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SARS-CoV-2 Antibodies in Pregnant Women Admitted to Labor and Delivery

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Objective

Serologic testing for Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) with immunoglobulin G (IgG) is now broadly available in the United States. Antibody levels for SARS-CoV-2 rise within 2-3 weeks of infection and can detect whether an individual has ever been infected, either symptomatically or asymptotically. Serology is not recommended by the Center for Disease Control as a diagnostic test for active infection but instead can be used to understand the epidemiology of the virus and identify groups who are at higher risk of infection.¹

Previous studies utilizing SARS-CoV-2 polymerase chain reaction (PCR) from nasopharyngeal swabs for disease confirmation suggest that pregnancy does not appear to increase the risk of acquisition of SARS-CoV-2 above the non-pregnant population.² However, PCR testing at the time of hospitalization for delivery may underestimate the prevalence of SARS-CoV-2 in pregnancy; infection in earlier gestation may only be detectable by antibody testing. Other factors that may affect the prevalence of SARS-CoV-2 in pregnancy include viral prevalence in different regions of the country, asymptomatic carriage of the virus, unavailability of testing in particular regions of the country and whether the patient seeks screening for various indications (e.g., offered through employment, due to symptoms, protocol-driven routine screening in Labor and Delivery (L&D) unit).

The objective of this study was to determine the seroprevalence rate of SARS-CoV-2 in pregnant women admitted to L&D. A secondary objective was to correlate serum

antibody status to PCR testing results to determine prevalence of potential immunity in our population.

Study Design

Seven hospitals with L&D units in the Northwell Health system in New York State were included in the study. Participants were all women admitted to L&D between May 27, and July 24, 2020 who had their blood drawn for SARS-CoV-2 IgG antibodies. IgG titers were resulted as either positive, negative or equivocal. The serology test used to perform the study was Roche Elecsys anti-SARS-CoV-2. This test has a false positive rate of 0.2% secondary to cross reactivity with cytomegalovirus, Epstein-Barr virus and systemic lupus erythematosus. The false negative rate is unknown.³ False negative results may be secondary to testing before seroconversion or waning antibodies over time. We employ a universal testing approach for SARS-CoV-2 upon admission to L&D with PCR in a nasopharyngeal swab. The PCR results were recorded for all study participants if available.

This study received Institutional Review Board approval from The Feinstein Institute for Medical Research at Northwell Health. Descriptive statistics were used to evaluate the data.

Results

In the study period 1671 women delivered in the Northwell Health system and had available SARS-CoV-2 antibody results. Of those, 269 were seropositive (16.1%), 1400

were seronegative (83.7%) and two were equivocal (0.11%). PCR results for each group are presented in Table 1.

Discussion

To date, three other studies examined the seroprevalence of SARS-CoV-2 in pregnancy with prevalence rates between 0.6-10.1% (Table 2)^{4,5,6}. In our cohort, 16.1% of pregnant women were seropositive for SARS-CoV-2, representing the highest reported prevalence rate of SARS-CoV-2 in pregnancy. This likely reflects the higher prevalence of the virus in New York state⁷, once the epicenter for SARS-CoV-2 in the United States.

Results of both PCR and antibodies to SARS-CoV-2 can help to determine the timing of infection. Acute infection may be represented by positive PCR and negative antibody results. A past infection may be represented by negative PCR and positive antibodies. If both are positive, a recent or past infection may have occurred. PCR in some individuals was shown to stay positive for weeks after infection.⁸ There is a concern that some patients who were exposed to the virus have a transient elevation in antibodies, complicating the interpretation of testing results.

Universal testing on L&D represents a unique opportunity to continuously study exposure to SARS-CoV-2 in the population. The general public has been practicing social distancing and avoiding healthcare contact, creating a selection bias in seroprevalence studies. Pregnant women, a generally healthy and mostly asymptomatic

group, continue to routinely receive prenatal and L&D services. A cohort of pregnant women admitted to L&D is therefore more representative of the general population.

It is still unclear whether SARS-CoV-2 antibodies confer immunity to reinfection and for how long. However, there is growing interest in the literature regarding SARS-CoV-2 antibodies. They may be a useful tool in studying exposure rates to the virus in different populations, in developing a vaccine, and in treating sick patients with convalescent plasma. Further research is necessary to determine the antibody response to SARS-CoV-2 in pregnant women, its accuracy and its significance for the management of seropositive pregnant women and their fetuses.

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		PCR result		
		Positive	Negative	Not Available
Antibody status	Positive (16.1%, n=269)	51 (18.9%)	217 (80.6%)	1
	Negative (83.7%, n=1400)	15 (1%)	1372 (98%)	13
	Equivocal (0.11%, n=2)	0	2 (100%)	0

Table 1 COVID-19 antibody and PCR results in pregnant women admitted to Labor and Delivery
 PCR – polymerase chain reaction

Table 2

Seroprevalence Studies of SARS-CoV-2 Antibodies in Pregnancy

Study	Sample Size	Timing in Pregnancy	Study Period	Location	Seroprevalence of SARS-CoV-2 Antibodies
Flannery et al. ⁴	1293	Antepartum and delivery admission	4/4/2020-6/3/2020	Philadelphia, PA, USA	6.2%
Zollkau et al. ⁵	234	Delivery admission	4/6/2020-5/13/2020	Jena, Thuringia, Germany	0.6%
Cosma et al. ⁶	138	First trimester	4/16/2020-6/4/2020	Turin, Piedmont, Italy	10.1%
Haizler-Cohen et al.	1671	Delivery admission	5/27/20-7/24/20	New York City and Long Island, NY, USA	16.1%