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Clinical Outcome of Neonates Delivered from mothers (Covid positive): An experience from maternal and child health hospital north india

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Abstract

Aims and objectives: To highlight the clinical course of neonates delivered from Covid-19 positive mothers. Methods: It was a retrospective observational study.

Results and Conclusions: we found out that neonates born to covid 19 positive mothers have very minimal risk of vertical transmission. Risk of transmission from covid 19 positive mother to neonate by rooming in and breast feeding is low, provided proper infection control practices are implemented.

Keywords: covid positive mothers, neonates. clinical characteristic

INTRODUCTION

The Coronavirus disease 2019 (COVID-19) outbreak is caused by the novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) The disease first emerged in wuhan province of China in early December 2019(1) on January 30, 2020, the World Health Organization (WHO) declared the outbreak, as a Public Health Emergency of international concern (2) and later on upgraded the outbreak on 11 March 2020, to a Pandemic. To date, India has reported confirmed cases of covid 19 infection. Among vulnerable population pregnant woman are highy susceptible due to physiological changes involving immune system. As a result, Neonates have different of risks and susceptibilities to level the virus(3).According to Chinese center for Disease Control and Prevention(China CDC),25.1% of the44,672 confirmed cases in mainland China were women of reproductive age[4,5] The risk of in-utero (vertical transmission) transmission of SARS-CoV-2 is anticipated to be low. The risk of perinatal transmission, especially during breastfeeding and the

neonate's risk of developing COVID-19 during the perinatal period are also varied. Until date, the knowledge is limited on whether rooming-in the neonate with mother (if she is SARS-COV-2 positive) after delivery is a safe practice.

Coronaviruses are single-strand, positive-sense RNA viruses with spike-like projections on their surface. These viruses can infect both animals and humans (6) Through the S protein (envelop spike protein) SARS-CoV-2 infects the host cells, it mediates the binding and membrane fusion through the angiotensinconverting enzyme 2 (ACE-2) receptor (7) Majority of ACE-2 receptors are found in alveolar epithelial type II cells in the lungs, although they are expressed in many tissues. By down regulating the ACE-2 intracellular signaling (mitochondrial assembly receptor), SARS-COV-2 causes inflammation, vasoconstriction, and fibrosis in the lung(8)The overall understanding is that this disease is more virulent in adults with increasing age along with co-

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morbidities, compared to children(9) Few studies focused on understanding the clinical characteristics in the Neonates who have different level of risks and susceptibilities(9,10) They can be infected by intrauterine transmission, during delivery, from breast milk or from infected mother and family members in postnatal period. The risk of in-utero (vertical transmission) transmission of SARSCoV-2 is anticipated to be low (11) Case reports describing isolation of SARS-CoV-2 from amniotic fluid and placental tissue and isolation of SARS-CoV-2 from the nasopharynx of neonates within 48 h of life suggested probable congenital infection. However, the rate of such infection in exposed neonates is unknown (12,13) The risk of perinatal transmission, especially when breastfeeding, and the neonate's risk of developing COVID-19 infection are also unknown. We are still not clear whether to rooming in the neonate with mother (COVID-19 positive) after delivery. There are many recommendations globally regarding management of mother – infant dyad, but they differ on the management strategies due to scarcity of clinical data (14-18)

In this study, we analyzed maternal and neonatal clinical characteristics of all women with confirmed COVID -19 infection at maternal and child hospital north India and followed up their neonate through telephonic interview or on follow up in pediatric and neonatal opd or ward. We also aimed at finding out potential risk factors associated with transmission of infection and elucidate best infection control and management practices.

MATERIALS AND METHODS:

In this study neonates born to covid positive mothers were included between 1st may 2020 to 31 April 2021 at mother and child hospital north India. Covid 19 positive and covid negative mother neonate dyads were provided care in different buildings at two different locations of the hospital. The covid positive mother residing in one building was covid designated hospital by j & k health services with separate theatre and labor room for delivery of covid positive mothers. isolation wards were created for covid positive mother and neonates along with neonatal care units where covid positive neonates were taken care of. As recommended, all the health care staff followed donning and doffing sequence of complete personal protective equipment (PPE). This is a retrospective observational study. All neonates who tested positive forSARS-COV-2 infection, confirmed by real time reverse transcriptase polymerase chain reaction (rt-pcr) during birth or readmitted at any time during neonatal period (28 days) were included in this study. This study was approved by institutional ethical committee.

Diagnosis of COVID-19 infection was done by real time reverse transcriptase polymerase chain reaction (rtPCR) performed on nasopharyngeal swab samples. First sample was collected at birth (24-48 hours) and retested after 5-7days. If negative on repeat testing, they were discharged. Those who continued to be positive on day 5 or day 7 were discharged on day 10 without repeating the test if asymptomatic Care of delivered neonate was as per our COVID-19 and latest neonatal resuscitation program (NRP) guideline. If mother and neonates (whether positive or negative) were stable then both are roomed in a separate isolation room.. Mother was educated in infection prevention practices like; wearing mask, hand washing and precautions to be taken during caring for the baby and encouraged for breastfeeding. . Separation of mother and baby was done only for medical reasons. The protocol for clinical management and investigation of neonates was based on national guidelines and recommendations as per the currently available evidence [19-22]. Neonates who tested positive for COVID 19 infection were not given any specific treatment against SARS-COV-2 infection.

All neonates born to COVID confirmed mothers were enrolled. Data was extracted retrospectively from the patient medical records (electronic) and included gestational comorbidities, address, age, age, symptoms at onset, the outcome of pregnancy and information on neonates (including birth weight, Apgar score, perinatal complications and clinical course during the hospital stay. Information was also collected regarding infection control practices like; disposition of the neonate at delivery (room in with mother or in isolation room), feeding method (breastfeeding or formula). Descriptive statistics were used and outcome expressed as proportions, median and interquartile ranges. Data were analyzed using Microsoft excel 2016.

RESULTS:

Out of 1270 tested mothers 166 tested positive for SARS-COV-2 infection during the study period. Out

of which, 150 caeserian section and 16 vaginal deliveries were done. 11 SARS-COV-2 Positive newborn reported. Five mothers had fever and three of these had mild breathlessness and responded well to treatment as depicted in flowchart, were included for analysis. Table 1 summarizes the characteristics of mothers. Average age of mothers was 28 to 30 years at the time of delivery. . There was one maternal death due to COVID-19 related complications. . Among 11 neonates7 (63.63%) were male and 4 (36.36%) were females. About 2 (18.1%) and 9 (81.9%) were borderline term and term respectively with median gestational age of 37 weeks (37,39). Median weight at birth was 2972.7gms (range2300 - 3700gms). Out of 11 neonates 3 were admitted in NICU 2(18.18) for neonatal jaundice and 1(9.09) for transient tachypnea of newborn (TTN). All of the neonates who were roomed-in with mother received direct breast feeding with proper infection control practice which has been taught to the mother. None of our babies had significant congenital anomalies. The clinical and laboratory characteristics of all Covid Positive neonates is depicted in table 1.

Mothers were infected in 70% of cases while as in 20% both father and mother while as grandparents or thirdparty involvement cannot be ruled out in remaining cases. Nasopharyngeal sample for rtPCR were collected for detection of infection as per our hospital protocol Telephonic follow up was done for most of neonates and infants till 3 months of age in view of safety concerns during pandemic. All positive neonates were in good condition during follow up and none of positive neonates were re-hospitalized. Early outpatient clinic follow up was given for all the babies.

Discussion:

In this study the outcome of neonates born to SARS-COV-2 positive mothers was evaluated.In our study maternal RT-PCR were done prior to admission in majority of cases although in 20% of cases reorts were available after 48 hrs of delivery, as a result RT-PCR tests in neonates were done mostly after birth and in some cases after 48 hours of life .Nasopharyngeal swabs were taken for RT-PCR testing in our study . Vertical transmission risk could not be ruled out there is still controversary regarding the same (23). Recent evidence suggest vertical transmission of Covid-19, as reported by Vivanti et al(24) There are several case reports available to date, of neonates who have tested with 5 ml of amniotic fluid positive for SARS-COV 2 and neonate nasopharyngeal swab positive for SARS-COV 2. Sheth et.al., in a narrative review of literature found that 10 out of 23 COVID-19 positive neonates have a chance of vertical transmission, they also postulated that, approximately 3% of the babies born to COVID-19 positive mother have some chances of vertical transmission.(25) Few other reports also predicted possibility of vertical transmission but the overall risk for infant's remains to be determined.(26) The low risk of vertical transmission has been hypothesized to be due to paucity of ACE2 receptors in the placenta, which may be necessary for transplacental transfer to the fetus(27). WHO (World Health Organisation) and other professional bodies recommend rooming in of mother newborn dyad breastfeeding and maintaining 6 feet distance between mother and neonate (19,28,29). Current evidence on feeding practices and Covid 19 infection exist in form of case series, case reports or family clusters. (30.31). There is paucity of evidence suggesting presence of SARS-COV-2 virus in breast milk. (32,33,34-38) In view of potential risk of transmission from roomingin and breast milk feeding; we recommend if adequate infection control precautions is followed then mother (even if they have mild symptoms) and baby should be roomed-in together and exclusive breast-feeding practice should be followed leading to mother infant bonding and benefits of breast feeding. in our study we followed universal screening of all pregnant mothers so that asymptomatic cases could not be missed. while as limitation of our study was it was retrospective in

positive for SARS-CoV-2 within 48 h of life.

Zamaniyan et al reported Covid -19 positive mother

CONCLUSION:

nature and small number of subjects.

The majority of reported infants born to confirmed covid positive mothers were asymptomatic and showed no clinical abnormalities.in our study only 11 neonates were confirmed SARS –COV-2 positive while majority of neonates were covid negative. Transmission rate of SARS-COV-2 from mother to child is minimal if proper identification of infections and strict infection control precautions are taken. Current evidence showed that maternal and neonatal mortality is lower in Covid 19 than in SARS-COV-1 and MERS-COV infection. however, Covid 19 during pregnancy might cause in some cases severe complications and even death. Therefore, Careful

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monitoring of confirmed covid positive mothers and neonates with adequate infection control measures should be taken to prevent complications. 1270 mothers tested for severe acute respiratory syndrome (SARS-COV-2)

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Flowchart showing patients during study period

Table neonatal (SARS-COV-2) Positive characteristics born from Covid positive mothers

Neonatal outcome

N=11				
Number of live birth	11(100%)			
Birthweight(g)mean	2972.7(388.1)			
Vaginal delivery(%)	2(18.18)			
Cesarean section(%)	9(81.81)			
Diagnostic method	RT-PCR			
Specimen collection site	Throat			
Laboratory confirmed cases of SARS-COV-2	11			
Hemoglobin(g/dl) 14.7(1.5)				
Leukocyte count $(10^{9}/L)$	7.08(1.96)			
Absolute neutrophil count($10^9/L$)	5.34(1.93)			
Absolute lymphocyte count $(10^9/L)$	7.31(1.80)			
AST(IU/L),median(IQR)	49(42.5,62.5)			
ALT(IU/L),median(IQR)	65(48,76.5)			
CRP(mg/dl),median(IQR)	5.1(4.25,5.8)			
Creatinine(mg/dl)	0.4(0.25,0.55)			
LDH(IU/L),median(IQR)	370(315,397.5)			
Gender				
Male n(%)	3 (27.27)			
Female n(%)	8(72.72)			
Gestational age(weeks), median(IQR)	36(35.5,38.5)			
Number of preterm n(%)	2(18.18)			
Apgar score median(IQR)				
1 minute	8(6-9)-IQR-2			
5 minute	9(8-10)-IQR-0			

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Roomed in with mothers n	l(%))8(72.72	2)
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Separated 0(0%)	from	mothers	due	to	maternal	illness	n(%)3(72.72)	Congenital	abnormalities	n(%)
Received 11(100)	breas	st mill	k(breas	st	feeding/I	EBM)	n(%)9(82.81)	Discharge	e Home	n(%)
Death n(%)	I						0(0%)			
Followup n	(%)						8(72.72)			
			Neon	atal	symptoms					
Fever							2(18.18)			
Cyanosis							3(27.27)			
Fast breathi	ng						1(9.09)			
Vomiting							nil			
Asymptoma	atic.						10(90.90).			

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