

# COVID-19 Pandemic and Neonatal Health: What We Know so Far?

Bhandari TR,<sup>1</sup> Dangal G<sup>2</sup>

<sup>1</sup>Department of Public Health,  
School of Health and Allied Sciences,  
Pokhara University, Nepal.

<sup>2</sup>Kathmandu Model Hospital,  
Bagbazzar, Kathmandu, Nepal.

## Corresponding Author

Tulsi Ram Bhandari  
Department of Public Health,  
School of Health and Allied Sciences,  
Pokhara University, Nepal.  
E-mail: tulsib2004@gmail.com

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## ABSTRACT

COVID-19 first time appeared in December 2019 in Wuhan, China. The number of cases increased rapidly in china and outside and the World Health Organization declared a pandemic on 11<sup>th</sup> March 2020. The pregnant and postpartum women, child, and neonatal populations are vulnerable to this disease due to immunological and physiological changes. This paper analyzed the published evidence for assessing the effect of COVID-19 on neonatal health and health care. Online published literature was searched from PubMed, Google Scholar, and other official webpages using keywords: “coronavirus/COVID-19/new coronavirus 2019”/SARS-CoV-2 and neonatal health/care/outcomes” and reviewed to prepare this article.

COVID-19 is the potential to transmit either mother to fetus or mother/caregiver to neonates. However, neonates born from infected mothers did not show significant clinical features. Pharyngeal-swab, amniotic-fluid, cord-blood, and breast-milk test results were not found positive. Health facility-based vaginal/caesarian delivery was considered a low risk of transmission. However, recommended to separate neonates with infected mothers/caregivers and test immediately after birth to avoid the possible transmission. Mothers/caregivers should take routine preventive measures such as washing hands frequently and avoiding contact with infected people. If neonates suffered from the server acute respiratory distress requires intensive care urgently. Despite the possibility of the intrauterine transmission of COVID-19 direct evidence is still lacking so it needs more studies for further confirmation. The International Pediatric Association suggested preventive programs, curative care, vaccination, and telemedicine care as the minimum services and called on its members to address these cares during the pandemic.

## KEY WORDS

COVID-19, Neonatal care, Novel coronavirus, SARS-CoV-2, Vertical transmission

## INTRODUCTION

Despite 19,854,544 infections, 730,523 deaths worldwide related to COVID-19 till August 09, 2020. The proportion of death and critically ill pregnant and postnatal women was reported as similar to other adults 1 and no evidence of vertical transmission.<sup>1-3</sup> The mortality proportion of the COVID-19 in aged group 0-17 years neonates, children, and adolescents ranged from 0.04 to 0.06% respectively.<sup>4</sup> However, there should be aware of the possible death among pregnant women with COVID-19 in the third trimester and their neonates.<sup>2</sup>

COVID-19 can increase stress to patients and healthcare providers and challenged the existing obstetric care. Obstetric care is time-sensitive and cannot be delayed. Hence, the prescribed procedures have to be offered

considering the possible risks and safety.<sup>5</sup> All neonates born from women with COVID-19 are susceptible to its infection but consistent evidence is still lacking. However, the clinical features were noticed milder and outcomes were also less severe/critical in neonates and children.<sup>6</sup>

COVID-19 was declared a Public Health Emergency of International Concern on 30 January 2020.<sup>7</sup> The affected countries started lockdown and confined the mobility of the people to prevent and control the transmission. Most of the regular maternal, neonatal, and child health care programs were suspended for the time being.<sup>8</sup>

The International Pediatric Association recommended preventive and curative care as minimum healthcare

services for neonates and children and called on its members to address these cares during the COVID-19 pandemic.<sup>8</sup> This paper analyzed the online published evidence for assessing the effect of COVID-19 on neonatal health and health care.

For preparing this article, we searched and retrieved the published literature from PubMed and Google Scholar using various keywords: "coronavirus/COVID-19/new coronavirus 2019"/SARS-CoV-2 and neonatal health/care/outcomes". We further searched the official webpages of the World Health Organization and other governmental and non-governmental organizations for the updated information.

## DISCUSSION

### Epidemiology

Coronavirus belongs to the subfamily of Coronaviridae which is an enclosed virus with a single strand, positive-sense RNA genome.<sup>9</sup> Before the emergence of SARS coronavirus (SARS-CoV) in 2003, there were two prototypes of human coronaviruses: HCoV-OC43 and HCoV-229E, both of which were the etiologic agents of the common cold which was low pathogenic to the human being.<sup>10-12</sup> In 2003, SARS-CoV was identified that can cause severe acute respiratory syndrome (SARS) as it was the first example of serious illness in humans caused by a coronavirus.<sup>13-16</sup> From that outbreak 8096 people affected in 30 countries and resulted in about 774 deaths and 9.6% case-fatality rate.<sup>17,18</sup> After 10 years of the outbreak of SARS-CoV in 2012 another highly pathogenic coronavirus was diagnosed in Saudi Arabia, it was named the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) as it occurred only in Middle Eastern countries.<sup>19</sup> There were 2494 confirmed cases and 856 associated deaths with a case-fatality rate of 34.4%.<sup>20</sup>

In December 2019, a local outbreak of pneumonia of unknown etiology was detected in Wuhan city of Hubei Province in China.<sup>21,22</sup> These patients were epidemiologically linked to the seafood and wet animal wholesale market of Wuhan.<sup>23,24</sup> The Chinese Center for Disease Control and Prevention (CCDC) immediately dispatched a rapid response team to conduct an epidemiologic and etiologic investigation in Wuhan, Hubei. The team collected three bronchoalveolar-lavage samples from Wuhan Jinyintan Hospital. It was observed that the virus genome was 85% identical with bat SARS-like CoV and it named 2019 novel coronavirus (2019-nCoV).<sup>25</sup> On February 11, 2020, the International Committee on Taxonomy of Viruses (ICTV) declared that the name of 2019 novel coronavirus as SARS-CoV-2.<sup>26,27</sup> On 3<sup>rd</sup> January 2020, the Government of the Chinese notified the WHO about the epidemic which was later confirmed to be 2019-nCoV and WHO announced the name of the disease caused by this novel virus as COVID-19.<sup>28</sup> The number of cases increased rapidly in china

and outside and WHO declared the COVID-19 outbreak as a pandemic on 11<sup>th</sup> March 2020.<sup>29</sup>

SARS-CoV-2 can transmit from person to person by respiratory droplets and close contact routes. The common modes of transmission are droplet infection, fomites, closed unprotected contact, aerosol-generating procedures in health care settings, and contaminated surfaces. Considering the recent publications World Health Organization suggested that there has been airborne transmission. However, the early findings need to be interpreted cautiously.<sup>30</sup>

### Clinical features

The clinical features of the SARS-COV-2 virus in pregnant and postpartum women were found as similar as reported for adults and non-pregnant patients. The earliest common clinical features of the disease were fever ( $\geq 100.4^{\circ}\text{F}$ ), runny nose, extreme sneezing, non-productive cough, sore throat, fatigue and exhaustion, breath shortness, diarrhea and/or vomiting, rapidly increased of heart bit, myalgia, chest pain, and headache. Some of the patients showed various complications including server sore throat, acute pneumonia, hemoptysis, and server diarrhea.<sup>31</sup> Similarly, the pulmonary CT scan showed ground-glass opacity, patchy like shadows, fiber shadows, pleural effusion, and thickening shadow.<sup>3,32</sup> But most of the pregnant women reported asymptomatic or mild stage, so laboratory technique qualitative real time polymerase chain reaction (qRT-PCR) and radiological test (chest CT) were recommended to diagnose and prevent further transmission, and no indication for caesarian section.<sup>33</sup> Out of the total COVID-19 infected women, 80% were found asymptomatic or mild, 15% percent had severity and five percent of women were in critical condition.<sup>34</sup>

The neonates born from COVID-19 infected mothers did not show significant clinical features as such asphyxia and invasive continuous airway pressure. Similarly, pharyngeal swab, amniotic fluid, breast milk and the cord-blood test results were not found positive. The COVID-19 infection in late trimester pregnant women had no adverse outcomes in their neonates. However, a vaginal delivery is considered a low risk of intrapartum COVID-19 transmission to the new-born and recommended also to separate mothers and child immediately to avoid the possible risk of transmission after birth.<sup>35-37</sup>

Neonates and children are also at risk of the COVID-19 and they have distinctive clinical features compared with adults and elders. However, children with COVID-19 had low incidence, slight clinical characteristics, a short course of the disease, and few severe cases of the disease. Hence, they need specific laboratory and radiological tests for the timely diagnosis.<sup>38</sup>

### Diagnosis of COVID-19

For effective prevention and control of the COVID-19 timely

testing and confirmatory testing is required condition. However, diagnosis of the disease is primarily based on epidemiological history, the manifestation of clinical signs and symptoms and laboratory and radiological examinations such as nucleic acid detection by real-time quantitative polymerase chain reaction (RT-qPCR) and high-throughput sequencing of the whole genome tests, CT scan of lungs, and antibody identification techniques (point-of-care testing -POCT) of IgM/IgG, ELISA test and blood culture. Currently, various rapid diagnostic test kits are available which were found to be clinically effective for conducting population-based screening and management of the COVID-19 disease. RT-qPCR is a specific test for confirming the COVID-19. However, considering the false reporting rate of the RT-qPCR laboratory scientists suggest both TR-qPCR and CT scan for the precise diagnosis of the COVID-19.<sup>39-45</sup>

### Management of neonates born to COVID-19 women

COVID-19 is not an indication of cesarean section. However, RT-qPCR test and/or CT scan screening on admission may reduce the risk of nosocomial transmission SARS-COV-2 during the pandemic.<sup>33</sup> None of the neonates born with COVID-19 women found vertical transmission and developed clinical, radiologic, hematologic and biochemical evidence of the COVID-19. However, natal care has to be provided with caution and neonates should be separated immediately from the infected mothers and caregivers.<sup>46</sup> SARS-COV-2 is not transmitted through mother's milk so Donor Milk Banking is predicted always on the protection, promotion and support of breast milk to the neonates. Lockdown, quarantine and isolation were to be found effective control measures of the COVID-19 which may decrease the breastfeeding rates, supply and use of donor milk during this very unstable and concerning of times.<sup>47</sup>

Most of the studies showed no evidence of the vertical transmission of the COVID-19 cases. Even though protective measures and confirmatory tests are recommended on the admission of pregnant women with COVID-19 to prevent unexpected outcomes and cross-infection throughout intra-natal and perinatal times.<sup>48</sup> for providing the essential

neonatal health care and addressing neonatal health issues during COVID-19 pandemic the state must be as prepared, adaptable, efficient as possible to make the most of the available human and physical resources.<sup>49</sup>

During the pandemic of COVID-19, shortage of blood and its products are global concerns. For reducing the maternal and neonatal deaths the management of blood for obstetric care is a cost effective strategy that should be applied with urgency.<sup>50</sup> The parents of the neonates infected by COVID-19 may suffer emotional and psychological stress, thus health care providers should counsel them frequently about the current condition and urgent needs of the neonates.<sup>51</sup>

The information presented in this article were based on the online published literature from 1<sup>st</sup> December to 9<sup>th</sup> August 2020.

### CONCLUSION

The findings of the previous studies suggest no evidence of vertical transmission. Neonates and children are at risk of the COVID-19 due to immunological and physiological changes and they have distinctive clinical features compared with adults and elders. However, the clinical features were noticed milder and outcomes were also less severe/critical in neonates and children compared to adults. Despite the possibility of the intrauterine infection of COVID-19 direct evidence is still lacking so it needs more comprehensive studies for further validation of the vertical transmission. Health care providers are suggested to continue preventive programs, curative care, vaccination, and telemedicine care as the minimum health care services for neonates and called on to address these cares during the COVID-19 pandemic.

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