



A REVIEW ON RISK OF CORONAVIRUS DISEASE [COVID19] IN PREGANCY

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ABSTRACT

Introduction: The happening of the new corona virus china in 2019 and afterward in varied countries round the world has raised consideration regarding the like hood of vertical transmission of the virus from mother to craniates. The present study aimed to review printed literature regard . **METHOD:** We have a tendency to reviewed the danger of transmission of COVID-19 to the craniates of infected mother by victimization information of printed articles on web site. **Conclusion:** Currently, supported restricted information, there is no proof for intrauterine transmission of COVI- 19 from infected pregnant ladies to their fetuses. Mother could also be at accrued risk for a lot of severe metabolic process complications.

KEYWORDS: Covid19 [zoonotic infection], vertical transmission, placenta, pregnant mother, neonate.

INTRODUCTION

Pregnancy may be a state of partial immune suppression that makes ladies additional liable to infectious agent infection, and additional morbidity is higher even with seasonal contagious disease. Therefore, the covid-19 epidemic could have serious consequence for pregnant ladies. Corona viruses are among human and animal pathogen .^[1]The covid-19 epidemic began in China and quickly unfold to different countries and have become a serious unhealthiness.^[2] The unwellness was initial unfold in Wuhan, the capital of Hubei province, china, and also the quickly unfold to different countries round the Persia.^[3] Since the primary case of COVID-19 in Wuhan, China, up to March 19, 234073 individuals within the world are infected with COVID-19 and 9840 individuals have died attributable to COVID-19 infection.

On January 30, 2020, the planet health organization (WHO) labeled the happening as a Public Health Emergency of International Concern (PHEIC). On February 12, 2020, eorld health organization named the malady caused by the novel corona virus CORONA virus malady 2019" (COVID-19).^[4] A team of international consultants with a spread of specializations has tried to manage this happening.^[5] Respiratory disease caused by COVID-19 could be a extremely contagious and communicable disease declared a health emergency by the planet Health Organization.^[6] The exact approach of malady transmission has not nonetheless been determined, however the researchers found that the virus

spreads through metabolism droplets just like the respiratory disease, and air precautions square measure terribly necessary given the shortage of knowledge during this space.^[7]

With the unfold of the corona virus, consideration are raised concerning its intrauterine transmission from mother to fetus in pregnant ladies.^[8] Virus infection is one amongst the leading causes of maternity deaths worldwide.^[9] Important queries raised thanks to the unfold of COVID-19 include: are the symptoms of respiratory disorder in pregnant ladies completely different from those of non-pregnant women? However seemingly are maternal and babe mortality? Will it cause maternity complications or premature birth? And the way a lot of COVID-19 is transmitted to the baby ? Given the importance of the difficulty and also the lack of sufficient proof, the current study aimed to review the printed proof during this regard.^[10]

Interim steering has been issued by the globe Health Organization and Centers for malady management and bar on managing COVID-19, that embrace some recommendations specific to pregnant ladies largely drawn on expertise from previous corona virus outbreaks.^[11] Chinese professional recommendations for the care of pregnant ladies with suspected and confirmed COVID-19 were developed and disseminated in China quite early following the irruption in metropolis.^[12] These recommendations are dynamic, evolving as additional information concerning epidemiology, pathological

process, malady progression and clinical course among infected pregnant patients has been gathered. Restricted clinical experience in managing pregnant ladies with COVID-19 and their neo-bum has been rumord from China recently supported a case series of 9 pregnancies with confirmed COVID-19 treated in Zhongnan Hospital of metropolis University and ten neonates (nine pregnancies) delivered at 5 totally different hospitals.^[13]

Although more cases (>100) of suspected or confirmed COVID-19 are treated and delivered in many hospitals in China in line with the news releases and media reports. So far, no maternal deaths are according. There seems to be some risks of premature rupture of membranes, preterm delivery, foetal arrhythmia and abnormal condition once the infection happens within the trimester of physiological state. But there's no proof suggesting placental transmission primarily based on terribly restricted information, because the analysis of humour, cord blood, infant throat swab, and breast milk samples offered from six of the nine patients were found to be negative for SARS-COV-2. Whether or not virus shedding happens vaginally is additionally not famous.^[14] Whether COVID-19 will increase the danger of miscarriage and stillbirth is unknown. Issues are expressed by consultants within the media regarding ladies undergoing termination of maternity for worry of non-heritable infection and teratogenicity.^[15]

However, data on the impact of COVID-19 on the course and outcome of maternity within the first and second trimesters isn't offered however. As COVID-19 still seems to spreading, additional infections in pregnant ladies area unit probably to be encountered in numerous regions, countries, and continents. Therefore, it's necessary that pregnant ladies and their families, yet because the general public and health-care suppliers, receive as correct data as attainable. Here is our conceive to summarize some necessary sensible clinical aspects of managing COVID-19 in pregnancy.^[16,18]

METHOD

This study may be a narrative review designed to gather revealed literature and articles on intrauterine transmission of COVID-19 from mother to craniates.^[19] During this review, we have a tendency to hunted for all articles revealed in varied databases together with Pub-med, Scopus, Embase, Science direct and internet of Science mistreatment MeSH-compliant keywords together with COVID-19, preg-city, vertical transmission, Corona virus 2019, SARS-Cov-2 and 2019-nCoV from Gregorian calendar month 2019 to March 11,2020 and so reviewed them.^[20] All original analysis studies, letters to the edito4r, and reviews revealed on the impact of COVID-19 on craniates health and intrauterine transmission of COVID-19 were enclosed. The title and abstract of all revealed articles were analyzed on an individual basis mistreatment specific keyword by two researchers, the relevant articles

were collected, and their results were summarized and according.^[21,25]

Prevention

Incubation period of COVID-19 is regarding 2-14 days, however infected persons will transmit the virus via shut contact and metastasis droplets even perhaps before they become symptomatic. Physiological changes within the immune and system might built pregnant ladies a lot of prone to COVID-19 infection throughout the epidemic.^[26,28] No effective immunizing agent is obtainable at the moment. Therefore, it's judicious that pregnant ladies refrain from supernumerary travel, avoid crowds, conveyance, contact with sick individuals, and a lot of significantly, observe and maintain smart personal and social hygiene. Pregnant ladies with symptoms of fever, cough, fatigue, myalgia, inflammatory disease or shortness of breath ought to ask for timely medical consultation and facilitate. Ladies with a travel history to endemic areas and people with a clinical suspicion of infection ought to be isolated and investigated. Some pregnant ladies might developed severe anxiety and depression requiring skilled psychological support to stop adverse outcomes.^[29]

Identification

The main clinical manifestations are fever, fatigue, myalgia,dry cough,and shortness of breath. Few Patients could gift with nasal congestion, runny nose, raw throat, hemoptysis, or looseness of the bowels. Peripheral white blood cell count is traditional or cut in early stages, and therefore the leucocytes count is also reduced. CRP is also redoubled. Some patients could have delicate Thrombopenia, elevated levels of liver enzymes and amino acid phosphokinase.^[30,33]

A computed axial tomography (CT) scan of the chest while not distinction is that most helpful investigation to substantiate or rule out virus infection, and may be performed in suspected cases because the risk of radiation exposure to the craniates is extremely tiny. In an exceedingly recent report, sensitivity of chest CT in diagnosis COVID-19 was shown to be bigger than that of RT-PCR (98%vs71%) 13. Tomography signs of infectious agents pneumonia were gift in an awesome majority of reportable pregnancies with COVID-19 infection.^[34]

SARS-COV-2 is that the etiologic agent of COVID-19, and it's infective agent macromolecule detection victimization time period enzyme chain reaction (RT-PCR) is taken into account the reference normal for the identification.^[35] Specimens ought to be obtained from spit, higher tract (nasopharyngeal and bodily cavity swab), lower tract (sputum, endotracheal aspirate, or bronchoalveolar lavage), piddle and stool if attainable. Recurrent testing could be needed to verify the identification.^[36] If the SARS-COV-2 macromolecules isn't detected in tract samples taken on two consecutive occasion a minimum of twenty four hours apart, COVID-

19 are often dominated out. Medical science as a procedure ought to be used on condition that RT-PCR isn't out there.^[37]

To screen for different metabolism infections, samples ought to additionally to be tested for different viruses (such as respiratory illness virus A and B, adenovirus, metabolism syncytial virus, rhinovirus, human metapneumo virus, SARS-COV, microorganism respiratory disorder, Chlamydia and eubacterium pneumonia.^[38]

It is necessary to require blood cultures for microorganism that cause respiratory disorder and infection ideally before initiating antimicrobial medical aid.^[39]

Management

Pregnant ladies suspected of COVID-19 ought to be isolated and investigated. Those diagnosed with infection ought to be promptly admitted to a negative pressure isolation ward, ideally in a very selected hospital with adequate facilities and multi-disciplinary experience to manage critically unwell medical specially patients, they must be triaged and stratified into gentle (symptomatic patients with stable very important signs), severe (respiration rate >30/min, resting SaO₂ < 93%, blood element partial pressure (PaO₂)/element concentration (FiO₂) < 300mmhg) or vital (shock with organ failure, metabolism process failure requiring mechanical ventilation or refractory hypoxemia requiring extra-corporal membrane oxygenation) classes supported clinical analysis, and managed by a multidisciplinary team of accoucheuse, accoucheur, specialist in medicalaid medication, biologist, anesthesiologist and neonatologist.^[40] All medical workers caring for COVID-19 patients ought to use personal protecting instrumentation together with robe, N95 masks, goggles, and gloves. Special thought ought to incline to physiological diversifications in maternity once treating pregnant ladies with COVID -19 infection.^[41]

Confirmative Medical Care

Adequate rest, hydration, organic process support, and water and balance ought to be ensured. It's essential to watch very important signs and chemical element saturation closely. Reckoning on the severity of the unwellness, supplemental chemical element inhalation (60%-100% concentration at a rate of forty L/min) ought to incline via high flow nasal tubing reckoning on the severity of hypoxemia.^[42] cannulization and mechanical ventilation or may be extra-corporal membrane natural process (ECMO) is also needed to keep up natural process. Alternative complications might embody septic shock, acute urinary organ injury, and virus induced viscus injury. Therefore, it's vital to see blood gases, lactate, urinary organ perform, liver perform and viscus enzymes as indicated by the clinical state of affairs.^[43]

Antiviral Treatment

Antiviral treatment has been habitually wont to trat COVID-19 infection in china, and is additionally suggested for pregnant patients. Combination medical aid with antiproteases Lopinavir / Ritonavir has been the well-linked drug plan because it is understood to be comparatively safe in maternity. The suggested dose is {2} capsules of Lopinavir / protease inhibitor (200mg/50mg per capsule) orally in conjunction with inhalation (5 million IU in 2 milliliter of sterile water for injection) doubly on a daily basis.^[44]

WHO advises caution and careful risk benefit analysis before mistreatment investigational therapeutic agents in pregnant ladies outside clinical trails. Remdesivir, a ester analog, and antimalarial, associate degree antiprotozoal drug, square measure promising medicine against COVID-19 as they are noted to inhibit SARS-COV -2 virus in vitro. Clinical trails have al-prepared started in china and square measure planned elsewhere.^[45]

Medication Treatment

The intensive respiratory organ harm by the virus well will increase the chance of secondary microorganism respiratory disease. Antibiotics square measure indicated provided that there's proof of secondary microorganism infection. However, antibiotics ought to be administered at once if microorganism infection is suspected. Blood vessel Rocophin will be administered at the start whereas awaiting culture and sensitivity results.^[46]

Adrenal Cortical Steroid Medical Care

In general, use of corticosteroids within the treatment of COVID-19 respiratory disease isn't suggested because it might delay the virus clearance from the body. However, short (3-5) administration of methylprednisolone (1-2mg/kg body weight per day) has been used oftentimes in china, particularly once dyspnoea and hypoxemia square measure severe, in an effort to ameliorate respiratory organ inflammation and stop acute metabolic process distress syndrome.^[47] This regime is additionally suggested for pregnant ladies with COVID-19, though information on its effectiveness and safety would like more analysis. Administration of betamethasone 12mg intramuscularly followed by another dose 24 hours later ought to be thought about to push craniates respiratory organ maturity once preterm delivery is anticipated.^[48]

Temporal Arrangement and Mode of Delivery

Timing of delivery ought to be individuals supported sickness severity, existing comorbidities like toxemia, diabetes, internal organ sickness etc, medicine history, and fetal age and craniates condition. In delicate and stable cases responding to treatment and within the absence of craniates compromise, physiological state could also be continuing to term beneath shut police work. Regular watching of maternal important signs (temperature, heart rate, force per unit area, respiration rate and atomic number8 saturation by pulse oximetry). Dynamic assessment of electrolytes and fluid balance,

blood gases and acid-base standing is needed. Ultrasound examination of the foetus and craniates rate watching area unit counseled to assess craniates welfare.^[49]

In important cases, continued physiological condition might endanger the security of the mother and her craniates. In such things, delivery could also be indicated not with standing the baby is premature, associate in nursing determination of physiological condition ought to be thought about as an possibility before vertebrate viability is reached so as to save lots of the pregnant woman's life when careful consultation with the patient,

her family associate in nursing moral board. Mode of delivery is especially determined by medical specialty indications.^[50] Careful though ought to tent with reference to alternative of physiological condition once a delivery by caesarean delivery is needed. In two printed reports from china involving a complete of eighteen pregnant ladies with COVID-19 virtually two were delivered vaginally, and none of those neonants were infected by SARS-COV02. Because the proof for duct shedding of virus and vertical transmission is lacking, duct delivery could also be thought about in stable patients.^[51]

Table 1: Comparison of Characteristics of Severe Acute Respiratory Syndrome (SARS), Middle East Respiratory Syndrome (MERS), and Coronavirus Disease 2019 (COVID-19).^[52]

Characteristics	Severe Acute Respiratory Syndrome	Middle East Respiratory Syndrome	Corona virus Disease-2019
First patients reported	Guangdong, China, November 2002	Zarga, Jordan, April 2012 and Jeddah, Saudi Arabia, June 2012	Wuhan, China, December 2019
Virus	SARS-CoV	MERS-CoV	SARS-CoV-2
Type of coronavirus	betacoronavirus	betacoronavirus	Betacoronavirus
Host cell receptor	Angiotensin converting enzyme 2	Dipeptidyl peptidase 4	structural analysis suggests Angiotensin converting enzyme 2 receptor ⁵²
Sequence similarity	Reference		79% to SARS-CoV, 50% to MERS-CoV ³⁵
Animal hosts	Bats (natural reservoir), masked palm civet and raccoon dogs maybe intermediate hosts	Bats (natural reservoir), dromedary camel (intermediate host)	Bats, animal sold at the seafood market in Wuhan might represent an intermediate host ³⁵
Incubation period			
Mean (95% CI: days)	4.6 (3.8-5.8)	5.2 (1.9-14.7)	5.2 days (95% confidence interval [CI], 4.1 to 7.0); 95th percentile of the distribution was 12.5 days ³³
Range (days)	2-14	2-13	2-14
Time from illness onset until hospitalization	2-8 days	0-16 days	12.5 days (mean) (95% CI, 10.3 to 14.8) - onset before January 1 9.1 days (mean); 95% CI, 8.6 to 9.7 (onset January 1-11) ³³
Basic reproduction number (R0) **	2-3	<1	2.2 (95% CI, 1.4 to 3.9) ³³
Patient characteristics			
Adults	93%	98%	Nearly all reported patients are adults
Children	5-7%	2%	Children have been infrequently reported (<1% of cases) ³⁹
Age range (years)	1-91	1-94	10-89 years
Average age (years)	Mean 39.9	Median 50	59 years (median) ³³
Sex ratio (M:F)	43%:57%	64.5%:35.5%	56%:44% ³³
Mortality			
Case fatality rate overall	9.6%	35-40%	Initial estimate is

			1%38
Clinical Manifestations			From hospitalized patients32,36,37
Fever	99-100%	98%	83-100%
Cough	62-100%	83%	59-82%
Myalgia	45-61%	32%	11-35%
Headache	20-56%	11%	7-8%
Diarrhea	20-25%	26%	2-10%
Laboratory findings			
Radiographic abnormalities on chest imaging	94-100%	90-100%	100%
Leukopenia	25-35%	14%	9-25%
Lymphopenia	65-85%	32%	35-70%
Thrombocytopenia	40-45%	36%	5-12%

Care of the Newborn

Limited information obtained from cases of pregnant ladies with COVID-19 recommend that the placental transmission is unlikely in late gestation getting ready to term, because the virus wasn't known within the liquid body substance, placenta, breast milk of those mothers or within the nasal secretions of their neonates.^[53] However, infection will occur in neonates via shut contact. Two such cases of infant COVID-19 infection are confirmed up to now at thirty six hours and seventeen days when birth, each seem to possess been infected postnatally .therefore, early twine clamping and temporary separation of the newborn for a minimum of two weeks is usually recommended to reduce the chance of microorganism transmission by avoiding longer, shut contact with the infected mother. The newborn infant ought to be cared for in associate in nursing isolation is for the mother to pump her breast milk, which may be fed to the baby by a healthy caregiver.^[54]

CONCLUSION

Limited evidence exists on vertical transmission, prevalence and clinical features of covid19 during pregnancy ,birth ,and the postnatal period.currently there was noevidence for intrauterine vertical transmission of covid19 from infected pregnant mother to their fetuses.However,infected mothers may be at increased risk for more severe respiratory complications. It is well known that an infected mother can transmit the covid19 virus through respiratory droplets during breastfeeding Thus,the mothers with known or suspected covid19 should adhere to standard and contact precautions during breastfeeding.

REFERENCE

- McIntosh K, Hirsch MS, Bloom A. Corona virus disease, 2019. (COVID-19).
- Qiao J. What are the risk of COVID-19 infection in pregnant women? The Lancet, 2020.
- Mardani M, Pourkaveh B. A Controversial Debate: Vertical transmission of COVID-19 in Pregnancy. Neoscriber Demo Publisher.
- Rasmussen SA, Smulian JC, Lednicky JA, Wen TS, Jamieson DJ. Corona virus Disease 2019 (COVID-19) and Pregnancy: What obstetricians need to know, American Journal of Obstetrics and Gynecology, 2020.
- Tavakoli A, Vahdat K, Keshavarz M. Novel Corona virus Disease 2019 (COVID-19) :An Emerging infectious disease in the 21st century. ISMJ, 2020; (6): 432-50.
- Organization WH. Corona virus disease 2019 (COVID-19) situation report -60 2020 [updated March 16, cited 2020]. Available from: <https://www.who.int/emergencies/diseases/novel-corona-virus-2019/situation-report/>, 2020.
- Yang P, Liu P, Li D, Zhao D. Corona virus Disease 2019, a growing threat to children? Journal of infection, 2020.
- Yu A, Wang Z , Ren W, Wu Z , Hu Z, Li L, et al. Epidemic analysis of COVID-19 in china after wuhan was restricted.
- Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ , Lu GM, et al. Corona virus Disease 2019 (COVID-19): After Perspective from China. Radiology, 2020; 200490.
- Jiang F, Deng L, Zhang L, Cai Y, Cheung CW, Xia Z. Review of the clinical characteristics of corona virus disease 2019 (COVID-19). Journal of general internal medicine, 2020; 1-5.
- Zhu N, Zhang D, Wang W, Li X, Yang B , Song J, et al. A novel Corona virus from patients with pneumonia in China, 2019. New England Journal of Medicine, 2020.
- 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. The Lancet, 2020.
- Huang C, Wang Y, Li,X, Ren L, Zhang J, Hu Y, et al. Clinical features of patients infected with 2019 novel Corona virus in Wuhan China. The Lancet, 2020; 395(10223): 497-506.
- Organization WH. Novel Corona virus situation report-2 Jaunary22, Available from: <https://www.who.int/docs/default-source/corona>

- virus situation-reports/2020012sitrep-2-2019-ncov.pdf (Accessed on January 23,2020), 2020.
15. Wang X, Zhou Z, Zhang J, Zhu F, Tang Y, Shen X. A case of 2019 Novel Corona virus in a pregnant women with preterm delivery. *Clinical infectious disease: an official publication of the infectious disease society of America*, 2020.
 16. Liu W, Wang Q, Zhang ,Q, Chen L, Zhang B, et al. Corona virus disease 2019 (COVID-19) During pregnancy: A case series, 2020.
 17. Liu D, Li L, Wu X, Zheng D, Wang J, Liang B, et al. pregnancy and perinatal outcomes of Women with COVID-19 pneumonia: A preliminary analysis. Available at SSRN, 3548758.
 18. Chan JF-W, Yuan S, Kok K-H, et al. A familial cluster of pneumonia a family cluster *Lancet*, 2020; 395(10223): 514-523. [https://doi.org/10.1016/SO140-6736\(20\)30154-9](https://doi.org/10.1016/SO140-6736(20)30154-9).
 19. Li Q, Guan X, Wu P, et al. Early transmission dynamics in Wuhan, china, of novel Corona virus – infected pneumonia. *N Engl J Med*, 2020. <http://doi.org/10.1056/NEJMoa2001316>.
 20. Liang H, Acharya G. Novel Corona virus disease (COVID-19) in pregnancy: What clinical recommendation to follow? *Actaobstetriciaetgynecologica scandinavica*, 2020.
 21. Phelan AL, Katz R, Gostin LO. The novel corona virus originating in Wuhan, china. Challenges for global health governance *JAMA*, 2020; 323(8): 709. <https://doi.org/10.1001/jama.2020.1097>.
 22. Zhang M. protecting healthcare workers in china during the corona virus outbreak .*BMJ*, 2020.
 23. [https://blogs.bmj.com/bmj/2020/02/14/min-zhang -protecting-healthcare-workers-china - corona virus-outbreak /](https://blogs.bmj.com/bmj/2020/02/14/min-zhang-protecting-healthcare-workers-china-corona-virus-outbreak/). Accessed Feb 28, 2020.
 24. World Health Organization (WHO). Clinical management of sever acute respiratory infection when Novel corona virus (2019-nCoV) infection is suspected : Interim Guidance, 2020.
 25. [https://www.who. Int/publications-detail/clinical-management- of-sever-acute-respiratory-infection-when novel corona virus-\(ncov\)-infection-is-suspected](https://www.who.int/publications-detail/clinical-management-of-sever-acute-respiratory-infection-when-novel-corona-virus-(ncov)-infection-is-suspected). Accessed Feb28, 2020.
 26. Centers for Disease Control and prevention (CDC). Interim considerations for infection prevention and control of corona virus disease 2019 (COVID-19) in inpatient obstetric healthcare setting. [https://www.cdc.gov/corona virus/2019-nCoV/hcp/infection-control.html](https://www.cdc.gov/corona-virus/2019-nCoV/hcp/infection-control.html). Accessed Feb28, 2020.
 27. Maternal and Fetal Experts Committee, Chinese physician society of obstetrics and gynecology, Chinese medical doctor Association, Obstetric subgroup, et al. proposed management of 2019 2019- novel corona virus infection during pregnancy and puerperium. *China J Perinat Med*, 2020; 23(02): 73-79. <http://dio.org/10.3760/cma.j.i.ssn.1007-9408.2020.02.001>.
 28. 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. [https://doi.org/10.1016 /SO140-6736\(20\)30360-3](https://doi.org/10.1016 /SO140-6736(20)30360-3).
 29. Zhu H, Wang L, Fang C, et al. clinical analysis of ten neonates born to mothers with 2019-nCoV pneumonia. *TranslPediatr*, 2019; (1): 51-60. <https://dio.org/10.21037/tp.2020.02.06>.
 30. Ai T, Yang Z, Hou H, et al. correlation of chest CT and RT-PCR testing in corona virus disease 2019 (COVID-19) in China : a report of 1014 cases. *Radiology*, 2020.
 31. <https://dio.org/10.1148/radiol.2020200642>.
 32. Wang M, Cao R, Zhang L, et al. Remdesivir and chloroquine effectively inhibit the recently emerged novel corona virus (2019-nCoV) in vitro. *Cell Res.*, 2020. <https://dio.org/10.1038/s41422-020-0282-0>.
 33. Qia J. What are the risks of COVID-19 infection in pregnant women? *Lancet*, 2020. [https://dio.org/10.1016/SO140-6736\(20\):30365-2](https://dio.org/10.1016/SO140-6736(20):30365-2).
 34. Rasmussen SA, Hayes EB. Public health approach to emerging infections among pregnant women. *Am J Public Health*, 2005; 95: 1942-1944.
 35. SistonAM, Rasmussen SA, Honein MA, et al. pandemic 20019 influenza A (H1N1) virus illness among pregnant women in the united states. *JAMA*, 2010; 303: 1517-1525.
 36. Moore CA, Staples JE, Dobyns WB, et al. characterizing the pattern of anomalies in congenitalZika syndrome for pediatric clinicians. *JAMA Pediatric*, 2017; 171: 288-295.
 37. Rasmussen SA, Jamieson DJ, Honein MA, Petersen LR.Zika virus and birth defects- reviwing the evidence for causality. *N Engl J Med*, 2016; 374: 1981-1987.
 38. Zhao S, Lin Q, Ran J,et al. Preliminary estimation of the basic reproduction number of novel corona virus (2019-nCoV) in China, from 2019 to 2020: A data-driven analysis in the early phase of the outbreak. *Int J Infect Dis.*, 2020.
 39. World Health Organization Corona virus disease (COVID-19) outbreak. <https://www.who.int/emergencies/disease/novel-corona-virus-2019> Accessed Feb 17, 2020.
 40. Gorbalenya AE, Baker SC, Baric RS, et al. Severe acute respiratory syndrome-related corona virus: The species and its viruses a statement of the corona virus study group.<https://www.biorxiv.org/contetn/10.1101/2020.02.07.937862v1>. pdf Accessed on Feb 16, 2020.
 41. Hui DSC, Zumla A. Severe acute respiratory syndrome :Historical, epidemiologic, and clinical features. *Infect Dis Clin North Am.*, 2019; 33: 869-889.
 42. Wong G, Liu W, Liu Y, Zhou B, Bi Y, Gao GF. MERS, SARS, and EBOLA: The role of super-spreaders in infectious disease. *Cell Host Microbe*, 2015; 18: 398-401.
 43. Wong SF, Chow KM, Leung TN, et al. Pregnancy and perinatal outcome of women with severe acute

- respiratory syndrome. *Am J Obstet Gynecol*, 2004; 191: 292-297.
44. Shek CC, Ng PC, Fung GP, et al. infants born to mothers with severe acute respiratory syndrome. *Pediatrics*, 2003; 112: e254.
 45. Ng PC, Leung CW, Chiu WK, Wong SF, Hon EK. SARS in newborn and children. *Biol Neonate*, 2004; 85: 293-298.
 46. Park MH, Kim HR, Choi DH, Sung JH, Kim JH. Emergency cesarean section in an epidemic of the middle east respiratory syndrome: a case report. *Korean J Anesthesiol*, 2016; 69: 287-291.
 47. Lam CM, Wong SF, Leung TN, et al. A case controlled study comparing clinical course and outcome of pregnant and non- pregnant women with severe acute respiratory syndrome. *BJOG*, 2004; 111: 771-774.
 48. Robertson CA, Lowther SA, Birch T, et al. SARS and pregnancy: a case report. *Emerg Infect Dis*, 2004; 10: 345-348.
 49. Stockman LJ, Lowther SA, Coy K, Saw J, Parashar UD. SARS during pregnancy, united states. *Emerg Infect Dis.*, 2004; 10: 1689-1690.
 50. Yudin MH, Steele DM, Sgro MD, Read SE, Kopplin p, Gough KA. Severe acute respiratory syndrome in pregnancy. *Obstet Gynecol*, 2005; 105: 124-127.
 51. Jiang X, Gao X, Zheng H, et al. Specific immunoglobulin g antibody detected in umbilical blood and amniotic fluid from a pregnant women infected by the corona virus associated with severe acute respiratory syndrome. *ClinDiagn Lab Immunol*, 2004; 11: 1182-1184.
 52. Lau KK, Yu WC, Chu CM, Lau ST, Sheng B, Yuen KY. Possible central nervous system infection by SARS corona virus. *Emerg Infect Dis.*, 2004; 10: 342-34.
 53. Haines CJ, Chu YW, Chung TK. The effect of severe acute respiratory syndrome on a hospital obstetrics and gynaecology service. *BJOG.*, 2003; 110: 643-645.
 54. Owolabi T, Kwolek S. Managing obstetrical patients during severe acute respiratory syndrome outbreak. *J ObstetGynaecol Can.*, 2004; 26: 35-41.
 55. Bialek SR, Allen D, Alvarado-Ramy F, et al. First confirmed cases of middle East respiratory syndrome corona virus (MERS- CoV) infection in the United States, updated information on the epidemiology of MERS-CoV infection, and guidance for the public, clinicians, and public health authorities- may 2014. *MMWR Morb Mortal Wkly Rep.*, 2014; 63: 431-436.
 56. Rasmussen SA, Watson AK, Swerdlow DL. Middle East Respiratory Syndrome (MERS). *Microbiol Spectr*, 2016; 4.