Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information website.

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Correspondence

COVID-19 vaccination in pregnancy: Experience in Viet Nam

Dear Editor,

Vaccination has been the most effective strategy against coronavirus 2019 disease (COVID-19). However, given the disruptive nature of the pandemic, vaccines have understandably been approved using expedited assessment processes. Studies on vaccination in pregnant women have shown no increased risk of pregnancy complications, but these had a retrospective design and/or were limited to mRNA vaccines [1–4]. Furthermore, data on the comparative impact of different vaccines in this important patient group is lacking.

Based on our experience, we compared pregnancy and neonatal outcomes in Vietnamese women vaccinated against COVID-19 with the Astra Zeneca versus Pfizer-BioNTech vaccines. Between August and November 2021, 954 pregnant women at approximately 30–31 weeks' gestation were offered COVID-19 vaccination at My Duc Hospital, Ho Chi Minh City, Vietnam. The vaccine used (Astra Zeneca or Pfizer-BioNTech) was based availability at the time of vaccination. We prospectively followed pregnant women until their babies were delivered (see Table 1).

A total of 513 women were vaccinated with the Pfizer-BioNTech vaccine and 441 with the Astra Zeneca vaccine (mean age 30.8 ± 4.5 vs. 30.0 ± 4.4 years [$p < 0.001$], first pregnancy 40.2% vs. 54.5% [$p < 0.001$], spontaneous pregnancy 92.6% vs. 87.3% [$p = 0.009$], gestation at vaccination 32.4 ± 4.0 vs. 31.9 ± 4.5 weeks [$p = 0.067$], and two vaccine doses received 80.7% vs. 60.1% [$p < 0.001$], respectively). Side effects related to both vaccines were mild, but some were significantly more common after the AstraZeneca versus Pfizer-BioNTech vaccine (self-reported fatigue, headache, muscle or joint pain, and fever). The proportion of women with preeclampsia and gestational diabetes mellitus was slightly, but not significantly, higher in those received the Pfizer-BioNTech versus AstraZeneca vaccine (both 1.0% versus 0.2%; $p = 0.225$).

Women who received the Pfizer-BioNTech or AstraZeneca vaccine had a similar post-vaccination rate of COVID-19 (8.6% and 6.8%, respectively; $p = 0.359$). The proportion of women who delivered low birthweight infants (birthweight < 2500 g) was significantly higher in those vaccinated with the Pfizer-BioNTech versus AstraZeneca vaccine (5.3% vs. 2.5%; relative risk 2.1, 95% confidence interval 1.05–4.18; $p = 0.046$). This appeared to be due to a higher rate of growth restricted infants rather than a higher rate of preterm birth (data not shown). On multivariate analysis that included vaccine type along with maternal age, number of previous pregnancies, type of pregnancy (natural vs. in vitro fertilization) and post-vaccination COVID-19 infection, vaccination with the Pfizer-BioNTech versus Astra Zeneca vaccine during pregnancy was significantly associated with delivering a low birthweight infant (odds ratio 2.65, 95% confidence interval 1.30–5.76; p =

Table 1
Pregnancy and neonatal outcomes in pregnant women vaccinated against COVID-19.

	AstraZeneca (n = 441)	Pfizer-BioNTech (n = 513)	Difference (95% CI)	Relative risk (95% CI)	p-value
Pregnancy outcomes					
Preeclampsia after vaccination, n (%)	1 (0.2)	5 (1.0)	0.75 (–0.42, 1.92)	4.3 (0.5, 36.65)	0.225
Diabetes after vaccination, n (%)	1 (0.2)	5 (1.0)	0.75 (–0.42, 1.92)	4.3 (0.5, 36.65)	0.225
Gestational age at birth, weeks	38.4 ± 1.6	38.6 ± 1.3	0.1 (–0.1, 0.3)	–	0.176
Preterm delivery, n (%)					
<28 weeks	3 (0.7)	0 (0.0)	–	–	–
<34 weeks	6 (1.4)	8 (1.6)	0.2 (–1.52, 1.92)	1.15 (0.4, 3.28)	0.95
<37 weeks	28 (6.4)	34 (6.6)	0.28 (–3.07, 3.62)	1.04 (0.64, 1.69)	0.9
Oligohydramnios, n (%)	12 (2.7)	15 (2.9)	0.19 (–2.11, 2.49)	1.07 (0.51, 2.26)	0.95
Polyhydramnios, n (%)	14 (3.2)	23 (4.5)	1.31 (–1.33, 3.95)	1.41 (0.74, 2.71)	0.381
ICU monitoring, n (%)	0 (0)	2 (0.4)	–	–	–
Stillbirth, n (%)	2 (0.5)	1 (0.2)	0.43 (0.04, 4.72)	–0.26 (–1.2, 0.69)	0.6
Maternal death, n (%)	0 (0.0)	0 (0.0)	–	–	.
Neonatal outcomes					
Birth weight, g	3148.3 ± 376.8	3132.1 ± 403.5	–	–16.1 (–65.9, 33.6)	0.524
Low birth weight (<2500 g), n (%)	11 (2.5)	27 (5.3)	2.1 (1.05, 4.18)	2.75 (0.12, 5.39)	0.046
High birth weight (>4000 g), n (%)	6 (1.4)	10 (2.0)	1.42 (0.52, 3.88)	0.58 (–1.25, 2.41)	0.66
Birthweight percentile	50.0 [25.0; 75.0]	50.0 [25.0; 75.0]	–	–	0.445
Birthweight < 10th percentile, n (%)	65 (14.7)	85 (16.6)	1.12 (0.84, 1.51)	1.83 (–3, 6.66)	0.493
NICU, n (%)	24 (5.5)	23 (4.5)	0.82 (0.47, 1.44)	–0.96 (–3.95, 2.03)	0.594
Birth defects, n (%)	4 (0.9)	4 (0.8)	0.86 (0.22, 3.42)	–0.13 (–1.42, 1.17)	0.95

Data are mean ± standard deviation, median [interquartile range], or number of patients (%).
CI, confidence interval; ICU, intensive care unit; NICU, neonatal intensive care unit.

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0.01).

Although the data from this prospective cohort study should be considered preliminary due to the relatively small sample size, and lack of randomization and an untreated control group, we found that a higher proportion of women vaccinated with the Pfizer-BioNTech vaccine during pregnancy delivered low birthweight infants compared to those vaccinated with the AstraZeneca product. A recent report of data from a large number of US-based women concluded that there was no overall increased risk for small for gestational age at birth or preterm delivery in vaccinated versus unvaccinated individuals [2]. However, our data suggest that all vaccines may not be equivalent in terms of their effect on infant birthweight when given during pregnancy. Nevertheless, vaccination remains an important tool for preventing the substantial maternal morbidity and mortality and neonatal complications associated with SARS-CoV2 infection during pregnancy [5]. Overall, additional research is needed to confirm our preliminary data and, in general, more longitudinal follow-up, including evaluation of large numbers of women vaccinated earlier in pregnancy, is necessary to fully understand the maternal, pregnancy, and infant impacts of COVID-19 vaccination during pregnancy.

CRediT authorship contribution statement

Lan N. Vuong: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. **Minh N. Chau:** Data curation, Investigation, Project administration, Writing – review & editing. **Duy L. Nguyen:** Data curation, Formal analysis, Writing – review & editing. **Toan D. Pham:** Data curation, Methodology, Formal analysis, Software, Writing – review & editing. **Ben W. Mol:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Writing – review & editing. **Tuong M. Ho:** Conceptualization, Investigation, Methodology, Project administration, Supervision, Writing – review & editing.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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Lan N. Vuong[a,b,*], Minh N. Chau[b,c], Duy L. Nguyen[b], Toan D. Pham[b], Ben W. Mol[d], Tuong M. Ho[b,c]
[a] *University of Medicine and Pharmacy at Ho Chi Minh City, Ho Chi Minh City, Viet Nam*
[b] *HOPE Research Center, My Duc Hospital, Ho Chi Minh City, Viet Nam*
[c] *My Duc Hospital, Ho Chi Minh City, Viet Nam*
[d] *Department of Obstetrics and Gynaecology, School of Clinical Sciences at Monash Health, Monash University, Melbourne, Victoria, Australia*

[*] Corresponding author at: Department of Obstetrics and Gynaecology, University of Medicine and Pharmacy at Ho Chi Minh City, 217 Hong Bang Street, District 5, Ho Chi Minh City, Viet Nam.
E-mail address: lanvuong@ump.edu.vn (L.N. Vuong).