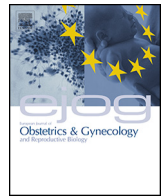




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The novel coronavirus (2019-nCoV) in pregnancy: What we need to know



Coronaviruses (CoVs) are the largest group of viruses belonging to the Nidovirales order. They are enveloped, non-segmented positive-sense RNA viruses [1]. The Novel Coronavirus (2019-nCoV), also known as Wuhan coronavirus, causes the 2019-nCoV acute respiratory disease, or COVID-19. The initial cases of 2019-nCoV occurred in Wuhan, China in December 2019 [2]. Based on a recent epidemiologic study there is evidence that human-to-human transmission has occurred among close contacts since the middle of December 2019 [3]. As of 3 February 2020, 17,238 laboratory-confirmed cases of 2019-nCoV have been reported including 361 deaths [4]. The disease has already spread to 19 countries outside China, with new cases continuing to emerge daily. Recently, Chen et al. reported nine cases of pregnant women with 2019-nCoV [5]. While coronavirus infection is a common and usually self-limiting infection, in a specific population like pregnant women, complications of the disease appear to be more relevant, and pregnant women are particularly susceptible to morbidity and mortality, especially in case of high pathogenicity CoVs such as severe acute respiratory syndrome (SARS–COV) or Middle East respiratory syndrome (MERS–COV) [6].

Prior cases of CoVs in pregnancy have been reported. Wong et al. [7] reported pregnancy and perinatal outcomes of women with severe acute respiratory syndrome, including 12 cases of SARS–COV during the 2002–2003 pandemic. Of them, more than 50 % of the women reported early abortion with first-trimester infection, while in those who contracted the virus in the second-trimester, 40 % of intrauterine growth restriction, and 80 % of preterm delivery

were reported. Moreover, three women (25 %) died during the pregnancy. Alfaraj et al. [8] reported in a literature review 11 cases of patients with Middle East respiratory syndrome (MERS–COV) during pregnancy. Of them 91 % had adverse outcomes, with three perinatal deaths.

Four papers on 2019-nCoV in pregnancy have been published so far. 591,011 Chen S. et al. in a paper published in Chinese described clinical characteristics and placental pathology of three women with confirmed 2019-nCoV who delivered by cesarean delivery [9]. All women presented with fever, one before delivery and two in postpartum. Authors found various degrees of fibrin deposition inside and around the villi with local syncytial nodule increases in all three placentas. One case of placenta showed the concomitant morphology of chorionic hemangioma and another one with massive placental infarction. No pathological change of villitis and chorioamnionitis was observed in our observation of three cases. All samples from three placentas were negative for the nucleic acid of 2019-nCoV [9]. Chen H. et al. reported data from nine pregnant women with 2019-nCoV [5]. No clinical or serologic evidence of vertical transmission was noticed, and no neonatal deaths were reported [5]. Chen Y et al. [10] reported data from four full-term singleton infants who were born to pregnant women tested positive for 2019-nCoV in the city of Wuhan. Of the three infants, for who consent to be diagnostically tested was provided, none tested positive for the virus. None of the infants developed serious clinical, and all four infants were alive at the time of hospital discharge [10].

The overall maternal and perinatal outcomes of pregnant women with SARS–COV and MERS–COV are reported in Table 1. Notably, infection of 2019-nCoV during pregnancy seems less serious compared to infection of SARS–COV and MERS–COV with no cases of maternal death, or perinatal death.

Table 1
Published cases of MERS–COV, SARS–COV, and 2019-nCoV in pregnant women.

	Wong 2004 ⁷	Alfaraj 2019 ⁸	Chen H. 2020 ⁵	Chen S. 2020 ⁹	Chen Y. 2020 ¹⁰	Total
Infection	SARS–COV	MERS–COV	2019-nCoV	2019-nCoV	2019-nCoV	–
Number of infected women	12	11	9	3	4	39
Women with first trimester infection	7	1	0	0	0	8
Abortion in women with first trimester infection	4/7 (57.1 %)	0/1	–	–	–	4/8 (50.0 %)
Women with second or third trimester infection	5	10	9	3	4	31
IUGR in women with second or third trimester infection	2/5 (40.0 %)	Not reported	0/9	Not reported	Not reported	2/14 (14.3 %)
PTB in women with second or third trimester infection	4/5 (80.0 %)	3/10 (30.0 %)	4/9 (44.4 %)	1/3 (33.3 %)	0/4	12/31 (38.7 %)
Cesarean delivery	4/5 (80.0 %)	4/10 (40.0 %)	9/9 (100 %)	3/3 (100 %)	3/4 (75.0 %)	23/31 (74.2 %)
Stillbirth	0/5	2/10 (20.0 %)	0/9	0/3	0/4	2/31 (6.5 %)
Neonatal death	0/12	1/10 (10.0 %)	0/9	0/3	0/4	1/38 (2.6 %)
Clinical or serologic evidence of vertical transmission	0/12	0/11	0/9	0/3	0/3*	0/39
Admission to ICU	Not reported	7/11 (63.3 %)	Not reported	Not reported	Not reported	7/11 (63.3 %)
Maternal death	3/12 (25 %)	3/11 (27.3 %)	0/9	0/3	0/4	6/39 (15.4 %)

MERS–COV, Middle East respiratory syndrome; SARS–COV, severe acute respiratory syndrome; IUGR, intrauterine growth restriction; PTB, preterm birth; ICU, intensive care unit.

* One neonate not tested.

In conclusion, strict monitoring of women with suspected 2019-nCoV is firmly recommended. Obstetricians should promptly recognize the symptoms of 2019-nCoV, and adequately assess severity and fetal well-being.

Declaration of Competing Interest

The authors report no conflict of interest.

References

- [1] Fehr AR, Perlman S. Coronaviruses: an overview of their replication and pathogenesis. *Methods Mol Biol* 2015;1282:1–23.
- [2] Perlman S. Another decade, another coronavirus. *N Engl J Med* 2020(January 24), doi:http://dx.doi.org/10.1056/NEJMe2001126.
- [3] Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med* 2020 (January 29), doi:http://dx.doi.org/10.1056/NEJMoa2001316.
- [4] WHO. Novel coronavirus (2019-nCoV). Situation report—14. February 3 (Accessed on February 3, 2020. 2020. https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200203-sitrep-14-ncov.pdf?sfvrsn=f7347413_2.
- [5] Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, 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;395 (March 7 (10226)):809–15.
- [6] Meijer WJ, van Noortwijk AG, Bruinse HW, Wensing AM. Influenza virus infection in pregnancy: a review. *Acta Obstet Gynecol Scand* 2015;94(August (8)):797–819.
- [7] Wong SF, Km Chow, Leung TN, et al. Pregnancy and perinatal outcomes of women with severe acute respiratory syndrome. *Am J Obstet Gynecol* 2004;191:292–7.
- [8] Alfaraj SH, Al-Tawfiq JA, Memish ZA. Middle East respiratory syndrome coronavirus (MERS-CoV) infection during pregnancy: report of two cases & review of the literature. *J Microbiol Immunol Infect* 2019;52:501–3.
- [9] Chen S, Huang B, Luo DJ, Li X, Yang F, Zhao Y, et al. [Pregnant women with new coronavirus infection: a clinical characteristics and placental pathological analysis of three cases]. *Zhonghua Bing Li Xue Za Zhi* 2020;49(March 1 (0)), doi:http://dx.doi.org/10.3760/cma.j.cn112151-20200225-00138 E005[Epub ahead of print].
- [10] Chen Y, Peng H, Wang L, Zhao Y, Zeng L, Gao H, et al. Infants born to mothers with a new coronavirus (COVID-19). *Front Pediatr* 2020;16(March), doi:http://dx.doi.org/10.3389/fped.2020.00104.

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