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SARS-CoV-2 During Omicron Variant Predominance Among Infants Born to People With SARS-CoV-2

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SARS-CoV-2, the virus that causes COVID-19, continues to evolve, resulting in variants with properties that can affect transmissibility and/or severity.[1] The period of Omicron variant predominance has been associated with increased transmissibility but lower severity in the general population.[2,3] However, studies have shown increases in hospitalizations among infants when comparing the period of Omicron predominance to previous periods.[4,5] SARS-CoV-2 infection during pregnancy can impart anti–SARS-CoV-2 antibodies to infants, but antibody levels quickly wane during the first 6 months.[6] Analyses of the pre-Omicron period showed low incidence of SARS-CoV-2 infection among infants aged 0 to 6 months born to people with SARS-CoV-2 infection during pregnancy.[7] Infants 0 to 6 months are the only group with no COVID-19 vaccine authorized. Our objective was to understand the rates of SARS-CoV-2 infection before and during the period of Omicron variant predominance among infants born to people with infection during pregnancy and whether the period of maternal infection affects infant susceptibility.

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CONFLICTS OF INTEREST DISCLOSURE: The authors have indicated they have no potential conflicts of interest to disclose. The findings and conclusions in this report are those of the authors and do not necessarily represent the official position of the U.S. Centers for Disease Control and Prevention.

METHODS

We used data on infants aged 0 to 6 months born from pregnant people with SARS-CoV-2 infections during 2020 and 2021 reported to the Centers for Disease Control and Prevention (CDC) Surveillance for Emerging Threats to Pregnant People and Infants Network (SET-NET) from 6 US jurisdictions. A jurisdiction's data were included if it reported all polymerase chain reaction (PCR) SARS-CoV-2 laboratory results (Massachusetts, Missouri, Puerto Rico, Tennessee, and the city of Philadelphia) for infants meeting inclusion criteria or reported a random sample of the same (Minnesota). We calculated incidence rates of infants' first laboratory-confirmed SARS-CoV-2 infection in the period before (March 22, 2020–December 18, 2021) and during (December 19, 2021–September 9, 2022) Omicron variant predominance.[3] Incidence rate ratios (IRR) comparing the 2 periods were also calculated. To examine differences when the maternal and infant infections were of discordant variant periods, a subanalysis was performed restricted to infants born to pregnant people with positive SARS-CoV-2 tests occurring before December 5, 2021. Survey weighting, survey procedures, and finite population corrections were performed. This activity was reviewed by the CDC and was conducted consistent with applicable federal law and CDC policy.

RESULTS

Timing of positive tests in this analysis was similar to the national trajectory of the pandemic (Fig 1). During the period before Omicron variant predominance (n = 27 403), the incidence rate of positive SARS-CoV-2 tests among infants aged 0 to 6 months born to people with SARS-CoV-2 infection during pregnancy was 3.1 per 100 person-years. During the period of Omicron variant predominance (n = 14 115), the rate was 15.3 per 100 person-years (IRR, 5.00; 95% confidence interval [CI], 4.83–5.21). Restricted to infants born to pregnant people who had SARS-CoV-2 pre-Omicron, the IRR increased to 5.83 (95% CI, 5.66–6.05) (Table 1). The proportion of infants infected ≤14 days after delivery with maternal infections ≤14 days before delivery declined from 31.4% (95% CI, 27.1–35.8) pre-Omicron to 0.8% (95% CI, 0.5–1.0) during Omicron predominance, suggesting the increased rate of infection was not due to increased perinatal transmission.

DISCUSSION

The incidence rate of positive SARS-CoV-2 testing among infants born to people with SARS-CoV-2 infection during pregnancy during the period of Omicron predominance was 5 times higher than the preceding period. The increased incidence of SARS-CoV-2 infections mirrors that observed in the general population and the increase in infant hospitalization during the same period.[5] The ratio of the incidence rates was magnified when limited to infants born to pregnant people with positive pre-Omicron SARS-CoV-2 tests. This finding aligns with other evidence of reduced protection against Omicron from previous infection with other variants.[8] Increased transmissibility of the Omicron variant to infants who are ineligible to receive COVID-19 vaccination, raises the importance of preventing SARS-CoV-2 transmission through other means, such as vaccination of pregnant and postpartum people.

The present report is strengthened by longitudinal, representative data. However, this report is subject to limitations. First, this analysis is limited to pregnant people and infants with PCR-confirmed infection and may underreport asymptomatic and nonmedically attended infections. A large portion of infants had no PCR testing (82.3%), limiting the interpretation of incidence. At-home COVID-19 diagnostic tests are authorized for those aged 2 years and older,[9] but their use among infants may has led to underascertainment of positive infant infections, especially in the Omicron period. Second, no genomic sequencing was performed to confirm the variant infecting individuals. Third, there may be unmeasured, time-dependent factors that confound the measured relationship including maternal COVID-19 vaccination, likely higher during the Omicron period, and other infection prevention and control measures, perhaps lower during the Omicron period.

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Dr Gosdin conceptualized and designed the study, drafted the initial manuscript, carried out the analysis, and critically reviewed and revised the manuscript; Mr Chang carried out the analysis and critically reviewed and revised the manuscript; Dr Olsen, Ms Lewis, and Dr Gilboa designed the data collection instruments, provided technical assistance for data collection, analysis, and interpretation, and critically reviewed and revised the manuscript; Dr Hall provided technical assistance for the analysis and interpretation and critically reviewed and revised the manuscript; Mr Tong and Dr Woodworth designed the data collection instruments, conceptualized the study, provided technical assistance for data collection, analysis, and interpretation, and critically reviewed and revised the manuscript. Mss Wingate, Ojo, and Shephard, and Mr Mobley coordinated and supervised data collection and critically reviewed and revised the manuscript; and all authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

ABBREVIATIONS

CI	confidence interval
CDC	Centers for Disease Control and Prevention
IRR	incidence rate ratio
PCR	polymerase chain reaction
SET-NET	Surveillance for Emerging Threats to Pregnant People and Infants Network

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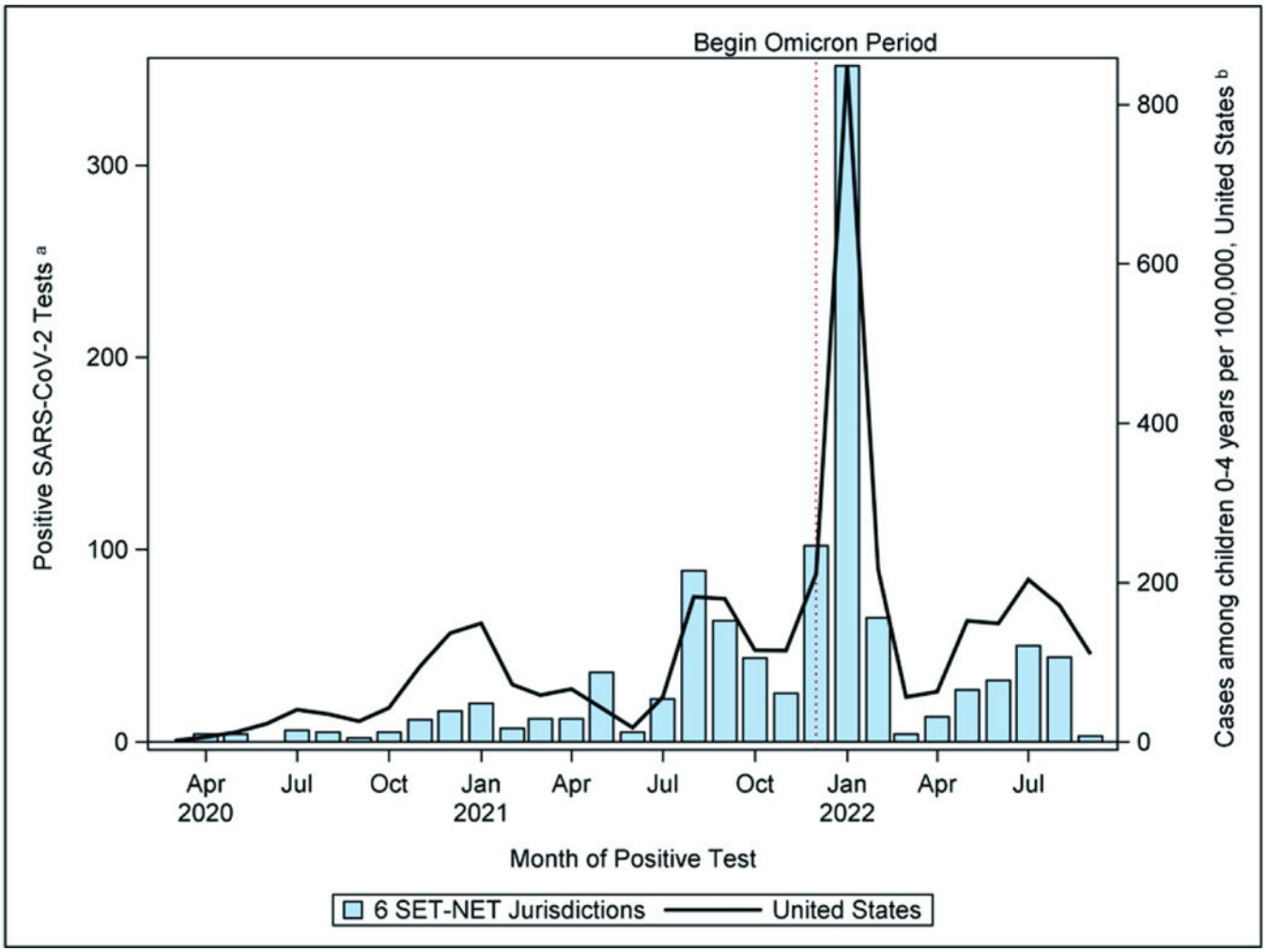

FIGURE 1.

Timing of first positive SARS-CoV-2 testing among infants aged 0 to 6 months born to people with SARS-CoV-2 infections during pregnancy compared with national case incidence among children aged 0 to 4 years: 6 SET-NET jurisdictions, March 2020–September 2022.

[a]Number of infants with first positive polymerase chain reaction SARS-CoV-2 laboratory test during their first 6 months of age, weighted.

[b]Centers for Disease Control and Prevention, COVID-19 response. COVID-19 case surveillance public use data with geography (version date: November 03, 2022).

TABLE 1

Positive SARS-CoV-2 Polymerase Chain Reaction Test Results by Period of Variant Predominance Among Infants Born to People With SARS-CoV-2 Infections During Pregnancy: 6 SET-NET Jurisdictions, March 2020–September 2022

	Period Before Omicron Variant Predominance[a]			Period of Omicron Variant Predominance[a]			
	Positive Tests[b]	Surveillance Time[c]	Incidence Rate (95% CI)[d]	Positive Tests[b]	Surveillance Time[c]	Incidence Rate (95% CI)[d]	IRR (95% CI)[e]
		(*n* = 27 403)			(*n* = 14 115)		
Infant SARS-CoV-2 infection between birth and 6 mo of age	359	130.4	3.07 (2.77–3.35)	641	44.5	15.32 (14.45–16.18)	5.00 (4.83–5.21)
Among infants born to pregnant people with SARS-CoV-2 infection during the period before Omicron variant predominance[f]							
		(*n* = 27 266)			(*n* = 12 170)		
Infant SARS-CoV-2 infection between birth and 6 mo of age	358	130.4	3.06 (2.77–3.34)	580	34.8	17.84 (16.74–18.91)	5.83 (5.66–6.05)

[a] Period before Omicron variant predominance was March 22, 2020–December 18, 2021, and period of Omicron variant predominance was December 19, 2021–September 9, 2022.

[b] Number of infants with first positive polymerase chain reaction SARS-CoV-2 laboratory test during their first 6 mo of life, unweighted.

[c] Surveillance time is the total time in 100 person-years from birth to first positive SARS-CoV-2 laboratory test, 6 mo of age, or death, whichever came first, weighted.

[d] Incidence rate is the number of first infant SARS-CoV-2 positive laboratory tests per 100 person-years, weighted.

[e] IRR is the ratio of the incidence rate during the period of Omicron variant predominance relative to the incidence rate during the period before Omicron variant pre-dominance, weighted.

[f] Restricted to maternal infections occurring before December 5, 2021.