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Clinical profile and outcome of neonates born to mothers who were infected with Covid during perinatal period – A retrospective study

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Abstract

COVID-19, since its origin, has spread globally and severely affected populations worldwide. India, being the second most populated country, was significantly impacted, including pregnant women and their newborns. Notable perinatal outcomes have been reported among these neonates. This study aims to evaluate the clinical profile and perinatal outcomes of neonates born to COVID-19 positive mothers in the hilly region of Uttarakhand and to compare the findings with reports from other parts of the country and the world.

Material and Methods: This retrospective study was conducted using data collected from the medical record department for the years 2020 and 2021. Mothers who tested positive for SARS-CoV-2 within 14 days prior to or up to 2 days after delivery were included. Neonates born to these mothers were evaluated in detail. The clinical profile, including maternal risk factors, chronic illnesses, gestational age, mode of delivery, birth weight, need for resuscitation, and severity of illness, was assessed. Asymptomatic and stable babies were breastfed and allowed rooming-in with appropriate precautions.

Results: Forty COVID-19 positive mothers were included. One baby was stillborn and one expired on day three of life. Among the neonates, 65.8% were male, 63.2% were delivered by caesarean section, 13.15% were preterm, and 36.8% were small for gestational age.

Conclusion: Most neonates were asymptomatic. Rooming-in and breastfeeding should be encouraged with precautions. Higher caesarean and preterm birth rates were observed.

Keywords: COVID-19; SARS-Co-V2; mothers; neonates

1. Introduction

COVID-19 has spread its wings everywhere. No human inhabited region on the earth has remained untouched by its effect and is re-emerging again and again through its different variants since then. Covid 19 as the name suggested originated in China and had spread throughout the world including India. India being second highest populated country in the world had remained the main victim of Covid which include pregnant females as well. Since the spread of Covid, studies have been done in different parts of the world on the effect of Covid on pregnant females and newborns. Many studies have been conducted in India to study the outcome of neonates born to positive mothers but as per our best knowledge, none of the study has been conducted in Uttarakhand and that too in the upper and hilly region of Garhwal Uttarakhand.

COVID-19 since its origin has continued to spread its wings and has hit hard all over the world. Currently looking at the situation, WHO has reported 767,518,723 confirmed cases of Covid with 6,947,192 deaths globally as on 28th june 2023.[1] Initially, not much of the data was available regarding COVID positive status of pregnant women and the outcome of newborns born to them. A meta analysis done in the year 2020 came out with the conclusion that there was no significant increase in pre term deliveries, caesarean section but there was increase in stillbirths during the pandemic in middle and low income countries.[1] But Mullins et. al in their observational study collected data from the PAN-COVID registry (the UK and Global Pregnancy and Neonatal outcomes in COVID-19) and the AAP-SONPM (American Academy of Pediatrics (AAP) Section on Neonatal-Perinatal Medicine) showed‘ the significant number of pregnant women infected with SARS-CoV-2 and more number of preterm deliveries in positive mothers. [2]

There was higher incidence of preterm deliveries and caesarean section was the preferred mode of delivery concluded by another two meta-analysis.[3,4] Two studies done in urban regions of Uttarakhand also came out with the same conclusion of increased rate of preterm deliveries and caesarean section. No study has been done in the hilly and remote region of Garhwal Uttarakhand, therefore; we aim to bring out the outcome of neonates born to positive mothers in this region and along with analysing if this study also come up with the same results when comparing with the data from rest of the regions of the country and world.

2. Material and methods

2.1 Study design and ethical approval

This is a retrospective study. The data was collected retrospectively from the medical record department for the year 2020 and 2021 with due approval from the Institutional Ethics Committee (IEC letter no: MC/IEC/2022-23/14).

2.2 Inclusion criteria

Only those mothers who came out to be positive for SARS-CoV-2 14 days before or 2 days after delivery were included in the study and babies born to these positive mothers were evaluated in detail. Test done in our study for detecting COVID-19 positivity was RAT (Rapid Antigen Test) and RT-PCR which are the recommended tests as per the standard protocol. [5]

2.3 Exclusion criteria

Mothers who were positive in the early phase of their pregnancy and those who were tested positive after the delivery were excluded from the study.

Clinical profile of all these newborns including any risk factors in mother, chronic diseases in mother, gestational age, mode of delivery, birth weight, need any resuscitation or any severity in newborn was evaluated thoroughly to look for any effect of in babies. Similarly, each baby born to covid positive mothers was tested for SARS-CoV-2 between 24- 48 hrs after birth. If any baby remained asymptomatic and planned for discharge, pre-discharge sample was taken and sent for testing. Irrespective of the test results, asymptomatic and healthy babies were allowed to room in with mother with proper precautions. Breastfeeding was allowed and mother was told to wear facemask while feeding her baby. Rooming-in was restricted only if the baby was sick or if mother was symptomatic and cannot take care of the baby due to any reason. Healthy babies were discharged successfully and repeat testing was only done if the baby had become symptomatic.

Data was entered in Microsoft excel sheet and was compiled using SPSS version 21.

3. Results

In this retrospective study, a total of 40 mothers who were tested positive for covid were shortlisted and the detailed data of the neonates born to these mothers was studied thoroughly. Total numbers of covid positive mothers admitted during the first wave of covid i.e. in the year 2020 were 19 and similar was the number in the year 2021 i.e. in the second wave of covid with 21 admissions (figure 1).

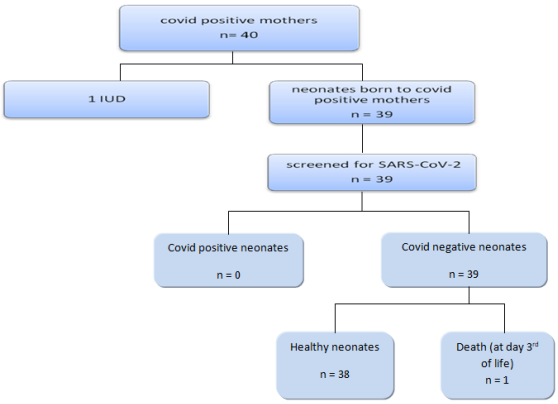


Figure 1. Study layout and outcome of neonates

Pregnancy related complications and co-morbidities in mothers were also evaluated. A total of 6 mothers had anaemia and 2 out of which had severe anaemia requiring blood transfusion. 1 mother was detected with dengue fever (dengue IgM positive), 1 mother had eclampsia, 2 had antepartum hemorrhage (APH), 5 had premature rupture of membrane (PROM). Non progression of labour (NPOL) was seen in 6 mothers, fetal distress was detected in 5, cephalo-pelvic disproportion in 1 and obstructed labour in 1 mother; hence leading to caesarean section as a preferred mode of delivery. Out of 40, one mother had Intra Uterine Death (IUD) of the fetus at 37 weeks 3 days of gestation as the mother had history of bleeding per vaginum. Till the time mother reached hospital, foetus died in utero (table 1).

Of the remaining 39 babies, one baby expired at day 3 of life with findings suggestive of aspiration of milk; leading to choking and sudden respiratory collapse. This was baby girl born via LSCS in view of non progression of labour at 39 weeks 1 day of gestation, with birth weight of 3.15 kilograms and APGAR of 8/9. Baby's covid test done at 24 hours of life was negative, baby was healthy with no complications hence, was shifted to mother after delivery. Though, mother was covid positive but neither she nor the baby had any signs and symptoms or any respiratory complaints. Rest of the 38 babies were born with APGAR of 7 or more. Majority of them i.e. 25 (65.8%) were boys and 13 (34.2%) were girls. 32 out of the 38 babies were born at term gestation (37 weeks to 41 weeks 6 days of gestation), 5 were preterm (<37 weeks) and 1 was born post-term (42 weeks or more). All the 5 babies born at a gestational age less than 37 weeks were late preterm (34 weeks to 36 weeks and 6 days of gestation). Talking about the mode of delivery; babies born via LSCS constituted 63.2% of the total cases i.e. 24 out of 38 were delivered through LSCS and the remaining 14 were delivered vaginally. 24 babies were appropriate for gestational age (AGA) and 14 were small for gestational age (SGA). 92% (35) of the babies had birth weight of 2.5 kg or more and only 3 babies had low birth weight (<2.5 kg). 1 baby was antenatally detected to have grade I hydronephrosis (HDN) in antenatal ultrasound and 1 baby had bilateral pyelectasis but both were healthy, passing urine normally and without any complications (table 2).

4. Discussion

This study focuses on the outcome of neonates born to covid positive mothers of hilly region of Uttarakhand and the effect of COVID-19 on these neonates in the perinatal period.

We enrolled 40 mothers who were positive in their perinatal period of which 1 was stillborn (IUD) (2.5 %) whereas; it was lower (0.79 %) in another study conducted in India. [6] There is higher percentage of IUDs in a study conducted in north India. [7] Globally, there was high incidence of observed in covid era as compared to non covid era. [2] Total of 39 neonates born to covid positive mothers in perinatal period were assessed for their clinical outcomes out of which 65.8% were males and 34.2% were females. Other study from the neighbouring country also showed male predominance (52 %). [8] In another study from India, more number of females were born to covid positive mothers. [6] In our study, all the newborns were born healthy and no newborn required ICU admission. All newborns when tested for SARS-CoV-2 turned out to be negative and were allowed to room-in with mothers with proper precautions. None of the newborn developed any signs and symptoms when roomed in with mothers. Studies from other parts of the country showed very low positivity rate of SARS-CoV-2 in newborns. PAN-COVID registry had positivity rate of 2% in newborns. [2]

1 baby in our study who was previously healthy, SARS-CoV-2 negative and on exclusive breastfeeding expired at day 3 of life suddenly. When evaluated, there was milk present in nostrils and trachea hence the most likely cause was milk aspiration and not likely due to covid.

In this study, 63.2 % of the babies were delivered by caesarean section which was done mainly due to indications like fetal distress, obstructed labour, non progression of labour, premature rupture of membrane and cephalo-pelvic disproportion. Comparing data from high income countries (PAN-COVID and AAP-SONPM registers); 47.9% and 38.3% of the babies were delivered via caesarean section respectively which is less as compared to our study. [2] In India, similar results were achieved in a study done in Bhubaneswar with 60% of the babies being delivered by caesarean sec-

Table 1. Pregnancy related co-morbidities & complications

Pregnancy related co-morbidities & complications	Number	Percentage (%)
Eclampsia	1	2.5
Anaemia	6	15
Intra-uterine death (IUD)	1	2.5
Dengue fever (dengue IgM positive)	1	2.5
Cephalo-pelvic disproportion (CPD)	1	2.5
Ante Partum Hemorrhage (APH)	2	5
Premature rupture of membrane (PROM)	5	12.5
Fetal distress	5	12.5
Obstructed labour	1	2.5
Non progression of labour (NPOL)	6	15

Table 2. Clinical outcome of neonates

Clinical parameters	Number	Percentage
Gestational age Term Late preterm Early preterm Post-term	32 5 0 1	84.2 13.15 0 2.63
Birth weight >/= 2.5 kg <2.5 kg- 1.5 kg <1.5 kg	35 3 0	92 7.89 0
APGAR (at 1 & 5 min) >7 <7	38 0	100 0
Mode of delivery Vaginal Delivery LSCS	14 24	36.8 63.2
Sex Males Females	25 13	65.8 34.2
SGA AGA LGA	14 24 0	36.8 63.1 0

tion. [9] Comparing it with the data from south India; caesarean section was the preferred mode of delivery in a study conducted in a tertiary care hospital in Mumbai with a percentage of 52% which corresponds with the study results from a study done in Kerala (52.28%). [6,10] A study done in Jaipur had 44% of the newborns delivered via caesarean section. [11]

Outcome for gestational age was also studied which showed that 13.15% of the babies were born preterm in our study. Similar results were obtained in a study done in China with 12% of the babies being born preterm. [12] Countries like U.K. and U.S.A. also came up with similar results with 12% and 15.7% preterm deliveries respectively. [2] Our study results also corresponds with study results from the neighbouring country Nepal which concluded that 12 % of their babies were born pretem. [2] Preterm deliveries were 31.7% and 35.3% respectively in two different studies done in north India which is higher as compared to our study. [7,13] Another study from Delhi also had higher number of preterm deliveries (40%).14 Study from south India showed lower number of preterm deliveries i.e. 4.8%. [10]

In our study, majority of the newborns had birth weight of more than or equal to 2.5 kg. 7.8% of the newborns had low birth weight and all of them were having birth weight in the category of 2.49 kg to 1.5 kg. In a systemic review, it was found that globally; 21% of the babies who were born to covid positive mother had low birth weight which is higher in number compared to our study. [4] While another study from low income country concluded that 14.3% of neonates born to covid positive mother had low birth weight. [8] Studies from North India showed that 33.8% of neonates had birth low birth weight in one study, 29.4 % in another study. [7,14] This percentage was 23.6 % and 36.8 % respectively in two different studies. [10,15]

In our study, newborns born small for gestational age (SGA) were 14(36.8 %) while it was 8.2 % in PAN-COVID and 9.6 % in AAP-SONPM(2). SGA babies in China were found to be 7 %.12 One study from India showed similar results to our study with 11.3 % of the babies being born SGA. [10]

5. Conclusion

Majority of the neonates born to mothers who are covid positive in their perinatal period are usually asymptomatic. Those neonates who require intensive care monitoring is due to other perinatal complications and co-morbidities. All neonates should be allowed to room-in with mothers with proper precautions and should be allowed to breastfeed if mother is healthy. However, it has been observed that the predilection for caesarean section is higher in mothers who are covid positive at the time of delivery and there is higher incidence of preterm births and more number of babies are born small for gestational age in infected mothers.

6. Limitations

This study has evaluated t term perinatal outcomes of neonates born to covid positive mothers. Neonates born to mothers who were infected with SARS-Co2 in the early antenatal period could not be assessed and hence we could not assess the early pregnancy effect of COVID-19 on neonates due to resource limiting and loss to follow up of pregnant mothers throughout pregnancy. Moreover, large sample size is required to validate the study results.

Conflict of interest: The authors declare no conflict of interest

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