

What are the risks of COVID-19 infection in pregnant women?



Since December, 2019, the outbreak of the 2019 novel coronavirus disease (COVID-19) infection has become a major epidemic threat in China. As of Feb 11, 2020, the cumulative number of confirmed cases in mainland China has reached 38 800, with 4740 (12.2%) cured cases and 1113 (2.9%) deaths; additionally, there have been 16 067 suspected cases so far.¹ All 31 provinces in mainland China have now adopted the first-level response to major public health emergencies. The National Health Commission of China has published a series of guidelines on the prevention, diagnosis, and treatment of COVID-19 pneumonia, based on growing evidence of the pathogens responsible for COVID-19 infection, as well as the epidemiological characteristics, clinical features, and the most effective treatments.²⁻⁴ The central government and some provincial governments have provided food and medical supplies and dispatched expert groups and medical teams to manage and control the outbreak response in the hardest-hit areas (Wuhan and neighbouring cities in Hubei province).

As the COVID-19 outbreak unfolds, prevention and control of COVID-19 infection among pregnant women and the potential risk of vertical transmission have become a major concern. More evidence is needed to develop effective preventive and clinical strategies. The latest research by Huijun Chen and colleagues⁵ reported in *The Lancet* provides some insight into the clinical characteristics, pregnancy outcomes, and vertical transmission potential of COVID-19 infection in pregnant women. Although the study analysed only a small number of cases (nine women with confirmed COVID-19 pneumonia), under such emergent circumstances these findings are valuable for preventive and clinical practice in China and elsewhere. Although neonatal nasopharyngeal swab samples have been collected in some hospitals across China, this study also collected and tested amniotic fluid, cord blood, and breastmilk samples for the presence of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), thus allowing a more detailed assessment of the vertical transmission potential of COVID-19 infection.

SARS-CoV-2 is a new strain of coronaviruses that are pathogenic to humans. Another two notable strains are SARS-CoV and the Middle East respiratory syndrome (MERS) coronavirus (MERS-CoV). A study

done by Roujian Lu and colleagues⁶ found that although SARS-CoV-2 is genetically closer to two bat-derived SARS-like coronaviruses, bat-SL-CoVZC45 and bat-SL-CoVZXC21 (with about 88% genome sequence identity), than to SARS-CoV-1 (about 79% identity) and MERS-CoV (about 50% identity), homology modelling has revealed that SARS-CoV-2 has a similar receptor-binding domain structure to that of SARS-CoV-1, which suggests that COVID-19 infection might have a similar pathogenesis to SARS-CoV-1 infection.⁶⁻⁸ Thus, the risk of vertical transmission of COVID-19 might be as low as that of SARS-CoV-1. The present study by Chen and colleagues did not find any evidence of the presence of SARS-CoV-2 viral particles in the products of conception or in neonates, in accordance with the findings of a previous study on SARS-CoV-1 done by Wong and colleagues.⁹ Two neonatal cases of COVID-19 infection have been confirmed so far,¹⁰ with one case confirmed at 17 days after birth and having a close contact history with two confirmed cases (the baby's mother and maternity matron) and the other case confirmed at 36 h after birth and for whom the possibility of close contact history cannot be excluded. However, no reliable evidence is as yet available to support the possibility of vertical transmission of COVID-19 infection from the mother to the baby.

Previous studies have shown that SARS during pregnancy is associated with a high incidence of adverse maternal and neonatal complications, such as spontaneous miscarriage, preterm delivery, intrauterine growth restriction, application of endotracheal intubation, admission to the intensive care unit, renal failure, and disseminated intravascular coagulopathy.^{9,11} However, pregnant women with COVID-19 infection in the present study had fewer adverse maternal and neonatal complications and outcomes than would be anticipated for those with SARS-CoV-1 infection. Although a small number of cases was analysed and the findings should be interpreted with caution, the findings are mostly consistent with the clinical analysis done by Zhu and colleagues¹² of ten neonates born to mothers with COVID-19 pneumonia. The clinical characteristics reported in pregnant women with confirmed COVID-19 infection are similar to those reported for non-pregnant adults with confirmed COVID-19 infection in the general



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population and are indicative of a relatively optimistic clinical course and outcomes for COVID-19 infection compared with SARS-CoV-1 infection.^{13,14}

Nonetheless, because of the small number of cases analysed and the short duration of the study period, more follow-up studies should be done to further evaluate the safety and health of pregnant women and newborn babies who develop COVID-19 infection. As discussed in the study, 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, especially if they have chronic diseases or maternal complications. Therefore, pregnant women and newborn babies should be considered key at-risk populations in strategies focusing on prevention and management of COVID-19 infection. Based on evidence from the latest studies and expert recommendations, as well as previous experiences from the prevention and control of SARS, the National Health Commission of China launched a new notice on Feb 8, 2020,¹⁵ which proposed strengthening health counselling, screening, and follow-ups for pregnant women, reinforcing visit time and procedures in obstetric clinics and units with specialised infection control preparations and protective clothing, and emphasised that neonates of pregnant women with suspected or confirmed COVID-19 infection should be isolated in a designated unit for at least 14 days after birth and should not be breastfed, to avoid close contact with the mother while she has suspected or confirmed COVID-19 infection.

We need to further strengthen our capacity to deal with emergent infectious disease outbreaks, through laws and regulations to prevent and control the spread of infectious diseases and to avoid outbreak clusters in families, communities, and other public places, and to do so with transparency and solidarity. Timely reporting and disclosure of emergent infectious diseases is also important to avoid delayed responses. Infection control and management procedures in hospitals and other places with several confirmed cases isolated together should also be maintained, and specialised clothing and equipment provided to protect medical professionals and other health workers from occupational exposure to COVID-19 infection.

The Chinese version of this Comment is provided in the appendix. I declare no competing interests.

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- 1 National Health Commission of the People's Republic of China. The latest situation of novel coronavirus pneumonia as of 24:00 on 11 February, 2020. <http://www.nhc.gov.cn/xcs/yqtb/202002/395f075a5f3a411f80335766c65b0487.shtml> (accessed Feb 12, 2020; in Chinese).
- 2 National Health Commission of the People's Republic of China. The notice of launching guideline on diagnosis and treatment of the novel coronavirus pneumonia (NCP). 5th edition. <http://www.nhc.gov.cn/xcs/zhengcwj/202002/3b09b894ac9b4204a79db5b8912d4440.shtml> (accessed Feb 5, 2020; in Chinese).
- 3 National Health Commission of the People's Republic of China. The notice of launching guideline on diagnosis and treatment of the novel coronavirus pneumonia (NCP). Revised version of the 5th edition. <http://www.nhc.gov.cn/xcs/zhengcwj/202002/d4b895337e19445f8d728fcfa1e3e13a.shtml> (accessed Feb 8, 2020; in Chinese).
- 4 National Health Commission of the People's Republic of China. Notice of the General Office of the National Health and Health Commission on issuing a new coronavirus pneumonia prevention and control plan (4th edition). <http://www.nhc.gov.cn/xcs/zhengcwj/202002/573340613ab243b3a7f61df260551dd4.shtml> (accessed Feb 7, 2020).
- 5 Chen H, Guo J, Wang C, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet* 2020; published online Feb 12. [https://doi.org/10.1016/S0140-6736\(20\)30360-3](https://doi.org/10.1016/S0140-6736(20)30360-3).
- 6 Lu R, Zhao X, Li J, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet* 2020; published online Jan 30. [https://doi.org/10.1016/S0140-6736\(20\)30251-8](https://doi.org/10.1016/S0140-6736(20)30251-8).
- 7 Hamming I, Timens W, Bulthuis MLC, Lely AT, Navis GJ, van Goor H. Tissue distribution of ACE2 protein, the functional receptor for SARS coronavirus. A first step in understanding SARS pathogenesis. *J Pathol* 2004; **203**: 631–37.
- 8 To KF, Lo AW. Exploring the pathogenesis of severe acute respiratory syndrome (SARS): the tissue distribution of the coronavirus (SARS-CoV) and its putative receptor, angiotensin-converting enzyme 2 (ACE2). *J Pathol* 2004; **203**: 740–43.
- 9 Wong SF, Chow KM, Leung TN, et al. Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome. *Am J Obstet Gynecol* 2004; **191**: 292–97.
- 10 National Health Commission of the People's Republic of China. Transcript of Press Conference on Feb 7, 2020. <http://www.nhc.gov.cn/xcs/s3574/202002/5bc099fc9144445297e8776838e57ddc.shtml> (accessed Feb 7, 2020; in Chinese).
- 11 Lam CM, Wong SF, Leung TN, et al. A case-controlled study comparing clinical course and outcomes of pregnant and non-pregnant women with severe acute respiratory syndrome. *BJOG* 2004; **111**: 771–74.
- 12 Zhu H, Wang L, Fang C, et al. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Transl Pediatr* 2020; published online Feb 10. DOI:10.21037/tp.2020.02.06.
- 13 Chen N, Zhou M, Dong X, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet* 2020; published online Jan 30. [https://doi.org/10.1016/S0140-6736\(20\)30211-7](https://doi.org/10.1016/S0140-6736(20)30211-7).
- 14 Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020.
- 15 National Health Commission of the People's Republic of China. Notice on strengthening maternal disease treatment and safe midwifery during the prevention and control of new coronavirus pneumonia. <http://www.nhc.gov.cn/xcs/zhengcwj/202002/4f80657b346e4d6ba76e2cfc3888c630.shtml> (accessed Feb 8, 2020).