groups

| Variables                       |      | No. (%)    |             |             | Sig.* |
|---------------------------------|------|------------|-------------|-------------|-------|
|                                 |      | <19 Years  | 19-35 Years | >35 Years   |       |
| Birth weight <2500 g            | Yes  | 14 (20.3)  | 25 (18.1)   | 27 (19.6)   | 0.919 |
|                                 | No   | 55 (79.7)  | 113 (81.9)  | 111 (80.4)  |       |
| Birth weight >4000 g            | Yes  | 1 (1.4)    | 9 (6.7)     | 9 (6.8)     | 0.239 |
|                                 | No   | 68 (98.6)  | 126 (93.3)  | 124 (93.2)  |       |
| Congenital anomalies            | Yes  | 0 (0.0)    | 2 (1.5)     | 4 (3.0)     | 0.292 |
|                                 | No   | 69 (100.0) | 133 (98.5)  | 129 (97.0)  |       |
| 1- min Apgar score              | 7-10 | 55 (79.7)  | 114 (84.4)  | 114 (85.7)  | 0.173 |
|                                 | 4-6  | 11 (15.9)  | 9 (6.7)     | 12 (9.0)    |       |
|                                 | <4   | 3 (4.3)    | 12 (8.9)    | 7 (5.3)     |       |
| 5- min Apgar score              | 7-10 | 64 (92.8)  | 123 (91.1)  | 125 (94.0)  | 0.669 |
|                                 | 4-6  | 2 (2.9)    | 2 (1.5)     | 3 (2.3)     |       |
|                                 | <4   | 3 (4.3)    | 10 (7.4)    | 5 (3.8)     |       |
| Neonatal resuscitation          | Yes  | 3 (4.3)    | 10 (7.2)    | 6 (4.3)     | 0.513 |
|                                 | No   | 66 (95.7)  | 128 (92.8)  | 132 (95.7)  |       |
| Intrauterine growth retardation | Yes  | 9 (13.0)   | 5 (3.6)     | 7 (5.1)     | 0.23  |
|                                 | No   | 60 (87.0)  | 133 (96.4)  | 131 (94.9)  |       |
| Rh incompatibility              | Yes  | 6 (8.7)    | 10 (7.2)    | 17 (12.3)   | 0.345 |
|                                 | No   | 63 (91.3)  | 128 (92.8)  | 121 (87.7)  |       |
| Stillbirth                      | Yes  | 2 (2.9)    | 5 (3.6)     | 5 (3.6)     | 0.958 |
|                                 | No   | 67 (97.1)  | 133 (96.4)  | 133 (96.4)  |       |
| Fetal death                     | Yes  | 0 (0.0)    | 5 (3.6)     | 0 (0.0)     | 0.022 |
|                                 | No   | 69 (100.0) | 133 (96.4)  | 138 (100.0) |       |

\* Fisher's Exact Test

band's educational level, the number of adverse pregnancy outcomes decreases ( $\beta=-0.266$ ).

## Discussion

This study aimed to determine the pregnancy outcomes in pregnant women with different age groups. The results showed that the highest percentage of maternal and neonatal outcomes were maternal diabetes, having cesarean section, and babies with birthweight <2500 g. Also, the percentage of maternal diabetes,

abnormal fetal presentation, premature rupture of the membranes and the delivery by cesarean section were statistically significant in the studied groups. The prevalence of diabetes was increased with the increase of maternal age, which is consistent with the results of Aliyu et al. [15]. The highest prevalence of premature rupture of membranes was reported in pregnant mothers aged <19 years, which is also consistent with the results of Fadaei et al. [16].

**Table 3.** Relationship between maternal age and pregnancy outcomes

| Models              | Sig.* | Unstandardized Coefficients |        | 95% CI      |             |
|---------------------|-------|-----------------------------|--------|-------------|-------------|
|                     |       | S.E                         | B      | Upper Bound | Lower Bound |
| (Constant)          | 0.001 | 0.850                       | 8.041  | 9.713       | 6.368       |
| Gestational age     | 0.001 | 0.019                       | -0.099 | -0.062      | -0.136      |
| Infertility history | 0.001 | 0.283                       | 1.153  | 1.710       | 0.596       |
| Place of residence  | 0.007 | 0.214                       | -0.577 | -0.157      | -0.998      |
| Husband education   | 0.010 | 0.103                       | -0.266 | -0.063      | -0.469      |

\*Logistic regression (conditional)

The prevalence of cesarean section was higher in adolescent pregnant mothers, similar to other studies [17, 18] which can be due to the greater tendency of adolescent mothers to have vaginal delivery in this study. The highest frequency of anemia was seen in adolescent pregnant mothers. In the study by Pourali et al., there was no significant difference in the frequency of anemia between the two groups of adolescents and adults aged 20-35 years with, where it was higher in the adolescent group [19]. The need for iron supplementation in adolescent mothers significantly increases due to growth and menstruation, and iron deficiency in early adolescence causes anemia during pregnancy. Similar results have been reported in Gautam et al.'s study [20].

Consistent with our study, Figueredo et al. reported that the prevalence of preeclampsia was lower in adolescent pregnant mothers [21]. However, in other study, the prevalence of preeclampsia in teenage pregnant women was higher than in young pregnant women [22]. The possible reasons for this discrepancy are the different study area and the characteristics of subjects. In the study by Rezavand et al, abnormal fetal presentation between adolescent and young mothers was not significantly different [23] which may be why the prevalence of preterm labor and multiple pregnancy were higher in our study. In Aloufi et al.'s study, the prevalence of diabetes mellitus, cesarean section, and macrosomia in pregnant women aged >35 years was higher than that in those aged 20-35 years [24]. In our study, like the study by Lean et al., the prevalence of preeclampsia was also higher in mothers over 35 years of age [25].

Shafieian et al. found that the infants of adolescent mothers had significantly more complications than those of adult mothers, the most important complications of which was the intrauterine growth retardation [26]. In our study, the prevalence of intrauterine

growth restriction was also higher in adolescent pregnant mothers. The fetus death rate in the group aged <19 years was zero indicating the lowest percentage of death rate is adolescent women, while in Pourali et al.'s study, the incidence of intrauterine death was higher in adult mothers and congenital anomalies and fetal death were higher in adolescent mothers [19].

The reason for this discrepancy may be the maternal and prenatal screening and lower underlying diseases in the adolescent mothers in our study. In the present study, the fetus death rate in mothers aged 19-35 years was higher, while in Dias et al.'s [27], the prevalence of fetus death was higher in the age group >35 years. The reason for this discrepancy may be that the fetus death was followed up while they were in the hospital. Consistent with the present study, Ijarotimi et al. suggested that the prevalence of birth weight <2500 g in adults mothers was lower [28].

In our study, the prevalence of congenital anomalies in newborns were higher in mothers >35 years. In Olusanya et al.'s study, the number of anomalies in older mothers was also higher [29], but in Basirat et al.'s study, no congenital anomalies were reported in any age groups [30]. The reason for this discrepancy is probably the higher prevalence of diabetes in mothers over 35 years of age. There was a significant relationship between some of the maternal and neonatal outcomes. Pregnant women in these age groups are at high risk. It is, therefore, suggested to encourage women at high-risk to participate in childbirth preparation training courses during pregnancy.

Midwives have a great role in protecting the health of mothers. Therefore, further studies are recommended on reproductive organs and related factors (economic) using a larger sample size. One of the limitations of this



study was the mothers' psychological state after child-birth, which can affect their answers to the questions.

## Ethical Considerations

### Compliance with ethical guidelines

This paper was approved by the Ethics Committee of Guilan University of Medical Sciences (Code: IR.GUMS.REC.1396.302).

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### Authors' contributions

Design, conceptualization, resources, and review: Soudabe Ebrahimi, Maryam Niknami, Fateme Rafat; Investigation, draft preparation and editing: Soudabe Ebrahimi, Maryam Niknami; Data collection: Soudabe Ebrahimi, Ehsan Kazemnezhad Leili; Data analysis: Soudabe Ebrahimi, Maryam Niknami, Ehsan Kazemnezhad Leili; Funding acquisition: All Authors.

### Conflict of interest

The authors declared no conflict of interest.

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