Decreased incidence of preterm birth during COVID-19 pandemic

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Decreased incidence of preterm birth during COVID-19 pandemic

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Short title: Preterm birth in COVID-19 pandemic
Introduction

While most studies have reported an increase in preterm birth (PTB) in pregnant women with severe or critical COVID-19 infection (1), population level European reports offer conflicting data on a decrease (2,3) or stability (4) in the overall rate of PTB during the pandemic. Our objective was to evaluate the incidence of PTB at our institution, in the North-East of the US, during the COVID-19 pandemic in 2020 compared to the similar period in 2019.

Methods

Birth data at Thomas Jefferson University Hospital were accessed by a query of the electronic medical record. Two time periods were examined: March 1-July 31 2020 (during COVID-19 pandemic) and March 1-July 31, 2019 (prior to onset of COVID-19 pandemic). Inclusion criteria were all births ≥ 20 weeks, inclusive of those with intrauterine fetal death, fetal anomalies, and multiple gestations. Individual charts were accessed for women who delivered preterm to confirm indication for delivery. The primary outcome was the incidence of PTB between the two groups, before and during the COVID-19 pandemic. Secondary outcomes included the incidences of late PTB (34 0/7-36 6/7 weeks), early PTB (<34 weeks) and very early PTB (<28 weeks), and perinatal death (fetal and neonatal death) between periods. Analyses by subgroups of spontaneous and iatrogenic PTB were also performed. Chi square analysis using odds ratios (ORs) and 95% confidence intervals (CIs) was used for categorical variables, and adjusted OR (aOR) for demographic differences using multivariable logistic regression analysis. A p value <0.05 was considered significant.

Results

There was a significantly decreased incidence of PTB in 2020 during the COVID-19 pandemic compared to the 2019 period (9.9% vs 12.6%; OR 0.76, 95% CIs 0.58-0.99) (Table). After adjusting for race/ethnicity, the 2020 period remained associated with a significantly decreased incidence of PTB (aOR 0.75, 95% CIs 0.57-0.99) compared to the 2019 pre-COVID period. There were also significant decreases in PTB <34 weeks (2.5% vs 4.7%; aOR 0.51, 95% CIs 0.31-0.82) and PTB <28 weeks (0.6% vs 1.5%, aOR 0.37, 95% CIs 0.15-0.93) in 2020 compared to 2019. The rate of late PTB 34-36 weeks was similar between groups (Table). Subgroup analyses of just spontaneous or just iatrogenic PTB did not reveal significant differences, except for a 60% decrease in iatrogenic PTB < 34 weeks in 2020 compared to 2019 (Table).The incidences of mode of delivery, and perinatal death were similar between time periods (Table). Eight (6.8%) of the 118 PTB in the 2020 period occurred in COVID-19 positive women. The incidence of PTB in COVID-19 positive women (most diagnosed during pregnancy because of symptoms) was 14.5% (8/55), and did not differ significantly compared to the rest of the women in the 2020 group (110/1142, 9.6%; OR 1.60, 95% CIs 0.74-3.47). The incidence of SARS-CoV-
2 positivity upon labor and delivery universal screening between April 13, 2020 (when we started) and July 31, 2020, was 4.5% (40/878).

Discussion

To our knowledge, this is the first US study reporting a significant (25%) decrease in the odds of PTB during the COVID-19 pandemic compared to a similar pre-pandemic period in the peer-reviewed literature. Specifically, we identified a significant decrease in early PTB (49% decrease for <34 and 63% decrease for <28 weeks), which have the highest risk of neonatal morbidity and mortality (Table). When analyzing the subgroup of spontaneous PTB, data pointed to a decrease in spontaneous PTB at different cutoffs, but none where significant, probably due to a type II error. When analyzing the subgroup of iatrogenic PTB, most – but not all - data also pointed to a decrease in iatrogenic PTB at different cutoffs and by race/ethnicity, with iatrogenic PTB < 34 weeks significantly decreased by 60% (Table). The incidences of cesarean delivery, and perinatal death were not different. The major limitation of this study is only accounting for race/ethnicity and no other sociodemographic data as possible confounders. The decrease in PTB, in particular in early (<34 weeks) and very early (<28 weeks) PTBs, is consistent with two prior reports from Denmark (2) and Ireland (3), but differs from a UK report which did not report changes in incidence of PTB (4).

The reasons for a decrease in PTB during COVID-19 pandemic are unclear and it is notable that the decrease seemed to be both in spontaneous and indicated PTB, but these subgroup analyses were small and probably underpowered. Several hypotheses can be postulated (Box). In particular, reduced work hours, reduced physical and/or emotional stress of work, being home with support from family, able to have time to exercise, and reduced exposure to environmental pollutants from reduced air pollution, could all be plausible explanations, among others, but require further study. Specifically the decrease in iatrogenic PTB could be related to reduced antepartum surveillance that would prompt a delivery. Examination of PTB rate should be evaluated in conjunction with fetal demise/neonatal morbidity and mortality rates as reduced access to care can certainly result in a rise in both (5). Further research is needed on the potential differential benefit among racial/ethnic groups (current analysis being limited by sample sizes and potential for type II error), and on how practice changes during the pandemic impact population level outcomes. If replicated in larger populations, this decrease in PTB opens a whole new avenue for investigation, as no single intervention has been shown to have such a major effect on the incidence of PTB in the general population.

Acknowledgements: Savannah Galloway, RN; Margie Gardner, RN, for help collecting the data.
References


<table>
<thead>
<tr>
<th></th>
<th>March-July 2020</th>
<th>March-July 2019</th>
<th>P value or aOR (95% CIs)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total Births</strong></td>
<td>1197</td>
<td>911</td>
<td></td>
</tr>
<tr>
<td><strong>Race/Ethnic group</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Black or African American</td>
<td>448 (37.4%)</td>
<td>343 (37.7%)</td>
<td>0.001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>177 (14.8%)</td>
<td>87 (9.5%)</td>
<td></td>
</tr>
<tr>
<td>Non-Hispanic, non-Black</td>
<td>572 (47.8%)</td>
<td>481 (52.8%)</td>
<td></td>
</tr>
<tr>
<td><strong>Preterm Births</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>PTB &lt; 37 weeks overall</td>
<td>118 (9.9%)</td>
<td>115 (12.6%)</td>
<td>0.75 (0.57-0.99)</td>
</tr>
<tr>
<td>PTB 34-36 weeks</td>
<td>88 (7.4%)</td>
<td>72 (7.9%)</td>
<td>0.93 (0.67-1.28)</td>
</tr>
<tr>
<td>PTB &lt; 34 weeks</td>
<td>30 (2.5%)</td>
<td>43 (4.7%)</td>
<td>0.51 (0.32-0.83)</td>
</tr>
<tr>
<td>PTB &lt; 28 weeks</td>
<td>7 (0.6%)</td>
<td>14 (1.5%)</td>
<td>0.37 (0.15-0.93)</td>
</tr>
<tr>
<td>SPTB &lt; 37 weeks overall</td>
<td>57 (4.8%)</td>
<td>59 (6.6%)</td>
<td>0.75 (0.52-1.10)</td>
</tr>
<tr>
<td>SPTB 34-36 weeks</td>
<td>44 (3.7%)</td>
<td>44 (4.8%)</td>
<td>0.76 (0.49-1.16)</td>
</tr>
<tr>
<td>SPTB &lt;34 weeks</td>
<td>14 (1.2%)</td>
<td>15 (1.6%)</td>
<td>0.76 (0.36-1.60)</td>
</tr>
<tr>
<td>SPTB&lt;28 weeks</td>
<td>3 (0.3%)</td>
<td>7 (0.8%)</td>
<td>0.33 (0.09-1.30)</td>
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<tr>
<td>IPTB &lt; 37 weeks overall</td>
<td>60 (5.0%)</td>
<td>56 (6.1%)</td>
<td>0.78 (0.53-1.10)</td>
</tr>
<tr>
<td>IPTB 34-36 weeks</td>
<td>44 (3.7%)</td>
<td>28 (3.1%)</td>
<td>1.19 (0.73-1.93)</td>
</tr>
<tr>
<td>IPTB &lt;34 weeks</td>
<td>16 (1.3%)</td>
<td>28 (3.1%)</td>
<td>0.40 (0.21-0.75)</td>
</tr>
<tr>
<td>IPTB &lt;28 weeks</td>
<td>4 (0.3%)</td>
<td>7 (0.8%)</td>
<td>0.42 (0.12-1.44)</td>
</tr>
<tr>
<td>COVID positive preterm deliveriesa</td>
<td>8 (3.4%)</td>
<td>Not applicable</td>
<td>-</td>
</tr>
<tr>
<td><strong>Mode of delivery</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cesarean delivery</td>
<td>344 (28.7%)</td>
<td>236 (25.9%)</td>
<td>0.15</td>
</tr>
<tr>
<td>Vaginal delivery</td>
<td>853 (71.3%)</td>
<td>675 (74.1%)</td>
<td></td>
</tr>
<tr>
<td>Perinatal death</td>
<td>7 (0.6%)</td>
<td>12 (1.3%)</td>
<td>.08</td>
</tr>
</tbody>
</table>

PTB, preterm birth; SPTB, spontaneous PTB; IPTB, iatrogenic PTB.

a Women with positive SARS-CoV-2 PCR test result within Jefferson Healthcare system at any point during pregnancy prior to delivery

b Spontaneous PTB included preterm labor and preterm prelabor rupture of membranes (PPROM)

c aOR is odds ratio adjusted for race
Box

Possible reasons for decrease in the incidence of PTB during COVID-19 pandemic

- Less stress, anxiety: work from home
- Other work changes: no shift work; no long hours; less physical work
- Better support systems: partner; family
- Better nutrition
- More exercise
- Better hygiene, less social interactions: less infections
- Less smoking since indoor; less chance for drug use given lockdown
- Less car driving: less stress, less accidents
- Less air pollution
- Government financial assistance
- Less medical interventions
Figure: Preterm birth by gestational age at delivery divided into 2019 pre-COVID-19 and 2020 COVID-19 periods

Rate of term and preterm delivery comparing March-July 2019 (blue) and March-July 2020 (red). *indicates a statistically significant difference between periods at p<0.05.
Figure: Preterm birth by gestational age at delivery divided into 2019 pre-COVID-19 and 2020 COVID-19 periods

Rate of term and preterm delivery comparing March-July 2019 (blue) and March-July 2020 (red). *indicates a statistically significant difference between periods at p<0.05.