



RETROSPECTIVE ANALYSIS OF PREGNANCY COURSE AND COMPLICATION PREVENTION IN WOMEN WITH COVID-19

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ABSTRACT

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has significantly impacted medical practices globally, particularly in the management of pregnant women. Due to physiological and immunological changes, pregnant women are at a higher risk of severe COVID-19 complications, which can negatively affect both the mother and fetus. This article aims to analyze studies on COVID-19's impact on pregnancy during different gestational stages and propose preventive measures tailored to each trimester. The review includes data from studies in various countries, covering risks such as miscarriage, preeclampsia, preterm birth, and placental blood flow impairment across trimesters. Social factors like access to healthcare, psychological impacts, and long-term health consequences for both mother and child are also discussed. The findings emphasize the importance of preventive protocols and the need for further research on pregnancy management during the COVID-19 pandemic to enhance maternal and fetal outcomes.

Introduction

The COVID-19 pandemic, caused by the SARS-CoV-2 virus, has led to significant changes in medical practice worldwide, particularly in the management of pregnant women. Pregnant women represent a special risk group due to physiological and immunological changes occurring in their bodies, which can contribute to more severe disease progression and increase the likelihood of complications for both the mother and the fetus. Understanding how COVID-19 affects the course of pregnancy at different stages of gestation is crucial for developing effective preventive measures and improving obstetric and perinatal outcomes [1,2].

The relevance of this topic is determined by the need for a systematic analysis of data on the management of pregnant women in the context of the COVID-19 pandemic. Studying the features of pregnancy in women infected with COVID-19 at different stages of gestation helps to identify specific risks and develop targeted preventive measures [3,4].



The purpose of this article is to analyze existing studies, identify knowledge gaps, and propose new directions for preventive measures for different stages of pregnancy. The main questions discussed in the article are: how COVID-19 affects pregnancy at different stages of gestation; which factors increase the risk of complications; and which preventive measures are the most effective[5,6].

This article is based on a systematic literature review using databases such as PubMed, Scopus, Web of Science, and national libraries from Russia, Belarus, Uzbekistan, Germany, Italy, etc. It includes publications that describe the course of pregnancy in women with COVID-19 at different stages of gestation, peer-reviewed journals with high citation indices. Inclusion criteria included original studies, reviews, meta-analyses, and recommendations from authoritative organizations[7,8].

For analysis, data from retrospective and prospective studies, case descriptions, as well as results from the analysis of specific indicators, such as levels of hemostasis, D-dimer, and glycoproteins related to the course of COVID-19 in pregnant women, were used [9,10]

In the first trimester of pregnancy, embryo implantation and the formation of the fetus's main organs and systems occur. These processes are accompanied by significant hormonal changes, which may increase women's vulnerability to infections, including COVID-19. Studies conducted in Russia showed that pregnant women in the first trimester who are infected with SARS-CoV-2 are at increased risk of miscarriage, especially if they have underlying conditions such as hypertension or diabetes [11]. Studies in Belarus confirm that the risk of miscarriage and stillbirth in women with COVID-19 increases by 15-20% in the first trimester compared to women who are not infected with the virus [12]. Similar findings were obtained in Italy and Germany when studying women with severe COVID-19 symptoms, such as fever and respiratory failure [13].

In Germany, studies showed that inflammatory processes caused by COVID-19 can affect the endometrium, which in turn increases the risk of non-developing pregnancies. These findings emphasize the importance of monitoring the condition of women infected with COVID-19 in the first trimester and implementing measures to minimize the risk of complications.

In the second trimester, the fetus continues to actively develop, and its organs and systems are forming. At this stage, COVID-19 may cause complications such as intrauterine growth restriction, hypoxia, and preterm birth. Studies conducted in Uzbekistan showed that pregnant women with COVID-19 in the second trimester are more likely to experience complications related to impaired placental blood flow, which can lead to growth restriction and hypoxia.

In Russia, data from studies at the Moscow State Medical University named after I.M. Sechenov confirmed that COVID-19 in the second trimester can cause severe pneumonia, requiring intensive therapy, including mechanical ventilation. Research in Belarus showed that pregnant women with COVID-19 in the second trimester have an increased risk of thrombosis and coagulation disorders. In Germany and Italy, studies also confirmed that inflammatory changes in the placenta and thrombosis of blood vessels can impair placental blood flow, reducing the delivery of oxygen and nutrients to the fetus.

The third trimester is the most critical for pregnant women with COVID-19, as this period is often associated with severe obstetric complications, such as preeclampsia, preterm labor,



impaired placental blood flow, and stillbirth. In Uzbekistan, a system of specialized maternity departments was established, and monitoring of pregnant women with COVID-19 was intensified.

Russian studies conducted at the D.O. Ott Institute of Obstetrics and Gynecology showed that the risk of preterm birth and the need for cesarean section is significantly higher in women with COVID-19 in the third trimester. In Italy and Germany, it was noted that pregnant women with severe forms of COVID-19 in the third trimester often require hospitalization and intensive treatment.

Additional studies suggest that COVID-19 infection can lead to the development of gestational diabetes and increased levels of inflammatory markers, which also increases the risk of complications during pregnancy. Research also indicates the possibility of vertical transmission of the SARS-CoV-2 virus from mother to fetus, though this mechanism remains a subject of debate and requires further study.

In different countries and regions, various guidelines have been developed for the management of pregnant women with COVID-19. In Russia, the Ministry of Health has developed guidelines that include the use of anticoagulants to prevent thrombosis in pregnant women with severe forms of COVID-19 and enhanced fetal monitoring. In Belarus, the focus has been on vaccinating pregnant women and monitoring their condition at the outpatient level. In Uzbekistan, campaigns have been organized to raise awareness about COVID-19 among healthcare professionals and the population, including training doctors and creating specialized centers for monitoring the condition of pregnant women with COVID-19. In Italy and Germany, studies emphasize the importance of early detection and intensive treatment of pregnant women with COVID-19, including the use of telemedicine.

Vaccination of pregnant women against COVID-19 has shown high effectiveness in reducing the risk of severe disease and related complications. Studies confirm that vaccinated pregnant women have a significantly lower risk of hospitalization and the need for intensive care compared to unvaccinated women [12, Westgren et al., 2020]. In addition, personal hygiene measures, social distancing, and the use of personal protective equipment play a significant role in preventing infection among pregnant women.

Data from retrospective and prospective studies, clinical case reports, and analysis of specific indicators such as hemostasis levels, D-dimer, and glycoproteins related to the course of COVID-19 in pregnant women were used for this analysis. The data included information on the clinical manifestations of the disease, treatment methods, maternal and fetal outcomes, and the use of preventive measures.

Social factors, such as education level, income, access to healthcare, and family support, play a significant role in the course of pregnancy in women with COVID-19. Research shows that women with low income and education levels are more susceptible to infection and complications due to limited access to medical resources and information on prevention. Moreover, stigma and psychological pressure may exacerbate the health condition of pregnant women, leading to increased stress levels and impaired immune response.

Access to high-quality medical care is critical for pregnant women with COVID-19. In countries with advanced healthcare systems, such as Germany and Italy, access to specialized



maternity wards and intensive care is significantly higher, which helps reduce the risk of severe complications.

The COVID-19 pandemic has had a significant psychological impact on pregnant women, including increased anxiety and depression levels. Isolation, fear of infection, and uncertainty about the future can negatively affect the psycho-emotional state of mothers, which in turn may influence the course of pregnancy and fetal development. It is essential to consider psychological factors when managing pregnant women with COVID-19 and provide necessary support and counseling.

The long-term impact of COVID-19 on the health of the mother and child remains under study. Preliminary data suggests possible long-term consequences, such as the development of chronic diseases in mothers and delayed psychomotor development in children born to women infected with COVID-19. Further research is needed to assess these consequences and develop measures for their prevention and correction.

Pregnancy is accompanied by natural immunological changes aimed at preventing fetal rejection. These changes can affect the immune response to SARS-CoV-2, increasing susceptibility to severe forms of the disease. Studies show that pregnant women with COVID-19 exhibit more pronounced inflammatory reactions, which may contribute to complications such as preeclampsia and thromboembolic conditions. Understanding these mechanisms is crucial for developing targeted therapeutic approaches.

The course of COVID-19 in pregnant women significantly depends on the gestational period and the presence of comorbidities. In the first trimester, attention should be focused on preventing complications and supporting the immune system. In the second trimester, monitoring placental health and preventing thrombosis should be prioritized, while in the third trimester, controlling the development of preeclampsia and other complications is essential.

The comparative analysis showed that approaches to the prevention and treatment of complications differ depending on the country and the level of healthcare development. At the same time, common recommendations include the use of anticoagulants, active fetal monitoring, and the application of telemedicine for early detection and treatment of complications. The limitations of this study include the diversity of methodologies and the quality of the original data, which require caution when interpreting the results.

Discussion

The findings of this study confirm that the course of COVID-19 in pregnant women is highly influenced by the gestational period and the presence of comorbidities, highlighting the critical need for tailored management strategies for each trimester.

In the first trimester, the vulnerability of pregnant women to SARS-CoV-2 infection is primarily due to early hormonal and immunological changes that occur during implantation and the initial development of the placenta. The increased risk of miscarriage observed in multiple studies underscores the significance of close monitoring and early intervention in women infected during this period. Inflammatory processes triggered by COVID-19, as well as maternal comorbidities such as hypertension and diabetes, exacerbate these risks. The findings from Germany and Belarus regarding endometrial inflammation and early pregnancy loss emphasize the need for enhanced prenatal care and targeted preventive measures in the early stages of pregnancy.



The second trimester poses its unique challenges, as this period is critical for the continued development and growth of fetal organs and systems. The increased incidence of complications such as placental blood flow impairment, intrauterine growth restriction (IUGR), and hypoxia highlights the direct impact of SARS-CoV-2 on the uteroplacental complex. Data from Uzbekistan and Russia demonstrating severe pneumonia and thrombosis in pregnant women during this period underscore the importance of aggressive management, including anticoagulation therapy and intensive respiratory care. The observed association between placental inflammation and fetal hypoxia in studies from Germany and Italy supports the integration of Doppler ultrasound monitoring into routine care for pregnant women with COVID-19 in the second trimester.

The third trimester is often associated with the highest maternal and fetal risks due to the compounded effects of advancing pregnancy and severe COVID-19 symptoms. Complications such as preeclampsia, preterm labor, and stillbirth are more prevalent during this period. Findings from Uzbekistan and Russia indicate a higher likelihood of cesarean delivery and preterm birth in women with severe COVID-19. Furthermore, the increased need for hospitalization and intensive care in this cohort demonstrates the critical role of specialized maternity units and multidisciplinary care. The data from Italy and Germany further emphasize the importance of timely and aggressive management to mitigate maternal and fetal morbidity and mortality.

Preventive measures, including vaccination, have emerged as a cornerstone in reducing the severity of COVID-19 and its associated complications in pregnant women. Studies demonstrating lower hospitalization rates and reduced need for intensive care among vaccinated pregnant women validate the efficacy of immunization programs. In addition to vaccination, public health measures such as social distancing, personal hygiene, and the use of personal protective equipment remain vital in minimizing the spread of infection.

The role of social and psychological factors cannot be understated in shaping pregnancy outcomes during the COVID-19 pandemic. Women with limited access to healthcare, lower socioeconomic status, and inadequate social support are disproportionately affected, highlighting the need for equitable healthcare resources and targeted interventions to address these disparities. Psychological stress, exacerbated by isolation and uncertainty, further compounds the risks for adverse pregnancy outcomes, underscoring the importance of mental health support for pregnant women during the pandemic.

While this study provides valuable insights, several limitations must be acknowledged. The diversity in methodologies and data quality across the analyzed studies may introduce variability in the findings. Additionally, the long-term effects of COVID-19 on maternal and fetal health remain underexplored, necessitating further research to address these gaps and inform comprehensive care strategies.

In conclusion, the study highlights the importance of a trimester-specific approach to managing pregnant women with COVID-19, emphasizing the need for preventive measures, early detection, and timely interventions to optimize maternal and fetal outcomes. Collaborative efforts across healthcare systems and continuous research are essential to address the evolving challenges posed by COVID-19 in pregnancy.

Conclusion



The conducted review highlights the need for further study of the characteristics of pregnancy in women with COVID-19 and the development of more detailed protocols for prevention and treatment. Understanding the impact of COVID-19 on obstetric and perinatal outcomes will help improve the quality of medical care and reduce risks for both the mother and the fetus. It is recommended to conduct multicenter studies aimed at standardizing approaches to the management of pregnant women with COVID-19 and continuously updating the developed guidelines, including international recommendations.

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