Severe acute respiratory syndrome coronavirus 2 antibodies in pregnant women admitted to labor and delivery units.

L. Haizler-Cohen  
Northwell Health

A. Davidov  
Zucker School of Medicine at Hofstra/Northwell, adavidov7@northwell.edu

M. J. Blitz  
Zucker School of Medicine at Hofstra/Northwell, mblitz@northwell.edu

G. Fruhman  
Zucker School of Medicine at Hofstra/Northwell, gfruhman@northwell.edu

Follow this and additional works at: https://academicworks.medicine.hofstra.edu/articles

Part of the Obstetrics and Gynecology Commons

Recommended Citation  
Haizler-Cohen L, Davidov A, Blitz MJ, Fruhman G. Severe acute respiratory syndrome coronavirus 2 antibodies in pregnant women admitted to labor and delivery units... 2020 Jan 01; ():Article 6714 [p.]. Available from: https://academicworks.medicine.hofstra.edu/articles/6714. Free full text article.

This Article is brought to you for free and open access by Donald and Barbara Zucker School of Medicine Academic Works. It has been accepted for inclusion in Journal Articles by an authorized administrator of Donald and Barbara Zucker School of Medicine Academic Works. For more information, please contact academicworks@hofstra.edu.
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.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Severe acute respiratory syndrome coronavirus 2 antibodies in pregnant women admitted to labor and delivery units

**OBJECTIVE:** Serologic testing for severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) immunoglobulin G (IgG) antibodies is now broadly available in the United States. The SARS-CoV-2 antibody levels rise within 2 to 3 weeks after infection and can indicate whether an individual has ever been infected, irrespective of symptomatic or asymptomatic presentation. Serology is not recommended by the Centers for Disease Control and Prevention as a diagnostic test for an active infection but instead can be used to understand the epidemiology of the virus and identify the groups who are at a higher risk of infection.\(^1\)

Previous studies utilizing polymerase chain reaction (PCR) tests to detect SARS-CoV-2 from nasopharyngeal swabs for disease confirmation suggest that pregnancy does not seem to increase the risk of acquiring a SARS-CoV-2 infection when compared with the nonpregnant population.\(^2\) However, PCR testing at the time of hospitalization for delivery may underestimate the prevalence of SARS-CoV-2 in pregnancy; infection during an earlier gestational period may only be detectable by antibody testing. Other factors that may affect the prevalence of SARS-CoV-2 infection in pregnancy include the 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 (eg, screening offered through employment, the presence of symptoms, and protocol-driven routine screening in labor and delivery [L&D] units).

The objective of this study was to determine the seroprevalence rate of SARS-CoV-2 antibodies in pregnant women admitted to L&D units. A secondary objective was to correlate the serum antibody status to the results of the PCR tests to determine the prevalence of potential immunity in our population.

**STUDY DESIGN:** A total of 7 hospitals with L&D units in the Northwell Health system in New York State were included in this study. The participants were all women admitted to the L&D units between May 27, 2020, and July 24, 2020, who had their blood drawn for SARS-CoV-2 IgG antibody testing. IgG titers were classified as either positive, negative, or equivocal. The serology test used in this study was the Roche Elecsys Anti-SARS-CoV-2 (Roche Diagnostics International Ltd, Rotkreuz, Switzerland) test. This test has a false positive rate of 0.2%, secondary to cross reactivity with the cytomegalovirus, Epstein-Barr virus, and systemic lupus erythematosus. The false negative rate for the test is unknown.\(^3\) False negative results may be because of testing before seroconversion or after the waning of antibody levels over time. We used a universal testing approach for SARS-CoV-2 on admission to an L&D unit with a PCR test of a nasopharyngeal swab. The PCR test results were recorded for all study participants, if available.

This study received institutional review board approval from the Feinstein Institutes for Medical Research at Northwell Health. Descriptive statistics were used to evaluate the data.

**RESULTS:** During 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 2 were equivocal (0.11%). The PCR results for each group are presented in Table 1.

**CONCLUSION:** To date, 3 other studies have examined the seroprevalence of SARS-CoV-2 antibodies in pregnancy with prevalence rates between 0.6% and 10.1% (Table 2).\(^4\) In our cohort, 16.1% of pregnant women were seropositive for SARS-CoV-2 antibodies, which is the highest reported prevalence rate of SARS-CoV-2 in pregnancy. This likely

### Table 1

<table>
<thead>
<tr>
<th>Antibody status</th>
<th>PCR result</th>
<th>Positive, n (%)</th>
<th>Negative, n (%)</th>
<th>Not available, n (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positive (16.1%; n=269)</td>
<td>51 (19)</td>
<td>217 (80.6)</td>
<td>1 (0.4)</td>
<td></td>
</tr>
<tr>
<td>Negative (83.7%; n=1400)</td>
<td>15 (1.0)</td>
<td>1372 (98.0)</td>
<td>13 (1.0)</td>
<td></td>
</tr>
<tr>
<td>Equivocal (0.11%; n=2)</td>
<td>0</td>
<td>2 (100)</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

COVID-19, coronavirus disease 2019; L&D, labor and delivery; PCR, polymerase chain reaction.

reflects the higher prevalence of the virus in New York State, which was once the epicenter of SARS-CoV-2 infections in the United States.

The results from both the SARS-CoV-2 PCR and antibody tests can help to determine the timing of infection. An acute infection may be characterized by a positive PCR and negative antibody test result. A past infection may be characterized by a negative PCR and positive antibody test result. If both tests are positive, a recent or past infection may have occurred. The PCR test results for some individuals have been reported to remain positive for weeks after infection. There is a concern that some patients who were exposed to the virus have a transient elevation in antibody levels, complicating the interpretation of the test results.

Universal testing in L&D units represents a unique opportunity to continuously study the exposure to SARS-CoV-2 in a 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 receive routine prenatal and L&D services. A cohort of pregnant women admitted to L&D units 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 on SARS-CoV-2 antibodies. Antibody testing may be a useful tool for studying exposure rates to the virus in different populations, 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 role in the management of seropositive pregnant women and their fetuses.

Lylach Haizler-Cohen, MD
Adi Davidov, MD
Department of Obstetrics and Gynecology
Donald and Barbara Zucker School of Medicine at Hofstra/Northwell
Staten Island University Hospital
Northwell Health
475 Seaview Ave.
Staten Island, NY 10305
lhaizlerco@northwell.edu

Matthew J. Blitz, MD
Department of Obstetrics and Gynecology
Donald and Barbara Zucker School of Medicine at Hofstra/Northwell
Southside Hospital
Northwell Health
Bay Shore, NY
Gary Fruhman, MD
Department of Obstetrics and Gynecology
Donald and Barbara Zucker School of Medicine at Hofstra/Northwell

TABLE 2 Seroprevalence studies of SARS-CoV-2 antibodies in pregnancy

<table>
<thead>
<tr>
<th>First author, year</th>
<th>Sample size (N)</th>
<th>Timing during pregnancy</th>
<th>Study period</th>
<th>Location</th>
<th>Positive seroprevalence results for SARS-CoV-2 antibodies (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flannery et al., 2020</td>
<td>1,293</td>
<td>Antepartum and delivery admission</td>
<td>April 4, 2020, to June 3, 2020</td>
<td>Philadelphia, PA, USA</td>
<td>6.2</td>
</tr>
<tr>
<td>Zoller et al., 2020</td>
<td>234</td>
<td>Delivery admission</td>
<td>April 6, 2020, to May 13, 2020</td>
<td>Jena, Thuringia, Germany</td>
<td>0.6</td>
</tr>
<tr>
<td>Cosma et al., 2020</td>
<td>138</td>
<td>First trimester</td>
<td>April 16, 2020, to June 4, 2020</td>
<td>Turin, Piedmont, Italy</td>
<td>10.1</td>
</tr>
<tr>
<td>Current study</td>
<td>1,671</td>
<td>Delivery admission</td>
<td>May 27, 2020, to July 24, 2020</td>
<td>New York City and Long Island, NY, USA</td>
<td>16.1</td>
</tr>
</tbody>
</table>

SARS-CoV-2, severe acute respiratory syndrome coronavirus 2.
The authors report no conflict of interest.

REFERENCES


© 2020 Elsevier Inc. All rights reserved. https://doi.org/10.1016/j.ajog.2020.09.022