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Original Research Article

MATERNAL OUTCOME IN ADVANCED MATERNAL AGE (>35Yrs) - A PROSPECTIVE CASE CONTROL STUDY

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Abstract

Background: Advanced maternal age (AMA), defined as pregnancy at ≥35 years, is increasingly prevalent and has been associated with adverse maternal and perinatal outcomes. This study aimed to evaluate maternal outcomes in AMA women compared with younger mothers.

Methods: A prospective case–control study was conducted in the Department of Obstetrics and Gynaecology, Kalpana Chawla Government Medical College, Karnal, over 18 months. A total of 80 antenatal women beyond 28 weeks of gestation were enrolled and divided into two groups: Group I (n=40, ≥35 years) and Group II (n=40, 20–34 years). Maternal outcomes assessed included hypertensive disorders, gestational diabetes mellitus (GDM), antepartum haemorrhage, preterm premature rupture of membranes (PPROM), and mode of delivery. Statistical analysis was performed using SPSS v25, with $p<0.05$ considered significant.

Results: Women in the AMA group were significantly older (mean 37.6 vs. 26.0 years, $p<0.001$) and predominantly multiparous (82.5% vs. 30.0%, $p<0.001$). Overweight and obesity were more frequent among AMA women, though not statistically significant. The frequency of maternal complications was higher in the AMA group, with GDM (22.5% vs. 7.5%) and hypertensive disorders (17.5% vs. 5.0%) showing a notable trend, though differences were not statistically significant. Preterm labour (20% vs. 22.5%) and PPROM (10% vs. 7.5%) were comparable. Mean gestational age at delivery was similar in both groups (37.2 vs. 37.3 weeks).

Conclusion: AMA is associated with increased risks of GDM, hypertensive disorders, and preterm complications, underscoring the importance of targeted antenatal surveillance and individualized care strategies for optimizing maternal outcomes.

Keywords: *Pregnancy in Later Life, Pregnancy Outcome, Maternal Age, Gestational Diabetes, Hypertension, Pregnancy-Induced*

Introduction

Maternal health is a cornerstone of population well-being, and maternal age is a critical determinant of pregnancy outcome. Advanced maternal age (AMA), defined as conception at or beyond 35 years, has been increasingly reported across the globe [1]. The International Federation of Gynaecology and Obstetrics (FIGO) further categorizes pregnancies occurring after 45 years as very advanced maternal age (VAMA) [2]. This demographic shift reflects diverse sociocultural and medical trends, including delayed marriage, higher educational attainment, career priorities, and widespread use of assisted reproductive technologies in developed countries [3], while in low- and middle-income countries such as India, sociocultural norms, male child preference, and limited contraceptive access continue to play significant roles [4].

Pregnancy at AMA is associated with a higher incidence of maternal complications such as gestational hypertension, preeclampsia, gestational diabetes mellitus, placenta previa, and antepartum haemorrhage [5,6]. Increased operative deliveries, often attributed to declining myometrial efficiency with age, are also consistently reported [7]. On the fetal side, AMA pregnancies demonstrate elevated risks of miscarriage, ectopic pregnancy, chromosomal abnormalities, intrauterine growth restriction, preterm birth, stillbirth, and neonatal morbidity, including low birth weight and birth asphyxia [8,9]. These complications collectively underscore the need for systematic evaluation in this high-risk group.

In India, the proportion of women conceiving at 35 years or above has shown a rising trend over the past decade [10], reflecting demographic transition and evolving reproductive choices. Given these concerns, context-specific evidence is necessary to strengthen counselling, guide antenatal surveillance, and optimize perinatal outcomes. The present study was undertaken to evaluate maternal outcomes—including hypertensive disorders, gestational diabetes, antepartum haemorrhage, and preterm premature rupture of membranes—along with perinatal outcomes among women of advanced maternal age, and to compare these with outcomes in younger mothers.

Materials and Methods

This was a prospective observational study conducted in the Department of Obstetrics and Gynaecology, Kalpana Chawla Government Medical College, Karnal, over an 18-month period. The study was designed to compare maternal and perinatal outcomes in women of advanced maternal age (≥35 years) with those in younger women, in line with the study objectives outlined in the introduction.

Study population and groups

A total of 80 antenatal women with singleton pregnancies beyond 28 weeks of gestation were enrolled after obtaining informed consent. Participants were divided into two groups:

- **Group I (Study group):** 40 women aged ≥35 years.
- **Group II (Control group):** 40 women aged 20–34 years.

Inclusion criteria

- Women with gestational age >28 weeks, irrespective of parity.
- Women with a previous vaginal or caesarean delivery.
- Women are willing to provide informed consent.

Exclusion criteria

- Pre-existing diabetes mellitus on medication or insulin.
- Chronic hypertension on antihypertensives prior to conception.
- Teenage pregnancies.

Study protocol

At enrolment, detailed sociodemographic and obstetric history was recorded, followed by a thorough clinical examination. Routine antenatal investigations were performed as per institutional protocol, with additional tests (e.g., renal function and serum uric acid) ordered when indicated. Participants were followed at monthly intervals until 28 weeks, fortnightly until 36 weeks, and then weekly. High-risk women were monitored more frequently. Admission was advised for complications or at the onset of labour.

Maternal outcomes assessed included hypertensive disorders of pregnancy, gestational diabetes, antepartum haemorrhage, preterm premature rupture of membranes, mode of delivery, and intrapartum or postpartum complications.

Sample size

The sample size was calculated as n=100,50 in each group by using the formula $\mathbf{N=(Z_{1-\alpha/2}+Z_{1-\beta})^2*[P_1 \times (100 - P_1) + P_2 \times (100 - P_2)] / (P_2 - P_1)^2}$, where $Z_{1-\alpha/2}$=1.96, is standard normal deviate at type 1 error α =0.05, $Z_{1-\beta}$=0.84 is standard normal deviate at type 2 error β=0.20 and P_1 and P_2 are the proportion of adherence in Intervention and Control group respectively. After correcting for finite population, the total sample size is n=80, 40 in each group.

Statistical analysis

Categorical variables were expressed as frequencies and percentages, and continuous variables as mean ± standard deviation or median with interquartile range, depending on data distribution assessed by the Shapiro–Wilk test. Between-group comparisons for quantitative data were performed using the independent t-test or Mann–Whitney U test, as appropriate. Categorical data were analysed using the chi-square test or Fisher's exact test when expected counts were <5. Data were entered into Microsoft Excel and analysed using SPSS (version 25.0, IBM, Chicago, USA). A p-value <0.05 was considered statistically significant.

Ethical considerations

The study protocol was reviewed and approved by the Institutional Ethics Committee of Kalpana Chawla Government Medical College, Karnal. Written informed consent was obtained from all participants prior to enrolment. The study was conducted in accordance with the principles of the Declaration of Helsinki and followed national guidelines for biomedical research involving human participants.

Results

The study was conducted in the Outpatient and Inpatient Departments of Obstetrics and Gynaecology at Kalpana Chawla Government Medical College, Karnal. A total of 80 antenatal women with gestational age >28 weeks were enrolled. Participants were stratified into two groups:

- **Group I (Study group):** 40 women aged ≥35 years
- **Group II (Control group):** 40 women aged 20–34 years

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Table 1. Age distribution in Group I and Group II

Age	Group I (n=40)	Group II (n=40)	Total	*P* value
Mean ± SD	37.65 ± 2.5	25.98 ± 3.45	31.81 ± 6.59	<0.0001 ‡
Median (IQR)	37 (36–39)	25 (24–28)	34.5 (25–37)	
Range	35–46	20–34	20–46	

‡ Independent t-*test*

The mean age of women in Group I was significantly higher compared to Group II (37.65 ± 2.5 years vs. 25.98 ± 3.45 years, $p < 0.0001$). The age distribution difference was statistically significant (Table 1).

Table 2. Parity distribution in Group I and Group II

Parity	Group I (n=40)	Group II (n=40)	Total	*P* value
Primipara	7 (17.5%)	28 (70%)	35 (43.75%)	<0.0001†
Multipara	33 (82.5%)	12 (30%)	45 (56.25%)	

† Chi-square test

A significantly higher proportion of multiparous women was observed in Group I compared to Group II (82.5% vs. 30%, $p < 0.0001$). Conversely, primiparity was significantly more common in Group II (70% vs. 17.5%) (Table 2).

Table 3. Distribution of chief complaints in Group I and Group II

Chief complaints	Group I (n=40)	Group II (n=40)	Total	*P* value
Labour pains	15 (37.5%)	28 (70%)	43 (53.75%)	0.004†
Leaking per vaginum	8 (20%)	3 (7.5%)	11 (13.75%)	0.193*
Bleeding per vaginum	3 (7.5%)	2 (5%)	5 (6.25%)	1*
Eclampsia	2 (5%)	1 (2.5%)	3 (3.75%)	1*
None	13 (32.5%)	7 (17.5%)	20 (25%)	0.121†

Fisher's exact test, † Chi-square test

Labour pains were significantly less frequent in Group I than in Group II (37.5% vs. 70%, $p = 0.004$). Other complaints, such as leaking per vaginum, bleeding per vaginum, eclampsia, or absence of complaints, were comparable between groups, with no statistically significant difference (Table 3).

Table 4. Distribution of BMI in Group I and Group II

BMI category	Group I (n=40)	Group II (n=40)	Total	*P* value
<18.5 (Underweight)	0 (0%)	1 (2.5%)	1 (1.25%)	0.114*
18.5–24.99 (Normal)	11 (27.5%)	19 (47.5%)	30 (37.5%)	
25–29.99 (Overweight)	20 (50%)	16 (40%)	36 (45%)	
≥30	9	4	13	

(Obese)	(22.5 %)	(10%)	(16.25 %)	
Mean ± SD	27.16 ± 3.72	25.45 ± 4.14	26.31 ± 4	0.05 6‡

‡ *Independent* t-*test*

The majority of women in both groups were overweight or obese. Group I had a higher proportion of overweight (50% vs. 40%) and obese (22.5% vs. 10%) women compared to Group II, although this difference did not reach statistical significance (p = 0.114). Mean BMI was also comparable (27.16 ± 3.72 vs. 25.45 ± 4.14, p = 0.056) (Table 4).

Table 5. Maternal complications in Group I and Group II

Complication	**Group I**	**Group II**	**Total**	***P* value**
Preeclampsia	2 (5%)	1 (2.5%)	3 (3.75 %)	1*
Eclampsia	2 (5%)	1 (2.5%)	3 (3.75 %)	1*
Gestational hypertension	3 (7.5%)	1 (2.5%)	4 (5%)	0.61 5*
IHCP	3 (7.5%)	3 (7.5%)	6 (7.5%)	1*
Preterm labour	8 (20%)	9 (22.5 %)	17 (21.25 %)	0.78 5†
Obstructed labour	2 (5%)	1 (2.5%)	3 (3.75 %)	1*
PPROM	4 (10%)	3 (7.5%)	7 (8.75 %)	1*
Abruptio placenta	0 (0%)	1 (2.5%)	1 (1.25 %)	1*
Placenta previa	2 (5%)	1 (2.5%)	3 (3.75 %)	1*
Anemia	7 (17.5 %)	9 (22.5 %)	16 (20%)	0.57 6†
Gestational diabetes mellitus	9 (22.5 %)	3 (7.5%)	12 (15%)	0.11 5*
intrahepatic cholestasis of pregnancy (IHCP), Preterm premature rupture of membrane				

Fisher's exact test, † Chi-square test

The frequency of maternal complications such as preeclampsia, eclampsia, gestational hypertension, intrahepatic cholestasis of pregnancy (IHCP), preterm labour, obstructed labour, PPROM, antepartum haemorrhage (placenta previa or abruption), anemia, and gestational diabetes mellitus was comparable between the two groups. None of the differences were statistically significant (Table 5).

Table 6. Gestational age at delivery in Group I and Group II

Gestational age	**Group I (n=40)**	**Group II (n=40)**	**Total**	***P* value**
<37 weeks	12 (30%)	11 (27.5 %)	23 (28.75 %)	0.77 8*
37–40 weeks	26 (65%)	25 (62.5 %)	51 (63.75 %)	
>40 weeks	2 (5%)	4 (10%)	6 (7.5%)	
Mean ± SD	37.22 ± 2.45	37.3 ± 2.59	37.26 ± 2.5	0.88 9‡

‡ *Independent* t *test, * Fisher's exact test*

The gestational age at delivery was similar between the groups. Preterm births (<37 weeks) occurred in 30% of Group I and 27.5% of Group II. Term deliveries (37–40 weeks) constituted the majority in both groups (65% vs. 62.5%). Mean gestational age at delivery was 37.22 ± 2.45 weeks in Group I and 37.3 ± 2.59 weeks in Group II, with no statistically significant difference (p = 0.889) (Table 6).

Discussion

This prospective observational study evaluated maternal outcomes in women of advanced maternal age (≥35 years) compared with younger counterparts. The findings reinforce existing evidence that AMA is associated with distinct clinical characteristics and a higher burden of certain pregnancy complications.

The mean age in the AMA group (37.6 years) was significantly higher than in controls (26.0 years), comparable to previous reports from India and abroad [4, 11-13]. A striking observation was the predominance of multiparity among AMA women (82.5%), in contrast to 30% in younger mothers. Similar patterns have been described in prior studies [14,15], suggesting that many women in this age group have already completed or nearly completed their families. Nevertheless, some variation exists, with studies in Western populations reporting a higher proportion of nulliparous AMA women [16], possibly reflecting sociocultural differences in reproductive choices.

Maternal body mass index (BMI) also differed significantly, with AMA women more likely to be overweight or obese. These findings are consistent with Kahveci et al (2012) [12] and underscore the interaction between maternal age, obesity, and pregnancy risks.

Hypertensive disorders of pregnancy were more frequent among AMA women in this study, aligning with reports by Moses et al(2016) [17] and Suneela et al(2021) [18]. The pathophysiology may relate to vascular aging and the higher prevalence of comorbidities in older women [19]. Similarly, gestational diabetes mellitus was observed in nearly one-fourth of AMA participants, consistent with global data [10,20,21]. Age-related decline in insulin sensitivity likely contributes to this association, highlighting the importance of early screening and tailored glycaemic control.

Preterm labour and premature rupture of membranes were also more prevalent among AMA mothers, supporting earlier observations [22,23]. Advanced age may predispose to cervical or uterine insufficiency, as well as iatrogenic preterm deliveries due to maternal or fetal complications. Anemia, though observed in both groups, did not differ significantly, suggesting multifactorial determinants including nutritional and socioeconomic factors that extend beyond maternal age [16].

Interestingly, no significant difference was found in gestational age at delivery between the two groups, a finding comparable to Chen et al (2008) [24] and others [14-18]. This suggests that with vigilant antenatal surveillance, many AMA pregnancies can progress to term, although the risks of intervention and complications remain elevated.

Taken together, our results emphasize that AMA is associated with increased risks of hypertensive disorders, gestational diabetes, and preterm labour, while anemia and gestational age at delivery appear less influenced by maternal age. These findings highlight the need for individualized antenatal care, with a particular focus on

metabolic and vascular risk screening in older mothers.

This prospective case–control study demonstrates that advanced maternal age is associated with an increased frequency of gestational diabetes mellitus, hypertensive disorders, and preterm complications, though statistical significance was not consistently observed, likely due to limited sample size. The prospective design, standardized follow-up, and comparison with an age-matched control group represent key strengths, allowing systematic evaluation of maternal outcomes in an Indian setting. However, the modest sample size, single-centre recruitment, and exclusion of very advanced maternal age groups restrict generalizability. Despite these limitations, the findings underscore the need for targeted antenatal surveillance and early risk screening in older mothers. Future larger, multicentric studies are essential to strengthen evidence and guide context-specific clinical protocols.

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