Medical and Research Publications
International Open Access

Research Article **Journal of Case Reports (Volume 7 Issue 4)**

Pregnancy Outcomes in Women of Advanced Maternal Age: A Retrospective Cohort Study

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Received Date: May 11, 2023

Published Date: June 01, 2023

Abstract

Background: *A higher rate of obstetrical and perinatal complications, such as congenital disorders, placenta previa, ectopic pregnancy, spontaneous abortion, stillbirth, preterm birth, induction of labor, caesarean delivery, and small for gestational age (SGA), are thought to be associated with delayed childbearing compared to younger women.*

Objectives: *To study the adverse maternal and fetal outcomes of pregnancy in advanced maternal age.*

Methods: *It was a Retrospective cohort study done for duration of 1 year in a tertiary care hospital in India. Pregnant women ≥20 years who were attending the Department of Obstetrics and Gynaecology during the study period were included in the study. Women with multiple pregnancies were excluded from study. Sample size of 200 was studied. Gestational age, presentation, mode of delivery, indications for caesarean, maternal complications and fetal outcomes were analysed. Statistical analysis was done by SPSS 22.0 statistical software.*

Results: *increasing maternal age was associated with increasing gravidity times and rate of assisted reproductive technology (ART) pregnancies. More women of AMA groups were likely to be categorized as overweight or obese. Especially in women aged 40 and above. Women in the referent group were better educated than women in the AMA groups. The stark difference in ART pregnancy risk between AMA groups supported the idea that fertility declines in women over 35. The adjusted odds ratio for ART pregnancy in groups 2, 3, and 4 was 3.2, 17.1, and 25.0 in comparison to the referent group, respectively.*

Conclusion: *Maternal problems, both obstetric and medical, have been seen to occur more frequently in older moms. Preterm births, caesarean deliveries, PROM, PPROM, gestational hypertension, gestational diabetes rose significantly among these mothers who are older. It has become more normal for mothers to get pregnant even in their late forties because to the expansion and advancements in infertility treatments.*

Keywords: *Advanced maternal age (AMA), LBW, PROM, PPH, eclampsia, Obesity, Fetal complications.*

Introduction

In high income countries, there is an increasing tendency known as "advanced maternal age," or childbirth in women over 35 numerous contemporary according to studies, the age cut off for AMA has been raised to 40.[1,2,3] In addition to multiparous women prolonging childbearing, older primi gravid women delaying childbirth owing to subfertility or lifestyle choices are the most common causes of the trend of pregnancy happening in moms of advanced age. This is also because assisted reproductive technologies have advanced. In a retrospective comparison study carried out in South Africa, the frequency of advanced maternal age was 17.5% Africa.[4]

A higher rate of obstetrical and perinatal complications, such as congenital disorders, placenta previa, ectopic pregnancy, spontaneous abortion, stillbirth, preterm birth, induction of labor, caesarean delivery, and small for gestational age (SGA), are thought to be associated with delayed childbearing compared to younger women. Older individuals have a higher prevalence of chronic illnesses such cancer, diabetes mellitus, hypertension, and other problems that may have an impact on the course of pregnancy. [5,6]

According to numerous studies, the incidence of prenatal problems only starts to rise after the age of 35, with the greatest notable increase in incidence occurring after the age of 40. AMA resulting in neonatal problems as well, including low Apgar scores, NICU admissions, premature births, low birth weights, birth deformities, chromosomal abnormalities, and perinatal deaths.[7] Early in their 30s, women's fertility begins to decline, and it does so even more quickly in their mid- and late-thirties.

Materials and Methods

It was a Retrospective cohort study done for duration of 1 year in a tertiary care hospital in India. Pregnant women ≥20 years who were attending the Department of Obstetrics and Gynaecology during the study period were included in the study. Women with multiple pregnancies were excluded from study.

Sample Size estimation

The still birth rate among mothers >35 years and 20 – 34 years was 8.5% and 2.8% respectively by study conducted by Salihu HM et al3 expecting similar rates, the sample size required calculated by the below formula:

$$n = 2(Z\_/2 + Z\ 1-)2pq/d^2$$

So, the required sample size was found to be 198 which was round off to 200.

Methodology

Patients were divided into 4 age groups based on the age of the mother (20-29, 30-34, 35-39, ≥40) and 50 participants in each group was allotted in each age group. The medical records division provided access to the case files. The following data was gathered: age, parity, reason for delaying conception, history of infertility therapy, gestational age, risk factors, maternal co-morbidities, mode of delivery, maternal problems, apgar scores, sex of the baby, birth weight, and NICU admissions.

Preeclampsia, placental abruption, preterm birth, gestational diabetes mellitus, newborn death, small for gestational age, NICU hospitalizations, and other fetal outcomes were investigated. Maternal problems, such as preterm labor, antepartum hemorrhage, premature membrane rupture, prevalence of gestational diabetes, gestational hypertension, and prevalence of caesarean delivery, were the main outcome evaluated. And secondary outcomes like intrauterine death, intrauterine growth restriction, low apgar scores also compared.

Statistical Analysis

The statistical analysis was performed using SPSS for windows version 22.0 software (Mac, and Linux). The findings were present in number and percentage analyzed by frequency, percent, and Chi-squared test. Chi-squared test was used to find the association among variables. The critical value of P indicating the probability of significant difference was taken as <0.05 for comparison.

Results

Characteristic	Maternal age (years)			
	Group1 20–29 (N = 50)	Group2 30–34 (N = 50)	Group3 35–39 (N = 50)	Group4 ≥40 (N = 50)
Age (y), mean (SD)	26.05 ± 2.48	32.31 ± 1.28	36.70 ± 1.37	41.14 ± 1.47
Gestational weeks (w), mean (SD)	38.55 ± 2.09	38.85 ± 1.64	38.55 ± 1.84	38.32 ± 2.01
Baseline BMI (kg/m^2), mean (SD)				
Underweight, n (%)	04	03	09	07
Normal, n (%)	18	25	21	21
Overweight, n (%)	23	15	11	11
Obese, n (%)	5	7	9	11
Gravidity, n (%)				
1	15	10	10	21
2	10	18	16	12
≥3	25	22	24	17
Education, n (%)				
Low, n (%)	12	09	15	08
Middle, n (%)	20	21	15	22
High, n (%)	18	20	20	20
Area of residence, n (%)				
Urban	30	32	31	27
Rural	20	18	19	23
ART, n (%)	7	9	11	19

Table1 Baseline characteristics of study population based on maternal age group

As per table 1 we found that increasing maternal age was associated with increasing gravidity times and rate of assisted reproductive technology (ART) pregnancies. More women of AMA groups were likely to be categorized as overweight or obese. Especially in women aged 40 and above. Women in the referent group were better educated than women in the AMA groups. Most of the females comes in Normal category (45%) followed by overweight category.

	Maternal age 30–34 years		Maternal age 35–39 years		Maternal age ≥40 years	
	Crude OR [95% CI]	Adjusted OR[a] [95% CI]	Crude OR [95% CI]	Adjusted OR[a] [95% CI]	Crude OR [95% CI]	Adjusted OR[a] [95% CI]
Maternal Outcomes						
Emergency CS	1.17 [0.83 1.37]	1.17 [0.82 1.40]	0.85 [0.74 1.23]	0.86 [0.65 1.14]	0.98 [0.77 1.27]	0.84 [0.63 1.13]
ART	2.81 [1.22 6.93]	3.24 [1.33 7.90]	13.87[6.37 30.19]	17.10[7.59 38.51]	19.06[8.81 41.21]	24.95[11.04 56.39]
Preeclampsia	1.58 [0.73 3.87]	2.32 [0.98 5.52]	3.80 [1.80 8.00]	3.97 [1.81 8.74]	7.46 [3.68 15.14]	7.33 [3.43 15.68]
Severe preeclampsia	1.41 [0.67 3.39]	2.37 [1.00 5.57]	2.56 [1.22 5.36]	3.18 [1.42 7.10]	2.98 [1.44 6.17]	3.35 [1.51 7.45]
Gestational Hypertension	1.20 [0.37 3.96]	1.15 [0.34 3.94]	5.15 [1.96 13.53]	4.75 [1.70 13.29]	2.63 [0.93 7.42]	2.52 [0.83 7.66]
GDM	1.30 [0.98 1.72]	1.39 [1.00 1.87]	2.78 [2.15 3.61]	2.51 [1.89 3.33]	3.26 [2.52 4.21]	2.90 [2.16 3.88]
Placental abruption	1.21 [0.45 2.76]	0.94 [0.36 2.46]	1.23 [0.51 2.98]	1.23 [0.46 3.30]	0.78 [0.29 2.09]	0.79 [0.26 2.41]
Placenta Praevia and Vasa Praevia	1.38 [0.87 1.87]	1.49 [0.99 2.25]	1.32 [0.90 1.93]	1.14 [0.75 1.73]	2.05 [1.44 2.92]	1.60 [1.06 2.41]
PPH	1.17 [0.72 1.89]	1.38 [0.82 2.33]	0.74 [0.43 1.27]	0.65 [0.36 1.17]	1.30 [0.81 2.09]	1.07 [0.62 1.85]
Fetal outcomes						
Preterm birth (<37 weeks)	0.65 [0.39 0.77]	0.65 [0.45 0.94]	0.71 [0.51 0.97]	0.70 [0.49 0.99]	0.84 [0.62 1.14]	0.80 [0.56 1.15]
Low birthweight (<2500 g)	0.73 [0.40 0.98]	0.76 [0.47 1.23]	0.83 [0.55 1.27]	0.81 [0.50 1.30]	1.01 [0.67 1.51]	0.93 [0.58 1.49]
Macrosomia (>4000 g)	1.45 [0.91 2.32]	1.38 [0.84 2.29]	1.10 [0.67 1.81]	0.98 [0.57 1.70]	0.94 [0.56 1.57]	0.81 [0.45 1.46]
IUGR	0.30 [0.04 0.91]	0.21[0.04 1.02]	1.00 [0.41 2.41]	0.71 [0.25 1.98]	0.90 [0.37 2.24]	0.58 [0.20 1.73]
Apgar score < 7 at 5 minute	0.67 [0.11 4.00]	1.28 [0.18 8.88]	0.67 [0.11 4.00]	1.41 [0.20 10.13]	1.34 [0.30 6.02]	2.93 [0.49 17.70]
NICU admission	0.54 [0.34 0.86]	0.62 [0.38 1.02]	0.78 [0.51 1.18]	0.72 [0.45 1.15]	0.86 [0.57 1.30]	0.73 [0.45 1.18]
Respiratory complications	2.91 [1.22 6.93]	2.45 [0.99 6.06]	2.61 [1.08 6.30]	2.05 [0.80 5.25]	2.62 [1.09 6.33]	1.86 [0.70 4.92]

Table 2- Maternal and Fetal Outcomes in association with age

As per table 2 a rising tendency in AMA populations, notably, for the risks of unfavorable pregnancy outcomes as people age (group 3 and 4). The stark difference in ART pregnancy risk between AMA groups supported the idea that fertility declines in women over 35. The adjusted odds ratio for ART pregnancy in groups 2, 3, and 4 was 3.2, 17.1, and 25.0 in comparison to the referent group, respectively. Preeclampsia risk was roughly seven times higher in group 4 patients than in group 1, but only four times higher in group 3. The risk for GDM (lifestyle intervention) was roughly four times higher in group 4 than in group 1, but only two and a half times higher in group 3 women. We included preeclampsia and GDM as confounding factors into the analysis in another model. For the reason that these two complications were more common in our AMA patients compared with other pregnancy

complications. These two factors were also reported to increase the risks for adverse perinatal outcomes22–24. After adding these two factors, we found that advanced maternal age was a protective factor for preterm birth and neonatal intensive care unit (NICU) admission. Higher maternal baseline body mass index (BMI) was associated with increased risks for emergency CS, GDM and low birthweight. It also increased the risks for preeclampsia, brought the onset time earlier and aggravated the severity. Lower maternal BMI was associated with higher risks of low birthweight and placenta previa. Conceived by ART increased the selective CS risk. Patients of more gravidity times had elevated rates for placenta previa. Lower educational level increased risks for many maternal complications, including preeclampsia, early onset preeclampsia, severe preeclampsia, GDM (on insulin), placenta previa and PPH. Risks for adverse perinatal outcomes such as preterm birth, low birthweight and NICU admission were elevated in mothers of low educational level as well. Compared with patients living in metropolitan, residents of rural area had higher incidence of preeclampsia, preterm birth, low apgar score and NICU admission.

Discussion

According to a study on the result of pregnancies among older moms, 7.2% of mothers are over 40, a rise from prior years of the females In the study group, 92.6% of the participants were between the ages of 35 and 39, and 6.6% were between the ages of 40 and 45, which is consistent with the findings in the studies. This is mostly a result of changing attitudes among women on the value of education and careers, as well as growing acceptance of cutting-edge infertility treatments like assisted reproductive technologies.7,8 Analyzed based on parity, advanced maternal age group showed increased incidence of multiparity and 16.9% of moms were nulliparous. Preterm birth rates were high among this study's older moms as well, with 25.8% in the study group and 14.5% in the control group. Older mothers are an independent factor risk element for premature birth. Comorbid medical conditions can potentially worsen pregnancy's impact of maternal age. Other investigations reported on this identical observation. When evaluated prior cesareans, a protracted time of pregnancy, and advanced mother age were the most common indications for a poor cervix, severe preeclampsia, infertility, etc. Apart from previous cesareans, the grounds for caesarean in the control group included fetal distress, cephalopelvic disproportion, oligamnios, failed induction, etc.**[**9,10**]**

Around 38% of the advanced maternal age group's mothers had hypertensive problems, compared to 14% of the controls. Important incident in the study group, the likelihood of persistent hypertension complicating pregnancy was high. Similar results were found in studies that were done.**[**11,13,14**]**

Similar to how it was almost twice as common for diabetes to complicate pregnancy in the control group. The prevalence of placenta praevia, preterm membrane rupture, and fibroid complicating pregnancy is also increased in the older mother age group 35 pregnancy after infertility. **[**11,12**]**

When compared to the control group, the study group's rate of fetal problems like growth restriction, oligamnos, and intrauterine death of the fetus was significantly higher. The study group experienced more neonatal problems, such as low apgar, very low birth weight infants, and NICU admission. Congenital abnormalities were also prevalent among women who were older. Yet, in contrast to most research, the control group experienced more inductions of labor than the study group. **[**13,14**]**

Conclusion

In the present study the maternal and neonatal complications were more in >40 years maternal age as compared to younger age group women, similar to most of the studies. Even though medical complications were significantly higher, proper antenatal care and timely termination of pregnancy significantly reduced the major adverse outcome of hypertension and hyperglycemia in these women.

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