Iranian Journal of Reproductive Medicine Vol.8. No.2. pp: 80-85, Spring 2010

Delayed childbearing: pregnancy and maternal outcomes

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Received: 7 October 2009; accepted: 29 March 2010

Abstract

Background: Women 35-39 years old have a 2–3 fold higher risk of pregnancy-related death than women in their twenties, and the risk is even more dramatic for women 40 years and older.

Objective: The aim of this study was to investigate the association of maternal age with risk of adverse pregnancy and mother outcomes in our setting, Tehran, Iran.

Materials and Methods: In this retrospective observational hospital-based study, 538 nulliparous women were assessed. The association between maternal age and various pregnancy and neonatal outcomes were reported. Data were extracted from the database of Akbar Abadi hospital in Tehran from 2001-2006 records. Univariate and multiple logistic regression analyses were preformed to investigate the association between maternal age and various relevant outcomes.

Results: Women aged 35 years or older had an increased percentages of gestational hypertension (18.8% vs 9.6%; p=0.02) and diabetes in pregnancy (3.7% vs 1.4%; p=0.08) compared with women younger than 35 years. There were no differences between the two age groups in Apgar score at 1 min, antepartum hemorrhage, preterm labor, PROM, fetal distress, perinatal death, and postpartum hemorrhage.

Conclusion: Advanced maternal age was shown to be independently associated with low birth weight, preterm labor and rate of cesarean delivery.

Key words: *Maternal age, Pregnancy outcomes, Neonatal outcomes.*

Introduction

The women have greater control over their reproductive lives than before and they are increasingly postponing entering motherhood until their late 20s and 30s. The reasons might be social changes in the structure of the family, with more late and second marriages, the necessity for many family women to work, and a revolution in the availability of safe, effective contraception.

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While advances in medical care can help women over age 35 have safer pregnancies than in the past, infertility and pregnancy complications for this age group are higher than for younger women. The trend of delaying pregnancy by women is worldwide and observes in both low- and high-income countries, especially among more educated and financially secure women (1, 2).

Women 35-39 years old have a two– threefold higher risk of pregnancy-related death than women in their twenties, and the risk is even more dramatic for women 40 years and older (3). Some studies have demonstrated an increased incidence of antepartum hemorrhage, pre-eclampsia, caesarean delivery, preterm birth, and diabetes mellitus (4-9).

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However, a few recent studies have indicated that women who have pregnancies at 35 years of age and older have outcomes as good as younger women or even better (10). Also, several studies have found that perinatal outcomes were similar among older and younger women too (11). Although pregnancy in older women is associated with many other risk factors, such as pre-existing diabetes mellitus, hypertension, and other chronic disorders which should be into account (12). To clarify these issues, the aim of this study was to investigate the association of maternal age with risk of adverse pregnancy and mother outcomes in our setting, Tehran, Iran.

Materials and methods

We conducted the study in years 2001-2006 in Akbar-Abadi teaching hospital, the largest maternity hospital in the capital city of Tehran, Iran. This hospital covered >80% of all deliveries in the south and south west of Tehran with a population of around 2.7million. The data collected over this five years period were retrieved from the hospital discharge records. These records contain all information about deliveries in the hospital. The study population consisted of all nulliparous women above 18 years. Five-hundred thirty eight records were included in this study.

We categorized women into the following age groups: 18-34 years and 35 years and older. All records of eligible women aged 35 years and older during the study period were collected (293). Forty eight records of this group excluded due to incomplete data. We randomly selected records of women aged 18-34 years as the same size as older women (293) over five year period of the study. Demographic data were collected for maternal age, education, occupation, and previous infertility problems. Outcome data collected included prenatal and perinatal complications (antepartum hemorrhage, hypertension in pregnancy, diabetes in pregnancy, preterm labor, premature rupture of membrane (PROM), and postpartum hemorrhage), labor events (mode of delivery, and fetus presentation), and neonatal outcome [birth weight, Apgar score at 1 min, congenital anomalies, perinatal death, fetal distress, and neonatal intensive care unit (NICU) admission].

Maternal age was considered as the age at the time of delivery. Maternal education categorized into two levels, as less than high school, or high school graduated and more corresponding to the Iranian school system. Because of low and middle socioeconomic women in the research area we stratified the occupation to two groups: housewife and having job.

Previous infertility history was taken from women's antenatal records. It was defined as 1 year of unprotected intercourse without pregnancy. Hypertension in pregnancy defined as history of essential hypertension or pregnancy-induced hypertension. We did not consider any distinction between chronic and pregnancy induced hypertension. Diabetes mellitus was considered as history of diabetes (based on medical records) or gestational diabetes. We also did not apply any distinction between these two types of diabetes in this study (13). Mode of delivery categorized as 'normal vaginal delivery' or 'caesarian section'. Antepartum hemorrhage was defined as any vaginal bleeding during pregnancy without regarding the causes.

Pregnancy termination before 37 completed weeks of gestation was defined as preterm delivery. Perinatal death consisted of fetal death and early neonatal death in this study. Neonatal death was defined as death of neonate during the first 7 days of life. Birth weight lower than 2500 g was defined as low birth weight (LBW). Birth weight more than 2 standard deviation below the mean birth weight for gestational age considered as small for gestational age (SGA) (14).

The proposal of study was approved by the institutional review board of the School of Medicine, Iran University of Medical Sciences.

Statistical analysis:

Data were analyzed by the SPSS software package version 13.0 (SPSS, Inc. Chicago, IL). Categorical variables were compared using the chi-square test. We used t-test for comparing continuous variables between two groups. Multiple logistic regression analysis was used to determine the independent effect of maternal age on different outcome variables as a method of assessing the effects of confounding variables. Dependent variables of pregnancy and neonatal outcomes included: antepartum hemorrhage, postpartum hemorrhage, preterm labor (less than 37 weeks), low birth weight (less than 2500gr), small for gestational age neonates (birth weight less than or equal to the 10^{th} percentile), type of delivery (normal vaginal delivery or cesarean), Apgar score at 1 min less than 7, NICU admission, malposition, and fetal distress. The models adjusted by education, occupation, diabetes in pregnancy, and hypertension in pregnancy (chronic hypertension, gestational hypertension). The significance level was set at $p < 0.05$.

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Results

Two-hundred forty five records of nulliparus women aged 35 years and older (response rate 84%) and two-hundred ninety three records of women aged 18-34 years were included in this study. Therefore 538 nulliparous women who gave birth during the study period included in the analyses. 54% (n=293) of the women were 18-34 years of age, and 46% (n=245) were 35 years or more. Table 1 shows the maternal characteristics of two groups. The percentage of educated women (39% vs 19.4%; p<0.01) was significantly higher in the women aged 18-34 years compared with older age group. 1.7% of women aged 18-34 years had job compared to 6.7% of older age group with a significant difference (p<0.01). History of infertility was higher in older women compared to younger women significantly (25.5 vs 11.3 %; p<0.01). Women aged 35 years or older had an increased percentages of gestational hypertension (18.8% vs 9.6%; p=0.02) and diabetes in pregnancy (3.7% vs 1.4%; p=0.08) compared with women younger than 35 years. There were also increase in some obstetric complications including cesarean delivery, malposition, low birth weight, small for gestational age, NICU admission, and congenital anomalies in women aged 35 years and older compared to younger women. There were no differences between the two age groups in Apgar score at 1 min, antepartum hemorrhage, preterm labor, PROM, fetal distress, perinatal death, and postpartum hemorrhage.

Independent role of maternal age on labor events and neonatal outcomes are presented in Table II. Multiple logistic regression analyses were performed to determine the role of maternal age on multiple complications. Increased maternal age was independently associated with preterm labor, low birth weight, and cesarean delivery.

Table I. Maternal characteristics, labor events and neonatal outcomes of women, 2001-2006, Akbar-Abadi Hospital, Tehran, Iran (n=538).

Variable	18-34 years	≥ 35 years	OR (95% CI)	p- value
Less than high school	61%	80.6%	2.64 (1.78-3.93)	0.0005
Housewife	98.3%	93.3%	0.24 (0.08-0.68)	0.004
Hypertension in pregnancy	9.6%	18.8%	2.18 (1.32-3.62)	0.002
Diabetes in pregnancy	1.4%	3.7%	2.76 (0.84-9.09)	0.08
History of infertility	11.3%	25.5%	2.70 (1.57-4.65)	0.0005
Antepartum hemorrhage	3.8%	5.7%	1.55 (0.69-3.48)	NS
Postpartum hemorrhage	0.7%	0.4%	0.59 (0.05-6.61)	NS
Preterm labor	31.4%	36.2%	1.24 (0.86-1.77)	NS
Premature rupture of membrane	19.5%	22%	1.17 (0.77-1.77)	NS
Cesarean delivery	33.8%	92.7%	24.7 (14.43-42.30)	0.0005
Malposition	6.1%%	16.9%	3.10 (1.73-5.55)	0.0005
Low Birth Weight	21.8%	28.2%	1.40 (0.94-2.08)	0.08
Small for Gestational Age	4.1%	9.5%	2.47 (1.20-5.07)	0.01
Fetal distress	19.5%	20%	1.03 (0.67-1.58)	NS
Perinatal death	3.1%	4.9%	1.62 (0.67-3.92)	NS
NICU[a] admission	44%	55.5%	1.58 (1.12-2.23)	0.008
Congenital anomalies	1.7%	4.5%	2.70 (0.92-7.90)	0.05
Apgar score <7 at 1 min	11.9%	11.8%	0.99 (0.58-1.67)	NS

[a]Neonatal Intensive Care Unit.

Table II. Independent role of maternal age on labor events and neonatal outcomes[a] of women, 2001-2006, Akbar-Abadi Hospital, Tehran, Iran (n=538).

Variable	p- value	OR (95% CI)
Labor events		
Antepartum hemorrhage	NS	1.04 (0.98-1.12)
Postpatum hemorrhage	NS	1.05 (0.85-1.28)
Cesarean delivery	0.0005	1.21 (1.17-1.25)
Preterm labor	0.007	1.04 (1.01-1.07)
Neonatal outcomes		
Malposition	NS	1.02 (0.97-1.06)
Low Birth Weight	0.001	1.08 (1.03-1.13)
Small for Gestational Age	NS	1.04 (0.98-1.11)
Fetal distress	NS	0.96 (0.91-1.00)
Perinatal death	NS	1.12 (0.94-1.34)
NICU[b] admission	NS	0.97 (0.94-1.01)
Apgar score <7 at 1 min	NS	0.99 (0.93-1.05)

[a]Adjusted by diabetes in pregnancy, hypertension in pregnancy, education, and occupation.
[b]Neonatal Intensive Care Unit.

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Discussion

In this study 538 nulliparous women assessed to determine the effect of age on maternal and neonatal outcomes. This study was based on a large teaching hospital which covers about 2.7 million residents in the south and south east of Tehran. Women aged 35 years or older suffered from infertility problems more than younger women. This result was expected and supports the finding of earlier study (15). The younger women were more educated than older women. This finding was also expected due to increasing trend of education of women in our country. The older women had job more than younger ones and probably delayed their pregnancy because of nothing have enough time to take care of infant. We did not ask about the type of their job, but it seems that there was not association between the level of education and having job.

We showed that the nulliparus women aged 35 years or older are at risk for some pregnancy outcomes such as diabetes in pregnancy, hypertension in pregnancy, and cesarean delivery in univariate analyses. These results support the findings of other studies (11, 14-16). However the prevalence of diabetes and hypertension are increased by age, and related to vascular endothelial damage that occurs with aging. Pancreatic B-cell function and insulin sensitivity fall with age, it is shown that about 16% of elderly pregnant women have an abnormal glucose tolerance test (17). The women aged 35 years or older had a higher rate of cesarean delivery in present study. When data are adjusted for confounding factors such as education, occupation, hypertension and diabetes in pregnancy, this difference was yet significant. This finding is consistent with another study conducted by Nanbakhsh *et al* (18). The higher rate of malposition, and preterm labor in this group of women can explain this finding. However, multiple reasons for each woman maybe existed.

Although the percentage of antepartum hemorrhage was higher in women aged 35 years or older than younger women (5.7% vs 3.8%), this difference was not significant. This finding has previously reported in earlier studies (11, 15, 19). It could be explained by the effect of advanced age and vascular damages and is also associated with chronic hypertensive disorders in this group of women (20).

In this study, however, there was a lower incidence of postpartum hemorrhage in elderly women in comparison with younger ones. Although, there was just few cases of postpartum hemorrhage (2 cases in younger vs 1case in older ones), and the wide range of confidence interval (0.05-6.61) supports this finding. Also, in earlier study incidence of this finding was small (15) and not significant between two groups. While Jolly *et al* reported a higher risk of postpartum hemorrhage (OR: 1.14, 95% CI: 1.09-1.19) between women aged 35 to 40 years versus 18-34 years (21). It is shown that malposition especially breech presentation is increased by advance maternal age. The range of odds ratio in some studies is 1.17 to 1.55 (20, 22). In present study, we found a risk of 3.1 (CI: 1.73-5.55) for occurring malprsentation in women aged 35 years or older. This finding was no longer significant after adjusting confounders. However, underlying uterine anomalies and decreasing skeletal muscle mass can explain this finding in elderly pregnant women (17). The incidence of preterm delivery was higher in elderly women. This risk difference was about 5% and not significant between two groups in univariate analysis. Surprisingly, this difference was significant in logistic regression model, although weak (1.04; CI: 1.04-1.07). Findings about this result are conflicting (17). Some studies showed a rise (11, 15, 23) and some a fall (24, 25) incidence with age. Hypertensive disorders, multiple gestation, and lifestyle changes are some possible risk factors for this complication.

28% of women aged 35 years or older vs. 21% of younger women had low birth weight infants. This difference was not significant, although, p-value was 0.08. This finding was supported by other studies (11, 15, 16). Age related changes in uterine vasculature and placental perfusion explain this finding. After adjusting for confounders, this difference was significant (p=0.001).

It was shown that growth restriction is significantly higher in singleton pregnancy of women above 40 years. Joseph *et al* reported a higher rate of small-for-gestational- age less than third and tenth percentiles among women 30 to 34 years or older compared to women 20-24 years (26). We also found a significant difference in incidence of SGA between two groups of women (4.1% vs 9.5%; p=0.01) by univariate analysis. Although there are some explanations for this finding (same for LBW) some authors did not find significant association between maternal age and SGA (11). This finding in present study when data are adjusted for confounders was no longer significant.

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Neonatal intensive care unit admission was more among older women versus younger ones. It may be due to higher rates of LBW, SGA, and preterm delivery in this group. After adjusting for other variables, this difference diluted and was no longer persisting. However, this finding supports by other study (15).

In this study we could not find any differences between maternal age and premature rupture of membrane, fetal distress, perinatal death, and Apgar score at 1 min. Perinatal mortality and Apgar scores were not associated with maternal age in study of Chan *et al* too (11). Advance maternal age was also a risk factor for premature rupture of membrane in other study (15).

The most important limitations of this study was using hospital records and retrospective nature of design. Although, we tried to contact women who their records were not complete, but it was very difficult and took times. However, we suggested additional work in this area by prospective studies. We could not find any relationship between some important outcomes and maternal age such as: Apgar score, antepartum hemorrhage, postpartum hemorrhage, and premature rupture of membrane. One reason could be the low incidence of these outcomes; therefore, we recommended the future studies with larger sample size.

In conclusion, our study showed that women aged 35 years or more are at higher risk of preterm labor, cesarean delivery, and low birth weight compared with younger women. The other maternal and neonatal outcomes were not associated with advanced maternal age. The above findings are important to counsel elder women who like to be pregnant in prenatal care clinics.

Acknowledgement

We would like to thank the research and technology affairs of Iran University of Medical Sciences that supported this study.
There is no conflict of interest for this article.

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