REVIEW ARTICLE

Effect of COVID-19 infection on pregnancy and the possibility of vertical transmission from infected pregnant mothers to fetuses

DOI: 10.29063/ajrh2022/v26i1.14

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Abstract

Coronavirus disease 19 has been predominant in China then transmitted to different countries. The study aimed to evaluate the recent evidences from published papers of potential risks of COVID-19 contagion through gestation and if vertical transmission is possible?. We reviewed several studies on the effect of COVID-19 through pregnancy by using published articles up to June, 2021. Infection with COVID-19 during pregnancy may increase risk of pregnancy problems such as preterm birth and PPROM in few cases, but other researchers establish no COVID-19 contagion was revealed in neonates. Vertical transmission of COVID-19 is feasible, and happens in a small percentage of infected mothers, but other researchers demonstrated no vertical transmission of COVID-19. According to the narrow data, there is no enough evidence for congenital defects to fetuses of infected mother and no sure for vertical transmission. More research must be done to prove the effect of COVID-19 on the fetuses and vertical transmission. *(Afr J Reprod Health 2022; 26[1]: 120-124).*

Keywords: COVID-19, SARS-CoV-2, vertical transmission, pregnancy, newborns

Résumé

La maladie à coronavirus 19 a été prédominante en Chine puis transmise à différents pays. L'étude a visé à évaluer les évidences récentes des papiers édités des risques potentiels de la contagion COVID-19 par la gestation et si la boîte de vitesses verticale est possible?. Nous avons examiné plusieurs études sur l'effet de COVID-19 pendant la grossesse en utilisant des articles publiés jusqu'en juin 2021. L'infection par COVID-19 pendant la grossesse peut augmenter le risque de problèmes de grossesse tels que l'accouchement prématuré et la RPMAT dans quelques cas, mais d'autres chercheurs établissent aucune contagion au COVID-19 n'a été révélée chez les nouveau-nés. La transmission verticale du COVID-19 est possible et se produit chez un petit pourcentage de mères infectées, mais d'autres chercheurs n'ont démontré aucune transmission verticale du COVID-19. Selon les données limitées, il n'y a pas suffisamment de preuves d'anomalies congénitales chez les fœtus de mère infectée et aucune certitude de transmission verticale. Des recherches supplémentaires doivent être menées pour prouver l'effet du COVID-19 sur les fœtus et la transmission verticale. *(Afr J Reprod Health 2022; 26[1]: 120-124).*

Mots-clés: COVID-19, SARS-CoV-2, transmission verticale, grossesse, nouveau-nés

Introduction

The World Health Organization (WHO) announced COVID-19, a respiratory illness caused by the novel coronavirus SARS-CoV-2, which became the world's the sixth public health crisis on January 30, 2020[1]. Because of its high transmissibility existence, it had spread to five continents by 9 April 2020, with approximately 85,522 deaths[2]. The contagion appears to occur mostly over contact with respiratory droplets from infected person[3]. The public health initiatives can prevent COVID-19 transportation by reveal suitable precautions, quarantine, and fast diagnosis for this virus[4]. The immune system of pregnant women change during pregnancy which making them more vulnerable to infection and that more danger for fetus and may cause early birth, spontaneous abortion, intensive care unit admission, kidney failure and intravasculitis[5]. The researches on the vulnerability of pregnant mothers to COVID-19 infection are in their early stages. While no evidence of viral transmission fetus or newborn pregnancy of delivery, the occurrence of antibodies, including particular IgG for viruses in neonatal serum samples[6].

Effect of COVID-19 on pregnancy

According to WHO, a sample of pregnant women (147) have COVID-19 contagion, about 8% only was seriously[7]. COVID-19 has been classified as severe in adults more than 60 years, immunocompromised people, people with comorbid conditions, including elevation in blood pressure, asthma, and inveterate obstructive pulmonary sickness. While the majority of pregnant women are under the age of forty, it is paramount to understand the possible effect of hypertension and hyperglycemia on COVID-19 outcomes[8]. Early results confusing that pregnant mother who experience pneumonia caused by COVID-19 have a comparable occurrence of intensive care unit entry to non-pregnant mother, but increase the rates of preterm and caesarean delivery. SARS and MERS had 25 percent and 27 percent case mortality rates compared to only one percent for COVID-19[9].

Effect of COVID-19 on fetuses

COVID-19 s is a recent strain of corona virus, although nothing is understood about its effect on pregnancy outcomes at this time[3]. Concerning the effect of corona virus infection on maternal health, there is no indication that gravid mother infected with COVID-19 are more probable than non-pregnant mother to suffer from serious respiratory symptoms. One case of a gravid mother with MERS who manifested at six weeks of pregnancy has been recorded. She was asymptomatic throughout her gestation and procreated a healthful baby in the end. In order to, no reports were found about the effect of COVID-19 infection during the first stages of pregnancy, the belongings of COVID-19 infection on the fetus during this time is unknown[10]. More problems, such as miscarriage, premature birth, and neonates that are too young for their gestational age, have been identified. One research, however, found that infected COVID-19 pregnant women, there was no rise in the danger of spontaneous abortion or premature birth[11].

In a reviewing cross-sectional analysis of 45 babies were born to SARS-CoV-2-positive mothers, 6.6 % were positive by the throat swab. They were all asymptomatic, and the test eventually came back negative, showing that colonization was only transient[12]. In a study of 836 infants born to infected mothers with COVID-19, 4.2 % was positive via PCR, and the majority of them had no breathing or further disease. Just seriously and chronically ill mothers gave birth to about 22% of their newborns early[13].

Vertical transmission

Vertical transmission of pathogens

Offspring born to infected gravid mothers with a certain virus are in danger of catching the virus from their mothers. Transmission is most common as the infant comes into close interact with the fluid of the mother, such as in utero if the placental barrier is breached, though the majority of vertical transmissions occur during childbirth[14]. Multiple forms of viruses, including those known as "TORCH" pathogens, can be spread from mother to child through vertical transmission, including toxoplasma gondi, treponema palladium, listeria monocytogenes, HIV, parvovirus, rubella, the varicella zoster virus, and cytomegalovirus, and herpes virus[14]. These viruses are a leading reason of death universal, and while much is known about the severe health risks they pose to newborns, the precise pathways of transmission across the placental membrane remain unknown, and TORCH virus infections persist. Recently, the Zika virus was discovered to be vertically transmissible, contributing to the TORCH viruses that have recently been a subject of study. The rise of the Zika virus has demonstrated the importance of tackling vertical transmission[15].

Although further research into the process of vertical transmission is needed, there are currently a range of preventative approaches in use to mitigate pathogen vertical transmission. Doctors screen mothers for HIV infection to deter vertical spread, and in the case of maternal infection, the best practice includes controlling maternal infection, implementing prenatal antiviral therapy and handling the mother and baby during labor and childbirth, delivering the baby by caesarean section rather than natural birth, and avoiding breastfeeding where possible[15].

Vertical transmission of COVID-19

Vertical transmission is the transmission of the pathogen from the mother to the fetus during the

antenatal, delivery or postpartum period via the placenta, body fluid contact through delivery and/or through direct contact of breastfeeding post natal. The vertical transmission of SARS-CoV-2 from the infected mother to the newborn has been discussed in some prior reviews[16]. Similar coronaviruses such as SARS and MERS syndrome have not been linked to vertical transmission, though the number of instances has been kept to a minimum. SARS and MERS share 50% and 79 % sequence homology with COVID-19; despite this homology, it is difficult to infer that there is a lack of vertical transmission of a same magnitude[17].

Concerns about vertical transmission in COVID-19 occur for a variety of reasons. The first is COVID-19's recognized tissue tropism. The major receptor that COVID-19 binds to reach the cell is the angiotensin-converting enzyme2 (ACE2) receptor. ACE2 is expressed in the placenta [18] and is found in the syncytiotrophoblast, cytotrophoblast, endothelium and vascular smooth muscle from both primary and secondary villi [19]. Furthermore, animal studies show that nasal inoculation of pregnant mice with Mouse hepatitis virus, the family of coronavirus, resulted in virus transmission to the fetus in each trimester[20].

As well as this biological plausibility, regarding vertical transmission, there are multiple appearances of clinical indication. IgM antibodies have been seen in neonates born to moms who were infected with COVID-19 in early reports from China[21], because IgM cannot penetrate the placenta, this raises concerns about in-utero transmission. The evidence of COVID-19 infect the placenta has been recognized in numerous new case reports, as evidenced by the incidence of SARS-CoV-2 viral RNA and protein in the placenta, in addition to a sign of virus noticed within the syncytiotrophoblast[22].

Evidences

The probability of mother-to-fetus transmission has been the focus of intensive study since the beginning the pandemic of COVID-19. On the other hand, a status of a neonate were registered for a mother with COVID-19, notice high levels of antibody and irregular cytokine test findings two hours after delivery. Since IgM antibodies are not spread to the fetus via the placenta, the high level of IgM antibody means that the neonate was compromised in utero[20].Vertical transmission could not be ruled out in this situation. Likewise, 3 neonates had a positive nasopharyngeal swab in the second day of their life. Prophylactic steps to prevent mother-to-child transmission were followed in order to avoid intra and post-partum transmission, additional at-risk connections were not present, and the infection began before the normal minimum incubation period[23].

In six case series studies, placental histology from infected mothers with COVID-19 is described, revealing a variety of abnormalities with some common pathological themes such as fibrin deposition, vascular malperfusion, and chronic villitis. Twelve out of fifteen placentas from COVID-19-infected mothers showed clue of vascular malperfusion of mothers, with four indicating centric and peripheral villous infarctions, according to a histological examination [24]. Furthermore, another study found 10 out of 20 placentas had vascular malperfusion, with some demonstrating intramural Chronic villitis (4/20) and fibrin deposition (3/20)[25]. In both of these studies there was no sign of newborn SARS-CoV-2 infection by NP swab and direct valuation of SARS-CoV-2 in placenta was not achieved. All five placentas tested negative for SARS-CoV-2 RNA in another group of five COVID-19 positive women, however, complement deposition (4/5) and fetal vascular malperfusion (5/5) were also seen[26].

Positive patients in a cohort of 8 COVID-19, one aborted fetus delivered at 38.7 weeks did not display any SARS-CoV-2 RNA in the placenta or in the tissue of fetus tested post-mortem 356 but there was sign of severe chronic villitis in the placenta[27]. Vertical transmission risk is very faint according to a research investigating 265 gravid mother[28]. In this unclear scenario, studying the newborn's antibody reaction to COVID-19 can be a valuable method for scientifically researching potential pathways of in utero transmission.

Conclusion

Depending on our review, it is not right to declare that the potential of vertical transmission of COVID-19 has been absolutely assured nor excluded. There is no enough information about

COVID-19's effects on pregnant mothers or their babies. Many of the articles used in this study were case reports. COVID-19 is generally less fatal than MERS and SARS. The majority of the pregnant women infected with COVID-19 in this study were asymptomatic or had just minimal symptoms, but those with underlying sicknesses should be given specific care because they are at a greater danger of contracting severe sickness than the general population. Gravid mother infected with SARS have a high miscarriage risk, according to reports. As a result, the absence of evidence of COVID-19 infection in first stages of pregnancy. An increased danger of miscarriage in mother infected with COVID-19 cannot be ruled out. Surveillance for fetal growth restriction is appropriate in women with COVID-19 and ongoing gestation, provided constraint in the fetal growth was found in the majority of ongoing SARS pregnancies. Cesarean section was most widely recommended in women infected with MERS and SARS due to maternal hypoxemia. Since COVID-19 disease does not seem to be as serious as SARS and MERS, the high prevalence of caesarean section (almost all) is unjustified, and further research is required. According to our results, neither the prospect of vertical transmission of COVID-19 has been definitively proven nor ruled out. Furthermore, the cases of vertical transmission of the infection became more prevalent, and with the finite evidence available, this danger cannot be ruled out. More large-scale trials, likely based on the assessment of complex antibody responses in newborns, are urgently required.

Contribution of authors

The author Mervat Ahmed AbdRabou who conceived and designed the study, collected the data and prepared the manuscript for publication.

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