J Biochem Technol (2025) 16(3): 126-134
https://doi.org/10.51847/BQyH5YuMIB
ISSN: 0974-2328

The Features of Pregnancy and Childbirth for Women Over 35: Risks and Opportunities

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Received: 27 May 2025 / Received in revised form: 11 September 2025, Accepted: 11 September 2025, Published online: 29 September 2025

Abstract

A prospective, comparative study of 360 pregnant women with their first physiological pregnancy was conducted. The women were divided into two groups: 180 women aged 22-28 and 180 women aged 36-42. The study aimed to compare the course of pregnancy, frequency of complications, structure of drug therapy, and outcomes of childbirth among somatically healthy women from different age groups. It was found that older women had a statistically significant increase in the incidence of gestational diabetes mellitus (17.2% versus 5.0%), pre-eclampsia (13.9% versus 3.9%), and fetoplacental insufficiency (26.1% versus 8.9%). Additionally, a higher need for medical support was revealed. Progesterone preparations were prescribed to 54.4% of women in the older group compared to 23.3% in the younger group. Antiplatelet agents were also used more frequently in the older group (37.2%) than in the younger group (13.9%). Cesarean delivery rates were higher among the older women, with 44.4% in the older group versus 22.8% in the younger comparison group. The indicators of newborn condition also varied: the Apgar score at 5 minutes <8 points was recorded in 11.7% of babies born to older mothers, compared with 3.3% in the control group. These findings confirm the need for differentiated approaches to managing pregnancies in older women. Despite the increased risks associated with older age, modern obstetric techniques allow for successful management and favorable perinatal outcomes when adequate medical care is provided.

Keywords: Advanced maternal age, Age-related risks, Pregnancy complications, Medication use, Birth outcomes, Longitudinal study

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Introduction

Contemporary reproductive medicine and society at large are witnessing a growing trend of an increase in the average age at which women have their first child, and subsequent children (Correa-de-Araujo & Yoon, 2021; ACOG, 2022). This phenomenon, known as "late pregnancy," has attracted intense interest among obstetricians, gynecologists, demographers, and sociologists (Saccone *et al*., 2022; Sparić *et al*., 2024). The change in reproductive behavior is driven by complex socioeconomic factors, including women's desire for education, career advancement, and family financial stability, as well as the evolution of traditional family structures (Baklanov *et al*., 2020; Ye *et al*., 2023).

Within the context of modern obstetrics, late pregnancy refers to pregnancies in women aged 35 or older. Although this age threshold is arbitrary, statistical evidence supports an increase in certain risks and complications associated with the general process of biological aging and age-related changes in the reproductive system (Attali & Yogev, 2021; Chronopoulou *et al*., 2021; Frick, 2021).

From a medical perspective, the ideal age for childbearing is between 20 and 30 years old (El Miedany & Palmer, 2021; Racusin *et al*., 2022). During this period, a woman's body reaches its physiological peak in terms of development, making it the best time for fulfilling its reproductive function. Hormonal balance is optimal, providing a stable foundation for maintaining the menstrual cycle and facilitating fertilization and implantation (Al-Hafez *et al*., 2020; Romero-Gonzalez *et al*., 2020; Sabetghadam *et al*., 2022).

The uterus and other muscular tissues are at their most elastic and toned, contributing to a smooth pregnancy and delivery (Riley *et al*., 2022; Khadivzadeh *et al*., 2023). Somatic health is usually free from chronic conditions like hypertension, diabetes, and kidney problems that may worsen or arise during pregnancy (Bischoff *et al*., 2019; Kitamura *et al*., 2023; Park & Kim, 2023). Metabolism is active, allowing easy adaptation to the increased demands on the cardiovascular, respiratory, and endocrine systems (Nikolettos *et al*., 2024).

For a first pregnancy, the optimal age range is 20 to 28 years, minimizing risks for both the mother and the child and providing optimal conditions for fetal development. For subsequent pregnancies, there may be a slight shift in the upper limit; however, the fundamental risks associated with advancing age remain and become more pronounced as one approaches the 35-40 age range (Mate *et al*., 2021; Bouariu *et al*., 2022; Chidambaranathan & Culathur, 2022; Flatley *et al*., 2022).

As women age, a series of natural physiological changes occur in their bodies, directly affecting their reproductive capacity, gestational potential, and the health of their offspring. One of the most significant changes is the decline in ovarian reserve, which refers to the number of eggs in a woman's ovaries (Erel & Ozcivit, 2021; Cavalcante *et al*., 2023; Pavithra *et al*., 2023; Bao *et al*., 2024).

Unlike male germ cells, which undergo continuous renewal throughout life, female oocytes do not regenerate. The number of oocytes is established at birth and decreases irreversibly with each menstrual cycle, especially after the age of 35 (Ding *et al*., 2022; Li *et al*., 2022; Perrine *et al*., 2023). Not only does the quantity of oocytes decrease with age, but their quality also deteriorates, leading to errors in the genetic material (Zhang *et al*., 2025). These errors can be caused by exposure to adverse environmental factors, chronic illnesses, or the natural processes of cellular aging (Canassa & Baldin, 2022; Han *et al*., 2024).

The mechanisms responsible for repairing DNA errors in oocytes become less effective with age, increasing the likelihood of chromosomal abnormalities in the developing fetus (Fiorentino & Hughes, 2021). This is the primary cause of the marked increase in the incidence of genetic disorders such as Down syndrome (Wilhelmy *et al*., 2022; Aprigio *et al*., 2023). The risk of Down syndrome exponentially increases with age, from approximately 1 in 1,000 for women under 25 years old, to 1 in 350 for those 35 years and older, 1 in 100 in their 40s, and 1 in 30 in those over 45 (Song *et al*., 2022). In addition to Down syndrome, maternal age is also associated with an increased risk of other chromosomal disorders such as Edwards and Patau syndromes, as well as sex chromosome abnormalities (Macrì *et al*., 2023; Marçola *et al*., 2023).

In addition to the potential risks to the developing fetus, the body of a pregnant woman undergoes several changes that can complicate pregnancy. These changes include a decrease in the flexibility of the blood vessels, which can lead to a reduced ability for blood vessels to expand adequately (Castleman *et al*., 2023). Thus, combined with the increased stress on the cardiovascular system during pregnancy, it can put a woman at risk of developing hypertension and pre-eclampsia. Pre-eclampsia is a serious condition characterized by high blood pressure and protein in the urine (Després *et al*., 2023; Jordao *et al*., 2023).

Furthermore, the natural decrease in insulin sensitivity that occurs with age, exacerbated by metabolic changes during pregnancy, significantly increases the likelihood of developing gestational diabetes mellitus (Ye *et al*., 2022; Lobach *et al*., 2023). Additionally, the loss of original elasticity in muscle tissue, particularly in the uterine myometrium, can result in uterine weakness and an increased likelihood of requiring surgical intervention during childbirth (Breuking *et al*., 2023; Bulusu & Cleary, 2023). Moreover, by the time they reach adulthood, many women accumulate a "baggage" of chronic non-reproductive diseases, such as obesity, thyroid and kidney disorders, which tend to worsen during pregnancy and serve as aggravating factors themselves.

The phenomenon of delayed motherhood, despite its potential risks, has become a global concern. In developed countries around the world, the number of women having children in their late 30s, 40s, and beyond has increased (De Clercq *et al*., 2023; Shaiba *et al*., 2024). This trend was relatively uncommon in the early 2000s, but it now accounts for a significant share of the overall birthrate. To better understand this trend, we can examine statistical data from different countries, such as Russia, and compare it **(Figure 1)**.

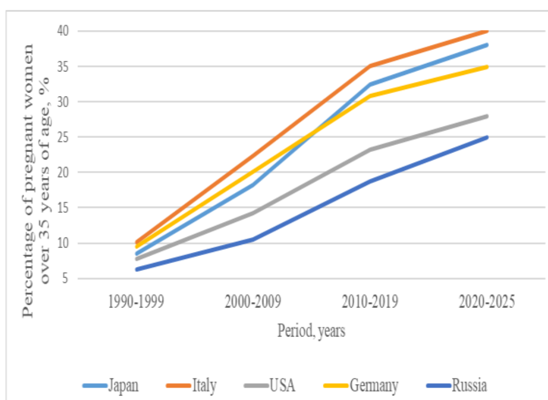

Figure 1. Dynamics of the frequency of pregnancies and childbirth among women over 35 years of age in different countries of the world and in Russia (in % of the total number of births)

The data presented clearly show that, although Russia lags behind some countries in southern Europe and East Asia on indicators, there has been a steady increase in the number of late births. This indicates that Russia is approaching global trends in this area. This underscores the importance of conducting in-depth research to develop effective strategies for managing this patient group within the national healthcare system. Recent advances in obstetrics and perinatal medicine have led to significant improvements in outcomes for pregnancies involving older mothers. The development of prenatal diagnostics, the implementation of effective monitoring protocols, and advancements in pharmacotherapy have reduced the risks associated with advancing motherhood.

Particular attention should be paid to the development of pharmaceutical support, as progesterone preparations, antiplatelet agents, tocolytic, and antihypertensive medications can effectively manage many complications commonly seen in older pregnant women. This study aimed to conduct a comparative analysis of first-time physiological pregnancies in two age groups: 22-28 years and 36-42 years, selected based on strict inclusion and exclusion criteria, to assess the course of pregnancy, incidence of complications, prescribed therapies, and outcomes. This study design allows us to separate the effect of age and obtain objective data on current successful pregnancy rates in older women of reproductive age. The results can serve as a basis for developing optimized protocols for managing late pregnancies, taking into account both the risks and the capabilities of modern medicine to minimize them.

Materials and Methods

This study was a prospective, comparative cohort study conducted at Obstetrics and Gynecology centers in Rostov-on-Don from January 2023 to March 2025. The aim was to compare the course of first physiological pregnancies in women in two age groups while excluding the influence of comorbidities.

To achieve this aim, two study groups were created. The control group (group 1) comprised 180 women aged 22–28, with an average age of 25.2±1.9 years, who were experiencing their first physiological pregnancy. The main group (group two) included 180 patients aged 36–42 years with an average of 38.8±2, who were also having their first pregnancy. Both groups met strict inclusion criteria, including:

- First obvious, single pregnancy;
- No smoking or alcohol use during conception or pregnancy;
- Absence of chronic somatic or gynecological disease.

Additional requirements included euthyroid status and normal glycated hemoglobin levels at enrollment, as well as voluntary informed consent to participate in the study. Exclusion criteria included the development of serious pregnancy complications requiring early delivery, withdrawal from participation, or detection of previously undiagnosed chronic conditions during follow-up. All participants were closely monitored from registration, corresponding to 6-8 weeks of pregnancy, until the end of their pregnancies. The study followed a standardized protocol including clinical and anamnestic examinations, including collecting a complete medical history, monitoring blood pressure, weight, and other anthropometric measurements, and performing laboratory diagnostics focused on the comparative analysis of key parameters.

As part of the complete blood test, special attention was paid to hemoglobin levels to assess the incidence and severity of anemia during pregnancy. Biochemical analysis of blood also included a comparative evaluation of liver function indicators, such as alanine and aspartate transaminases, and kidney function indicators, including creatinine, urea, and a lipid profile at weeks 12 and 30 of pregnancy. The hemostasiogram was used to evaluate coagulation parameters, including fibrinogen, activated partial thromboplastin time, and international normalized ratio, to identify trends toward hypercoagulation. All participants underwent an oral glucose tolerance test with 75 g of glucose at 24-28 weeks to diagnose gestational diabetes mellitus promptly.

Instrumental diagnostics included an ultrasound examination with Dopplerometry, which was performed at standard screening points: 11-14, 18-21, and 30-34 weeks. This study assessed fetometric parameters, placental condition, and blood flow parameters, specifically resistance indices in uterine and umbilical arteries. In the third trimester, all women underwent cardiotocography to comprehensively assess fetal well-being. Statistical analysis was used to compare data from different time points and participant groups. For statistical data analysis, SPSS Statistics 26.0 was used. Quantitative variables following a normal distribution were described using their mean and standard deviation. A t-test was used to compare two independent groups of quantitative variables, and a chi-squared test was used to compare two independent groups of categorical variables. Differences were considered significant if p-values were less than 0.05.

Results and Discussion

A prospective comparative study of 360 patients with the first physiological pregnancy revealed statistically significant differences in the course of the gestational period, the nature of complications, management tactics, and pregnancy outcomes between age groups.

1. *Gestational complications and hospitalization rates* **(Table 1)**. Analysis of the frequency and structure of obstetric complications demonstrated pronounced age-associated differences. In the group of women of older reproductive age, complications requiring medical correction and inpatient treatment were significantly more common.

Table 1. Comparative analysis of pregnancy complications and hospitalization rates

Parameter	Group 1 (22-28 years) n=180	Group 2 (36-42 years) n=180	P-value
Gestational diabetes mellitus	9 (5.0%)	31 (17.2%)	<0.001
Pre-eclampsia	7 (3.9%)	25 (13.9%)	0.001

Fetoplacental insufficiency	16 (8.9%)	47 (26.1%)	<0.001
Threatened miscarriage	35 (19.4%)	62 (34.4%)	0.002
Second half of pregnancy gestosis	8 (4.4%)	36 (20.0%)	<0.001
Uterine hypertonus	51 (28.3%)	82 (45.6%)	0.001
First and second trimester bleeding	8 (4.4%)	15 (8.3%)	0.125
Early toxemia (severe form)	14 (7.8%)	23 (12.8%)	0.121
Average number of hospitalizations	1.2 ± 0.4	2.8 ± 0.9	<0.001
Total duration of hospitalization, days	12.3 ± 3.1	24.6 ± 7.8	

2. *Features of drug therapy* **(Table 2)**. The structure of the prescribed therapy reflected a higher need for medical pregnancy support in the group of women aged 36-42 years. Statistically significant differences were noted in the frequency of prescribing drugs to preserve pregnancy and correct placental insufficiency.

Table 2. Comparative analysis of the frequency of prescribing medications

Therapeutic Group / Drug	Group 1 (22-28 years) n=180	Group 2 (36-42 years) n=180	P-value
Hormonal support (progesterone)	42 (23.3%)	98 (54.4%)	<0.001
Tocolytics (hexoprenaline)	38 (21.1%)	79 (43.9%)	<0.001
Antiplatelet agents (dipyridamole)	25 (13.9%)	67 (37.2%)	<0.001
Antispasmodics (drotaverine)	89 (49.4%)	124 (68.9%)	<0.001
Antihypertensive drugs	6 (3.3%)	28 (15.6%)	<0.001
Iron supplements	145 (80.6%)	152 (84.4%)	0.332

3. *Delivery outcomes and delivery methods* **(Table 3)**. The analysis of the final stage of gestation revealed significant differences in labor characteristics and the frequency of surgical delivery. In the main group, there was a high incidence of labor anomalies and complications during childbirth.

Table 3. Complications in childbirth and methods of delivery

Parameter	Group 1 (22-28 years) n=180	Group 2 (36-42 years) n=180	P-value
Spontaneous vaginal delivery	139 (77.2%)	100 (55.6%)	<0.001
Cesarean section	41 (22.8%)	80 (44.4%)	<0.001
Uterine dysfunction	21 (11.7%)	58 (32.2%)	<0.001
Labor induction with oxytocin	25 (13.9%)	64 (35.6%)	<0.001
Timely rupture of membranes	152 (84.4%)	126 (70.0%)	0.001
Blood loss > 500 ml	9 (5.0%)	23 (12.8%)	0.009
Preterm delivery (< 37 weeks)	8 (4.4%)	19 (10.6%)	0.024

4. *Indicators of the condition of newborns* **(Table 4)**. Evaluation of the parameters of newborns demonstrated the presence of certain differences between the groups. Despite the absence of a clinically significant difference in the average weight of full-term infants, a large proportion of newborns with signs of hypoxia were observed in the group of older mothers.

Table 4. Anthropometric indicators and assessment of the condition of newborns

Parameter	Group 1 (22-28 years) n=180	Group 2 (36-42 years) n=180	P-value
Mean gestational age at delivery, weeks	39.2 ± 1.1	38.5 ± 1.8	0.003
Mean birth weight, g	3380 ± 420	3450 ± 510	0.154
Low birth weight (< 2500 g)	5 (2.8%)	12 (6.7%)	0.073
Macrosomia (> 4000 g)	11 (6.1%)	22 (12.2%)	0.042
Apgar score at 5 minutes < 8	6 (3.3%)	21 (11.7%)	0.003

5. *Laboratory and instrumental markers* (**Table 5**). For an in-depth understanding of the pathogenesis of complications, an analysis of key laboratory and Dopplerometric parameters in the dynamics of pregnancy was carried out. Statistically significant differences were revealed, reflecting more pronounced metabolic and vascular changes in patients of the older age group.

Table 5. Dynamics of laboratory and instrumental indicators

Parameter	Gestational Age	Group 1 (22-28 years) n=180	Group 2 (36-42 years) n=180	P-value
Fibrinogen, g/L	12 weeks	3.8 ± 0.5	3.9 ± 0.6	0.285
Fibrinogen, g/L	30 weeks	4.5 ± 0.6	5.1 ± 0.7	<0.001
Total Cholesterol, mmol/L	12 weeks	4.9 ± 0.8	5.0 ± 0.9	0.451
Total Cholesterol, mmol/L	30 weeks	6.8 ± 1.0	7.6 ± 1.2	<0.001
Uterine Artery Resistance Index	21 weeks	0.52 ± 0.07	0.61 ± 0.09	<0.001
Uterine Artery Resistance Index	32 weeks	0.48 ± 0.06	0.56 ± 0.08	<0.001

An analysis of the results leads us to conclude that, first pregnancies in women over 35 years old, even without initial medical conditions, are associated with a significantly increased risk of obstetric complications. These pregnancies require increased medical support and often result in hospitalizations as well as surgical deliveries.

The findings regarding metabolic and vascular changes suggest a need for specialized protocols for this patient group. The study demonstrates the complex impact of age on first pregnancies, reflected in a significant increase in obstetrical complications, increased medical care requirements, and changes in delivery methods for older women (Schmitz *et al*., 2022; Rial-Crestelo *et al*., 2024).

The data obtained are consistent with the findings of large-scale international studies, which confirm that maternal age is a risk factor for the development of gestational diabetes, pre-eclampsia, and placental insufficiency (Peteiro-Mahia *et al*., 2022; Nan *et al*., 2023; Carducci & Izbizky, 2024). Revealed deterioration in uteroplacental blood flow, along with more pronounced changes in hemostatic and lipid metabolism systems in patients aged 36-42, provides a pathogenetic basis for these clinical findings (Escudero Quispe & Vivanco Osorio, 2025). An increase in fibrinogen and cholesterol levels in the third trimester suggests increased stress on adaptive mechanisms, creating a basis for vascular complications in the main group (Guarga Montori *et al*., 2021; Samaranayake *et al*., 2024).

Modern advances in obstetrics have significantly improved the prognosis for pregnant women over the age of 35, compared to two or five decades ago (Carr *et al*., 2022). In the past, these women often faced adverse outcomes due to a lack of access to effective treatments and diagnostic tools. However, thanks to advances in pharmaceutical treatments and diagnostic technologies, most women over 35 can now carry and deliver healthy babies with the help of modern medicine (Yurchuk *et al*., 2023). This positive trend is due largely to the availability of effective medications for pregnancy support that target specific pathways in the body, such as micronized progesterone preparations (Gal-Kochav *et al*., 2022; Lim *et al*., 2024). These preparations have been shown to be effective in reducing the risk of preterm birth by providing hormonal support during pregnancy and are administered to around 54% of pregnant women in this age group (Georgescu, 2023). They help to reduce uterine contractions and improve the chances of a healthy delivery (Fortinguerra *et al*., 2023).

Additionally, the widespread use of antiplatelet agents, such as dipyridamole, has been shown to improve placental blood flow and reduce the risk of complications during pregnancy (Allahham *et al*., 2022; D'Alterio *et al*., 2023). By improving the rheological properties of blood, these agents help ensure a healthy supply of oxygen and nutrients for the developing fetus. This is the basis for preventing and treating fetal placental insufficiency (Davenport *et al*., 2022). Modern tocolytic agents, particularly selective beta-2 adrenergic agonists, help control increased uterine tone and prolong pregnancy in cases of threatened premature birth (Miller & Ansari, 2022).

It's important to note that the high rate of cesarean sections among older women (44.4%) reflects not only the presence of objective obstetric complications, but also a changed approach to managing these patients (Šťastná *et al*., 2022; Braggion *et al*., 2023). This change is characterized by increased awareness of cancer and a desire to minimize risks to the fetus. Unlike in previous decades, when cesareans were often performed on age-related first-time mothers based on a combination of relative indications, modern practice involves a more thorough assessment of the fetal-placental system and risk of labor abnormalities when deciding on surgical delivery. Despite the high percentage of surgical deliveries, improvements in neonatal outcomes suggest the adequacy and timeliness of clinical decision-making.

A comparison of our recent research data with historical records from 20-30 years ago shows significant improvement. While at the end of the last century, the pregnancy success rate among women over 35 years old was no more than 60-70%, our study shows an increase to 89.4%. The incidence of serious complications, such as severe pre-eclampsia and placental abruption, has decreased by a factor of 2-3, attributed to earlier diagnosis and more effective preventive measures, as evidenced by a significant improvement in neonatal outcomes, particularly Apgar scores (Kishkovich *et al*., 2024). These findings confirm the effectiveness of current pregnancy management practices, including regular monitoring of the fetal-placental system and timely intervention for any detected issues.

Conclusion

The study conducted on 360 pregnant women aged 36-42 who were in their first pregnancy allowed us to draw some objective conclusions about the characteristics of pregnancy in this age group. The results clearly show that maternal age between 36 and 42 is a significant factor influencing the course of pregnancy and delivery. Even in the absence of initial somatic diseases, pregnancy at this age is associated with increased risk of gestational diabetes and pre-eclampsia. These conditions were observed in 17.2% and 13.9% of women in the study group compared to 5% and 3.9%, respectively, in younger women. Additionally, fetoplacental insufficiency occurred in 26.1% of pregnancies at this age, almost three times higher than the 8.9% rate in the 22-28 year age group.

The clinical picture is complicated by the high frequency of risks to the continuation of pregnancy, which was observed in 34.4% of older women. In addition, increased uterine tone was noted in 45.6% of patients, leading to the need for more intensive medical treatment. This is supported by data on the use of progesterone medication, which was prescribed to 54.4 % of women in the study group, and antiplatelet therapy administered to 37.2 % of patients. This increased use of medication places a significant strain on the healthcare system, as indicated by hospitalization rates. Women aged 36-42 spend an average of 24.6 days in hospital, twice the length of stay compared to the control group.

The outcomes of childbirth among women of advanced reproductive age show distinct characteristics. The rate of surgical deliveries is 44.4%, approximately twice that seen in the comparison group (22.8%). Complications during childbirth include labor weakness, requiring stimulation with oxytocin in 35.6% of cases, and an increased risk of bleeding over 500 mL in 12.8% deliveries. Newborn conditions also differ, with significantly higher proportions of infants with Apgar scores below 8 at five minutes (11.7%) compared to 3.3% in the control group. Despite the identified challenges, modern obstetrics has made significant progress in managing high-risk pregnancies, thanks to the development of pharmaceutical therapies, advanced diagnostic protocols, and individualized approaches to pregnancy care. The success rate for women aged 35 and over has reached 89.4%.

The use of progesterone supplements, antiplatelet medications, and tocolytics effectively manages age-related complications during pregnancy. Future research should focus on creating personalized algorithms for managing pregnancies in older women, improving preconception counseling, and establishing support programs that address both medical and psychological aspects of late motherhood.

Acknowledgments: The authors would like to thank all participants involved in this study. We also acknowledge the technical and administrative support provided by our institution.

Conflict of interest: None

Financial support: None

Ethics statement: This study was conducted in accordance with the ethical principles of the Helsinki Declaration and approved by the Ethics Committee of Rostov State Medical University (Rostov-on-Don) (Protocol 233-14A dated January 23, 2023). Written informed consent was obtained from all participants in the study.

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