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Research Article

Understanding Vaccine Hesitancy: Risk Perceptions in Pregnant Women during the COVID-19 Pandemic

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Abstract

Background: Although American College of Obstetricians and Gynecologists (ACOG) had dedicated significant efforts to reassure the public regarding vaccination safety during pregnancy, uptake in this vulnerable population remains low. Amid growing scrutiny of vaccination, this study examines COVID-19 vaccine uptake among our pregnant patient population and identifies key factors contributing to hesitancy.

Methods: Between April and July 2021, a prospective observation study was conducted across outpatient clinics affiliated with a New Orleans, LA academic medical center. During prenatal visits, pregnant patients received counseling on risks of COVID-19 infection during pregnancy and the benefits of vaccination. Data on patient demographics, obstetrical characteristics, and perceptions on COVID-19 vaccine were collected. Furthermore, to determine the vaccination acceptance rate in our study population, we checked the Louisiana Immunization Information System (LINKS) to verify vaccination status of those who delivered at our institution and were vaccinated during pregnancy or postpartum between February 2021 and February 2022 (when COVID-19 vaccine became more readily available in the US).

Results: Among 262 women surveyed (mean age 28.6 ± 6.3 years and mean gestational age of 24.7 ± 9.9 weeks), 103 (43.3%) had never been tested for COVID-19, with 18 (7.3%) reporting a pre-pregnancy infection and 8 (3.2%) already had COVID-19 infection during pregnancy. Vaccine hesitancy was primarily driven by safety concerns for themselves (28%) or the fetus (24%). Information sources on COVID-19 vaccine included news media (37.8%), friends/family (30.5%), social media (21.0%), and government sources (6.1%), with only 17.2% relying on healthcare practitioners. While 21.5% were vaccinated prior to the survey, comparison analysis across three racial groups (27.3% Caucasian, 21.3% African American, 14.1% Hispanic) showed no statistical significance. This survey result was supported by data obtained from LINKS from February 2021 to February 2022, which noted low COVID-19 vaccination rates of only 32% (Caucasian), 31% (African American), and 27% (other ethnicities) among obstetrical patients who delivered at our institution over that period.

Conclusion: Despite expecting hesitancy due to the COVID-19 vaccine's newness, we found that vaccine reluctance among pregnant women is high and consistent across ethnicities. By examining these perceptions and their information sources, we can develop targeted strategies to reduce vaccine hesitancy.

Keywords: *COVID-19; Vaccinations in Pregnancy; Vaccine Hesitancy*

Background

Since the start of the pandemic, extensive data have established that COVID-19 infection in pregnancy causes significant maternal morbidity and mortality, including heightened risks of intensive care unit admission, pneumonia, preterm birth, preeclampsia, cesarean delivery, and postpartum hemorrhage [1-3]. Conversely, COVID-19 vaccination in pregnancy significantly reduces these risks and vaccination further provides passive neonatal immunity, reduces preterm birth, and lowers stillbirth risks [4-8]. Subsequent studies have confirmed its safety and efficacy [9-14].

Despite robust safety evidence and strong recommendations from professional organizations like the American College of Obstetricians and Gynecologists (ACOG) and the Society for Maternal-Fetal-Medicine (SMFM), acceptance of vaccines during pregnancy remains a challenge. This hesitation may stem from the growing number of recommended prenatal vaccines and diverse information regarding safety. As of July 2023, the CDC reports uptake of only 16.2% for COVID-19 vaccination among pregnant patients aged 18-49 with even lower rates among Black (8.3%) and Hispanic (9.6%) pregnant patients [15]. Surprisingly, working in healthcare was not found to be associated higher uptake during pregnancy [16].

Efforts are ongoing to address these barriers and improve health literacy [16-18]. The issue is especially critical in Louisiana, a Deep South state with low vaccination rates - where only about 26% of local residents received a COVID-19 vaccination [19] - combined with some of the highest maternal morbidity and mortality and preterm birth rates in the country. Louisiana severe maternal morbidity rate is 73.6 per 10,000 delivery hospitalizations, with a maternal mortality rate of 39.0 per 100,000 births and a preterm birth rate of 13.3% [20]. In 2021, during the Delta variant surge, the Louisiana Department of Health reported 14 COVID-related maternal intensive care unit admission or death [21]. Therefore, vaccination in pregnancy against preventable disease remains a pressing public health concern.

In this study, we examined COVID-19 vaccine risk perceptions among a diverse cohort of pregnant individuals during the pandemic, identifying key reasons for hesitancy to help clinicians improve vaccine acceptance. These findings are particularly relevant given the current climate of heightened scrutiny surrounding vaccination in general.

Methods

A prospective observational study was conducted at ambulatory obstetrics and gynecology clinics within an academic center in New Orleans, LA. Between April and July 2021, participants received standardized counseling during prenatal and postpartum visits. Women who did not receive counseling on COVID-19 vaccine during these visits were excluded.

Obstetrics physicians provided standardized counseling regarding COVID-19 infection, covering the risks of infection during pregnancy, vaccine benefits, and addressing common, specific concerns regarding vaccination. Data was collected to analyze patient perceptions of vaccination during pregnancy, including patient demographics (self-identified race and ethnicity), obstetrical characteristics, gestational age (at counseling and delivery), maternal consent or refusal regarding the COVID-19 vaccine and other vaccines, and maternal perceived risk and concerns about COVID-19 infection and vaccination. Additionally, we use the Louisiana Immunization Information System (LINKS) to assess vaccination prevalence among women delivering at our institution from February 2021 through February, 2022 - time period of widespread vaccine availability to pregnant women. These records were then compared to our survey results on vaccine uptake.

Data analysis was performed using descriptive and comparison analysis, with statistical significance set at $p\text{-value} < 0.05$.

Results

Over the course of this study, we provided COVID-19 vaccine counseling to 262 women during routine prenatal care (Demographics and obstetric characteristics in table 1). The cohort included a substantial population of African American women (44%). Counseling was provided at a mean gestational age of 24.7 ± 9.9 weeks, with participants delivering at a mean of 38.3 ± 1.4 weeks. While 50.4% of the cohort had no underlying medical conditions, the remainder presented with other medical complications listed in table 2.

Age (years)	28.6 ± 6.3
Gravidity	2.8 ± 1.6
Parity	1.3 ± 1.2
Weight at counseling (lbs)	176.2 ± 48.2
BMI at counseling (kg/m^2)	30.8 ± 7.7
EGA at counseling (weeks)	24.7 ± 9.9
EGA at delivery (weeks)	38.3 ± 1.4
Race	
Caucasian	55 (22.2%)
Black	109 (44%)
Non-white Hispanic	71 (28.6%)
Asian	7 (2.8%)
Other	6 (2.4%)

Table 1: *Demographic and obstetric characteristics of pregnant women who received prenatal vaccine counseling (n = 262).*

Data presented as mean ± SD or number and percent.

No medical complications	133 (50.4%)
Chronic Hypertension	25 (9.5%)
Diabetes Mellitus (pre-existing)	5 (1.9%)
Gestational Diabetes	15 (5.7%)
Hypertensive disorders of pregnancy	13 (4.9%)
HIV	3 (1.1%)
Sickle Cell Disease	2 (0.8%)
Other Immunocompromised Status	2 (0.8%)
Obesity	76 (28.8%)
Other Pregnancy Complications	31 (11.7%)

Table 2: *Medical conditions during pregnancy.*

Data presented as number and percent. Percentages will not total 100% because some individuals report multiple medical conditions.

According to our study population survey, 103 (43.3%) had never been tested for COVID-19, 18 women (7.3%) reported a pre-pregnancy COVID-19 infection and 8 (3.2%) tested positive during this index pregnancy. Among those previously infected with COVID-1, 3 (15%) were asymptomatic, 15 (75%) experienced minor symptoms, and 2 (10%) reported severe symptoms. Regarding vaccination status, only 56 (21.5%) had received the vaccine at the time of the survey, and 82 (38%) planned to receive it. Among those who have not received the vaccine, survey results showed that 77 (35.5%) of participants reported that their doctors did not discuss the COVID-19 vaccine with them (Table 3). Primary information sources for our study population regarding the vaccine included TV or radio news outlets (37.5%), friends/family (30.3%), social media (20.8%), CDC/government website (6.1%) while 17% obtained information from doctors' office. Our cohort's perceptions concerning infection risk and vaccinations are outlined in table 4. Of significant note, 80.3% of participants did not consider themselves high risk for COVID-19 infection, 43% did not believe that the virus posed a danger to pregnant women, and 53% were not worried about contracting COVID-19 during pregnant. Participants are more receptive to T-dap vaccination during pregnancy (69.5%) and COVID-19 vaccine after delivery (69.5%), however, vaccine acceptance is lower during breastfeeding

participants (48.8%). Conversely, 96.7% will approve Hepatitis B vaccine for their baby after birth and 97.7% supported all childhood vaccines. Our participants also had a low acceptance for influenza vaccine (21.5%).

When did you last test for COVID-19 infection	
Never taken a COVID-19 test	103 (43.3%)
Within the last 2 weeks	18 (7.6%)
Within the last 4 weeks	18 (7.6%)
More than 4 weeks ago	99 (41.6%)
Had COVID-19 infection before pregnancy	18 (7.3%)
Had COVID-19 infection during current pregnancy	8 (3.2%)
Of those infected with COVID-19, level of symptoms	
Asymptomatic	3 (15%)
Minor	15 (75%)
Severe	2 (10%)
Already received COVID-19 vaccine	56 (21.5%)
If you have not received the vaccine, did any doctor talk to you about the vaccine before this visit?	77 (35.5%)
Plan on receiving the COVID-19 vaccine	82 (38%)

Table 3: *COVID-19 infection and vaccination status of our cohort.*

Data presented as number and percent.

	Yes	**No**
Are you worried about getting COVID-19 while pregnant?	102 (47%)	115 (53%)
Do you consider yourself high risk for getting COVID-19 infection?	43 (19.7%)	175 (80.3%)
Do you think COVID-19 infection is more dangerous for pregnant women?	122 (57.0%)	92 (43.0%)
Did you receive influenza vaccine in the past	47 (21.5%)	172 (78.5%)
Did you or will you receive T-dap?	141 (69.5%)	62 (30.5%)
If you will not get the COVID-19 vaccine during pregnancy, will you get it after giving birth?	134 (69.1%)	60 (30.9%)
Do you plan to breastfeed?	166 (77.6%)	48 (22.4%)
Will you accept the COVID-19 vaccine while breastfeeding?	80 (48.8%)	84 (51.2%)
Will you allow your baby to get the Hepatitis B vaccine after birth?	206 (96.7%)	7 (3.3%)
Will you allow your baby to get all other vaccines in childhood?	210 (97.7%)	5 (2.3%)

Table 4: *Perception of vaccination during pregnancy.*

Data presented as number and percent.

A comparative analysis of the three largest ethnic groups in our cohort-Caucasian, African-American, and Hispanic-revealed no statistically significant differences in vaccine refusal rates, current vaccination status, or intentions to vaccinate during pregnancy, postpartum, or in the future (Table 5).

	White	Black	Hispanic	P-value
Already received COVID-19 vaccination	15 (27.3%)	23 (21.3%)	10 (14.1%)	NS
Declined vaccination	1 (4.8%)	2 (4.0%)	0 (0%)	NS
Plan to receive vaccine during pregnancy	7 (33.3%)	13 (26.0%)	12 (48.0%)	NS
Consider vaccination during postpartum period	8 (38.1%)	20 (40.0%)	9 (36.0%)	NS
Consider vaccination in the future	5 (23.8%)	15 (30%)	4 (16.0%)	NS

Table 5: *Outcomes after counseling on COVID-19 vaccination among Caucasian, African American, and Hispanic cohorts.*

Data presented as number and percent.

NS = Not Significant.

Table 6 details survey results regarding COVID-19 vaccine safety perceptions. As anticipated, the primary concerns centered on potential personal side effects during pregnancy (28.8%) and potential impacts on the baby (24.2%).

No concerns about getting the vaccine	56 (21.2%)
Potential personal side effects during pregnancy	76 (28.8%)
Unknown personal long-term side effects	38 (14.4%)
Concern for potential effects on the baby	64 (24.2%)
Personal reaction to previous vaccine	5 (1.9%)
Would like to know more about how well it works before accepting vaccine	31 (11.7%)
Do not think they need it	14 (5.3%)
Believe that infection with COVID-19 is not that bad	1 (4%)
Believe that if other people get the vaccine, then they do not have to get it	1 (4%)
Cost	1 (4%)
Others (friend had side effects, do not trust vaccine, only believes in natural remedies, will get Covid from vaccine, do not know what is in vaccine)	11 (4.2%)

Table 6: *Concerns from patients who declined getting the COVID-19 vaccine.*

Data presented as number and percent. Percentages will not total 100% because some individuals report multiple concerns.

We validated our survey-reported vaccination rates by comparing them with documented uptake among women who delivered at our institution between February 2021 and February 2022, a period of widespread vaccine availability. Analysis of LINKS data revealed similar vaccination rates across demographic groups: Caucasians (32%), African Americans (31%), and other ethnicities (27%; p = ns). These objective findings confirm that our survey results are comparable to actual vaccination rates within our institution during this one-year period.

Discussion

Although vaccine hesitancy is not new, controversy surrounding vaccines during pregnancy in the U.S. has intensified in recent years and gained widespread media attention [22]. During the COVID-19 pandemic, the initial exclusion of pregnant women from clinical trials of the new COVID-19 vaccine, along with rapidly shifting and inconsistent recommendations from authorities, sparked uncertainty among pregnant women. In 2025, the U.S. Department of Health and Human Services no longer recommended COVID-19 vaccines for pregnant women, which drew critique from ACOG and SMFM, who continued to recommend COVID-19 vaccines [23,24]. Furthermore, the concern

that vaccines are associated with autism spectrum disorder has resurfaced. These factors have not only led to general vaccine hesitancy but especially among pregnant women who have added concern on potential effects on the fetus.

Our study highlighted significant controversy and distrust of the COVID-19 vaccine within the current climate. At the time of data collection, only 21.5% of participants were vaccinated, with 38% planning to do so. While acceptance rate improved after giving birth (69.1%), only 48.8% were willing to vaccinate while breastfeeding. The higher acceptance of established vaccines-T-dap (69.5%), Hepatitis B (97.7%) and routine childhood vaccines (97.7%) for their baby-suggests that the novelty of the COVID-19 vaccine may play a key role in fueling broader vaccine hesitancy. From this survey, COVID-19 vaccine acceptance was uniformly low across racial groups (50% Caucasian, 37.7% African American, 39.0% Hispanic), a trend validated by data obtained from LINKS from February 2021 to February 2022, which showed COVID-19 vaccination rates of only 32% (Caucasian), 31% (African American), and 27% (other ethnicities) among obstetric patients who delivered at our institution. The survey data reveals a critical gap in patient education: only 6% relied on the CDC or official sources for information, and 17% from their physician's office, while a large percentage depended on media, TV, radio and news (37%) and friends and family (30%), likely leading to misinformation. To reduce vaccine hesitancy, accurate safety information must be disseminated through more informal, influential channels, such as TV and the radio.

Key strengths of this study include a racially and ethnically diverse cohort, standardized COVID-19 vaccine counseling, and the validation of this self-reported vaccine uptake against actual vaccination records of women who delivered at our institution over one year period. Still, it has limitations, including a small sample size, potential selection bias inherent to survey methodologies, and a cross-sectional design which captures attitudes at a single time point and does not reflect the dynamic nature of vaccine perceptions which change with evolving information. Future research using qualitative or mixed-methods approaches could provide deeper insights into the reasons behind vaccine hesitancy.

Conclusion

Using the COVID-19 vaccine as a case study, our study demonstrates that overall vaccine acceptance rates, in particular, COVI-19 vaccine are low among a racially and ethnically diverse and metropolitan population of pregnant women with significant medical comorbidities, which may be attributable to distrust of the vaccine and concern for its safety. By examining these perceptions and their information sources, we can develop targeted strategies to reduce vaccine hesitancy.

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