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individualized strategies for prevention. In the absence of validation of such a model, we present a basic and easily adaptable framework for capturing otherwise low-risk pregnant patients, who are at an increased risk of spontaneous preterm birth. ■

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#### REFERENCES

1. Boelig RC, Kripalu V, Chen SL, Cruz Y, Roman A, Berghella V. Utility of follow-up cervical length screening in low-risk women with a cervical length of 26 to 29 mm. *Am J Obstet Gynecol* 2021;225:179.e1–6.
2. Boelig RC, Naert MN, Fox NS, et al. Predictors of early preterm birth despite vaginal progesterone therapy in singletons with short cervix. *Am J Perinatol* 2020;37:1289–95.
3. Gudicha DW, Romero R, Kabiri D, et al. Personalized assessment of cervical length improves prediction of spontaneous preterm birth: a standard and a percentile calculator. *Am J Obstet Gynecol* 2021;224:288.e1–17.

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



**TO THE EDITORS:** We read with great interest the article titled “Worse outcomes of pregnancy in COVID-19 infection during parturition may be due to referral bias: analysis in a prospective cohort of 963 pregnancies” by Mohini et al<sup>1</sup>. It gives us an insight into the hospital scenario of the developing world during the COVID-19 pandemic and clears the mist around the pregnancy outcomes during this challenging time. It is a very relevant study, especially because of the obstetrical outcomes and the referral bias during the second wave. However, we would like to comment on certain observations, which will help to better comprehend this study.

First, we commend the meticulous and thorough effort that was put in to recruit the large number of people in the prospective cohort. However, we are keen to know the time period of the recruitment. Were all consecutive pregnancies recruited? Furthermore, it would be highly appreciated if you could shed light on how many of these pregnant women were primary admissions to your unit and how many were referred from peripheral institutions, as it is vital to justify the title of your research.

Supplementary Table 2 shows a significant increase in the rates of cesarean delivery and postpartum hemorrhage among COVID-19-infected participants. It makes us ask whether an increase in postpartum hemorrhage could be attributed to a lack of manpower and adequate drugs and equipment in COVID-19-dedicated wards, as most of the hospital settings in the

developing world were poorly equipped with consumables during the peak of the second COVID-19 wave. Moreover, Supplementary Table 4 shows that a COVID-19-positive status was a leading cause of cesarean delivery. We wonder how COVID-19 per se could increase the rate of cesarean delivery. Was it attributable to continuous cardiotocography owing to high-risk pregnancies? We are interested to learn about the obstetrics protocol for cesarean delivery in your unit during the COVID-19 pandemic.

We are really grateful to the authors for throwing light on this subject. A query about the cause of low Apgar scores at birth and 5 minutes (Supplementary Table 3) need to be responded to. Could it be because of respiratory distress in newborns or because of a delay in arranging staff and preparing operation theaters for emergency cesarean deliveries in the COVID-19 wards? This is a vital question that needs to be analyzed with proper justification. Your response to the queries above would further strengthen our understanding of this study. ■

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#### REFERENCE

1. Mohini, Ahmed S, Kasarla V, Rath SK. Worse outcomes of pregnancy in COVID-19 infection during parturition may be due to referral bias: analysis in a prospective cohort of 963 pregnancies. *Am J Obstet Gynecol* 2022;226:144–5.e3.

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## Interpreting COVID-19 outcomes in pregnancy needs knowledge of prevalent conditions in that time frame



We thank Sarkar et al<sup>1</sup> for their interest in our manuscript. We had shown that relatively worse outcomes during parturition in COVID-19-positive mothers were associated with other confounding risk factors for pregnancy.<sup>2</sup> The multivariate analysis did not reveal COVID-19 to be an independent risk factor, and we hypothesized that patients with other such risk factors are more likely to be referred to a specialized center.

We would like to clarify that the data were collected during the first wave and not the second wave in India. Our university was one of the first in the country to have a dedicated COVID-19 hospital. Again, this hospital was the first in the state to have full facilities for cesarean delivery. Of all the consecutive pregnancies, only those who were delivering in this hospital between June 2020 and November 2020 were included.

Because it was a government-designated COVID-19 hospital, most patients were admitted by referral from other healthcare facilities (facilities for cesarean delivery were not available in other COVID-19 hospitals). Simultaneously, a non-COVID-19 hospital was running, where the deliveries of COVID-19-negative patients took place. We do not have the exact data on how many were referral admissions in each section, but they would be much more than in the COVID-19 section than in the non-COVID-19 section.

Most hospitals around the world were stretched for resources, including manpower, at the peak of the COVID-19 waves. Fortunately, we did not face any dire shortages, and all the resources were shared proportionately between the COVID-19 and non-COVID-19 sections. Postpartum hemorrhage was more in the univariate analysis and not on multivariate analysis, whereas cesarean deliveries were higher in the COVID-19 group even on multivariate regression. There could be 3 reasons for this. First, in the initial stages, cesarean deliveries were preferred to minimize the risk of neonatal transmission. Second, the other

(non-COVID-19) preexisting risks factors were greater in the COVID-19 group. Third, hypoxemia in the mother might lead to more fetal distress (poor tocograms) in babies, leading to more cesarean deliveries in a few cases.

The higher proportion of referrals might account for the lower APGAR scores in the newborns. In case any other healthcare facility detected fetal distress and the mother was found to be positive for COVID-19, it would refer the patient to our center. The time taken for transfer to our center might lead to lower APGAR scores, but the quick operative delivery and a strong neonatal intensive care unit backup ensured that this did not translate into neonatal mortality.

We thank Sarkar et al<sup>1</sup> for bringing out this important message that it is imperative to interpret the COVID-19 outcomes in the light of the background, at the time of the study. COVID-19 and its management have evolved rapidly since its emergence, to its current status, where postvaccination breakthrough infections are major issues. ■

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