

The Effect of Maternal Age on Pregnancy Outcome

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Abstract: The objective of this study is to estimate the effect of maternal age on obstetric outcomes. This is a prospective descriptive investigation of subjects referring to Bandar Abbas Shariaty Maternity Hospital. Subjects were selected and divided into 3 age groups: 1) ≤ 18 years, 2) 19-34 years, and 3) ≥ 35 . The frequencies of preterm labor, placenta previa, low birth weight, abortion, pregnancy-induced hypertension, abruption, macrosomia and gestational diabetes were compared. 2940 women with complete data were available: Six percent were 18 or less than 18 years of age; 79.7% were 19-34 years; and 14.3% were 35 years or older. Preterm labor and placenta previa were significantly higher in less-than 18 yrs group. In our study maternal age in the two extremes affected pregnancy outcome. Yet, age was not independently associated with specific adverse pregnancy outcomes.

Key words: Adverse pregnancy outcome, maternal age, obstetric complication

INTRODUCTION

Advanced maternal age, defined as age 35 years and older at estimated date of delivery, has become increasingly common. From 1970 to 2000, live births among women aged 35 years and older in the United States increased from approximately 5% to approximately 13% of all live births (Bianco *et al.*, 1996; Martin *et al.*, 2002). Effective birth control, advances in Assisted Reproductive Technology (ART), delayed marriage, increasing rates of divorce followed by remarriage, and women's higher education all may contribute to this trend.

Although a number of studies found an association between delaying childbirth and adverse maternal and fetal outcomes (Bell *et al.*, 2001; Martin, 2002; Prysak *et al.*, 1995; Seoud *et al.*, 2002; Vercellini *et al.*, 1993), other studies challenge these findings (Ales *et al.*, 1990; Kirz *et al.*, 1985).

Young maternal age has been compared with other age groups (Table 1 from Vidaver *et al.*, 2005), and is considered a reproductive advantage with regard to adverse pregnancy outcome (Cleary-Goldman *et al.*, 2005). The objective of this study is to estimate the effect of maternal age on obstetric outcomes.

MATERIALS AND METHODS

From July to December 2008, 3000 pregnant women from Bandar Abbas Shariaty Maternity Hospital prenatal clinic were selected based on inclusion criteria of parity 1,2,3/nonsmokers/similarity in ethnicity and site of living/ability to read/lack of previous medical illness and a viable singleton intrauterine pregnancy without evidence

of anencephaly confirmed by ultrasound examination at the time of enrollment. Pregnant women were at least on their 10th week of gestation.

Baseline data were recorded with a questionnaire and patient interview. Post delivery follow-up was performed one day after delivery.

In addition, a single perinatologist reviewed detailed maternal and pediatric medical records for the following patient subsets: abnormal first- and/or second-trimester screening and adverse obstetric or pediatric outcome. For this investigation, all subjects with complete outcome information were divided into 3 age groups:

- ≤ 18 years
- 19-34 years
- ≥ 35 years

The following adverse pregnancy outcomes were considered in the subjects studied:

- Miscarriage (fetal loss after enrollment but before 24₀₇ weeks)
- Gestational hypertension (blood pressure $> 140/90$ on at least 2 occasions greater than 6 h apart without evidence of chronic hypertension or significant proteinuria)
- Preeclampsia (criteria for gestational hypertension and significant proteinuria)
- Gestational diabetes (nonfasting 50 g oral glucose challenge test 135 followed by 2 or more abnormal values on fasting 100 g oral glucose tolerance test [fasting 95, 1-h 180, 2-h 155, 3-h 140])

Table 1: Percentages of obstetric complications by maternal age

Outcome	Age <35 y (n = 28,398)	Age 35-39 y (n = 6,294)	Age >40y (n = 1,364)	p-value
Threatened abortion	13.9	15.4	19.3	< 0.001
Miscarriage	0.8	1.5	2.2	< 0.001
Chromosomal abnormality	0.2	0.8	1.9	< 0.001
Congenital anomaly	1.7	2.8	2.9	< 0.001
Gestational hypertension	4.7	4.1	5.5	0.034
Preeclampsia	2.4	2.3	3.0	0.422
Gestational diabetes	2.9	5.3	7.3	< 0.001
Placenta previa	0.5	0.9	1.9	< 0.001
Placental abruption	0.7	0.8	1.6	< 0.001
Preterm labor	5.3	5.2	5.3	0.883
PPROM	1.5	1.8	2.3	0.238
Term delivery	7.8	8.6	11.8	0.002
Low birth weight	5.2	5.1	7.5	< 0.001
Macrosomia > 4,500 g	1.1	1.8	1.2	< 0.001
Operative vaginal delivery	7.5	7.1	6.3	0.111
Cesarean delivery	21.7	31.4	40.5	< 0.001
Perinatal loss	0.3	0.3	0.7	0.079

PPROM, preterm premature rupture of membranes; Data are presented as percentage of cases

Table 2: Summary table: Chi-square of maternal age and pregnancy outcome

	Abortion	Preterm labor	C/S	PIH	Placenta previa	abruption	macrosomia	LBW	GD
Pearson chi-square	0.100	0.037*	0.166	0.007*	0.0001*	0.028*	0.010*	0.001*	0.011*
Likelihood ratio	0.115	0.59	0.142	0.008*	0.004*	0.067	0.033*	0.005*	0.300
Linear by linear association	0.225	0.077	0.379	0.002*	0.018*	0.038*	0.036*	0.020*	0.005*

C/S = Cesarean Section, PIH = Pregnancy Induced Hypertension, LBW = Low Birth Weight, GD = Gestational Diabetes,

*: Statistically significant at $p < 0.05$

- Preterm delivery (delivery before 37 weeks of gestation)
- Low birth weight (birth weight < 2,500 g)
- Macrosomia (birth weight > 4,500 g)
- Placental abruption (premature separation of a normally implanted placenta),
- Placenta previa (placenta completely or partially covering the internal cervical os at the time of delivery)
- Cesarean delivery

Statistical analysis was performed to evaluate the effect of maternal age on the specific pregnancy outcomes, considered separately. All analyses were performed with SPSS version 18.

First, descriptive statistics of each pregnancy outcome was generated, for all patients and for each of the 3 groups. Next, a chi-square test was used to compare frequencies (Table 2) and percentages (Table 3) of adverse outcomes in each maternal age group.

RESULTS

In a prospective descriptive study in 2008, 2940 subjects referring to Bandar Abbass Shariaty Maternity Hospital were chosen among 3000 who met the inclusion criteria. The reason for 60 drops was lack of follow up.

Selected women divided into 3 age groups: less than 18 years of age (6%), 19-34 years (79.7%) and 35 years and older (14.3%).

According to Fig. 1 the most common complication of pregnancy was low birth weight in ≤ 18 years old women and Cesarean Section in ≥ 35 years old women.

According to Table 2, which is a summary of chi-square of frequencies of outcomes of the total 2940, age was associated with pregnancy induced Hypertension ($p = 0.008$), placenta previa ($p = 0.004$), macrosomia ($p = 0.33$) and low birth weight ($p = 0.005$). But if the percentage of each subgroup is considered in this calculation no association can be found (Table 3).

DISCUSSION

The findings reveal that the risk of preterm labor, placenta previa and low birth weight newborn were more in mothers under 18 yrs of age. This is against the text citation that maternal advanced age is a risk factor for placenta previa (Cunningham *et al.*, 2010). Mothers over 35 showed more risk for abortion, Pregnancy Induced Hypertension, abruption, macrosomia, C/S and Gestational Diabetes.

There was also no relationship between maternal age (over all) and rate of C/S (Table 2). Preterm labor and delivery was higher in less-than-18 years group. This

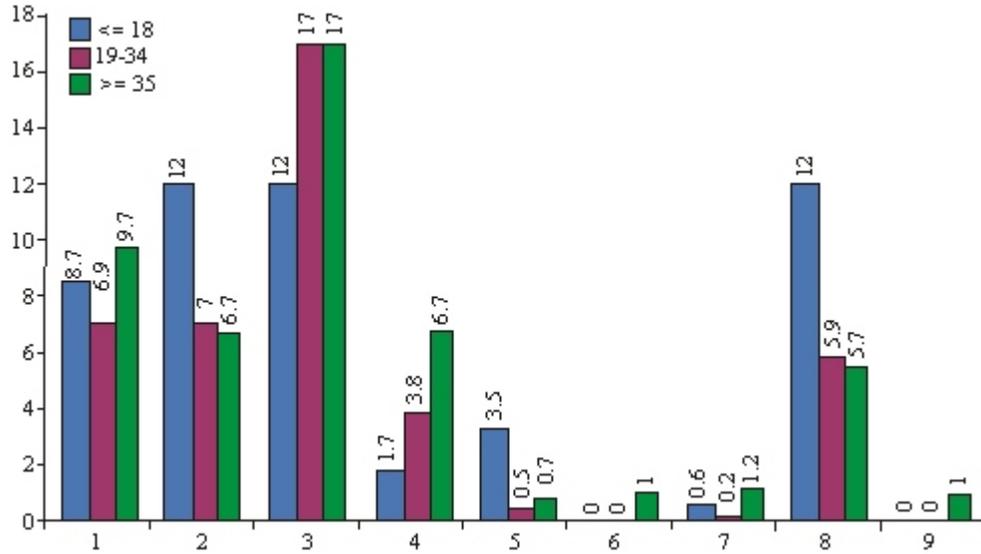


Fig. 1: Complications as percentage in the three groups. (1=abortion/2=PTL/ 3=C/S/ 4=PIH/ 5=Previa/6=abruption/ 7=macrosomia/ 8=LBW/ 9=GD)

Table3: Summary table: Level of significance of Pearson Chi-square of maternal age and pregnancy outcome (percent in each group)

	Abortion	Preterm labor	C/S	PIH	Previa	Abrupton	Macrosomia	Low Birth Weight	GD
Pearson Chi-square	0.199	0.199	0.223	0.199	0.199	0.223	0.199	0.199	0.223

finding is according to the previous studies that show young mother age can be a risk factor for preterm delivery (Prysak *et al.*, 1995; Seoud *et al.*, 2002). This age group also did not show any increased rate of C/S. This can be a direct effect of LBW or preterm labor which results in small babies in proportion to the maternal pelvic bony structure. However, maternal age may exert effect on uterine contraction intensity as Main states that increased maternal age can increase C/S due to failure to progress (Main *et al.*, 2000).

PIH was not higher in young women; neither was it significantly higher in older mothers. This can be related to the socioeconomic status or ethnicity. Placenta previa was higher in below-18 yrs group. This finding is against previous literature reports (Ales *et al.*, 1990; Weiss *et al.*, 2004). Abrupton was significantly higher in women over 35 compared to other groups. Macrosomia show a concordant trend with maternal age. This was so because older mothers giving birth to LGA babies also suffered gestational diabetes.

Studies of LBW babies are contradictory. For example Ndiayo could not find any relationship (Ndiaye *et al.*, 1998).

CONCLUSION

In summary, the findings of this study states that maternal age in the two extremes affects pregnancy outcome. Yet by inclusion of healthy individuals age is

not independently associated with specific adverse the importance of both counseling patients for specific adverse outcomes associated with maternal age. Maternal age alone may be a factor influencing physician decision making. As stated by Peipert "It is uncertain whether the reported increased rates of cesarean delivery are due to a real increase in complications or it is iatrogenic" (Bell *et al.*, 2001; Ezra *et al.*, 1995; Rosenthal *et al.*, 1998).

It is important to note that certain confounding factors such as BMI could not be adjusted due to lack of data on pre pregnancy weight.

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