

Original research article

To Evaluate the Clinical Profile of Neonates Born to COVID Positive Mothers During Pandemic at GIMS Hospital, Kalaburagi.

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Abstract

Background: The incidence of mother-to-newborn Covid 19 transmission is low. However, data are limited on the factors associated with neonatal clinical or viral testing outcomes. This study aims at evaluation of clinical profile of neonates born to COVID positive mothers.

Objective: To determine the number of neonates from 01 April 2020 to 30 August 2021 with lab confirmed COVID-19 infection born to Covid 19 positive mothers. To assess the clinical features of neonates born to Covid 19 positive mothers.

Methods & Materials: Study design: Retrospective cohort study

Study period: 01 April 2020 to 30 August 2021

Study Place: Gulbarga institute of medical science kalaburagi , Karnataka India.

Conclusions: Perinatal covid 19 infection may have adverse effects on newborns causing problems such as fetal distress , premature labour, Hyperbilirubinemia , respiratory distress, oxygen requirement , sepsis, birth asphyxia and even death. However vertical transmission of Covid 19 is yet to be confirmed

Aims and objectives:

To determine the number of neonates from 01 April 2020 to 30 August 2021with RTPCR confirmed COVID-19 infection born to Covid 19 positive mothers.

To assess the clinical features of newborns born to Covid 19 positive mothers.

Inclusion criteria: All neonates born to Covid 19 positive mothers

METHODS :

Manual medical records of mother and baby were reviewed. Data on maternal demographic factors (age, residence, socioeconomic status), co morbidities, symptoms of COVID 19, Data on newborn demographic factors (gestational age, sex , birth weight, mode of delivery, Apgar score) were collected . All neonates born to covid 19 positive mother were reviewed for clinical and lab data till time of discharge. Clinical data such as respiratory distress, oxygen desaturation, poor feeding, apnea, seizures, tachycardia, fever, hypothermia, jaundice in those neonates was reviewed. Associated morbid factors such as Birth asphyxia, prematurity, relative sepsis were analysed. Lab data such as TLC, CRP, Sr Ferritin, Sr LDH, D-Dimer, Procalcitonin, RTPCR analysis of nasopharyngeal and throat swab of neonates born to covid positive mothers were reviewed. Chest x ray was reviewed. Those having clinical symptoms/

signs were admitted in NICU. Asymptomatic hemodynamically stable Covid19 negative neonates were isolated on mother side.

Sample size: 200 neonates born to covid19 positive mothers.

Sample size was determined based on the incidence of covid19 positive rates of neonates born to covid positive mothers, using formula $4PQ/L^2$.

Results:

Among these 200 pregnant women with confirmed Covid 19 infection, fever and cough were the common symptoms noted. Of the newborns born to these mothers, 92 were male neonates and 108 were female neonates , 153 were full-term neonates and 32 were born premature; 15 were small-for-gestational-age (SGA) neonates. Clinically, the initial presentations in the neonates were respiratory distress(n=5) and failure to breathe at birth(n=4), but other presentations such as fever(n=1), poor feeding(n=3),rapid heart rate(n=4), hyperbilirubinaemia (n=5) abnormal Xray(n=3) and oxygen requirement(n=4) were also observed. All neonates were improved and discharged. Nasopharyngeal and throat swab specimens were collected from these neonates 2to3days after birth for Covid 19 RT-PCR tests, out of which 02 neonates showed positive results. One COVID-19 positive baby presented with failure to breathe at birth was treated with antiviral and antibiotics. The other baby also had similar presentation was treated with antiviral and oxygen. Both neonates improved and discharged.

Keywords: Covid 19 infection, neonates, clinicalprofile.

Introduction

In December2019, a novel coronavirus labeled 2019-nCoV, which has originated in Wuhan, began spreading rapidly across China. On March 11th 2020, the World Health Organisation(WHO) classified the novel coronavirus disease(COVID-19),caused by the SARS-CoV-2virus, as a global pandemic, highlighting the enormity of the viral outbreak.¹ The virus is transmitted mainly via respiratory droplets and/or contact, and human-to-human transmission and family clustering have been reported.^{2,3} Human populations are generally susceptible to 2019-nCoV, and it bears a particularly high risk for pregnant women and children because they are in a special state of immune suppression. . As the biological characteristics of 2019-nCoV require further investigation, it is unclear whether rmother-to-infant transmission is possible. In this article, we retrospectively analyzed the clinical features and outcomes of all neonates born to 200 mothers with confirmed Covid19 infection in GIMS hospital from April 2020 to August2021.

Methods

Subjects: Neonates born to mothers with confirmed 2019 Covid 19 infection were selected.

Research methods

The neonatal information including gender, gestational age, birth weight, clinical symptoms, laboratory findings, chest X-ray images, treatments admission, and outcomes was also collected. Then nasopharyngeal and throat swab specimens were sent, where the Covid19 RNA was detected by real-time reverse transcription-polymerase chain reaction (RT-PCR). This study was approved by the Institutional ethics committee .

Results:

Information of neonates born to mothers with confirmed Covid 19 infection was collected. Among these newborns there were 92 male neonates and 108 female neonates, 153 of whom were full-term neonates and 32 premature neonates; 15 were small-for-gestational-age (SGA) neonates. 171 neonates were asymptomatic and were isolated with their mothers and remained asymptomatic throughout hospital stay and were discharged. 29 neonates required some therapeutic intervention. 10 neonates required ICU admission. The common clinical presentations in these neonates were birth asphyxia (n=4) and respiratory distress (n=5), although other manifestations such as fever (n=1) and hyperbilirubinaemia (n=5) were also observed, gastrointestinal symptoms such as feeding intolerance, refusal of feeds were seen in 3 of the neonates. Chest radiography showed abnormalities in 3 neonates at admission, which included infections (n=1), neonatal respiratory distress syndrome (NRDS) (n=2). Each of the newborn neonates received symptomatic supportive treatments after admission. (Tables 1,2). After the neonates were hospitalized, nasopharyngeal and throat swab specimens for COVID 19 RTPCR test were collected from all neonates born to Covid 19 positive mothers. The sampling was performed within 72 hours after admission. The Covid19 RTPCR turned positive for 2 neonates, antiviral treatment was administered to these 2 neonates.

Table1: Information of neonates born to mothers with confirmed Covid19 infection

CaseNo.	1	2	3	4	5	6	7	8	9	10
Gender	Female	Female	Male	Female	Male	Male	Female	Male	Male	Female
Gestational age(weeks)	34	38	34+2	38	35	39	34	39	31	36
Birthweight (g)	1,500	2,500	2,200	2,300	2,100	3,500	2,300	3,750	1,720	2,105
Pregnancy	Singleton	Singleton	Twin 2	Singleton	Singleton	Singleton	Singleton	singleton	Singleton	Singleton
AGA	SGA	Yes	Yes	SGA	Yes	yes	Yes	Yes	Yes	SGA
Apgarscore										
1-min	9	6	9	5	9	6	9	7	9	9
5-min	10	9	10	8	10	8	10	8	10	10
First presentation	Respiratory distress	Failure to breathe at birth, respiratory distress	Poor feeding	Respiratory distress, cyanosis, Failure to breathe at birth	Poor feeding	Failure to breathe at birth	Respiratory distress	Failure to breathe at birth	Respiratory distress	Poor feeding
Other presentation	Hyperbilirubinaemia, sepsis	Hyperbilirubinaemia, sepsis	thrombocytopenia	Hypoxia, Hyperbilirubinaemia	No	Hyperbilirubinaemia	Hyperbilirubinaemia, sepsis	No	Thrombocytopenia, Hyperinflammation	Fever and refusal of feeds
Transfusion of blood product	FFP	No	No	No	No	No	No	No	No	No

Oxygen requirement										
Complications	Septic shock	Sepsis	No	Early onset sepsis	No	No	No	No	No	No
Outcome	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged	Improve & Discharged

AGA, Appropriate for gestational age; SGA, small for gestational age

Table 2: Imaging and laboratory findings of neonates

CaseNo.	1	2	3	4	5	6	7	8	9	10
Chest X-ray at admission	Normal	Normal	Normal	Slightly blurred markings	Normal	Normal	Mild RDS	Normal	Mild RDS	Normal
WBC(per microlitre)	12,700	7,620	12,700	10,600	15,600	18,680	16,700	15,300	9,700	6,800
L%(%)	64	33	42	56	40	35	39	40	21	75
PLT(L per microL)	1.68	1.85	1.22	2.88	2.05	2.58	2.33	2.44	95,000	3.49
Hb(g/dL)	18.2	15.9	16.6	18.3	23.5	17.2	21.1	17.4	18.5	19.6
CRP(mg/L)	<0.5	8.88	0.6	50	<0.5	<0.5	3.21	1.11	0.52	5.36
PCT(ng/mL)	–	0.16	9.20	3.2	–	–	–	–	–	–
ALT(IU/L)	7.0	7.9	–	24.0	45	10	26	48	29	28
AST(IU/L)	33.4	55.3	–	26	33	41	30	33	27	46
BUN(mg/dL)	43	21	44	68	19	19	20	41	22.12	13
sCr(mg/dl)	0.69	1.1	0.23	0.9	1.1	0.5	0.7	0.3	0.86	0.85
PT(s)	19.3	–	13.6	–	15.5	–	17.3	–	–	22.98
D-dimer(micg/ml)	0.5	–	0.5	0.6	–	–	21.53	–	–	3.87
Sr Bilirubin(mg/dl)		16.3(TB) 3.0(DB)			22.2(T) 0.5(DB)	17(TB) 0.3(DB)				

WBC, white blood cell; L%, percentage of Lymphocyte; PLT, Platelet counts; Hb, hemoglobin; CRP, C-reactive protein; PCT, procalcitonin; ALT, alanine aminotransferase; AST, aspartate aminotransferase; BUN, blood urea Nitrogen; sCr, serum creatinine; PT, prothrombin time; APTT, activated partial thromboplastin time.

Discussion:

Human populations are generally susceptible to Covid 19 infection and pregnant women are at a particularly high risk of Covid 19 infection because they are in a special state of immune suppression. After being infected with 2019-nCoV, the first symptoms were fever and cough, and there were few symptoms (e.g., sneezing, nasal congestion, and a sore throat) related with upper respiratory tract infections. Some mothers also experienced GI symptoms.⁴ Coronavirus is an RNA virus and falls into the virus family Coronaviridae, order Nidovirales. It is widely found in humans, mammals, and birds and can cause infections of the respiratory tract, gastrointestinal system, and nervous system.² Prior to the Covid 19 outbreak, there were 3 strains common in the human population and can be vertically transmitted through the placenta.⁵ In contrast, there is no evidence supporting the vertical transmission of SARS-CoV and MERS-CoV.^{6,7,8,9} In our study, intrauterine fetal distress developed in 4 cases. It is speculated that 2019-nCoV infection in mothers may cause hypoxemia, therefore increasing the risk of perinatal adverse events. However, whether intrauterine fetal distress is directly related to Covid 19 infection in mothers is still unclear. In our current study, only 2 neonatal nasopharyngeal and throat swabs tested positive for Covid 19, and the possibility of a false negative result could not be ruled out. If conditions allow, more specimens, including umbilical cord blood and amniotic fluid from the mother and serum, gastric fluid, anal swabs, or stools from the neonates, can be collected to optimize the detection rate of NAT.¹⁰ Furthermore, the placenta tissue can also be examined for placental inflammation caused by viral infection¹¹, so as to identify whether there is any placental transmission.

The first symptoms of the neonates in our study after admission were mainly respiratory distress (n=5), failure to breathe at birth (n=4) and other presentations like poor feeding (n=3), fever (n=1), increased heart rate (n=4), hyperbilirubinaemia (n=5), thrombocytopenia (n=2). Thus, respiratory rate, body temperature, heart rate, and gastrointestinal symptoms and signs should be closely monitored, and there should be early intervention for patients with abnormal findings. Covid 19 infection is highly contagious and outbreaks can easily occur. Once an outbreak occurs in a maternal and child health facility, the consequences can be disastrous as the viral infection is complex, unpredictable, and difficult to control. Thus, enhanced health education and effective prevention and control measures must be taken. Each newly admitted mother and newborn should receive careful pre-examination and be appropriately triaged. The conditions of neonates, mothers, and their close contacts should be carefully evaluated. If symptoms such as fever, coughing, and lethargy are present, the baby should be admitted to an isolation room for observation and treatment, and specimens should be collected immediately and dynamically to facilitate early diagnosis and treatment. Neonates born to women with suspected or confirmed Covid 19 infection should be carefully evaluated by neonatologists. If there are high-risk factors including prenatal and postnatal fever in the mother, premature rupture of membranes, premature birth, low birth weight, or the infant is small for gestational age, it is recommended that the neonate should be admitted into the neonatal isolation ward as soon as possible, where any change in condition is closely monitored, and timely symptomatic and supportive treatments should be administered. According to the chest radiographic findings, RTPCR results, and the patient's symptoms and signs, the interventions may be initiated proactively.

Conclusions.

Covid 19 infection has caused major morbidity and mortality worldwide. Neonates born to mothers with confirmed or suspected Covid 19 infection are most of the time asymptomatic. However, neonatal critical illness is still a possibility; therefore, isolation precautions and vertical transmission should be studied thoroughly. In addition, testing these neonates by

nasopharyngeal and throat swab at least at 24 hours after birth should be done.

Acknowledgments

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

References

1. WHO, Coronavirus disease Situation Report 85. 2020, World Health Organisation
2. Zhu N, Zhang D, Wang W, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med* 2020. [Epub ahead of print].
3. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* 2020. [Epub ahead of print]
4. General Office of the National Health Commission of China, General Office of the State Administration of Traditional Chinese Medicine. Diagnosis and Treatment Protocol for 2019-nCoV (Fourth Trial Edition). 2020. Available online: <http://www.nhc.gov.cn/yzygj/s7653p/202001/4294563ed35b43209b31739bd0785e67.shtml>
5. Zhang H, Kang Z, Gong H, et al. The digestive system is a potential route of 2019-nCoV infection: a bioinformatics analysis based on single-cell transcriptomes. *bioRxiv* 2020. doi:10.1101/2020.01.30.927806.
6. Gagneur A, Dirson E, Audebert S, et al. Materno-fetal transmission of human coronaviruses: a prospective pilot study. *Eur J Clin Microbiol Infect Dis* 2008;27:863-6.
7. Ng PC, Leung CW, Chiu WK, et al. SARS in newborns and children. *Biol Neonate* 2004;85:293-8
8. Robertson CA, Lowther SA, Birch T, et al. SARS and pregnancy: a case report. *Emerg Infect Dis* 2004;10:345-8.
9. Stockman LJ, Lowther SA, Coy K, et al. SARS during pregnancy, United States. *Emerg Infect Dis* 2004;10:1689-90
10. Zhu H, Wang L, Fang C et al. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Transl Pediatr* 2020;9(1):51-60. doi:10.21037/tp.2020.02.06
11. Alserahi H, Wali G, Alshukairi A, et al. Impact of Middle East Respiratory Syndrome coronavirus (MERS-CoV) on pregnancy and perinatal outcome. *BMC Infect Dis* 2016;16:105