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Research Article

COMPARATIVE OUTCOME OF NEONATES BORN TO SARS-COV2 (RTPCR TEST) POSITIVE MOTHERS IN 1ST, 2ND, AND 3RD WAVE OF COVID PANDEMIC AT A TERTIARY CARE HOSPITAL IN NORTH INDIA

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ABSTRACT

Objectives: To access the incidence of perinatal transmission of SARS-CoV-2 virus from pregnant mothers having RTPCR test positive for SARS-CoV-2 virus to their newborn babies, to evaluate the morbidity and mortality in these neonates, and to compare the outcomes of these neonates during the first, second, and third waves of the COVID pandemic (March 2020–July 2022) admitted at a tertiary care health facility in North India (Punjab).

Methods: Data were retrospectively gathered from hospital records for all neonates born to pregnant women who had tested positive for the virus using the RTPCR method from March 2020 to July 2022, when the SARS-CoV-2 pandemic was in full swing. In order to assess the relationship between various maternal and perinatal risk factors, a thorough history of the neonate and the pregnant mother was recorded.

Results: During the COVID-19 outbreak, 168 neonates in total were born to mothers who tested positive for the SARS-CoV-2 virus. The majority of these neonates were healthy, although the premature birth rate was higher. Our study's results show a statistically significant relationship between pregnancy-related issues and newborn problems like premature births, low neonatal weight, newborns exhibiting one or more disease symptoms, and poorer neonatal outcomes.

Conclusions: According to our research, there was very little perinatal transmission of the SARS-CoV-2 virus from the pregnant mothers to the newborns. Although there were more premature babies, most of them managed to survive.

Keywords: Perinatal, Pregnant mothers, Premature, Positive test, SARS-CoV-2, Neonates.

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INTRODUCTION

Over 500 million people have been infected with COVID-19 worldwide, and 6.2 million deaths were reported [1]. Both children and adults were infected with the SARS-CoV-2 virus, although older people and those with comorbid conditions were more likely to become ill and die [2]. According to the research, pregnant women were just as vulnerable as the general population [3]. Neonatal COVID-19 virus infection was still lower compared to infections in older children and adults. However, SARS-CoV-2 infection might indirectly damage neonates through the effects on maternal health during pregnancy, such as causing hypoxia in the mother and premature births [4]. Postnatal infections can occur equally in both breastfed and formula-fed newborns [5,6], although vertical transmission is regarded as uncommon [7]. Although extensive research has been done, it is still unknown why neonates primarily exhibit mild symptoms and have reduced fatality rates [8].

There is a paucity of information on mother-to-fetus and perinatal transmission of SARS-CoV-2 infection in the developing world. The majority of the information that has been gathered till date on the effects of SARS-CoV-2 infection in pregnancy, the fetus, and the newborn comes from case reports, small case series, retrospective cohort studies, or cross-sectional studies [5], which were done recently. In order to assess the effects of perinatal transmission of SARS-CoV-2 infection and compare the outcomes of neonates born to mothers who had been diagnosed with SARS-CoV-2 infection during the first, second, and third waves of the COVID pandemic in a public health care center in North India (Punjab), the present study was designed.

METHODS

Approval was sought from the institute's ethical committee for conducting this study.

Study design

A cohort study that is retrospective.

Subjects

From March 2020 to July 2022, all neonates admitted to the NICU (also known as the "covid ward") of the Public Health Care Institute (Punjab) who were delivered to pregnant mothers have had a RTPCR test that was positive for the SARS-CoV-2 virus 2 weeks prior to or 2 days after delivery.

Data collection

Data were gathered from the case files of COVID-positive mothers and their newborn babies who were admitted to the NICU (for observation as per COVID pandemic protocols).

The following information is included in the data: the mother's demographic profile, Mother's information regarding the symptoms of COVID infection (asymptomatic, mild/moderate, or severe illness according to the Mohfw Guidelines), and any chronic illness- or pregnancy-induced problems in the pregnant mother.

- Information on a newborn's birth events includes the gestational age, birth weight, delivery method, any resuscitation procedures, and the Apgar score.
- Any other symptoms in neonates, like signs of neonatal sepsis, neonatal jaundice, respiratory problems, oxygen requirements, shock or septic shock, etc.

- Neonatal COVID RTPCR was performed after 24 to 72 h of life to determine the neonate's COVID status or earlier if the newborn had any signs or symptoms.

Outcomes in the form of discharge, LAMA, referred, and any deaths of these neonates were recorded.

RESULTS

All of the pregnant women who had RTPCR tests that were positive for the SARS-CoV-2 virus were referred to local hospitals because the study setting was a tertiary care referral hospital. The majority (52.4%) of the mothers were from urban areas.

A total of 168 live neonates were born to pregnant women with COVID RTPCR test-positive status at Rajindera Hospital in Patiala from March 2020 to July 2022. In the total number of babies delivered during the COVID pandemic, 54.8% were delivered by LSCS, and 32.1% of neonates were born prematurely. The majority of newborns (54.2%) were male, and 72.6% had birth weights that were normal for gestational age (Table 1).

These pregnant women experienced pregnancy-related symptoms that were comparable to those of the general population. Seventy-eight percent of them had no symptoms, 29% of their mothers were ill, and 5% had multisystem involvement. 4.2% of mothers had hypertension, 2.4% had hypothyroidism, and 1.2% had gestational diabetes (Table 2).

During the first wave of the COVID pandemic (March 2020–October 2020), 45 neonates were born to moms who were hospitalized with positive RTPCR tests. At 24–72 h after birth, the COVID RTPCR test results for all the newborns were negative. One neonate died of neonatal sepsis and septic shock.

Table 1: Demography of the study population

Factors	N	%
Background		
Urban	88	52.4
Rural	80	47.6
Mode of delivery		
Normal vaginal delivery	76	45.2
Lower segment cesarean section	92	54.8
Gestation		
Term	114	67.9
Preterm	54	32.1
Sex		
Male	91	54.2
Female	77	45.8
Weight		
Small for gestational age	38	22.6
Large for gestational age	8	4.8
Appropriate for gestational age	122	72.6

Table 2: Pregnancy related problems in study population (mothers)

Symptoms	N	%
Asymptomatic	119	70.8
Oligohydramnias	4	2.4
Hyper tension	7	4.2
Premature rupture of membranes	9	5.4
Hypothyroidism	4	2.4
Anemia	5	3.0
Anhydraminas	2	1.2
Meconium stained liquor	3	1.8
Gestational diabetes mellitus	2	1.2
Low platelet	1	0.6
Previous LSCS	4	2.4
Deranged color Doppler	4	2.4
Decreased fetal movement	1	0.6
Any other	1	0.6

In the second wave of the COVID pandemic, which lasted from April 2021 to September 2021, 85 neonates (50.5%) were delivered by women who had the COVID virus infection. A majority (55%) was preterm births, and 37.6% had symptoms at birth. Symptoms were respiratory distress (17.6%), sepsis, and septic shock (8.2%); however, only three newborns tested positive for COVID (RTPCR test) after 72 h of birth. The rate of neonatal sickness and mortality during this time was higher.

38 infants were hospitalized in Rajindera Hospital's NICU (COVID ward) during the third wave of the COVID pandemic, which occurred from January 2022 to July 2022. They were either asymptomatic or barely symptomatic. There is a statistically significant link between pregnancy-related issues, newborn preterm birth, low birth weight, baby symptoms, and poorer neonatal outcomes (Table 3).

In all three waves of the COVID pandemic, the majority of the neonates were discharged from the hospital in satisfactory conditions, but only 3 (1.8%) of the newborns exhibited positive RTPCR results for SARS-CoV-2 on day 3 of life, making up the majority of the newborns with negative RTPCR results. Only 4 (2.4%) neonates died between days 2 and 5 of life (Table 4).

DISCUSSION

In our investigation, we described the incidence of perinatal transmission of the SARS-CoV-2 virus and the comparative outcomes of neonates born to SARS-CoV-2-infected mothers. According to WHO standards, all newborns born to SARS-CoV-2-infected mothers were admitted to NICUs (covid) and monitored for the first 72 h of life for the emergence of any symptoms. After 24 h of life and 72 h of life, the COVID RTPCR test was performed.

1.7% of COVID infections were transmitted during pregnancy to neonates, according to our findings. However, the National Neonatology Forum (NNF) India COVID-19 Registry reported in March 2021 that only 5.1% of neonates tested positive on day 1, and although they may have contracted the infection intrauterine or during childbirth, they could also have gotten the infection postpartum from other family members or medical professionals [8,9]. Dhir *et al.* [10] observed a higher prevalence of perinatal transfer of COVID from pregnant mothers to newborns.

In 2020, there were reportedly 13.4 million preterm births (births that occurred before 37 full weeks of pregnancy). Preterm birth rates in India were over 22% [11]. However, in our study, it was 26% (for the first and third waves) and 37% for the second wave of the COVID pandemic (2021). In contrast, according to statistics from the UK, 14% of premature births during the COVID pandemic were caused by iatrogenic factors, and 19% of these infants got neonatal care [12]. It was significantly elevated as a result of the unidentified impact of SARS-CoV-2 on maternal health. Maternal illness progression, especially in seriously unwell or critically sick pregnant women, probably played a significant impact in accelerating delivery, as the severity of other acute respiratory diseases in pregnant women has been shown to correlate with rates of preterm delivery [13].

The preterm rate in our group (Schwartz *et al.*) was significant [14] and comparable to what the UK registry [13] reported. It was 20.7%. Preterm birth rates were similarly higher in SARS-CoV-2 exposed neonates in utero (15.7%) than in the general Spanish population (7.5%), according to Sa'nchez-Luna *et al.* [13] and Yuan *et al.* [16]. In addition, 19.9% of in-utero SARS-CoV-2 affected newborns were delivered preterm. Similar statistics showed that 15.7% and 12.0% of neonates were delivered preterm in the AAP-SONPM and PAN-COVID registries, respectively [21].

Table 3: Comparison of characteristics of SARS Cov-2 positive mothers and their neonates in 1st, 2nd, and 3rd wave

Year of data collection	No .of neonates admitted N	Mode of delivery LSCS N (%)	Preterm births N (%)	No. of babies sick at birth N (%)	Respiratory distress Syndrome in neonate N (%)	Sepsis and septic shock in neonate N (%)	Mothers sick N (%)	Mother's with multisystem involvement N (%)	Covid RTPCR+ve in Neonates N (%)	Neo natal death N (%)	p-value
2020 (1st wave)	45	19 (42)	12 (26)	2 (4)	2 (4)	10 (22)	0	0	0	1	0.76
2021 (2nd wave)	85	48 (56)	32 (37.6)	47 (55)	15 (31)	34 (40)	48 (56)	8 (9)	3 (3.5)	3 (3.5)	0.00
2022 (3rd wave)	38	25 (65)	10 (26)	4 (10.5)	6 (12.6)	10 (26)	1 (2.6)	1 (2.6)	0	0	0.56
Total	168	92 (54)	54 (32)	53 (31.5)	23 (13.6)	54 (32)	49 (29)	9 (5.3)	3 (1.8)	4 (2.3)	0.02

Table 4: Outcome of neonates born to SARS CoV2-infected pregnant women

S. No.	Outcome	Number	%
1	Discharged	163	96.4
2	LAMA	1	0.6
3	Death	4	2.4
4	COVID positive	3	1.8
5	COVID negative	165	98.2

The current study emphasizes the significant rate of illness in newborns whose moms have SARS-CoV-2. All newborns born to COVID-positive women were admitted to the NICU (COVID) and monitored for 72–96 h for the emergence of any symptoms in accordance with WHO guidelines [17]. Majority of newborns in the first and third waves were asymptomatic or only mildly symptomatic, but the worst sickness was seen in the second wave in both mothers and newborns. Our study reported that RDS (56%), sepsis, septic shock (9%), and neonatal jaundice were significant illnesses in addition to preterm birth. 3.5% was a high mortality rate during this period.

Similar results were reported by Gale *et al*. in their study, they found that the population-level neonatal SARS-CoV-2 infection rate in the UK during the peak months of March and April 2020 was just 5–6 per 10,000 newborns. They also found that of 66 newborns with confirmed SARS-CoV-2 infection, 36% required intensive care for respiratory support (although it should be noted that 24% of the sample's infants were born prematurely).

A study from New York evaluated the clinical characteristics and outcomes in feverish neonates under 57 days of age in March and April of 2018, 2019, and 2020 [18] and discovered that SARS-CoV-2 infection was most prevalent in febrile newborns seen in their medical center in 2020 (20 of 30 newborns). When compared to febrile newborns who tested negative for SARS-CoV-2, the authors' research revealed that SARS-CoV-2-infected infants were more likely to experience lethargy or feeding issues and had lower white blood cell, neutrophil, and lymphocyte counts. However, COVID-19 disease was generally minor, with no newborn requiring intubation or other medical intervention, with the exception of two of the 20 newborns who needed more oxygen.

Similarly, the Swedish report revealed a moderate illness course: of the 21 children who tested positive, none of the neonates with SARS-CoV-2 exhibited congenital pneumonia or morbidities that could be directly linked to the virus infection. Both Mithal *et al*. [20] and Numan *et al*. [19] found that none of the 48 SARS-CoV-2-infected newborns reported on and seen in pediatric emergency departments in New York City needed oxygen therapy or experienced respiratory distress. They also demonstrated that none of the infected newborns at a major medical center in Chicago required intensive care or respiratory support. However, in our investigation, all of the COVID infected neonates had symptoms and serious diseases in the second wave of the COVID pandemic. They died as a result of their extreme respiratory distress and multisystem involvement.

Because of the study's limited sample size and the fact that it came from a single institution, conclusions cannot be generalized to form policy.

CONCLUSIONS

The majority of research available has demonstrated that newborns delivered to moms who tested positive for COVID (RTPCR) during pregnancy are less likely to transmit the infection (vertical or perinatal). The majority of investigations came to the conclusion that there is no difference in the rate of virus transfer between housing newborns together or separating them from their COVID-infected mothers. Although neonates born to moms who tested positive for COVID have a higher prematurity risk, all neonates were healthy and were discharged from the hospital early. To know whether this in utero

exposure to the COVID-19 pandemic and/or SARS-CoV-2 virus would affect these children's development; long-term follow-up studies are urgently required.

The institute's ethics committee was consulted regarding any ethical issue.

CONFLICT OF INTEREST

None.

There is no need for financing to carry out this investigation.

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