

ORIGINAL ARTICLE

Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2) Vertical Transmission Covid-Positive Mothers in NeonatesMARYAM NAJAM¹, RIZWANA TAREEN², NIGHAT JABEEN³, MARYAM RAFIQ GHUNCHA⁴, MUHAMMAD SAQIB HABIB⁵, AMMARA FAROOQ⁶, MUHAMMAD HAMZA⁷¹Senior Registrar Pediatrics, Fazaia Medical College, Islamabad, Pakistan.²Professor of Pediatrics, Bolan University of Medicine and Health Sciences, Quetta, Pakistan.³Assistant Professor Pediatrics, Quetta Institute Of Medical Sciences, Quetta Cantt, Pakistan.⁴Assistant Professor Pediatrics, Fazaia Ruth Pfau Medical College Karachi, Pakistan⁵Assistant Professor Medicine, Islamic International Medical College and Trust, Rawalpindi, Pakistan.⁶Assistant Professor Pediatrics, Federal General Hospital, Chak Shahzad, Islamabad, Pakistan.⁷MBBS (3rd Year) Rawal Institute Of Health Sciences, Islamabad, Pakistan.Corresponding author: Nighat Jabeen, Email: drnighatjabeen73@gmail.com, Cell: 0332-3026739**ABSTRACT**

An outbreak of Covid-19 occurred in Wuhan, China initially in December 2019. Over the next few months, the wide spread of SARS-CoV-2 had been reported in all continents and the transmission in utero from an infected mother to fetus debating yet was observed.^{1,9}

Objectives: To determine risk of vertical transmission of corona virus in neonates of SARS COVID-2 positive mothers.

Study Design: A Cross-Sectional study.

Place and Duration of Study: Pediatric department of Pakistan Air Force (PAF) Hospital, Islamabad, Pakistan. The study conducted during 01-03-2020 to 31-08-2020.

Methodology: After taking informed consent, Nasopharyngeal swab for PCR for SARS-CoV-2 was taken one week before delivery. Confirmed COVID positive pregnant ladies were included irrespective of symptoms of COVID-19 infection and any other medical illness. Neonates born to COVID-19 positive mothers were admitted in NICU, and Performa was filled for neonates after PCR done 24 and 48 hours respectively.

Results: Total 14(87.5%) out of 16 COVID positive mothers were asymptomatic. 16(100%) neonates were negative for Sars-COV-2 at 24 hours and 48 hours.

Conclusion: This study concluded with no evidence of transmission of COVID-19 from infected mothers.

Keywords: Vertical transmission, COVID-19, neonate, infected mother.

INTRODUCTION

Coronavirus disease COVID-2019 is a respiratory tract infection caused by Coronavirus, that was first recognized in Wuhan, China, in December 2019. Since then cases have been reported in all continents, except for Antarctica¹⁻¹⁰. The reported case counts underestimate the overall burden of COVID-19, as only a fraction of acute infections was diagnosed and reported. Seroprevalence surveys in the United States and Europe have suggested that the rate of prior exposure to SARS-CoV-2, as reflected by seropositivity, exceeds the incidence of reported cases by approximately 10-fold or more.^{2,3,7,25}

COVID-19 had spread rapidly across the world, as a result, number of pregnant women and children with COVID-19 also were on rise. However, only 19 neonates born to affected mothers have been investigated, and no information on early-onset infection in newborns has been published in previous studies.^{3,5,16}

Retrospective case review done by Chen Y et al showed none of the pregnant ladies with COVID-19 were admitted in ICU or died due to treatment and most common symptoms at time of presentation were cough (80.95%), fatigue(47.62%), fever(33.3%), expectoration(4.76%) and shortness of breath(4.76%). All of them were cured and delivered successfully without any evidence of mother to child transmission.^{4-11,13,17-19} With spread of COVID-19, major concern was to develop effective preventive and clinical strategies to control COVID-19 infection among pregnant women and to decrease the potential risk of vertical transmission. The latest research by Huijun Chen and colleagues, analyzed only a small number of cases (nine women with confirmed COVID-19 pneumonia) showed that^{1,13,17,18,19,24}, The clinical characteristics of COVID-19 pneumonia in pregnant women were similar to those reported for non-pregnant adult patients who developed COVID-19 pneumonia and there is no evidence for intrauterine infection caused by vertical transmission in women who develop COVID-19 pneumonia in late pregnancy. Under such dire straits these findings are beneficial for preventive and clinical practice in and elsewhere. In this study, along with neonatal nasopharyngeal swab samples, they also tested amniotic fluid, cord blood, and breast

milk samples for SARS-CoV-2, which were negative for the virus.^{5,11,18}

Pregnant women are susceptible to respiratory pathogens and to development of severe pneumonia, which possibly makes them more susceptible to COVID-19 infection than the general population, in particular related to chronic diseases or maternal complications¹⁷⁻²¹. Therefore, pregnant women and newborn babies should be considered key at-risk populations in strategies focusing on prevention and management of COVID-19 infection.⁶⁻¹⁰

Pregnant women are at an immunosuppressive state, and physiological adaptive changes occur such as diaphragm elevation, increased oxygen consumption, and respiratory tract mucosal oedema. As a result there is decreased tolerance to hypoxia. In 1918 during influenza pandemic, mortality rate was 2-6% in the overall population, but 37% among pregnant women. So we could be vigilant to pregnant mother with signs and symptoms of COVID 19, the disease course and prognosis to avoid the complications in the new born neonate^{5,8} delivered by COVID-19 positive mothers.^{12,16,19,20,24}

By observing the clinical features of COVID-19 during pregnancy, birth, and the postnatal period, the infected mother could transmit the COVID-19 virus through respiratory droplets during breastfeeding^{20,25}. If their COVID-19 status is known during pregnancy or immediately after delivery, we could advise and educate them to adopt and adhere to standard preventive measures of spread of infection to PCR-Negative babies during breastfeeding. And positive PCR- for COVID-19 Neonates could be isolated and manage in time for COVID-19 related infection under specific protocol to prevent complications and mortality delivered by COVID-19 positive mothers^{18,23}.

METHODOLOGY

A Cross-Sectional study was conducted at Pediatric Department PAF Hospital Islamabad, from 01-03-2020 to 31-08-2020 on 16 neonates-mother pairs. Sample technique was non-probability convenience sampling. Pregnant mother whose PCR test was positive for COVID irrespective of symptoms of COVID 19 infection and any other medical illness, and neonates born to these mothers

were included. After, an informed consent, the Nasopharyngeal swab for PCR was taken one week before delivery and all neonates born to COVID-19 mothers were admitted in NICU, which were tested for COVID-19. Nasopharyngeal swab was taken to confirm on PCR for COVID-19. Performa was filled for neonates which included name, gestational age, gender, need for resuscitation at birth, APGAR Score at 1 minute and 5 minutes, requirement for admission in NICU and final diagnosis. The data was analyzed by SPSS (version19.0) and for descriptive variable like, age, clinical features, risk factors in mothers and Covid-19 test status, and APGAR score of babies.

Exclusion and Inclusion Criteria: Exclusion and inclusion criteria for Cross-Sectional study to determine Risk of vertical transmission of corona virus in neonates of SARS COVID-2 positive mothers.

Inclusion criteria	Exclusion criteria
<ul style="list-style-type: none"> 16 neonates-mother pairs Nasopharyngeal swab PCR for COVID-19. Risk factors in delivering mothers Diabetic Mother Hypertensive mothers 	<ul style="list-style-type: none"> Neonates Age ≤ 35 week Diagnosis Covid-19 wide spread of SARS-CoV-2 Jaundice Malnutrition Breast feeding

RESULTS

Out of 16 COVID positive mothers 14 (87.5%) were asymptomatic and 2(12.5%) symptomatic for COVID-19and both of them had fever and flu only ((temperature from 99 to 101°F). Both of them had no other symptoms like cough, respiratory distress, dyspnea, lethargy. Both of them did not require oxygen at any stage of illness. Median age is 31.50 of mothers with Inter Quarter Range is 9. Regarding mothers' risk factor three had hypertension (18.8%), [two(12.5%) had history of hypertension and one(6.3%) had history of pregnancy induced hypertension(PIH)]. One (6.3%) had history of meconium stained liquor and one(6.3%) had diabetes mellitus.

Table 1: COVID-19 infection related signs & symptoms among delivering mothers

COVID-19- Symptoms	Frequency	Percent	Cumulative Percent
ASYMPTOMATIC	14	87.5	87.5
SYMPTOMATIC	2	12.5	100.0
Total	16	100.0	

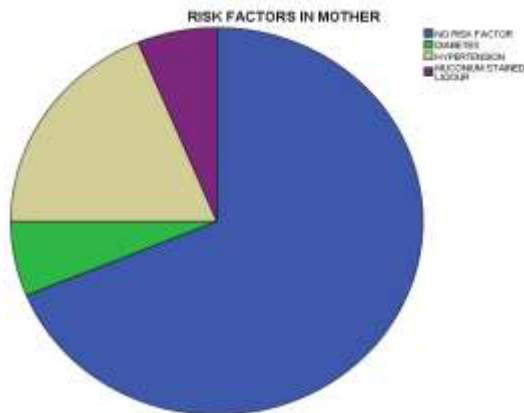


Figure 1: Risk factors in delivering mothers

Table 2: Risk factors in delivering mothers

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	No risk factor	11	68.8	68.8	68.8
	Diabetes	1	6.3	6.3	75.0
	Hypertension	3	18.8	18.8	93.8
	Muconium stained liquor	1	6.3	6.3	100.0
	Total	16	100.0	100.0	

Data of Neonates: Out of 16 neonates 4 (25%) female and 12 (75%) males, all delivered alive. 5 (31.25%) were preterm and 1 (6.25%) of them was of 35 weeks, male baby delivered with APGAR 5 and 8 at 1 and 5 mins and needed 3 inflation breaths. 11(68.75%) of them were full term between 37 to 42 weeks and had normal APGAR score.

All 16 neonates were negative for SARS-COV-2 at 24 hours and 48 hours.

Three neonates were admitted in COVID nursery and one of them required positive pressure ventilation but final diagnosis was transient tachypnea of new born for all three and they were negative for PCR for Sars.COV.2 at 24 hours and 48 hours.

Table 3: Apgar score at 1 min

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	3-5	1	6.3	6.3	6.3
	5-7	7	43.8	43.8	50.0
	8-10	8	50.0	50.0	100.0
	Total	16	100.0	100.0	

Table 3: Apgar score at 5 min

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	8-10	16	100.0	100.0	100.0

DISCUSSION

In the current global situation related to COVID-19 infection is how to prevent and control the spread among the general population, and infections in pregnant women is of most concerned as it likely transmits infection to fetus in vitro and newborn after delivery as well.^{1,5-9,19,25}

A systemic review and Meta analysis of clinical features and pregnancy outcome in SARS-COV-2 infection was done by Khalil A et al. shown that the conception products may be associated with vertical transmission were reported in a minority of cases (placenta:10.7%, amniotic fluid: 5.5%, cord blood: 6.2% . Maternal bodily fluid PCR positivity was rare (vaginal swab: 0%, stool: 12.5%, breast milk: 6.7%)^{7,9,21,24,25}.

Fan C, Lei D, Fang C et al presented two cases of COVID-19 associated SARS-CoV-2 infection during third trimester of pregnancy with excellent outcomes in mothers and babies. This report provided evidence of low risk of intrauterine infection by vertical transmission of SARS-CoV-2⁸⁻¹⁵. Some newborn infants, however, developed severe intrauterine growth retardation and life-threatening gastrointestinal complications^{9,17,22}.

Chen et al.reported the clinical characteristics and placental pathology from three women with confirmed COVID-19 infection. No COVID-19 nucleic acid was detected in the placentas or neonatal throat swabs by RT-PCR.¹⁰⁻¹³

In a Chinese cohort study, 3 of 33 newborns (9%) presented with early onset SARS-CoV-2 infection. In this study, authors concluded that specimens taken from neonates'upper respiratory tract and anus' of SARS-CoV-2 positive neonates' were maternal origin because strict infection control and prevention procedures were implemented during the delivery.¹¹⁻²⁰

In other study, Chen et al. revealed that the clinical characteristics of COVID-19 in pregnant women were similar to infected non-pregnant women²⁰⁻²⁵. They reported nine live births and none of the patients developed severe COVID-19 or died, and all samples tested negative for the virus in neonates⁵⁻⁷.

CONCLUSION

This study showed no evidence of intrauterine vertical transmission of COVID-19 from infected mothers to neonates. Further large sample size studies are needed to address the vertical transmission of COVID-19 virus in pregnant women.

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Authors Contribution: Every author had done its part successfully, with providing us with results for this present Cross-Sectional study. We are very thankful to Dr Maryam Najam and all authors who supported from start till the end of this research.

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