Obstetrics

COVID-19 vaccination uptake among pregnant individuals in a middle-income setting

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During pregnancy, coronavirus disease 2019 (COVID-19) is associated with increased morbidity and mortality.[1] To date, there are no safety concerns for COVID-19 vaccination in pregnancy, and the World Health Organization recommends that the vaccine be offered to all pregnant individuals. This study aimed to determine COVID-19 vaccination status and factors associated with its uptake among pregnant people in a middle-income setting.

This is a population-based cross-sectional study. The records of all participants enlisted in a registry designed for identification and follow up during pregnancy in level I ($n = 84$) and level II ($n = 9$) centers of eight counties within the same state (Guanajuato, Mexico) during September 2021 were screened for eligibility. The only inclusion criterion was known vaccination status. Vaccine data, and sociodemographic and pregnancy characteristics were collected as available. The obstetric comorbidity index (OB-CMI) was used to assess factors potentially associated with severe morbidity.[2] Participants were classified as having a high-risk pregnancy using a composite outcome of the OB-CMI. The vaccination rate was calculated as the number of individuals who received at least one dose of any COVID-19 vaccine during pregnancy. Univariable logistic regression models were performed to estimate the association of available covariates with vaccination. The institutional review board approved this study.

A total of 2379 pregnant individuals were included for analysis (Table 1). Only 20% reported receiving at least one dose of the COVID-19 vaccine during pregnancy. Most participants were vaccinated during the third trimester (62.2%). The most commonly administered vaccine type was Oxford-AstraZeneca (22.9%), followed by Pfizer-BioNTech (12.2%). Unfortunately, in 55% of the cases, the vaccine type was not specified. Factors associated with COVID-19 vaccination included maternal age, gravidity, parity, and high-risk pregnancy (Table 1).

The overall vaccination rate during pregnancy was strikingly low, in line with previous reports.[3] Vaccine uptake was more likely among individuals with high-risk pregnancies. Compared with other populations, coverage variations by vaccine type are influenced by vaccine authorization and availability.[4] In this setting, five vaccine platforms were approved for pregnancy administration despite the paucity of evidence on the safety and efficacy of some of them in obstetric patients.[4] Limitations of the study include its retrospective design, which may have limited the data quality and acquisition of additional features of interest. A strategic plan to provide accurate information regarding vaccine safety and efficacy during pregnancy and improve access to high-quality vaccine platforms is needed to optimize vaccine uptake and coverage among this vulnerable population.

AUTHOR CONTRIBUTIONS

MJR-S helped with the conception of the work, analysis, and interpretation; and helped draft the work, revised it critically, and approved the final version of the manuscript. SA-G contributed to the conception of the work, analysis, and interpretation; and helped draft the work, revised it critically, and approved the final version of the manuscript. MC-Z was responsible for the conception of the work, analysis, and interpretation; and helped draft the work, revised

TABLE 1 Vaccine type, gestational age at administration, and factors associated with COVID-19 vaccination during pregnancy[a]

Variable	At least one dose during pregnancy (N = 475)	Did not receive a COVID-19 vaccine during pregnancy (N = 1904)	OR (95% CI)
Vaccine data			
Vaccine type		–	NA
Oxford-AstraZeneca	109 (22.9)		
Pfizer-BioNTech	58 (12.2)		
Sinovac-CoronaVac	8 (1.7)		
CanSino[b]	18 (3.8)		
Sputnik V[b]	21 (4.4)		
Not specified	261 (55.0)		
Gestational age at vaccination, weeks[c]	30.4 (25–35)	–	NA
Trimester at vaccination[c]		–	NA
First trimester	16 (3.4)		
Second trimester	160 (34.4)		
Third trimester	289 (62.2)		
Factors associated with vaccination			
Maternal age, years	25.52 ± 5.89	23.61 ± 6.18	1.05 (1.03–1.07)
Maternal age, years			
≤17	7 (1.5)	323 (17)	Reference
18–34	423 (89)	1452 (76.2)	13.4 (6.31–28.65)
≥35	45 (9.5)	129 (6.8)	16.10 (7.07–36.62)
High-risk pregnancy[d,e]	162 (34.1)	530 (27.9)	1.34 (1.08–1.66)
Gravidity[f]	2 (1–3)	2 (1–3)	1.13 (1.04–1.24)
Parous	344 (72.4)	1258 (66.1)	1.35 (1.08–1.68)
History of early pregnancy loss	178 (37.5)	717 (37.7)	0.99 (0.81–1.22)

Abbreviations: CI, confidence interval; IQR, interquartile range; NA, not applicable; OR, odds ratio; SD, Standard deviation.

[a]Data are presented as mean ± standard deviation; median (interquartile range) or as number (percentage) unless otherwise stated.

[b]Vaccine platform not approved by the World Health Organization during the study period.

[c]Ten missing values.

[d]Four missing values.

[e]Defined as a composite outcome of the obstetric comorbidity index (i.e., pre-eclampsia with severe features or eclampsia; pre-eclampsia/gestational/chronic hypertension; congestive heart failure; pulmonary hypertension; ischemic heart disease/cardiac arrhythmia; congenital heart and/or valvular disease; multiple gestation; intrauterine fetal demise; placenta previa/suspected accreta/abruption; previous cesarean delivery/myomectomy; autoimmune disease/lupus; HIV/AIDS; sickle cell disease/bleeding disorder/coagulopathy/anticoagulation; epilepsy/cerebrovascular accident/neuromuscular disorder; chronic renal disease; asthma; diabetes on insulin; maternal age > 44 years; maternal age 40–44 years; maternal age 35–39 years; substance use disorder; alcohol abuse; body mass index > 50; body mass index > 40 [calculated as weight in kilograms divided by the square of height in meters]).[2]

[f]Seven missing values.

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DATA AVAILABILITY STATEMENT

To preserve participants' privacy, the data that support the findings of this study will not be available.

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