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Worse outcomes of pregnancy in COVID-19 infection during parturition may be due to referral bias: analysis in a prospective cohort of 963 pregnancies

OBJECTIVE: The initial studies of COVID-19 suggested that pregnant women have more severe infection with an increased risk of preterm birth, preterm rupture of membranes, and even maternal deaths. Later studies and systematic reviews showed different results. When pregnant women were universally screened, severe disease rates mirrored those of the normal population. Most studies on outcomes have not controlled for either preexisting maternal risk factors or those acquired during pregnancy. In addition, there is still a gray area in understanding how COVID-19 infection around the time of delivery affects pregnant women. Thus, we analyzed if the apparent high risk of severe COVID-19 in referral centers was confounded owing to other concomitant risk factors.

STUDY DESIGN: In our cohort from a single tertiary referral hospital in India, all pregnant women coming for delivery or with labor pain were universally screened for SARS-CoV-2 infection using reverse transcriptase polymerase chain reaction performed on oronasopharyngeal samples. The patients who left the hospital before delivery were excluded. Of 963 pregnant women, 127 were COVID-19 positive. They were compared using tests for proportion in terms of maternal complications (cesarean deliveries, antepartum and postpartum hemorrhage, preterm and prelabor rupture of membrane, puerperal sepsis, and mortality) and neonatal outcomes (appearance, pulse, grimace, activity, and respiration scores; low birthweight; intensive care requirement; neonatal COVID-19 infection; neonatal sepsis; and death). The generalized linear models (GLMs) were then built to assess the contribution of various maternal risk factors and COVID-19 positivity on these outcomes.

RESULTS: The age, gravida, parity, gestational diabetes, and pregnancy-induced hypertension (PIH) rates were similar between the COVID-19 positive and negative cohorts (Supplemental Table 1). The COVID-19 cohort had an overrepresentation of various other pregnancy risk factors (Table). Furthermore, the COVID-19 cohort had higher cesarean deliveries (87 [68%] vs 445 [53.3%] in the negative cohort; \(P = .02\)), higher postpartum hemorrhage (6 [4.7%] vs 1 [0.1%]; \(P < .001\)), and higher maternal mortality (2 [1.6%] vs 1 [0.1%]; \(P = .048\)) (Supplemental Table 2). Among neonatal outcomes, Apgar score was lower at 1 minute (mean [standard deviation], 7.20 (1.63) in COVID-19 vs 7.54 (1.69) in the controls; \(P = .035\)) and at 5 minutes

| Comorbidities and pregnancy risk factors | COVID-19 (n = 127) | Controls (n = 836) | \(P\) value |
|-----------------------------------------|-------------------|------------------|------------|
| Prepregnancy comorbidity                | 26 (20.3)         | 159 (19.0)       | .72        |
| Hypertensive disease of pregnancy       | 9 (7.0)           | 64 (7.7)         | >.99       |
| Gestational diabetes                    | 6 (4.7)           | 32 (3.8)         | .62        |
| Other pregnancy-related risk            |                   |                  |            |
| None                                    | 799 (95.70)       | 117 (91.40)      | NA         |
| Twin pregnancy                          | 7 (0.80)          | 1 (0.80)         | <.01\(^a\) |
| Breech presentation                     | 10 (1.20)         | 8 (6.30)         | <.01\(^a\) |
| Intrauterine growth restriction          | 3 (0.40)          | 1 (0.80)         | <.01\(^a\) |
| In-vitro fertilization                  | 2 (0.20)          | 0                | .017\(^a\) |
| Rhesus-negative pregnancy               | 8 (1.00)          | 1 (0.80)         | <.001\(^a\) |
| Thalassemia                             | 2 (0.20)          | 0                | .017\(^a\) |
| Obstetrical cholestasis                 | 4 (0.5)           | 0                | <.001\(^b\) |

Data are presented as number (percentage).

\(^a\) Significant; \(^b\) Highly significant.

Mohini. Outcomes of COVID-19 positive deliveries. Am J Obstet Gynecol 2022.
and the facilitators of support. Engagement that assessed the experiences of Black women has not been explored. We share our process of stakeholder recruitment from the Endometrial Cancer Action Network for African Americans peer education program and survivor community. They had to carry a diagnosis of endometrial cancer and identify as Black or African-American. The focus group sessions were facilitated through interactive audiovisual conferences, which were recorded and transcribed. The transcripts were qualitatively analyzed via close reading and memo notes, employing Braun and Clarke thematic analysis techniques.

CONCLUSION: This study reiterates that COVID-19 infection does not pose additional risk to pregnancy outcomes by itself. Earlier systematic reviews were hampered by the high heterogeneity of the reported cohorts. This was compounded by duplicate reporting of the same patients in different cohorts, variable inclusion criteria of systematic reviews, and scarce and missing data. More recent systematic reviews have shown that maternal deaths and neonatal outcomes were similar in deliveries conducted in COVID-19 mothers compared with non—COVID-19 mothers. The limitations of our study include the fact that we do not have the indications for cesarean deliveries in the cohort and that it was carried out in a tertiary center that would receive more complicated cases. It brings to light that COVID-19–positive mothers being treated at tertiary care centers have higher rates of cesarean delivery and higher morbidity and mortality, possibly owing to the extra underlying risk factors arising from a referral bias.

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Social support and resilience in Black women affected by endometrial cancer

OBJECTIVE: Considering the issue of endometrial cancer, the role of social support in the experiences of Black women has not been explored. We share our process of stakeholder engagement that assessed the experiences of Black women with endometrial cancer, with attention to both the barriers and the facilitators of support.

STUDY DESIGN: We conducted 2 stakeholder engagement-focus groups with patient survivors. The participants were recruited from the Endometrial Cancer Action Network for African Americans peer education program and survivor community. They had to carry a diagnosis of endometrial cancer and identify as Black or African-American. The focus group sessions were facilitated through interactive audiovisual conferences, which were recorded and transcribed. The transcripts were qualitatively analyzed via close reading and memo notes, employing Braun and Clarke thematic analysis techniques.
**SUPPLEMENTAL TABLE 1**

Demographics of the cohort

| Characteristic                  | COVID-19 positive (n = 127) | COVID-19 negative (n = 836) | P value |
|--------------------------------|----------------------------|-----------------------------|---------|
|                                | Mean                       | Standard deviation          | Mean    | Standard deviation | |
| Age                            | 28.18                      | 4.64                        | 27.71   | 4.23              | .29 |
| Gravida                        | 1.69                       | 0.98                        | 1.72    | 0.87              | .74 |
| Parity                         | 0.42                       | 0.58                        | 0.51    | 0.59              | .11 |
| Period of gestation at delivery| 36.94                      | 3.14                        | 37.42   | 2.90              | .10 |
| Body mass index                | 28.00                      | 1.33                        | 28.12   | 1.35              | .34 |

Data are presented as number (percentage).

Mohini. Outcomes of COVID-19 positive deliveries. Am J Obstet Gynecol 2022.

**SUPPLEMENTAL TABLE 2**

Maternal outcomes (univariate analysis)

| Outcome                                      | COVID-19 (n = 127) | Controls (n = 836) | P value |
|----------------------------------------------|--------------------|--------------------|---------|
| Cesarean delivery                            | 87 (68)            | 445 (53.3)         | .002a   |
| Maternal intensive care unit requirement     | 3 (2.3)            | 6 (0.7)            | .10     |
| Antepartum hemorrhage                        | 0                  | 15 (1.8)           | .11     |
| Preterm premature rupture of membranes       | 1 (0.8)            | 35 (4.2)           | .036a   |
| Preterm rupture of membranes                 | 2 (1.6)            | 38 (4.6)           | .08     |
| Postpartum hemorrhage                        | 6 (4.7)            | 1 (0.1)            | <.001a  |
| Puerperal sepsis                             | 0                  | 0                  | NA      |
| Maternal mortality                           | 2 (1.6)            | 1 (0.1)            | .048a   |

Data are presented as number (percentage).

* Significant; † Highly significant.

Mohini. Outcomes of COVID-19 positive deliveries. Am J Obstet Gynecol 2022.
### SUPPLEMENTAL TABLE 3

#### Neonatal outcomes (univariate analysis)

| Outcome                                      | COVID-19 (n = 127) | Controls (n = 836) | P value |
|----------------------------------------------|--------------------|--------------------|---------|
| Apgar score at 1 min, mean (SD)             | 7.20 (1.63)        | 7.54 (1.69)        | .035a   |
| Apgar score at 5 min, mean (SD)             | 8.27 (1.72)        | 9.14 (1.74)        | <.001b  |
| Low birthweight <2 kg                        | 16 (17.4)          | 127 (24.1)         | .19     |
| Neonatal intensive care unit requirement    | 28 (21.9)          | 206 (24.7)         | .58     |
| Neonatal COVID-19 positivity                | 5 (3.9)            | 0                  | <.001b  |
| Neonatal sepsis                             | 0                  | 2 (0.2)            | .75     |
| Neonatal death                              | 2 (1.6)            | 14 (1.7)           | .64     |

Data are presented as number (percentage) unless stated otherwise.

SD, standard deviation.

a Significant; b Highly significant.

Mohini. Outcomes of COVID-19 positive deliveries. Am J Obstet Gynecol 2022.

### SUPPLEMENTAL TABLE 4

#### Generalized linear model for mode of delivery

| Parameter                                      | B     | Standard error | Wald chi-square | P value |
|------------------------------------------------|-------|----------------|-----------------|---------|
| (Intercept)                                    | -2.625| 2.0160         | 1.696           | .193    |
| Previous lower segment cesarean delivery       | -2.590| .2819          | 84.436          | <.001a  |
| (COVID-19 status = negative) vs (COVID-19 status = positive) | .655  | .2196          | 8.909           | .003a   |
| (Hypertensive disease of pregnancy = no) vs (hypertensive disease of pregnancy = yes) | 1.330  | .3307          | 16.173          | <.001a  |
| (Gestational diabetes = no) vs (gestational diabetes = yes) | 1.184  | .4248          | 7.771           | .005a   |
| (Other risk factor = no) vs (other risk factor = yes) | -.607 | .3412          | 3.167           | .075    |
| Body mass index                                | -.002 | .0535          | .002            | .965    |
| Hemoglobin                                     | .050  | .0812          | .377            | .539    |
| Gravida                                        | -.068 | .1277          | .284            | .594    |
| Parity                                         | .120  | .2087          | .332            | .564    |
| Period of gestation at delivery                | -.032 | .0232          | 1.883           | .170    |

a Significant.

Mohini. Outcomes of COVID-19 positive deliveries. Am J Obstet Gynecol 2022.
### SUPPLEMENTAL TABLE 5

**Generalized linear model for maternal complications**

| Parameter                                           | B     | Standard error | Wald chi-square | P value |
|-----------------------------------------------------|-------|----------------|-----------------|---------|
| (Intercept)                                         | .237  | 2.8844         | .007            | .935    |
| Previous lower segment cesarean delivery           | .472  | .3010          | 2.456           | .117    |
| (COVID-19 status=negative) vs (COVID-19 status=positive) | -.204 | .3296          | .381            | .537    |
| (Hypertensive disease of pregnancy=no) vs (hypertensive disease of pregnancy=yes) | .971  | .3157          | 9.464           | .002<sup>a</sup> |
| (Gestational diabetes=no) vs (gestational diabetes=yes) | .502  | .4711          | 1.135           | .287    |
| (Other risk factor=no) vs (other risk factor=yes)  | .586  | .3929          | 2.228           | .136    |
| Body mass index                                     | -.011 | .0797          | .020            | .888    |
| Hemoglobin                                          | .171  | .1133          | 2.275           | .131    |
| Gravida                                             | -.055 | .1804          | .093            | .760    |
| Parity                                              | -.229 | .2953          | .602            | .438    |
| Period of gestation at delivery                     | -.033 | .0355          | .864            | .353    |

<sup>a</sup> Highly significant.

Mohini. Outcomes of COVID-19 positive deliveries. Am J Obstet Gynecol 2022.

### SUPPLEMENTAL TABLE 6

**Generalized linear model for poor neonatal outcomes**

| Parameter                                           | B     | Standard error | Wald chi-square | P value |
|-----------------------------------------------------|-------|----------------|-----------------|---------|
| (Intercept)                                         | -2.836| 2.0216         | 1.967           | .161    |
| Previous lower segment cesarean delivery           | .335  | .1940          | 2.984           | .084    |
| (COVID-19 status=negative) vs (COVID-19 status=positive) | -.298 | .2286          | 1.695           | .193    |
| (Hypertensive disease of pregnancy=no) vs (hypertensive disease of pregnancy=yes) | 1.129 | .2533          | 19.850          | <.001<sup>a</sup> |
| (Gestational diabetes=no) vs (gestational diabetes=yes) | .290  | .3614          | .642            | .423    |
| (Other risk factor=no) vs (other risk factor=yes)  | .730  | .3219          | 5.145           | .023<sup>a</sup> |
| Body mass index                                     | .115  | .0548          | 4.383           | .036    |
| Hemoglobin                                          | -.054 | .0836          | .416            | .519    |
| Gravida                                             | -.124 | .1221          | 1.034           | .309    |
| Parity                                              | .070  | .2070          | .114            | .735    |
| Period of gestation at delivery                     | -.013 | .0239          | .308            | .579    |

<sup>a</sup> Significant.

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