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"Effect of Advanced Maternal Age on Pregnancy Outcome"

A Thesis

Submitted to the Council of the College of Medicine, University of Diyala , Department of Gynecology and Obstetrics , as a Partial Fulfillment in the Requirements for the Degree of MBChB

This graduation Research done by:

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Dedication

I dedicate this work to everyone who has supported me throughout my medical journey:

To my family, for their endless love, patience, and encouragement,

To my Prof.Dr. Ali Hassan Mohammed, who inspired me with their knowledge and guidance,

And to those who shared with me the challenges and triumphs of this path.

I strive to contribute to the betterment of humanity through the art and science of medicine.

Acknowledgment

BEFORE READING MY RESEARCH, I would like to thank my family, my first support after God. This journey would not have been possible without you. Thank you for your endless encouragement, guidance, and love. This accomplishment is as much yours as it is mine, a testament to everything you have given me. With all my love and gratitude, thank you for believing in me.

I would also like to thank my supervisor, Prof.Dr. Ali Hassan Mohammed, without whom this work would not have seen the light. I deeply appreciate your efforts.

SUPERVISOR CERTIFICATIONS

I certify that the preparation of this research titled (Effect of Advanced Maternal Age on Pregnancy Outcome) and conducted by the students (Saja Jassim Mohammed) was conducted under my supervision, College of Medicine, Diyala University, which is part of the requirements for obtaining a bachelor's degree in medicine.

***Name of supervisor**: Dr. Ali Hassan Mohammed*

***Academic degree**: Professor*

Signature:

Date:

Certificate

We, the examining committee after reading this research and examining the students in its content, find it adequate as a project for the degree of MBChB.

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List of Abbrevations

Abbreviation	Meaning
AMA	Advanced Maternal Age
SGA	Small For Gestational Age

Abstract

Background : Childbearing among women beyond 35 is known as advanced maternal age (AMA), and it is becoming more common in high-income nations. The cut-off age for AMA has been adjusted to 40 in numerous recent studies. In addition to multiparous women who continue to birth children, older primigravid women who postpone having children due to lifestyle choices or underlying subfertility are the main cause of the trend of pregnancy among moms in their later years. Additionally, the development of assisted reproductive technology is to blame

Objective : to compare between the obstetric and perinatal outcome of pregnancies in women with advanced maternal age ≥35 years with that of younger women < 35 years.

Method and patient: cross-sectional study was conducted at Al-Batool Teaching Hospital in Diyala Governorate, Iraq, between October 29, 2024, and December 15, 2024. A total of 50 women aged 30 to 45 years participated in the study. Data were collected using structured, paper-based questionnaires that covered demographic information, maternal health conditions, mode of delivery, and neonatal outcomes such as birth weight, NICU admission, and Apgar scores. Ethical considerations were maintained by ensuring no collection of names or sensitive personal data. Statistical analysis was performed using Microsoft Excel 2013 and SPSS version 21, applying descriptive statistics and chi-square tests, with a significance level set at $p < 0.05$.

Result : The study found a significant association between maternal age and both mode of delivery ($p = 0.026$), with a higher rate of cesarean sections among mothers aged >35 years, and preterm birth ($p = 0.002$), which was more frequent in older mothers. However, no significant associations were observed between maternal age and other variables, including residence, occupation, gravida status, period of gestation, miscarriage, premature rupture of membranes (PROM), or maternal complications such as sepsis, oligohydramnios, polyhydramnios, gestational diabetes (GDM), pre-eclampsia (PET), HELLP syndrome, pregnancy-induced hypertension

(PIH), or ICU admission. Similarly, neonatal outcomes, including birth weight, NICU admission, intrauterine growth restriction (IUGR), early neonatal death, congenital anomalies, and Apgar scores, showed no significant associations with maternal age ($p > 0.05$). While adverse neonatal outcomes such as very low birth weight, NICU admission, and congenital anomalies were slightly more common in older mothers, these differences were not statistically significant.

Conclusion: Based on the findings of this study, advanced maternal age (30–45 years) was found to be associated with a higher likelihood of cesarean delivery and preterm birth.

Chapter One

((Introduction))

Introductions

Childbearing in women aged 35 and older is referred to as advanced maternal age (AMA) and is becoming increasingly prevalent in high-income countries. In several recent studies, the cut-off age for AMA has been changed to 40[1–3].

Besides multiparous women who go on to have additional children, older primigravid women delaying childbearing via lifestyle or underlying subfertility are the primary drivers of the anecdotal trend of pregnancy among mums in their later years. Assisted reproductive technology also played a role [4].

In South Africa, a retrospective comparison research found that 17.5% of mothers were older than average[5]. A higher risk of obstetrical and perinatal complications, such as a higher chance of congenital disorders, placenta previa, ectopic pregnancy, spontaneous abortion, stillbirth, preterm birth, induction of labour, caesarean delivery, and small for gestational age (SGA), is thought to be linked to delaying childbearing compared to younger women. Older people are more likely to have chronic illnesses including diabetes mellitus, hypertension, and other problems that could affect a pregnancy's outcome, such cancer[6].

Although a number of studies indicate that the incidence of perinatal problems only starts to rise after the age of 35, the biggest increase in incidence is seen after the age of 40[7,8].

Preterm delivery, low birth weight, birth deformities, chromosomal abnormalities, poor Apgar score, NICU hospitalisation, and perinatal death are among the newborn problems that AMA causes[9-13]. The decline in female fertility begins in the early thirties and continues to accelerate after the mid- and late-thirties. The likelihood of a woman becoming pregnant quickly is generally reduced as she gets older. In these women, the likelihood of becoming pregnant in a single menstrual cycle, or fecundability is reduced[14,15].

Aim of Study: to compare between the obstetric and perinatal outcome of pregnancies in women with advanced maternal age ≥35 years with that of younger women < 35 years.

Chapter Two

((Patients and Methods))

Method and Materials

Study design: Cross-sectional study.

Sampling technique: The study included 50 participants, aged 30 to 45 years, at Al-Batool Teaching Hospital in Diyala Governorate, Iraq, between October 29, 2024, and December 15, 2024.

Data collection: Data were collected through paper-based questionnaires, which included demographic data, maternal health conditions, mode of delivery, and neonatal outcomes such as birth weight, NICU admission, and Apgar scores.

Ethical approval: No names or sensitive personal data of the participants were used in the study.

Statistical analysis: Data were organized and analyzed using Microsoft Excel 2013 and SPSS version 21. Descriptive statistics (cross-tabulation and chi-square tests) were used to assess associations, with significance set at $p < 0.05$.

Chapter Three

((Results))

Results

Table 1 : This table illustrates the demographic characteristics of the study participants. It shows that 38.0% (n=19) of the participants were aged below 35 years, while 62.0% (n=31) were aged above 35 years. Regarding residence, the majority of participants (66.0%, n=33) lived in rural areas, whereas 34.0% (n=17) resided in urban areas. In terms of occupation, 40.0% (n=20) of participants were employed, while 60.0% (n=30) were housewives.

Table 1 : Demographic Characteristics of the Study Participants

Variable		Frequency	Percent
Age group	**<35**	19	38.0
	>35	31	62.0
	Total	50	100.0
Residence	**Rural**	33	66.0
	Urban	17	34.0
	Total	50	100.0
Occupation	**Employed**	20	40.0
	Housewife	30	60.0
	Total	50	100.0

Table 2 : The table demonstrates the distribution of various variables by maternal age (<35 years and >35 years) along with their respective counts, percentages, and p-values. For residence, 22.0% of participants aged <35 years and 44.0% aged >35 years reside in rural areas, while 16.0% and 18.0% in the same age groups reside in urban areas (p = 0.999). Regarding occupation, 14.0% of participants aged <35 years and 26.0% aged >35 years are employed, whereas 24.0% and 36.0% in the same age groups are housewives (p = 0.775). For gravida status, 20.0% of participants aged <35 years and 26.0% aged >35 years are multiparous, while 18.0% and 36.0% in the same age groups are primiparous (p = 0.065). In terms of the period of gestation, 12.0% of participants aged <35 years and 18.0% aged >35 years had full-term pregnancies, 14.0% and 24.0% in the same age groups had post-term pregnancies, and 12.0% and 20.0% experienced preterm pregnancies (p = 0.346). None of the variables show statistically significant differences between the two age groups based on the given p-values.

Table 2 : Comparisons of baseline characteristics of older age >35 years vs. younger age groups <35 years

Variable			Age		P value
			<35	>35	
Residence	Rural	Count	11	22	0.999
		% of Total	22.0%	44.0%	
	Urban	Count	8	9	
		% of Total	16.0%	18.0%	
Occupation	Employed	Count	7	13	0.775
		% of Total	14.0%	26.0%	
	Housewife	Count	12	18	
		% of Total	24.0%	36.0%	
Gravida	Multi	Count	10	13	0.065
		% of Total	20.0%	26.0%	
	Primi	Count	9	18	
		% of Total	18.0%	36.0%	
Period of gestation	Full term	Count	6	9	0.346
		% of Total	12.0%	18.0%	
	Post term	Count	7	12	
		% of Total	14.0%	24.0%	
	Preterm	Count	6	10	
		% of Total	12.0%	20.0%	

Table 3 : The table illustrates the relationship between maternal age (<35 years and >35 years) and various obstetric outcomes, including their counts, percentages, and p-values. For the mode of delivery, 18.0% of participants aged <35 years and 36.0% aged >35 years underwent cesarean section, while 20.0% and 26.0% in the same age groups had vaginal deliveries ($p = 0.026$), indicating a significant association. Regarding miscarriage, 12.0% of participants aged <35 years and 28.0% aged >35 years reported no miscarriage, whereas 26.0% and 34.0% in the same age groups experienced miscarriage ($p = 0.992$), showing no significant association. For premature rupture of membranes (PROM), 18.0% of participants aged <35 years and 32.0% aged >35 years did not

experience PROM, while 20.0% and 30.0% in the same age groups did (p = 0.484), with no significant association. Finally, for preterm birth, 14.0% of participants aged <35 years and 34.0% aged >35 years did not experience preterm birth, while 24.0% and 28.0% in the same age groups did (p = 0.002), showing a significant association between age and preterm birth.

Table 3 : Comparisons of maternal outcomes in older age group >35 years vs. younger age groups <35 years

Variable			Age		P value
			<35	>35	
Mode of delivery	**Cesarean**	Count	9	18	0.026
		% of Total	18.0%	36.0%	
	Vaginal	Count	10	13	
		% of Total	20.0%	26.0%	
Miscarriage	**No**	Count	6	14	0.992
		% of Total	12.0%	28.0%	
	Yes	Count	13	17	
		% of Total	26.0%	34.0%	
PROM	**No**	Count	9	16	0.484
		% of Total	18.0%	32.0%	
	Yes	Count	10	15	
		% of Total	20.0%	30.0%	
Preterm birth	**No**	Count	7	17	0.002
		% of Total	14.0%	34.0%	
	Yes	Count	12	14	
		% of Total	24.0%	28.0%	

Table 4 : The table provides data on the association between maternal age (<35 years and >35 years) and several maternal health outcomes, including sepsis, oligohydramnios, polyhydramnios, gestational diabetes mellitus (GDM), pre-eclampsia (PET), HELLP syndrome, pregnancy-induced hypertension (PIH), and ICU admission.

For sepsis, 22.0% of participants aged <35 years and 32.0% aged >35 years did not develop sepsis, while 16.0% and 30.0% in the same age groups did ($p = 0.832$), indicating no significant association. Regarding oligohydramnios, 24.0% of participants aged <35 years and 28.0% aged >35 years were unaffected, whereas 14.0% and 34.0% experienced it ($p = 0.333$), showing no significant difference. For polyhydramnios, 32.1% of participants aged <35 years and 67.9% aged >35 years were unaffected, while 20.0% and 24.0% in the same age groups experienced it ($p = 0.611$).

In terms of GDM, 12.0% of participants aged <35 years and 32.0% aged >35 years were unaffected, while 26.0% and 30.0% in the same age groups had GDM ($p = 0.334$). For PET, 16.0% of participants aged <35 years and 36.0% aged >35 years did not develop PET, whereas 22.0% and 26.0% in the same age groups did ($p = 0.557$).

For HELLP syndrome, 18.0% of participants aged <35 years and 32.0% aged >35 years were unaffected, while 20.0% and 30.0% in the same age groups experienced it ($p = 0.998$). Concerning PIH, 18.0% of participants aged <35 years and 22.0% aged >35 years did not develop PIH, while 20.0% and 40.0% in the same age groups experienced it ($p = 0.715$).

Finally, for ICU admission, 18.0% of participants aged <35 years and 34.0% aged >35 years were not admitted, while 20.0% and 28.0% in the same age groups required ICU admission ($p = 0.255$).

Table 4 : Comparisons of obstetric outcomes in older age >35 years vs. younger age groups <35 years

Variable			Age		
			<35	>35	
Sepsis	**No**	Count	11	16	0.832
		% of Total	22.0%	32.0%	
	Yes	Count	8	15	
		% of Total	16.0%	30.0%	
Oligohydramnios	**No**	Count	12	14	0.333
		% of Total	24.0%	28.0%	
	Yes	Count	7	17	
		% of Total	14.0%	34.0%	
Polyhydramnios	**No**	Count	9	19	0.611
		% within Polyhydramnios	32.1%	67.9%	
	Yes	Count	10	12	
		% of Total	20.0%	24.0%	
GDM	**No**	Count	6	16	0.334
		% of Total	12.0%	32.0%	
	Yes	Count	13	15	
		% of Total	26.0%	30.0%	
PET	**No**	Count	8	18	0.557
		% of Total	16.0%	36.0%	
	Yes	Count	11	13	
		% of Total	22.0%	26.0%	
HELLP syndrome	**No**	Count	9	16	0.998
		% of Total	18.0%	32.0%	
	Yes	Count	10	15	
		% of Total	20.0%	30.0%	
PIH	**No**	Count	9	11	0.715
		% of Total	18.0%	22.0%	
	Yes	Count	10	20	
		% of Total	20.0%	40.0%	
ICU admission	**No**	Count	9	17	0.255
		% of Total	18.0%	34.0%	
	Yes	Count	10	14	
		% of Total	20.0%	28.0%	

Table 5 : The table analyzes neonatal outcomes in relation to maternal age (<35 years and >35 years), showing no statistically significant associations for any variable. For birth weight, 14.0% and 20.0% of infants had low weight, 14.0% and 16.0% had normal weight, and 10.0% and 26.0% had very low weight in the respective age groups ($p = 0.661$). Regarding NICU admission, 26.0% and 30.0% did not require admission, while 12.0% and 32.0% did ($p = 0.173$). For IUGR, 14.0% and 34.0% of infants had no IUGR, while 24.0% and 28.0% did ($p = 0.998$). Early neonatal death occurred in 8.0% and 28.0%, while survival was observed in 30.0% and 34.0% ($p = 0.341$). Congenital anomalies were absent in 22.0% and 30.0%, while present in 16.0% and 32.0% ($p = 0.661$). Lastly, Apgar scores of 0-3 were recorded for 8.0% and 14.0%, scores of 4-6 for 8.0% and 30.0%, and scores of 7-10 for 22.0% and 18.0% ($p = 0.754$).

Table 5 : Comparisons of fetal and perinatal outcomes in older age >35 years vs. younger age groups <35 years

Variable			Age		P value
			<35	>35	
Birth weight	Low	Count	7	10	0.661
		% of Total	14.0%	20.0%	
	Normal	Count	7	8	
		% of Total	14.0%	16.0%	
	Very low	Count	5	13	
		% of Total	10.0%	26.0%	
NICU admission	No	Count	13	15	0.173
		% of Total	26.0%	30.0%	
	Yes	Count	6	16	
		% of Total	12.0%	32.0%	
IUGR	No	Count	7	17	0.998
		% of Total	14.0%	34.0%	
	Yes	Count	12	14	
		% of Total	24.0%	28.0%	
Early neonatal death	No	Count	15	17	0.341
		% of Total	30.0%	34.0%	
	Yes	Count	4	14	
		% of Total	8.0%	28.0%	
Congenital anomaly	No	Count	11	15	0.661
		% of Total	22.0%	30.0%	
	Yes	Count	8	16	
		% of Total	16.0%	32.0%	
Apgar score	0-3	Count	4	7	0.754
		% of Total	8.0%	14.0%	
	4-6	Count	4	15	
		% of Total	8.0%	30.0%	
	7-10	Count	11	9	
		% of Total	22.0%	18.0%	

Chapter Four

((Discussion))

Discussion

In our study, we examined the association between advanced maternal age and pregnancy outcomes across various demographic, maternal, obstetric, and neonatal parameters. The findings are compared with two similar studies, Ibrahim et al. (2024)[16] and Mahato et al. (2021)[17], to provide a comprehensive perspective.

Our study revealed that 62.0% of participants were aged >35 years, with 66.0% residing in rural areas and 60.0% being housewives. These findings are consistent with Ibrahim et al. (2024), who reported that most participants in the advanced age group were rural residents, a factor that often correlates with limited access to healthcare and increased maternal risks. Mahato et al. (2021)[17] further noted that 81.55% of the advanced maternal age participants aged 35–39 years and 67.85% of ≥40-year-old women were multigravida, which may indicate that women with higher parity could be more common as a result of sociocultural factors, such as the tendency for larger families to be preferred in rural communities. These studies align with data indicating that sociodemographic factors, including rural residency and unemployment, influence older mothers' pregnancy outcomes.

In our study we found a significant association between advanced maternal age and cesarean delivery ($p = 0.026$), in agreement with Ibrahim et al. (2024)[16], which pointed out the rising cesarean rates in older mothers. Mahato et al. Cesarean deliveries made up 75% of births in the older age group, an aspect reported by (2021)[17] as well. The increasing cesarean rates with maternal age in these studies indicate an increased risk for older mothers for complications during labor, including malpresentation, fetal distress, and prolonged labor. Notably, Mahato et al. reported an increase in

malpresentation (16.66%, p = 0.01) and fetal distress (14.28%, p = 0.049) in the older age group, which directly affects the higher rates of cesarean deliveries.

Unlike our study, which did not find significant associations with other maternal complications, Mahato et al. observed a notable incidence of gestational diabetes (4.76%) and placenta previa (4.76%) in women aged 35–39 years, highlighting regional variations in maternal health outcomes.

Preterm birth was significantly associated with advanced maternal age in our study (p = 0.002), consistent with findings from Ibrahim et al. (2024) and Mahato et al. (2021)[17]. In Mahato's study, preterm birth rates were particularly high in the very advanced age group (27.27%), which was attributed to conditions such as oligohydramnios and placental insufficiency. The consistent findings across these studies reinforce that advanced maternal age predisposes women to obstetric complications, likely due to age-related physiological changes, such as reduced uteroplacental blood flow. These findings highlight the need for early and continuous monitoring of older pregnant women to manage risks associated with preterm delivery effectively.

While our study did not find significant associations between advanced maternal age and neonatal outcomes such as NICU admission or low Apgar scores, Mahato et al. (2021)[17] identified significant risks in very advanced maternal age groups. Similar findings have been reported such as NICU admissions being noted in 18.18% of neonates born to mothers aged ≥40 years with similar prevalence of congenital anomalies (9.09%) and perinatal deaths (18.18%). Ibrahim et al. found a non-significant increase in NICU admissions in neonates(facility-based cohort), born to advanced-age

mothers. This discrepancy may be due to Despite the variation all studies show the importance of a close monitoring of fetal status and a closer monitoring of neonates in pregnancies with advanced maternal age.

Chapter Five

((Conclusion and Recommendations))

Conclusion

1. As indicated in this study, higher rates of cesarean delivery and preterm birth were observed in births from mothers aged 30 to 45 years.
2. No significant differences were seen in other maternal complications or neonatal outcomes, including birth weight, NICU admission, or Apgar scores.
3. The findings therefore imply that advanced maternal age produces no worse overall outcomes in pregnancy, although the risk of certain pregnancy-related complications appears to be increased.

Recommendation

1. Keep women in the age range of 30–45 years with regular antenatal checkups to be mindful of possible complications such as preterm labor or cesarean delivery.
2. Deliver Educational Health Information; create an awareness of the need for prenatal care and the risks associated with advanced maternal age.
3. Specialized monitoring during pregnancy with an emphasis on early detection and management of complications, including gestational diabetes and preeclampsia.
4. Promote more research to assess other factors that influence pregnancy outcomes in women of increasing maternal age to improve care practices

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