


# Birthing Experience and Perinatal Outcomes with COVID-19: A Prospective Study

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## ABSTRACT

**Aim:** To study childbirth experience of women with coronavirus disease-2019 (COVID-19) at our institute and to assess clinical characteristics, maternal, and perinatal outcomes of SARS-CoV-2-positive pregnancies.

**Materials and methods:** We conducted a prospective cohort study of all SARS-CoV-2-positive women who delivered at our institute from 1 September 2020 to 31 March 2021. The data was collected from labor room birth register, electronic medical record (EMR), and feedback questionnaire, Kerala Institute of Medical Sciences–Childbirth Experience Questionnaire (KIMS–CEQ), filled by women to express their childbirth experience.

**Results:** Of the 50 women we studied, 84% were asymptomatic. In contrast to the majority of the studies published till now, preterm labor in our study was noted only in 12% cases. In our study, 62% delivered vaginally and cesarean section (CS) rate was 38%. All cesarean deliveries were done only for obstetric or fetal indications. A total of 6% women had minor peripartum complications. Majority of the neonates had normal appearance, pulse, grimace, activity, and respiration (APGAR) scores, and all were COVID-19 screen negative; 12% required neonatal intensive care unit (NICU) admission; 84% women opted to breastfeed their babies (direct breastfeeding or expressed breast milk) maintaining all precautions and hygiene they were taught; 88% women experienced positive childbirth experience based on KIMS–CEQ score.

**Conclusion:** In our study, the pregnancy complications including the pre-term labor and severity of COVID-19 are not found to be above those in screen negative pregnant women nor any case of vertical transmission of SARS-CoV-19 reported. Our study is unique as it also assesses the birthing experience in women with COVID-19 which shows that most of them had a positive birth experience at our institute. The COVID-19 status should not deprive any women of her childbirth rights, although more precautions are warranted.

**Clinical significance:** A positive or negative childbirth experience can have far-reaching consequences in life of a woman and the newborn. It is the need of the hour to address the important issue of positive birth experience, especially during the era of ongoing COVID-19 pandemic. The KIMS–CEQ provides an efficient tool to assess birthing experience of women with COVID-19.

**Keywords:** Antenatal, COVID-19, Labor, Perinatal outcome, Positive childbirth experience.

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## INTRODUCTION

In the recent times, COVID-19 has emerged out as a public health emergency of global concern leading to drastic modifications in the delivery of primary and secondary healthcare services. Especially in maternity care, many antenatal appointments occurred virtually, restrictions were imposed on the presence of birthing partner and use personal protective equipment (PPE) limited the effective communication.<sup>1</sup> The assessment of COVID-19 in terms of its risk factors, clinical course, manifestations, and outcomes can play a key role in effectively planning the maternal care and management during the pandemic.<sup>2,3</sup> Very few of studies done till now have covered the aspect of maternal childbirth experience. It is a contemporary area of research and birthing experience is now considered as one of the most important and relevant quality of care indicators in maternity health services.<sup>4</sup>

Pregnancy is one of the most pleasant experiences but at the same time it can be one of the most critical periods in the life of a woman.<sup>2,5</sup> A “Positive childbirth experience,” as per WHO, is a significant final state of accomplishment for all laboring women which refers to a safe clinical and psychological environment where a woman’s desire of physiological labor and birthing a healthy baby is fulfilled or exceeded. Increasing burden of cases has put the healthcare facilities with limited resources at a tough test. In this time of uncertainty and unpredictability, evaluation

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of childbirth experience can provide a valuable insight into the impact of pregnancy and birth stressors on the overall experience of woman thus helping improving quality of care.<sup>6,7</sup> Our study sought to understand and describe how the changes in the maternity care during the pandemic impacted the childbirth experience of women. We used CEQ originally proposed by Denker *et al.*<sup>8</sup> and

has been validated by many studies<sup>9,10</sup> as an established method of evaluation of childbirth experience. The original CEQ was modified in terms of the aspects related to prevailing pandemic (KIMS–CEQ), retaining the following four main aspects of childbirth experience: Own capacity, professional support, perceived safety, and participation.<sup>8</sup>

**MATERIALS AND METHODS**

The study was conducted in the Department of Obstetrics and Gynaecology, KIMS Health, Thiruvananthapuram. We performed a prospective cohort study including the pregnant women detected with COVID-19 who consented and delivered at KIMS Health. A total of 50 women were included from 1 September 2020 to 31 March 2021. We ran two labor rooms simultaneously and screened all antenatal women in screening area with COVID-19 real-time-polymerase chain reaction (RT-PCR) before admission to the main labor room, in accordance with hospital protocol. Women with COVID-19 were retained in isolation labor room and taken care of by the recruited staff. The research site was committed to provide a one midwife to one pregnant woman ratio for all those in labor. The SARS-CoV-2 negative birth companion was allowed throughout the labor. Multidisciplinary inputs were taken from pulmonary medicine, infectious disease, neonatology, and other respective specialties. Medical treatment was given as per the interim guidelines. All babies born to these women were screened for COVID-19 by RT-PCR of nasopharyngeal swab. Those who opted for breastfeeding were counseled in detail regarding the precautions and hygiene to be maintained during breastfeeding. Special lactation teams were recruited to take care of the feeding issues. The data were obtained from the electronic medical record (EMR) and labor-room birth register. We studied the characteristic features of COVID-19 in pregnancy including the presentation, symptoms, and accompanying comorbidities. We also studied the maternal outcomes in terms of timing and mode of delivery, intrapartum management, associated medical and obstetric complications. Neonatal records were obtained in collaboration with Department of Neonatology, KIMSHealth, Thiruvananthapuram, Kerala. The perinatal outcomes included APGAR score at 5 minutes of birth, birthweight, NICU admissions, and vertical transmission. Women were asked to fill up the KIMS–CEQ just before the discharge from the hospital; on day 2 in vaginal delivery, and on day 3 in women who delivered by cesarean section. The data obtained was utilized to quantify the childbirth experience based on cut-off limit of third quartile for positive childbirth experience, as per the statistician.

**RESULTS**

We observed that 78% of women had asymptomatic presentation and among 22% who were symptomatic, 44% had fever, 44% had cough while others had sore throat (33%), dyspnea (22%), and diarrhea (22%) as the main symptom. As per the classification by Royal College of Obstetricians and Gynaecologists (RCOG),<sup>2</sup> most had mild-to-moderate disease and 3 (6%) had critical disease. Of the comorbidities associated, anemia [mild-to-moderate as per the Centers for Disease Control and Prevention (CDC)]<sup>11</sup> was noted in 19 (38%), gestational diabetes in 18 (36%) patients, others were found in less than 10 % of patients. Majority of the symptomatic women had some comorbidities associated. The altered laboratory findings including acute inflammation serum markers [C-reactive protein

**Table1:** Characteristics and maternal outcomes with COVID-19

<i>1</i>	<i>Presentation</i>	<i>N (%)</i>
a	Asymptomatic	39 (78)
b	Symptomatic	11 (22)
<i>2</i>	<i>Symptoms</i>	<i>N (%)</i>
a	Fever	4 (44)
b	Cough	4 (44)
c	Sore throat	3 (33)
d	Dyspnea	2 (22)
e	Diarrhea	2 (22)
<i>3</i>	<i>Associated comorbidities</i>	<i>N (%)</i>
a	Anemia	19 (38)
b	Gestational diabetes mellitus	18 (36)
c	Hypertensive disorders	5 (10)
d	Bronchial asthma	3 (6)
e	Others (Addisonian crises/rheumatoid arthritis/ multiple sclerosis)	3 (6)
f	ARDS	1 (3)
<i>4</i>	<i>Obstetric complications</i>	<i>N (%)</i>
a	Pre-term labor	5 (10)
b	Impending eclampsia + Iatrogenic pre-term delivery	1 (2)
c	Fetal distress	45 (10)
d	Emergency LSCS	15 (30)
<i>5</i>	<i>Medical complications</i>	<i>N (%)</i>
a	ICU admission/mechanical ventilation/ECMO	3 (6)
<i>6</i>	<i>Mode of delivery</i>	<i>N (%)</i>
a	Vaginal deliveries	31 (62)
b	Cesarean section	19 (38)
<i>7</i>	<i>Vaginal deliveries</i>	<i>N (%)</i>
a	Full-term normal delivery	15 (48)
b	Vaginal birth after cesarean	5 (16)
c	Pre-term vaginal delivery	5 (10)
d	Assisted vaginal birth (Ventouse)	4 (13)
e	Assisted breech delivery	2 (7)
<i>8</i>	<i>Indications for cesarean section</i>	<i>N (%)</i>
a	Failed induction and labor dystocia	5 (26)
b	Fetal distress	4 (21)
c	Previous CS for recurring indications	4 (21)
d	Cephalopelvic disproportion	2 (11)
e	CDMR	2 (11)
f	Placenta previa	1 (5)
g	Impending eclampsia	1 (5)

CS, cesarean section; ECMO, extracorporeal membrane oxygenation; LSCS, lower segment cesarean section

(CRP), lactate dehydrogenase (LDH), and ferritin] were raised in 13 (26%) women. Obstetric complication such as pre-term labor was noted in 5 (10%) women and 1 had iatrogenic pre-term cesarean delivery in view of impending eclampsia. Other complications

included the fetal distress in 5 (10%) and an emergency cesarean section performed in 15 (30%) cases, including impending eclampsia (Table 1).

A total of 31 (62%) women had vaginal deliveries and 19 (38%) underwent cesarean section. Mode of delivery was not affected by COVID-19 status. Out of the vaginal deliveries, 15 (30%) had full-term normal deliveries and other modes included 5 pre-term vaginal deliveries, 5 vaginal births after cesarean, 4 assisted vaginal births (ventouse), and 2 assisted breech deliveries.

Indications for cesarean section included failed induction with labor dystocia in 5 (26%), fetal distress in 4 (21%), previous cesarean section for recurring indication in 4 (21%) women, rest included impending eclampsia, placenta previa, and cesarean delivery on maternal request (CDMR) (Table 1). There were 6 (12%) pre-term deliveries (<37 weeks) and 44 (88%) term deliveries after 37 completed weeks. Low birth weight, less than 2.5 kg, was noted in 3 (6%) infants. Majority of the infants had 5 min APGARs (>7), only 1 infant had low APGAR score of less than 7 at 5 min; 6 (12%) neonates required NICU admission. No case of vertical transmission of SARS-CoV-2 was noted. A total of 42 (84%) women opted for

breast feeding (exclusive and mixed) and 8 (16%) women opted for exclusive formula feeds (Table 2). Taking third quartile as the cut-off for positive birth experience in KIMS CEQ (Table 3), we found that 88% of women had experienced a satisfactory and positive childbirth (Table 4).

**DISCUSSION**

The COVID-19 pandemic has led to unpredictable and unprecedented circumstances and its effect on the healthcare system, its facilities, caregivers and caretakers has been significant including expectant and new mothers. As per the living systematic reviews (LSRs) and meta-analysis by Allotey et al.<sup>3</sup> which included 192 studies, pregnant women with COVID-19 were less likely to manifest symptoms such as fever, dyspnea, and myalgia (OR 0.28, 95% CI 0.13 to 0.62). They were more likely to be admitted to the intensive care unit (4%) or needing invasive ventilation (3.2%) than non-pregnant women of reproductive age. We also found a similar picture with most of the women being asymptomatic and being detected on routine screening. Also, in our study, critical COVID-19 disease accounted for 6% of total screen positive pregnancies. Though the picture appears to be somewhat different during the second wave of pandemic in country, more evidence and data are required to substantiate it. Also, Allotey et al. concluded that the pre-existing comorbidities such as hypertension and diabetes, non-Caucasian ethnicity, high maternal age and body mass index are risk factors for severe COVID-19 in pregnancy.<sup>3</sup> In our study as well, anemia was the most common associated co-morbidity followed by gestational diabetes. The prevalence of comorbidities was higher in women with COVID-19 as compared to general population adding to immune compromise for increased susceptibility to infection.

In our study, birth-plan and mode delivery were not affected by SARS-CoV-2 positivity and most of the women had vaginal births (62%). The rate of cesarean section in our study was 38% (11). Meta-analysis by Toro FD et al.<sup>12</sup> including 28 studies and 1,100 pregnancies found a pooled prevalence of 85% cesarean births in COVID-19 pregnancies. Dubey et al.<sup>13</sup> found that the rate

**Table 2:** Perinatal outcomes with COVID-19

1	Gestational age at delivery (weeks)	N (%)
a	≥37	44 (88)
b	<37	6 (12)
2	Birth weight (kg)	N (%)
a	<2.5	3 (6)
b	≥2.5	47 (94)
3	Parameter	N (%)
a	5 minutes APGAR <7	1 (2)
b	NICU admission	6 (12)
c	Vertical transmission	0
4	Mode of feeding newborn	N (%)
a	Breastfeeding (Exclusive + Mixed)	42 (84)
b	Formula feeds	8 (16)

**Table 3:** Kerala Institute of Medical Sciences Health–Childbirth Experience questionnaire

Sl. No.	Questions	Yes	No
1	All my concerns and queries regarding COVID-19 and its effects on my health and labor process were answered patiently and satisfactorily	48	2
2	I was explained about the investigations and treatment protocols regarding COVID-19	50	0
3	My prenatal care and birth-plan were not modified due COVID-19	48	2
4	I could choose my birth companion after proper screening	25/31	6/31
5	I could choose about my position during labor and delivery	27/31	4/31
6	I could choose my pain relief method during labor and delivery	28/31	3/31
7	My midwife understood my needs and took very well care of me	42	8
8	Attending Doctor periodically examined me with all precautions and assessed the condition	45	5
9	Me and my birth partner were kept well informed about what is happening during labor and birth (and indication for cesarean section, when needed)	46	4
10	The labor process went as I had expected	43	7
11	All my questions and queries regarding COVID-19 affecting my baby were answered satisfactorily	46	4
12	My memories from the labor process/cesarean section make me feel happy	46	4
13	In postnatal period I was not anxious/worried/scared/panicky for any good reason	47	3
14	I was educated about the hygiene practices and precautions during breastfeeding my baby	50	0
15	On discharge, I was advised about precautions to be followed in postpartum period with regard to me and my baby's health	50	0



**Table 4:** KIMS–CEQ response assessment

KIMS–CEQ score (%)	Number of patients	%
≥75	44	88
<75	6	12

of cesarean section was substantially higher in studies from China (91%) compared to that from the USA (40%) or Europe (38%). Allotey et al.<sup>3</sup> did not find a statistically significant difference in comparative studies of pregnant women with and without COVID-19 in terms of cesarean section rates. Thus, the presence of COVID-19 should not be considered as a sole indication for considering cesarean section, although the maternal clinical worsening may warrant early delivery.

We found that the rate of pre-term birth is not increased with COVID-19 in pregnancy. Most of the studies in the initial period of the pandemic showed that COVID-19 affected pregnancies are more liable to end up in pre-term labour.<sup>14–16</sup> Martínez–Perez O et al.<sup>17</sup> in their multicenter prospective cohort study demonstrated that SARS–CoV-2 infection increases the risk for pre-term labor, pre-term pre-labor membrane rupture and NICU admissions. Karami et al.<sup>18</sup> also reported a 47% incidence of pre-term labor with half due to pre-term LSCS. Also, Allotey et al.<sup>3</sup> came up with analysis that the pregnant women with COVID-19 are more likely to have pre-term birth as compared to those without it. On contrary to these findings, another systematic review and meta-analysis including 40 studies, performed by Chmielewska et al.<sup>19</sup> concluded that there was no change in the overall rate of pre-term labor [0.94 (95% CI 0.87–1.02)]. Dube et al.,<sup>20</sup> Melo et al.,<sup>21</sup> and Khalil et al.<sup>22</sup> also concluded that the medically indicated pre-term births would have increased but the overall rates of spontaneous pre-term births in pregnant women with COVID-19 is broadly similar to the rate of pre-term birth in pre-pandemic period.

There was no stillbirth reported in our study. Khalil A et al.<sup>22</sup> reported a significant increase in the overall incidence of stillbirth during the pandemic (9.31 per 1,000 births) than during the pre-pandemic era (2.38 per 1,000 births), but this association was not specific with respect to COVID-19. They proposed that this could have been due to certain indirect effects such as reluctance to go to hospitals when indicated (such as with reduced fetal movements) in fear of contracting infection or due to logistic difficulties or probably unwilling to increase National Health Service load. However, the living systematic analysis<sup>3</sup> did not find any significant increase in the overall stillbirth and neonatal death rate when compared to the background data. Although, the exact estimates and associations are expected to improve by the availability of more data in the future.

In our study, all babies of the affected mothers were screened for COVID-19 and were handed over to screen negative bystanders after proper neonatal evaluation. A total of 12% of our babies required NICU admissions and all were pre-term. In our study, COVID-19 has not been found to be significantly affecting the perinatal outcome of term babies. Although some studies have shown that the babies of mothers with COVID-19 are more likely to be admitted to NICU. According to Allotey et al.,<sup>3</sup> overall, 33% (95% CI 24–43%) of neonates born to women with COVID-19 were admitted to the NICU.

There are only few reports in the literature stating the very low incidence of the vertical transmission. The PregCov-19 LSRs, involving pregnant and postnatal women, conducted by WHO in collaboration with University of Birmingham analyzed 4907 babies;

of which 6.7% had a positive COVID-19 test. Positive nasopharyngeal swab was seen in 96% (64% within 24 hours) of babies. Studies varied in the strength with which the mother-to-child transmission was ascertained. They concluded that till now, there is an insufficient evidence to confirm mother-to-child transmission of SARS–CoV-2. Evidence till date indicates that the babies are more likely to have acquired the disease postnatally from symptomatic mothers, and of those, mostly experience mild disease.<sup>23</sup> Thus, more studies are required to throw light on the vertical transmissibility of SARS–CoV-2.

It is well known that childbirth is a multifaceted experience.<sup>24</sup> Over the recent years, there has been a significant increase in the application of a wide range of clinical practices to induce, augment, monitor or terminate the physiological process of labor, aiming to improve maternal and neonatal outcomes.<sup>6</sup> However, extensively validated postpartum questionnaires covering multidimensional aspects with comprehensive exploration pregnant women’s beliefs and perceptions about their labor process and childbirth are lacking.

The SARS–CoV-2 infection in pregnancy is not associated with significant adverse health outcomes for the mother and newborns in majority of cases, but is likely to have a substantial psychological impact.<sup>24</sup> Negative childbirth experiences do increase the risk of postpartum depression and may affect a woman’s attitude towards future pregnancies and may also impact her choice of mode of delivery.<sup>8</sup> Thus, a comprehensive postpartum questionnaires to assess mothers’ childbirth experience are very much needed to help in identifying those who need support and counselling and also to improve the quality of care of labor and birth management.

Sense of security during labor and perceived control of the same, control of labor pain perception, personal and family support, midwifery care, experience of earlier deliveries, adequate interaction and exchange of information with healthcare staff, and involvement in decision-making contribute to a positive childbirth experience.<sup>25–33</sup>

By and large, it is already evident that the current pandemic situation is responsible for very significant anxiety, reduced quality of life and psychological depression in pregnant women.<sup>34–36</sup> Dencker A et al.,<sup>8</sup> taking into consideration four major dimensions of the childbirth experience, namely, own capacity, perceived safety, professional support, and participation designed the original CEQ. A childbirth experience questionnaire is the usual process of post-delivery feedback at our institute to improve the quality of care. It was further modified to include the different aspects of the COVID-19 disease and the modifications of the protocols (KIMS–CEQ). We, in our study, found that 88% mothers were satisfied with the maternity and neonatal care and experienced a positive childbirth experience. Major factors contributing to dissatisfaction were absence of a SARS–CoV-2 screen negative bystander, inability of midwife to understand their needs and progress of labor not going as per expectation. Almost all women agreed that their concerns and queries regarding COVID-19 and its effects on health and labor process were answered patiently and satisfactorily and were given adequate information about the investigations and treatment protocols regarding COVID-19. Also, most of the women experienced that their original child birth plan was not altered based on detection of COVID-19. Majority of mothers shared that their memory from labor process/cesarean section makes them

happy. Most of the mothers expressed that they were educated adequately about the postnatal care of baby and hygiene practices and were encouraged for breastfeeding.

Mollard E et al.<sup>37</sup> did a cross-sectional survey involving 885 women over a period of 5 months to describe the experiences of women who gave birth in a single center during the COVID-19 pandemic. They found that on testing positive for COVID-19, 33.8% of them reported anxiety, 18.6% had reported depression. 61% had reported inadequate support for childbirth, and 20.5% did not feel safe while giving birth in the hospital. They also observed that women with COVID-19 were more likely to be of Asian ethnicity, have a cesarean section, not have a birth partner present during labor, and would discontinue breastfeeding before 6 weeks. Birthing women's perceptions regarding the safety and support in the hospital environment have been significantly affected by pandemic-related changes in maternity care practices, making it more stressful. Healthcare policy and maternity care practices should aim to promote the sense of safety and control of labor and pain and overall positive experience for women giving birth in the hospital, especially during the prevailing pandemic.

Inversetti A et al.<sup>4</sup> performed a cross-sectional study to evaluate the birthing experience of women without COVID during the pandemic. A comparison of birthing experience was done between women who delivered during COVID-19 pandemic and a pre-COVID cohort recruited in 2018 in the same setting. They used Italian version of the Birth Satisfaction Scale-Revised (I-BSS-R). They found no difference in terms of childbirth experience satisfaction of mothers in both cohorts.

The Birth experience during COVID-19 confinement (CONFINE) study has been initiated by Bertholdt C et al.<sup>38</sup> where they have aimed to assess the maternal sense of control during childbirth between a group of women who gave birth during the confinement period vs those who gave birth after the confinement in the context of epidemic, and a comparison is done with a group of control women (excluding confinement and epidemic contexts). They will utilize Labour Agency Scale questionnaire in the immediate postpartum period. They also aim to evaluate for prevalence of postnatal depression among mothers at 2 months postpartum. But the results will be available later.

## CONCLUSION

Coronavirus disease-2019 (COVID-19) is an ongoing healthcare emergency, special attention and care needs to be given to pregnant women. Severity of COVID-19 is not increased in pregnancy. Most of the cases are asymptomatic, hence a routine screening is warranted. Presence of comorbidities is associated with symptomatic presentation. The rate of pre-term labor is not more in affected cases as compared to general population. Coronavirus disease-2019 (COVID-19) status does not alter the maternal and perinatal outcomes. Despite the ongoing pandemic crises, most parturients had a positive childbirth experience which is the right of every antenatal mother.

## STRENGTHS AND LIMITATIONS

Childbirth is described as a multifaceted experience. To the best of our knowledge, this is the first study evaluating the birthing experience of women with COVID-19 in the changing scenario of pandemic utilizing modified version of CEQ. Evaluation of birthing experience

aids in assessing the shortcomings with an intention to enhancing the quality of maternity care. The preventive measures adopted in the hospital remained unchanged for the whole duration of the study.

One of the main limitations of this study is that it a single-center study with a small sample size; therefore, we do not know the extent to which our findings are generalizable in the population. More studies are required to assess the birthing experience of women and to incorporate the changes to provide positive birthing experience.

## AUTHOR CONTRIBUTIONS

All authors have equally contributed to the study.

**Patient consent:** Informed consent was obtained from all patients.

**Ethical approval:** Ethical clearance was obtained as per the institutional protocol.

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