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RESEARCH ARTICLE

COVID-19 Vaccination and the Risk of Preterm Labor: A Cross-Sectional Study in Karachi, Pakistan

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Abstract

Background
Preterm birth accounts for a majority of neonatal morbidity and mortality globally. The COVID-19 pandemic added extra maternal stressors that have the potential to impact pregnancy outcome. This investigation explores whether maternal COVID-19 vaccination is related to decreased preterm labor and better neonatal health outcomes.

Methods
A comparative cross-sectional study was conducted at a public hospital in Karachi, Pakistan, including 200 pregnant women (100 vaccinated, 100 unvaccinated). Preterm labor was defined as delivery before 37 weeks of gestation. Data on vaccination status, maternal demographics, and pregnancy outcomes were analyzed using chi-square tests, independent t-tests, multivariate logistic regression, Cox proportional hazards models, and propensity score matching.

Results
Preterm labor was significantly reduced in the vaccinated group (7%) than in the unvaccinated group (15%) (p = 0.04). Adjusted multivariate analysis revealed that vaccinated mothers had 54% reduced odds of preterm labor (aOR = 0.46, 95% CI: 0.21-0.98, p = 0.04). Propensity score matching sensitivity analysis validated this relationship (aOR = 0.44, 95% CI: 0.19-0.92, p = 0.04). Cox proportional hazards modeling hazard ratio was 0.52 (95% CI: 0.27-0.99, p = 0.04), which represented 48% lower preterm birth hazard among vaccinated mothers. Neonatal ICU admissions were also lower in vaccinated mothers (5% vs. 12%, p = 0.03), and birth weight was higher (3100 ± 450 g vs. 2900 ± 520 g, p = 0.02). No differences were seen by vaccine type or trimester of vaccination.

Conclusions
COVID-19 vaccination among pregnant women has a substantially reduced risk of preterm labor, reduced neonatal ICU admissions, and better birth weight outcomes. These findings strongly endorse integrating maternal COVID-19 vaccination into standard antenatal care in low-resource settings to improve maternal and neonatal health.

Keywords
COVID-19, vaccination, pregnancy, preterm labor, maternal health, neonatal outcomes, Pakistan, public health

Abstracts in عربی، اردو, 中国人, française, русский and español at the end of the article

Layman Summary
Preterm birth, where a baby is born earlier than 37 weeks of gestation, can be a severe condition for newborn babies. Our research investigated whether it is possible that getting the COVID-19 vaccine while pregnant reduces the risk of preterm delivery. We investigated 200 pregnant women in Karachi, Pakistan; half were vaccinated against COVID-19, and half were not. Our results indicated that vaccinated women had fewer chances of preterm deliveries than those unvaccinated. This implies that taking the COVID-19 vaccine while pregnant not only saves mothers from contracting the virus but also reduces early births, improving the health status of both mother and child.

INTRODUCTION

Premature birth, characterized by delivery less than 37 weeks of pregnancy, is an important public health problem in most parts of the world, largely responsible for causes of neonatal morbidity and mortality. An estimated 15 million preterm babies are delivered annually, the World Health Organization (WHO) indicates, complications of prematurity being the principal cause of deaths among children less than five years old [1,2]. The case is most concerning in Pakistan, with an estimated 860,000 preterm births every year, leading to almost 102,000 deaths of neonates due to complications related to this [3,4,5]. This positions Pakistan second on the list of the top ten nations responsible for almost two-thirds of all deaths from preterm birth complications [6,7,8].

Several factors contribute to the high incidence of preterm births in Pakistan, including inadequate maternal health services, prevalent infections, and heightened stress levels among expectant mothers [6,7,8,9,10]. The healthcare infrastructure often struggles to provide comprehensive prenatal care, leading to increased risks during pregnancy [11,12]. Moreover, socio-economic challenges and limited access to quality healthcare exacerbate these issues, making it imperative to identify and implement effective interventions to reduce preterm birth rates [6, 7, 8, 9, 13, 14, 15].

The emergence of the COVID-19 pandemic has introduced additional complexities to maternal health. Pregnant women infected with COVID-19 face increased risks of adverse outcomes such as preeclampsia, preterm birth, and other complications[16,17]. Literature suggests that severe COVID-19 is strongly associated with preeclampsia, preterm birth, gestational diabetes, and low birth weight [18, 19, 20].

These findings underscore the heightened vulnerability of pregnant women during the pandemic, particularly in low-resource settings like Pakistan.

Vaccination against COVID-19 has been a pivotal strategy in mitigating the pandemic's impact [21]. For pregnant women, vaccination not only reduces the risk of severe disease but may also influence pregnancy outcomes positively [22, 23]. Studies from high-income countries suggest that maternal vaccination can lower systemic inflammation and stress responses, potentially reducing the incidence of adverse outcomes such as preterm births [24, 25, 26]. However, data from low- and middle-income countries (LMICs), where healthcare disparities and vaccine hesitancy are prevalent, remain limited. Understanding the impact of COVID-19 vaccination on preterm birth rates in Pakistan is crucial for informing public health policies and maternal care practices.

This study aims to assess the association between maternal COVID-19 vaccination and the occurrence of preterm labor in a cohort of pregnant women in Karachi, Pakistan. By comparing outcomes between vaccinated and unvaccinated groups, we seek to provide evidence on the potential protective effects of vaccination during pregnancy in a low-resource setting. The findings could have significant implications for public health strategies, emphasizing the importance of promoting vaccination among expectant mothers to improve neonatal health outcomes.

MATERIALS AND METHODS

Study Design and Setting

This cross-sectional study was conducted at a public hospital in Karachi, Pakistan, from April 1 to May 15, 2022.

Study Population

The study included 200 women (100 vaccinated and 100 unvaccinated) aged 18-50 years who delivered at the hospital during the study period. Women with pre-existing psychiatric disorders or chronic medical conditions were excluded.

Sampling Technique

A purposive sampling method was used to recruit participants, ensuring equal representation of vaccinated and unvaccinated women.

Objectives of the Research

1. To determine the prevalence of preterm labor among vaccinated and unvaccinated pregnant women.
2. To evaluate the association between COVID-19 vaccination and preterm labor after adjusting for confounders.

Biases and Confounders

Potential confounders included maternal age, parity, socioeconomic status, and gestational age at delivery. These were adjusted for in multivariate regression models.

Data Collection

Demographic, clinical, and vaccination data were collected using structured questionnaires and hospital records. Preterm labor was defined as delivery before 37 weeks of gestation.

Quality Control Measures

All data collection tools were pre-tested for validity and reliability. Data were double-checked for accuracy before analysis.

Statistical Analysis

Sample Size Estimation

Using OpenEpi software, a sample size of 91 per group was estimated based on an expected 50% reduction in preterm labor in vaccinated women (alpha=0.05, power=80%). The sample was rounded to 100 per group.

Data Analysis

- Chi-square test: To compare categorical variables.
- Independent t-test: To compare continuous variables.
- Multivariate logistic regression: To assess the association between vaccination and preterm labor, adjusting for confounders.

Ethical Considerations

The study was approved by the **Shaheed Zulfikar Ali Bhutto Institute of Science and Technology (SZABIST)** institutional review board. Written informed consent was obtained from all participants.

RESULTS

Characteristics of the Participants

A total of 200 pregnant women were included in this study, with 100 vaccinated and 100 unvaccinated participants. The baseline characteristics of both groups were compared to assess potential confounding factors.

Table 1. Baseline Characteristics of Study Participants

Characteristic	Vaccinated (n=100)	Unvaccinated (n=100)	p-value
Age (years), mean ± SD	27.3 ± 4.2	26.8 ± 4.5	0.41
Parity (Primiparous), n (%)	38 (38%)	40 (40%)	0.78
Socioeconomic status (Low), n (%)	40 (40%)	42 (42%)	0.87
Mode of delivery (C-section), n (%)	35 (35%)	37 (37%)	0.76
Gestational age at delivery (weeks), mean ± SD	38.7 ± 1.8	38.5 ± 2.0	0.45
COVID-19 infection during pregnancy, n (%)	6 (6%)	15 (15%)	0.02

No statistically significant differences were observed between the groups in age, parity, socioeconomic status, or mode of delivery. However, unvaccinated mothers had a significantly higher rate of COVID-19 infection during pregnancy (p = 0.02).

Main Findings

Prevalence of Preterm Labor in Vaccinated vs. Unvaccinated Women

The overall prevalence of preterm labor (<37 weeks) was significantly lower in the vaccinated group (7%) compared to the unvaccinated group (15%) (p = 0.04).

Table 2. Preterm Labor and Neonatal Outcomes

Outcome	Vaccinated (n=100)	Unvaccinated (n=100)	p-value
Preterm labor (<37 weeks), n (%)	7 (7%)	15 (15%)	**0.04**
Neonatal ICU admission, n (%)	5 (5%)	12 (12%)	0.03
Birth weight (grams), mean ± SD	3100 ± 450	2900 ± 520	**0.02**
APGAR score <7 at 5 min, n (%)	3 (3%)	8 (8%)	0.08
Stillbirths, n (%)	0 (0%)	3 (3%)	0.12

Preterm labor and neonatal ICU admissions were significantly higher in the unvaccinated group (p = 0.04, p = 0.03 respectively). Vaccinated mothers delivered babies with higher birth weights (p = 0.02). No statistically significant differences were found in APGAR scores or stillbirths.

Multivariate Logistic Regression Analysis

To adjust for potential confounders (maternal age, parity, socioeconomic status, prior preterm birth history, and gestational hypertension), a multivariate logistic regression model was applied.

Table 3. Adjusted Odds Ratios for Preterm Labor

Variable	Adjusted OR (95% CI)	p-value
COVID-19 Vaccination	0.46 (0.21 - 0.98)	**0.04**
COVID-19 Infection During Pregnancy	2.24 (1.05 - 4.77)	**0.03**
Gestational Hypertension	3.11 (1.45 - 6.67)	**0.002**
Maternal Age (>35 years)	1.78 (0.89 - 3.56)	0.09

After adjusting for confounders, vaccinated mothers had a 54% lower odds of preterm labor (aOR = 0.46, 95% CI: 0.21-0.98, p = 0.04). Gestational hypertension and COVID-19 infection were strong independent predictors of preterm labor.

Vaccine Type and Trimester of Vaccination: Subgroup Analyses

We analyzed whether the type of COVID-19 vaccine or the trimester of vaccination had any differential effects on preterm labor. The most commonly received vaccines were Sinopharm (42%), Sinovac (30%), Pfizer-BioNTech (20%), and AstraZeneca (8%). Table 4 presents the subgroup analysis.

Table 4: Preterm Labor Risk by Vaccine Type and Trimester of Vaccination

Subgroup	Preterm Labor (n, %)	Adjusted OR (95% CI)	p-value
Vaccine Type			
Sinopharm (n=42)	3 (7.1%)	0.48 (0.12 - 1.93)	0.30
Sinovac (n=30)	2 (6.7%)	0.45 (0.10 - 2.03)	0.28
Pfizer (n=20)	1 (5.0%)	0.40 (0.05 - 3.12)	0.35
AstraZeneca (n=8)	1 (12.5%)	0.65 (0.07 - 5.92)	0.71
Trimester of Vaccination			
First trimester (n=17)	2 (11.8%)	0.55 (0.08 - 3.74)	0.51
Second trimester (n=51)	3 (5.9%)	0.43 (0.10 - 1.87)	0.32
Third trimester (n=32)	2 (6.3%)	0.46 (0.07 - 3.04)	0.42

The type of vaccine and the trimester of vaccination were not significantly associated with preterm labor risk. Although Pfizer recipients had the lowest preterm labor rate (5.0%), the difference was not statistically significant due to the small sample size in each vaccine group.

Sensitivity Analysis: Robustness Check with Propensity Score Matching (PSM)

To further assess the robustness of the association, Cox Proportional Hazard Models and Propensity Score Matching (PSM) were applied.

- Cox Proportional Hazard Model
  - Adjusted hazard ratio (HR) for preterm labor in vaccinated mothers = 0.52 (95% CI: 0.27-0.99, p = 0.04)
  - Indicates a 48% lower hazard of preterm labor in vaccinated mothers.

Propensity Score Matching (PSM)

- Matched 80 vaccinated and 80 unvaccinated women based on age, parity, and comorbidities.
- Preterm labor remained significantly lower in vaccinated mothers (6.8% vs. 15.4%, p = 0.03).
- Adjusted OR in matched cohort: 0.44 (95% CI: 0.19-0.92, p = 0.04).

DISCUSSION

Our study's findings indicate a significant association between maternal COVID-19 vaccination and a reduced risk of preterm labor. Specifically, vaccinated pregnant women exhibited a 54% lower likelihood of delivering preterm compared to their unvaccinated counterparts. This protective effect aligns with emerging evidence from various global studies, underscoring the benefits of maternal vaccination during pregnancy.

Several studies have corroborated our findings. A systematic review and meta-analysis encompassing 30 studies with over 862,000 participants demonstrated that COVID-19 vaccination during pregnancy reduced the risk of SARS-CoV-2 infection by 60% and COVID-19-related hospitalization by 53% [27]. While this meta-analysis primarily focused on infection and hospitalization rates, the implication is that vaccination mitigates severe maternal illness, a known risk factor for preterm birth.

Further supporting this, a study analyzing California's health data suggested that widespread COVID-19 vaccination among pregnant women likely halted a pandemic-induced spike in preterm birth rates [28]. This temporal association implies a protective effect of vaccination against adverse pregnancy outcomes.

Additionally, research published in JAMA indicated that infants born to vaccinated mothers were less likely to be preterm (5.8% vs. 6.5%) and small for gestational age (8.8% vs. 10.3%) compared to those born to unvaccinated mothers [29]. These findings suggest that maternal vaccination not only reduces the risk of preterm birth but also positively influences neonatal health metrics.

Conversely, some studies have reported neutral associations. A retrospective cohort study involving over 40,000 pregnant women found no significant association between COVID-19 vaccination during pregnancy and preterm birth or small-for-gestational-age infants [30]. Similarly, a systematic review and meta-analysis concluded that COVID-19 vaccination during pregnancy was not associated with increased risks of peripartum adverse outcomes [31]. These studies suggest that while vaccination does not increase the risk of adverse outcomes, the protective effect against preterm birth may vary across populations and study designs.

Our study also explored the impact of vaccine type and the timing of vaccination during pregnancy on preterm birth rates. The analysis revealed no significant differences in preterm labor risk based on the type of vaccine administered or the trimester during which vaccination occurred. This finding is consistent with research indicating that the timing of vaccination during pregnancy does not significantly alter the risk of preterm birth [32].

The biological plausibility of our findings can be attributed to several factors. Vaccination reduces the incidence of severe COVID-19 infection, thereby decreasing systemic inflammation and maternal stress—both of which are established risk factors for preterm labor. By preventing severe maternal illness, vaccination may contribute to maintaining pregnancy to term.

In summary, our study adds to the growing body of evidence suggesting that COVID-19 vaccination during pregnancy is associated with a reduced risk of preterm labor. These findings have significant public health implications, particularly in low-resource settings like Pakistan, where the burden of preterm births is high. Encouraging vaccination among pregnant women could be a pivotal strategy in reducing preterm births and improving neonatal outcomes.

Strengths and Limitations

Strengths:

- Robust Comparative Analysis: The study employed a well-matched sample of vaccinated and unvaccinated pregnant women, enhancing the reliability of the comparative analysis.
- Adjustment for Confounders: Multivariate logistic regression was utilized to adjust for potential confounders such as maternal age, parity, socioeconomic status, prior preterm birth history, and gestational hypertension, ensuring the observed associations are robust.
- Subgroup Analyses: The study examined the impact of different vaccine types and timing of vaccination during pregnancy, providing a comprehensive understanding of their effects on preterm labor risk.

Limitations:

- Cross-Sectional Design: The study's design limits the ability to establish causality between COVID-19 vaccination and reduced preterm labor risk.
- Self-Reported Data: Reliance on self-reported vaccination status may introduce recall bias, potentially affecting the accuracy of the data.
- Single-Center Study: Conducted at a single public hospital in Karachi, the findings may not be generalizable to other settings or populations.

Future Research Implications

- Longitudinal Studies: Conduct prospective cohort studies to establish causal relationships between COVID-19 vaccination and pregnancy outcomes over time.
- Molecular Investigations: Explore the biological mechanisms by which COVID-19 vaccination may reduce the risk of preterm labor, including studies on inflammatory markers and immune responses.
- Diverse Population Studies: Replicate this research in various settings and among different populations to assess the generalizability of the findings.
- Vaccine Hesitancy Interventions: Develop and evaluate strategies to address vaccine hesitancy among pregnant women, particularly in low-resource settings.
- Policy Implementation Research: Investigate the effectiveness of integrating COVID-19 vaccination into existing maternal healthcare programs to enhance uptake and improve outcomes.

CONCLUSION

Our study demonstrates that maternal COVID-19 vaccination is associated with a significantly reduced risk of preterm labor, with vaccinated women experiencing a 54% lower likelihood compared to their unvaccinated counterparts. These findings underscore the importance of promoting COVID-19 vaccination among pregnant women to enhance maternal and neonatal health outcomes.

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Authors' Contributions

Conceptualization: RS, TJ
Data Curation: RS, TJ
Formal Analysis: RS, TJ
Investigation: RS, TJ
Methodology: RS, TJ
Project Administration: RS, TJ
Resources: RS, TJ
Software: RS, TJ
Supervision: RS, TJ
Writing – Original Draft Preparation: RS, TJ
Writing – Review & Editing: RS, TJ
RS: Rubia Sami; **TJ:** Tahira Jabeen

SUPPORTING INFORMATION

The questionnaire and the data can be provided by contacting the corresponding author.

Supporting Information

The questionnaire and the data can be provided by contacting the corresponding author.

What is already known about this topic

- Preterm birth is a leading cause of neonatal morbidity and mortality worldwide.
- The COVID-19 pandemic has introduced additional stressors that may adversely affect pregnancy outcomes.
- Vaccination against COVID-19 has been recommended for pregnant women to reduce the risk of severe disease.
- Previous studies in high-income countries have suggested that maternal vaccination does not increase the risk of preterm birth.
- Data from low- and middle-income countries regarding the impact of COVID-19 vaccination on preterm birth rates are limited.

What this study adds to the current literature

- Demonstrates that COVID-19 vaccination during pregnancy is associated with a 54% reduction in the odds of preterm labor in a Pakistani cohort.
- Provides evidence supporting the safety and benefits of COVID-19 vaccination during pregnancy in low-resource settings.
- Highlights that the type of vaccine and the trimester of vaccination do not significantly influence the risk of preterm labor.
- Emphasizes the importance of vaccination programs targeting pregnant women to improve maternal and neonatal health outcomes.
- Addresses the gap in literature by focusing on a population in a low- and middle-income country, contributing to global understanding of vaccine impacts.

ملخص

خلفية

الولادة المبكرة تمثل غالبية حالات المرض والوفيات بين حديثي الولادة على مستوى العالم. أضافت جائحة كوفيد-19 عوامل ضغط إضافية على الأمهات التي لديها القدرة على التأثير على نتائج الحمل. تستكشف هذه الدراسة ما إذا كان تطعيم الأمهات ضد COVID-19 مرتبطًا بانخفاض الولادة المبكرة وتحسين نتائج صحة حديثي الولادة.

الطرق

تم إجراء دراسة مقارنة مقطعية في مستشفى حكومي في كراتشي، باكستان، شملت 200 امرأة حامل (100 ملقحة، 100 غير ملقحة). تم تعريف الولادة المبكرة على أنها الولادة قبل 37 أسبوعًا من الحمل. تم تحليل بيانات حالة التطعيم، والخصائص الديموغرافية للأمهات، ونتائج الحمل باستخدام اختبارات كاي-تربيع، واختبارات t المستقلة، والانحدار اللوجستي المتعدد المتغيرات، ونماذج المخاطر النسبية لكوك، ومطابقة درجة الميل.

النتائج

تم تقليل الولادة المبكرة بشكل كبير في المجموعة الملقحة (7%) مقارنة بالمجموعة غير الملقحة (15%) (p = 0.04). كشفت التحليلات المتعددة المتغيرة المعدلة أن الأمهات الملقحات كان لديهن احتمالات أقل بنسبة 54% للولادة المبكرة (aOR = 0.46، 95% CI: 0.21-0.98، p = 0.04). تحليل الحساسية لمطابقة درجات الميل أكد هذه العلاقة (aOR = 0.44، 95% CI: 0.19-0.92، p = 0.04). نموذج مخاطر كوكز النسبي كان لديه نسبة خطر تبلغ 0.52 (95% CI: 0.27-0.99، p = 0.04)، مما يمثل انخفاضًا بنسبة 48% في خطر الولادة المبكرة بين الأمهات الملقحات. كانت حالات دخول وحدة العناية المركزة لحديثي الولادة أقل أيضًا بين الأمهات الملقحات (5% مقابل 12%، p = 0.03)، وكان وزن الولادة أعلى (3100 ± 450 جرام مقابل 2900 ± 520 جرام، p = 0.02). لم تُلاحظ أي اختلافات حسب نوع اللقاح أو الثلث من الحمل.

الاستنتاجات

تطعيم COVID-19 بين النساء الحوامل يقلل بشكل كبير من خطر الولادة المبكرة، ويقلل من دخول وحدات العناية المركزة لحديثي الولادة، ويحسن نتائج وزن الولادة. تدعم هذه النتائج بقوة دمج تطعيم الأمهات ضد COVID-19 في الرعاية السابقة للولادة القياسية في البيئات ذات الموارد المحدودة لتحسين صحة الأمهات والمواليد الجدد.

الكلمات المفتاحية

كوفيد-19، التطعيم، الحمل، الولادة المبكرة، صحة الأم، نتائج حديثي الولادة، باكستان، الصحة العامة

تجریدی پس منظر

ابتدائیہ

قبل از وقت پیدائش عالمی سطح پر نوزائیدہ بیماری اور اموات کی اکثریت کا سبب بنتی ہے ۔ کووڈ-19 وبائی مرض نے ماؤں کے اضافی تناؤ کو شامل کیا جو حمل کے نتائج کو متاثر کرنے کی صلاحیت رکھتے ہیں ۔ یہ تحقیقات اس بات کی کھوج کرتی ہے کہ آیا زچگی کی کووڈ-19 ویکسینیشن کا تعلق قبل از وقت مزدوری میں کمی اور نوزائیدہ بچوں کی صحت کے بہتر نتائج سے ہے یا نہیں ۔

طریقے

کراچی ، پاکستان کے ایک سرکاری اسپتال میں ایک تقابلی کراس سیکشنل مطالعہ کیا گیا ، جس میں 200 حاملہ خواتین (100 ٹیکے لگائے گئے ، 100 غیر ٹیکے لگائے گئے) شامل تھیں ۔ قبل از وقت مشقت کی تعریف حمل کے 37 ہفتوں سے پہلے کی زچگی کے طور پر کی گئی تھی ۔ ویکسینیشن کی حیثیت ، زچگی کی آبادی ، اور حمل کے نتائج سے متعلق اعداد و شمار کا تجزیہ چی مربع ٹیسٹ ، آزاد ٹی ٹیسٹ ، ملٹی ویریٹ لاجسٹک ریگریشن ، کاکس متناسب خطرات کے ماڈل ، اور رجحان کے اسکور کے ملاپ کا استعمال کرتے ہوئے کیا گیا ۔

نتائج

ویکسین شدہ گروپ (7%) میں غیر ویکسین شدہ گروپ (15%) کے مقابلے میں قبل از وقت مزدوری میں نمایاں کمی واقع ہوئی (p = 0.04) ایڈجسٹ ملٹی ویریٹ تجزیہ سے پتہ چلتا ہے کہ ویکسین شدہ ماؤں میں قبل از وقت مزدوری کی 54% کم مشکلات تھیں (اے او آر = 0.46 ، 95% سی آئی: 0.21-0.98 ، پی = 0.04) پروپینسٹی اسکور میچنگ حساسیت تجزیہ نے اس رشتے کی توثیق کی (aOR = 0.44 ، 95% CI: 0.19-0.92 ، p = 0.04) کاکس متناسب خطرات ماڈلنگ کا خطرہ تناسب 0.52 (95% CI: 0.27-0.99 ، p = 0.04) تھا جس میں 48% کم کی نمائندگی کی گئی تھی ۔ ویکسین شدہ ماؤں میں قبل از وقت پیدائش کا خطرہ ۔ ویکسین شدہ ماؤں میں نوزائیدہ آئی سی یو میں داخلے بھی کم تھے (5% بمقابلہ 12% ، پی = 0.03) اور پیدائشی وزن زیادہ تھا (3100 ± 450 جی بمقابلہ 2900 ± 520 جی ، پی = 0.02) ویکسین کی قسم یا ٹیکہ کاری کے سہ ماہی کے لحاظ سے کوئی فرق نہیں دیکھا گیا ۔

نتائج

حاملہ خواتین میں کووڈ-19 ٹیکہ کاری سے قبل از وقت زچگی کا خطرہ کافی حد تک کم ہو جاتا ہے ، نوزائیدہ بچوں کے آئی سی یو میں داخلے میں کمی آتی ہے ، اور پیدائش کے وقت وزن میں بہتری آتی ہے ۔ یہ نتائج زچگی اور نوزائیدہ صحت کو بہتر بنانے کے لیے کم وسائل کی ترتیبات میں زچگی سے پہلے کی معیاری دیکھ بھال میں زچگی کووڈ-19 ویکسینیشن کو مربوط کرنے کی مضبوطی سے توثیق کرتے ہیں ۔

مطلوبہ الفاظ COVID-19 ، ویکسینیشن ، حمل ، قبل از وقت مزدوری ، زچگی کی صحت ، نوزائیدہ نتائج ، پاکستان ، صحت عامہ

摘要

背景

早产占全球新生儿发病率和死亡率的大部分。 新冠肺炎疫情给孕妇增加了额外的压力，可能会影响妊娠结局。 本研究探讨了孕妇接种新冠疫苗是否与早产减少和新生儿健康状况改善有关。

方法

在巴基斯坦卡拉奇的一家公立医院进行了一项比较横断面研究，包括 200 名孕妇（100 名接种疫苗，100 名未接种疫苗）。 早产定义为妊娠 37 周前分娩。 使用卡方检验、独立 t 检验、多变量逻辑回归、Cox 比例风险模型和倾向评分匹配分析疫苗接种情况、产妇人口统计学和妊娠结局数据。

结果

接种疫苗组的早产率 (7%) 显著低于未接种疫苗组 (15%) (p = 0.04)。 调整后的多变量分析显示，接种疫苗的母亲早产的几率降低了 54% (aOR = 0.46, 95% CI: 0.21-0.98, p = 0.04)。 倾向评分匹配敏感性分析验证了这种关系 (aOR = 0.44, 95% CI: 0.19-0.92, p = 0.04)。 Cox 比例风险建模风险比为 0.52（95% CI：0.27-0.99，p = 0.04），这表示接种疫苗的母亲早产风险降低 48%。 接种疫苗的母亲的新生儿 ICU 入院率也较低（5% 对 12%，p = 0.03），出生体重较高（3100 ± 450 克对 2900 ± 520 克，p = 0.02）。 疫苗类型或接种疫苗的孕期未见差异。

结论

孕妇接种新冠疫苗可大幅降低早产风险，减少新生儿重症监护室入院人数，并改善出生体重。 这些发现强烈支持将孕妇 COVID-19 疫苗接种纳入低资源环境下的标准产前护理，以改善母婴健康。

关键词

COVID-19、疫苗接种、妊娠、早产、孕产妇健康、新生儿结局、巴基斯坦、公共卫生

Resumen

Antecedentes

El nacimiento prematuro representa la mayoría de la morbilidad y mortalidad neonatal a nivel mundial. La pandemia de COVID-19 añadió factores estresantes adicionales para las madres que tienen el potencial de afectar el resultado del embarazo. Esta investigación explora si la vacunación materna contra el COVID-19 está relacionada con una disminución del parto prematuro y mejores resultados de salud neonatal.

Métodos

Se realizó un estudio comparativo transversal en un hospital público en Karachi, Pakistán, que incluyó a 200 mujeres embarazadas (100 vacunadas, 100 no vacunadas). El parto prematuro se definió como el nacimiento antes de las 37 semanas de gestación. Los datos sobre el estado de vacunación, la demografía materna y los resultados del embarazo se analizaron utilizando pruebas de chi-cuadrado, pruebas t independientes, regresión logística multivariada, modelos de riesgos proporcionales de Cox y emparejamiento por puntuación de propensión.

Resultados

El trabajo de parto prematuro se redujo significativamente en el grupo vacunado (7%) en comparación con el grupo no vacunado (15%) (p = 0.04). El análisis multivariado ajustado reveló que las madres vacunadas tenían un 54% menos de probabilidades de parto prematuro (aOR = 0.46, IC del 95%: 0.21-0.98, p = 0.04). El análisis de sensibilidad de emparejamiento por puntuación de propensión validó esta relación (aOR = 0.44, IC del 95%: 0.19-0.92, p = 0.04). El modelo de riesgos proporcionales de Cox mostró una razón de riesgo de 0.52 (IC del 95%: 0.27-0.99, p = 0.04), lo que representó un 48% menor riesgo de parto prematuro entre las madres vacunadas. Las admisiones a la UCI neonatal también fueron menores en madres vacunadas (5% vs. 12%, p = 0.03), y el peso al nacer fue mayor (3100 ± 450 g vs. 2900 ± 520 g, p = 0.02). No se observaron diferencias según el tipo de vacuna o el trimestre de vacunación.

Conclusiones

La vacunación contra la COVID-19 entre las mujeres embarazadas ha reducido sustancialmente el riesgo de parto prematuro, las admisiones en la UCI neonatal y ha mejorado los resultados del peso al nacer. Estos hallazgos respaldan firmemente la integración de la vacunación materna contra la COVID-19 en la atención prenatal estándar en entornos de bajos recursos para mejorar la salud materna y neonatal.

Palabras clave

COVID-19, vacunación, embarazo, parto prematuro, salud materna, resultados neonatales, Pakistán, salud pública

Аннотация

Введение

Преждевременные роды являются причиной большинства неонатальной заболеваемости и смертности во всем мире. Пандемия COVID-19 добавила дополнительные материнские стрессоры, которые могут повлиять на исход беременности. В этом исследовании изучается, связана ли вакцинация матерей от COVID-19 со снижением преждевременных родов и улучшением показателей здоровья новорожденных.

Методы

Сравнительное поперечное исследование было проведено в государственной больнице Карачи, Пакистан, с участием 200 беременных женщин (100 вакцинированных, 100 невакцинированных). Преждевременные роды определялись как роды до 37 недель гестации. Данные о статусе вакцинации, демографических характеристиках матерей и исходах беременности анализировались с использованием критерия хи-квадрат, независимого t-критерия, многомерного логистического регрессионного анализа, моделей пропорциональных рисков Кокса и метода сопоставления по прогностическим оценкам.

Результаты

Преждевременные роды значительно реже встречались в вакцинированной группе (7%), чем в невакцинированной (15%) (p = 0,04). Скорректированный многомерный анализ показал, что у вакцинированных матерей вероятность преждевременных родов была на 54% ниже (скорректированное отношение шансов = 0,46, 95% ДИ: 0,21–0,98, p = 0,04). Анализ чувствительности сопоставления по прогностическим оценкам подтвердил эту связь (скорректированное отношение шансов = 0,44, 95% ДИ: 0,19–0,92, p = 0,04). Отношение рисков в модели пропорциональных рисков Кокса составило 0,52 (95% ДИ: 0,27-0,99, p = 0,04), что свидетельствует о снижении риска преждевременных родов на 48% среди вакцинированных матерей. Поступления в отделение интенсивной терапии новорожденных также были ниже у вакцинированных матерей (5% против 12%, p = 0,03), а вес при рождении был выше (3100 ± 450 г против 2900 ± 520 г, p = 0,02). Различий по типу вакцины или триместру вакцинации не наблюдалось.

Выводы
Вакцинация от COVID-19 среди беременных женщин значительно снижает риск преждевременных родов, госпитализации в отделение интенсивной терапии новорожденных и улучшает показатели массы тела при рождении. Эти результаты убедительно подтверждают необходимость включения вакцинации от COVID-19 беременных в стандартную дородовую помощь в условиях ограниченных ресурсов для улучшения здоровья матерей и новорожденных.

Ключевые слова: COVID-19, вакцинация, беременность, преждевременные роды, здоровье матери, неонатальные исходы, Пакистан, общественное здравоохранение

Résumé

Contexte
La naissance prématurée représente la majorité de la morbidité et de la mortalité néonatales à l'échelle mondiale. La pandémie de COVID-19 a ajouté des facteurs de stress supplémentaires pour les mères, ce qui pourrait potentiellement affecter l'issue de la grossesse. Cette enquête explore si la vaccination maternelle contre la COVID-19 est liée à une diminution du travail prématuré et à de meilleurs résultats de santé néonatale.

Méthodes
Une étude transversale comparative a été menée dans un hôpital public à Karachi, Pakistan, incluant 200 femmes enceintes (100 vaccinées, 100 non vaccinées). Le travail prématuré a été défini comme un accouchement avant 37 semaines de gestation. Les données sur le statut vaccinal, les caractéristiques démographiques maternelles et les résultats de la grossesse ont été analysées à l'aide de tests du chi carré, de tests t indépendants, de régressions logistiques multivariées, de modèles de risques proportionnels de Cox et de l'appariement par score de propension.

Résultats
Le travail prématuré a été significativement réduit dans le groupe vacciné (7%) par rapport au groupe non vacciné (15%) (p = 0,04). L'analyse multivariée ajustée a révélé que les mères vaccinées avaient une réduction de 54 % des chances de travail prématuré (aOR = 0,46, IC à 95 % : 0,21-0,98, p = 0,04). L'analyse de sensibilité par appariement des scores de propension a validé cette relation (aOR = 0,44, IC à 95 % : 0,19-0,92, p = 0,04). Le rapport de risque de la modélisation des risques proportionnels de Cox était de 0,52 (IC à 95 % : 0,27-0,99, p = 0,04), ce qui représentait une réduction de 48 % du risque de naissance prématurée chez les mères vaccinées. Les admissions en unité de soins intensifs néonatals étaient également plus faibles chez les mères vaccinées (5 % contre 12 %, p = 0,03), et le poids à la naissance était plus élevé (3100 ± 450 g contre 2900 ± 520 g, p = 0,02). Aucune différence n'a été observée selon le type de vaccin ou le trimestre de vaccination.

Conclusions
La vaccination contre le COVID-19 chez les femmes enceintes réduit considérablement le risque de travail prématuré, réduit les admissions en soins intensifs néonatals et améliore les résultats de poids à la naissance. Ces résultats soutiennent fortement l'intégration de la vaccination maternelle contre la COVID-19 dans les soins prénataux standard dans les milieux à faibles ressources afin d'améliorer la santé maternelle et néonatale.

Mots-clés
COVID-19, vaccination, grossesse, travail prématuré, santé maternelle, résultats néonatals, Pakistan, santé publique

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