

**Ministry of Higher Education**

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**College of Medicine**



**Association between paternal and maternal  
age groups with the incidence of premature  
infants in Al-Batool teaching hospital in  
Diyala Governorate - Iraq**

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## **Abstract**

**Background:** Preterm birth (<37 weeks of gestation) occurs in up to 10% of pregnancies in developed countries and even more in developing countries. Preterm birth, especially very preterm birth, may have serious long-term effects, including cerebral palsy, respiratory disease, blindness and deafness.

**Patients and methods:** 100 patients were enrolled in this study. We collected the sample from the patients that attend al- Batool teaching hospital in the period from September 2022 to December 2022.

**Results:** 100 patients were enrolled in this study. They were 56 male and 44 females with gestational age ranged from 27 to 35 weeks. There was significant association between increased maternal age and risk of preterm birth and no association between paternal age and risk of preterm birth.

**Conclusion:** We concluded that there is a strong association between maternal age and the risk of preterm birth.

**Keywords:** Preterm birth, Maternal age, Paternal age.

## **Introduction**

Preterm birth (<37 weeks of gestation) occurs in up to 10% of pregnancies in developed countries and even more in developing countries. Preterm birth, especially very preterm birth, may have serious long-term effects, including cerebral palsy, respiratory disease, blindness, and deafness. Preterm birth is one of the largest health problems in reproductive health, because it is associated with more than 70% of morbidity and mortality in early life. It is estimated that each day, across the world over 41,000 infants are born before this gestational age. The etiology of preterm birth is only partly understood [1-2].

While it is well documented that advanced age among women is an important risk factor for infertility, miscarriage, and offspring genetic defects, less is known about the effects of advanced age on reproductive impairment among men. Globally, paternal age at childbirth is steadily increasing. In 1993, the proportion of fathers aged 35 to 54 in the UK was 25%, and in 2003 this proportion rose to 40% [3].

Preterm birth (PTB) rates are rising in many high-income countries, but international comparisons that seek to understand the underlying reasons for the increase are lacking. It has been proposed that the rise in PTB is partly attributable to an increase in maternal age, as women in Western countries increasingly delay pregnancy to later in life [3]. Several studies have shown strong associations between advanced maternal age and PTB, but other studies only adjust for this variable, making it difficult to determine the extent to which changes in maternal age are in fact responsible for the increase in PTB rates over time [4].

There is preliminary evidence to suggest that advanced paternal age may increase the occurrence of adverse pregnancy outcomes such as miscarriage, stillbirth or preterm birth. The adverse offspring outcomes include higher rates of

congenital malformations, malignancies, early onset schizophrenia, autism and other psychiatry or academic morbidities [5].

Prior literature has identified several social and physiological characteristics of mothers as well as fathers as predictors of birth weight and gestational age. These include factors such as maternal smoking, maternal race/ethnicity, the sex and birth order of the child, parental height [6]. A minireview, concluded that advanced paternal age (40 years) was associated with miscarriages and fetal deaths. Diseases such as Alpert syndrome, Marfan syndrome, and Waardenberg syndrome are associated with advanced paternal age [7]. The evidence on the association between a young paternal age at birth and birth outcomes is also inconclusive, with some studies showing a positive association and others a lack of one. As a result of the fact that only a few studies have analyzed the association between paternal age and birth outcomes and with some limitations, the literature is inconclusive as to whether paternal age matters for birth outcomes [8-9].

We noticed that there is increased rate of PTB in Iraq and especially in Diyala province and little number of studies about the topic so we decided to conduct a study to determine the association between maternal and paternal age on the risk of preterm delivery in Diyala governorate.

**Aim of study:** To determine the effect of paternal and maternal age on the incidence of preterm birth.

## **Patients and methods**

This is observational study. We collected a sample of 100 preterm babies their gestational ages ranged from 27 to 35 weeks. We collected the data from al-batool teaching hospital for pediatric and gynecology in Diyala governorate by filling prepared written questionnaire in the period from September 2022 to December 2022. We asked them some questions including the baby gestational age, mode of delivery, father and mother age and if there is history of chronic diseases in the family. We asked in Arabic language and the privacy and confidentiality was preserved.

## **Statistical analysis**

Statistical package for social sciences (SPSS) version 26 was used to analyze the data. The data presented in simple measures of frequency, range and we used Pearson chi square to determine the association between the variables when  $P < 0.05$  considered significant.

## Results

The 100 patients were enrolled in this study. They were 56 male and 44 females with gestational age ranged from 27 to 35 weeks. We classified them to 4 groups as in table 1.

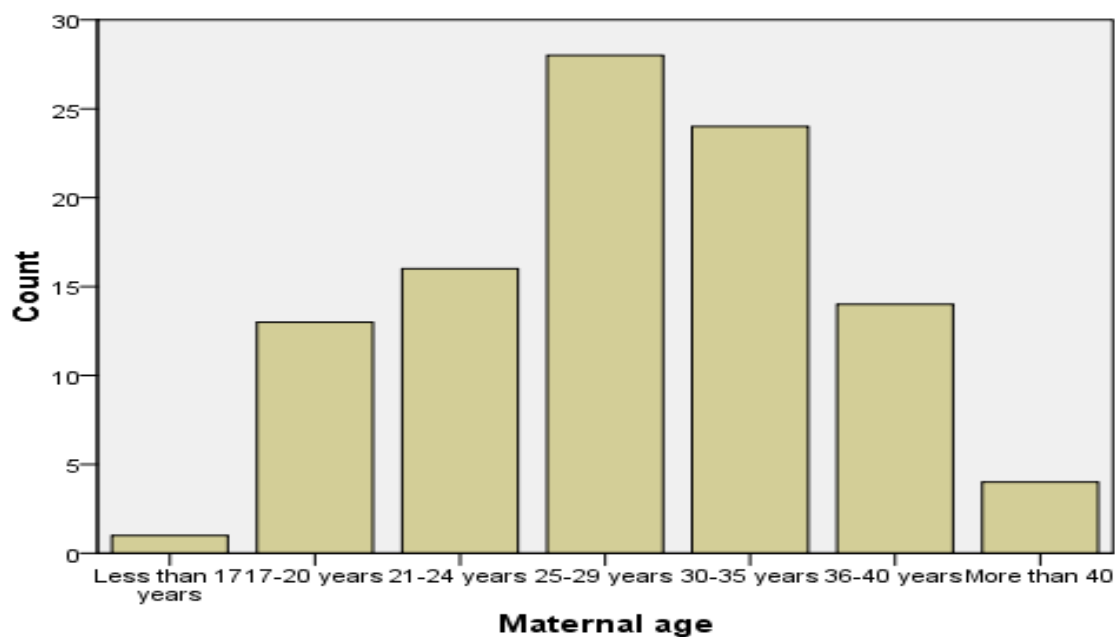
**Table 1. Gestational AGE.**

Gestational age	Frequency	Percent
36- 37 wks	10	10%
32-35 wks	61	61%
27-31 wks	25	25%
More than 26 wks	4	4%
Total	100	100%

41% of them were delivered by normal vaginal delivery and 59% were delivered by cesarean section. Their maternal age was as in table 2.

**Table 2. The maternal age.**

Category	Frequency	Percent
Less than 17 years	1	1%
17-20 years	13	13%
21-24 years	16	16%
25-29 years	28	28%
30-35 years	24	24%
36-40 years	14	14%
More than 40	4	4%
Total	100	100%

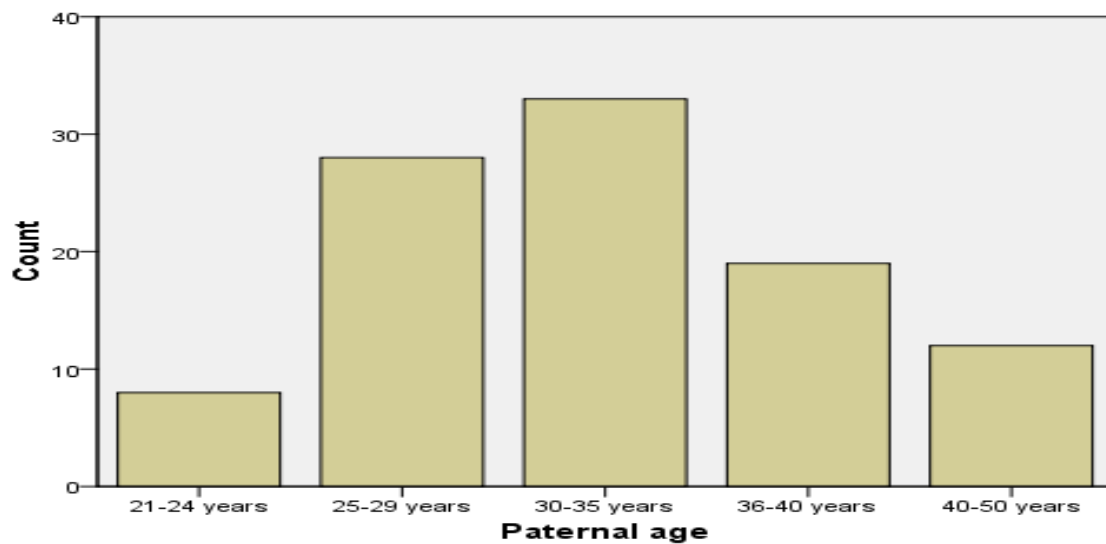


**Figure 1. Bar chart for the frequency of the maternal age groups in our study.**

And paternal age was as in table 3.

**Table 3. Paternal age.**

Category	Frequency	Percent
21-24 years	8	8%
25-29 years	28	28%
30-35 years	33	33%
36-40 years	19	19%
More 40 years	12	12%
Total	100	100%



**Figure 2. Bar chart for the frequency of the Paternal age groups in our study.**

The 87% of the mothers have no chronic disease and 13% have and 75% of fathers have no chronic diseases and 25% have chronic diseases as the following table 4.

**Table 4. Frequency of the chronic disease among the parents.**

Disease	Frequency of fathers	Frequency of mothers
Hypertension	6	6
Diabetes mellitus	4	2
Asthma	7	0
Arthritis	3	0
Chronic bronchitis	5	0
Toxoplasmosis	0	1
Hypothyroidism	0	1



Urinary tract infection	0	1
Thalassemia + clotting disorders	0	2
Total	25	13

There was no association between paternal age and risk of having preterm baby as P value > 0.05 as in the following table 5.

**Table 5. The association between paternal age and risk and prematurity.**

Fathers age		less than 37 wks	32-35 wks	27-31 wks	less than 26 wks	Total	P= 0.138
21-24 years	Count	1	2	4	1	8	
	% of Total	1.0%	2.0%	4.0%	1.0%	8.0%	
25-29 years	Count	2	20	5	1	28	
	% of Total	2.0%	20.0%	5.0%	1.0%	28.0%	
30-35 years	Count	3	22	8	0	33	
	% of Total	3.0%	22.0%	8.0%	0.0%	33.0%	
36-40 years	Count	1	13	3	2	19	
	% of Total	1.0%	13.0%	3.0%	2.0%	19.0%	
40-50 years	Count	3	4	5	0	12	
	% of Total	3.0%	4.0%	5.0%	0.0%	12.0%	
Total	Count	10	61	25	4	100	
	% of Total	10.0%	61.0%	25.0%	4.0%	100.0%	

And there was significant association between the maternal age and the risk of having preterm babies as in table 6.

**Table 6. The association between maternal age and risk and prematurity.**

Maternal age		less than 37 wks	32-35 wks	27-31 wks	less than 26 wks	Total	
Less than 17 years	Count	0	0	0	1	1	P < 0.001
	% of Total	0.0%	0.0%	0.0%	1.0%	1.0%	
17-20 years	Count	3	6	4	0	13	
	% of Total	3.0%	6.0%	4.0%	0.0%	13.0%	
21-24 years	Count	1	9	5	1	16	
	% of Total	1.0%	9.0%	5.0%	1.0%	16.0%	
25-29 years	Count	2	21	5	0	28	
	% of Total	2.0%	21.0%	5.0%	0.0%	28.0%	
30-35 years	Count	1	18	3	2	24	
	% of Total	1.0%	18.0%	3.0%	2.0%	24.0%	
36-40 years	Count	2	5	7	0	14	
	% of Total	2.0%	5.0%	7.0%	0.0%	14.0%	
More than 40	Count	1	2	1	0	4	
	% of Total	1.0%	2.0%	1.0%	0.0%	4.0%	
Total	Count	10	61	25	4	100	
	% of Total	10.0%	61.0%	25.0%	4.0%	100.0%	

## **Discussion**

The primary focus of the study was on the relationship maternal and paternal age with risk of preterm birth, which is responsible for an estimated 80% of post neonatal deaths not associated with congenital malformation [10].

As women in developed countries tend to delay childbearing, it becomes more important to understand the relationship of advanced maternal age to birth outcomes. Among birth outcomes, preterm birth and low birthweight are important as they are related to adverse developmental, health, educational and economic outcomes in childhood and adulthood. Researchers have typically tried to determine whether advanced maternal age is adversely related to these birth outcomes. Some studies reported no statistically significant relationship but literature reviews concluded that the relationship did exist other maternal characteristics may also be implicated. Risk factors such as diabetes, hypertension, and obesity are increasingly prevalent in younger women and may have contributed to the rising PTB rates of this age group. Smoking during pregnancy fell by approximately 50% from the 1980s to the 2000s in Denmark and a potentially larger decrease in older mothers may have stabilized or decreased their PTB rates [11-14].

Up to our knowledge, this is the first study in Diyala governorate that studied the association between both paternal and maternal age and the risk of preterm birth. We found no significant relationship between paternal age and the preterm birth risk ( $P > 0.05$ ) while we found a significant association between maternal age and the preterm birth risk ( $P < 0.001$ ) especially in the older age groups.

Our findings agree with the findings of a study found that Nulliparous women <18 years of age have the highest odds of adverse neonatal outcomes. Higher odds of adverse outcomes are also seen among parity  $\geq 3$  / age  $\geq 35$  mothers [15], also a study found the risk for the 25-to 29-year-old mothers was 1.26 times and for the > 30-year-old mothers 1.28 times that for the reference group [16], and another study found that advanced maternal age (40 years and over) was associated with an increased risk of preterm birth. The lowest risk of prematurity was found in mothers aged 30–34 years. Preterm birth was mainly spontaneous in younger women (20–24 years) [17].

And contradict with the findings of study found that paternal age was an independent risk factor for adverse fetal birth outcomes, in which elevated risks for stillbirth and late stillbirth were observed for the older paternal age categories [18]. Also another study underscored the importance of considering paternal age as a potential risk factor for adverse birth outcomes and of expanding research on its role and the mechanisms linking it to birth outcomes [19], and finally a study suggested that advanced paternal age is associated with a higher risk of preterm birth and very preterm births [20].

The main limitations for the study was the size of the sample, the uncertainty of the parents and that we collected the data from only al-batool hospital.

## **Conclusion and recommendation**

According to our findings we concluded that there is strong association between maternal age the increased risk of preterm birth.

We recommend conducting more studies about this topic an especially on the paternal age and its association with preterm birth in Diyala governorate.

## **Aim of study**

The aim of this study to determine the effect of paternal and maternal age on the incidence of preterm birth.

## References

1. Mattison DR, Damus K, Fiore E, Petrini J, Alter C. Preterm delivery: a public health perspective. *Paediatric and Perinatal Epidemiology*. 2001 Jul;15:7-16.
2. Platt MJ. Outcomes in preterm infants. *Public health*. 2014 May 1;128(5):399-403.
3. Bray I, Gunnell D, Smith GD. Advanced paternal age: how old is too old?. *Journal of Epidemiology & Community Health*. 2006 Oct 1;60(10):851-3.4
4. Johnson JA, Tough S, Wilson RD, Audibert F, Blight C, BrockS JA, Cartier L, Désilets VA, Gagnon A, Langlois S, Murphy-Kaulbeck L. Delayed child-bearing. *Journal of obstetrics and gynaecology Canada*. 2012 Jan 1;34(1):80-93.
5. Auger N, Hansen AV, Mortensen L. Contribution of maternal age to preterm birth rates in Denmark and Quebec, 1981–2008. *American journal of public health*. 2013 Oct;103(10):e33-8.
6. Cnattingius S, Haglund B, Kramer MS. Differences in late fetal death rates in association with determinants of small for gestational age fetuses: population based cohort study. *Bmj*. 1998 May 16;316(7143):1483.
7. Chen XK, Wen SW, Krewski D, Fleming N, Yang Q, Walker MC. Paternal age and adverse birth outcomes: teenager or 40+, who is at risk?. *Human Reproduction*. 2008 Jun 1;23(6):1290-6.
8. Olshan AF, Ananth CV, Savitz DA. Intrauterine growth retardation as an endpoint in mutation epidemiology: an evaluation based on paternal age. *Mutation Research/Genetic Toxicology*. 1995 Aug 1;344(1-2):89-94.

9. Mao Y, Zhang C, Wang Y, Meng Y, Chen L, Dennis CL, Sheng J, Wu Y, Huang H. Association between paternal age and birth weight in preterm and full-term birth: a retrospective study. *Frontiers in endocrinology*. 2021 Jul 22;12:706369.
10. De La Rochebrochard E, Mcelreavey K, Thonneau P. Paternal age over 40 years: the “amber light” in the reproductive life of men?. *Journal of andrology*. 2003;24(4):459-65.
11. Ekwo EE, Moawad A. Maternal age and preterm births in a black population. *Paediatric and perinatal epidemiology*. 2000 Apr;14(2):145-51.4
12. Chang HH, Larson J, Blencowe H, Spong CY, Howson CP, Cairns-Smith S, Lackritz EM, Lee SK, Mason E, Serazin AC, Walani S. Preventing preterm births: analysis of trends and potential reductions with interventions in 39 countries with very high human development index. *The Lancet*. 2013 Jan 19;381(9862):223-34.
13. Sohn K. The trend in the relationship of advanced maternal age to preterm birth and low birthweight. *The European Journal of Contraception & Reproductive Health Care*. 2017 Sep 3;22(5):363-8.
14. Goldenberg RL, Culhane JF, Iams JD, Romero R. Epidemiology and causes of preterm birth. *The lancet*. 2008 Jan 5;371(9606):75-84.
15. Hunt KJ, Schuller KL. The increasing prevalence of diabetes in pregnancy. *Obstetrics and gynecology clinics of North America*. 2007 Jun 1;34(2):173-99.
16. Kozuki N, Lee AC, Silveira MF, Sania A, Vogel JP, Adair L, Barros F, Caulfield LE, Christian P, Fawzi W, Humphrey J. The associations of parity and maternal age with small-for-gestational-age, preterm, and

- neonatal and infant mortality: a meta-analysis. *BMC public health*. 2013 Sep;13(3):1-0.
17. Fuchs F, Monet B, Ducruet T, Chaillet N, Audibert F. Effect of maternal age on the risk of preterm birth: A large cohort study. *PloS one*. 2018 Jan 31;13(1):e0191002.
18. Alio AP, Salihu HM, McIntosh C, August EM, Weldeselasse H, Sanchez E, Mbah AK. The effect of paternal age on fetal birth outcomes. *American journal of men's health*. 2012 Sep;6(5):427-35.
19. Goisis A, Remes H, Barclay K, Martikainen P, Myrskylä M. Paternal age and the risk of low birth weight and preterm delivery: a Finnish register-based study. *J Epidemiol Community Health*. 2018 Dec 1;72(12):1104-9.
20. Mao Y, Liu Z, Zhang C, Wang Y, Meng Y, Chen L, Sheng J, Wu Y, Huang H. Association between paternal age and subtypes of preterm birth: a retrospective study. *Reproductive BioMedicine Online*. 2022 Jun 1;44(6):1101-9.