



DIVERSE MANIFESTATIONS OF COVID-19 IN PREGNANT WOMEN: AN ANALYTICAL STUDY ELABORATING THE CLINICAL, PHYSIOLOGICAL AND PSYCHOLOGICAL EFFECT OF PANDEMIC ON SARS-COV-2 POSITIVE PREGNANT FEMALES

¹Dr. Devesh Bhomia and ²Dr. Neha Bhomia

¹Associate Professor, General Surgery, S. K. Government Medical College, Bajaj Gram, Sikar.

²Research Scientist (Medical), ICMR Project, Department of Microbiology, SMS Medical College, Jaipur.

*Corresponding Author: Dr. Neha Bhomia

Research Scientist (Medical), ICMR Project, Department of Microbiology, SMS Medical College, Jaipur.

Article Received on 12/06/2021

Article Revised on 02/07/2021

Article Accepted on 22/07/2021

ABSTRACT

Aims: The main aim of this analytical study was to assess the possible clinical symptoms, physiological & psychological changes in women infected with COVID-19 during their pregnancy. **Methods:** A total of 100 women who were tested positive with COVID-19 during their pregnancy were included in this study, from 1st April to 15th May 2021. A self-assessment survey was conducted via Google form whose link was sent through personal email IDs of all the participants. A descriptive statistic was performed. **Results:** Data collected and analyzed from the study presented that 35% females were in first trimester of pregnancy, 33% were in second trimester, and 32% were in third trimester of pregnancy when they got infected with SARS CoV-2 viral infection. The participants of the study showed varied clinical symptoms during the disease manifestation such as fever/chills in 65%, loss of smell & taste in 50%, cough 59%, shortness of breath 27%, sore throat 46%, headache 47%, runny nose 20%, muscle & body aches 48%, diarrhea 75%, fatigue 73%, nausea & vomiting 64%. However, none of the participant reported of any severe symptom due to COVID-19. All were home isolated and no one required hospitalization. **Conclusion:** Due to a paucity of inconsistent data regarding the impact of COVID-19 on the pregnant women, caution should be undertaken to further investigate and monitor possible infection in the COVID-19-infected mothers.

KEYWORDS: COVID-19, SARS-CoV-2, pregnancy, pneumonia, risk factors, clinical symptoms.

INTRODUCTION

In December 2019, cases of a novel coronavirus-associated pneumonia were first reported in Wuhan City, China.^[1] It has since been prevalent in China and in other countries all over the world. This new coronavirus disease was termed Coronavirus Disease 19 (COVID-19) by the World Health Organization (WHO) on February 11, 2020, and it was declared a pandemic on March 11, 2020.^[2] The International committee on Taxonomy of Viruses renamed the virus from 2019 novel coronavirus (2019-nCoV) to severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). Pregnant women may be susceptible to developing more severe symptoms after infection with respiratory viruses, due to physiological changes of the immune and cardiopulmonary systems during pregnancy.^[2,3] Both SARS-CoV and MERS-CoV have been associated with higher case fatality rates and more severe complications during pregnancy.^[4,5] The most common clinical symptoms of COVID-19 in the general population are fever (91%), cough (67%), fatigue (51%), and dyspnea (30%).^[6] Fever (68%) and cough

(34%) are also the most common symptoms in pregnant women with COVID-19, with other symptoms including dyspnea (12%), diarrhea (6%), and malaise (12%).⁷ These clinical manifestations are similar to those in non-pregnant women.^[8,9]

Available information,^[10] suggests that the infection was originally zoonotic. Still, the current transmission is person to person by respiratory droplets after contact with an infected person (< 2 m) or direct contact with contaminated surfaces by infected secretions.^[11] Transmission could also occur through infected faeces, but the propagation throughout this route is much less relevant.^[12] The possibility of vertical transmission is highly unlikely and has not been demonstrated in the Chinese COVID-19 outbreak,^[13] or in previous epidemics by other similar coronaviruses (severe acute respiratory syndrome SARS-CoV and Middle East respiratory syndrome [MERS]-CoV.^[14,15] Based on limited data, there is no evidence of the presence of the virus in genital fluids, urine, amniotic fluid, or breast

milk.^[16] The low maternal viremia found in this infection,^[17] also suggests a negligible placental seeding. However, most data on vertical transmission are based on women who had infection during the third trimester, and information regarding vertical transmission earlier in pregnancy is lacking. The usual incubation period is about 4–6 days, which can vary between 2 and 14 days.^[18] The median duration of viral shedding is 20.0 days (being the 75th centile at 24 days).^[19]

Viral pneumonia is one of the leading causes of pregnancy deaths worldwide.^[20] Physiological changes during pregnancy, such as reduced functional residual volumes, diaphragm elevation, and edema of respiratory tract mucosa, as well as changes in cell immunity can lead to increased susceptibility to viral infections and can have worsened outcomes.^[21] However, to date, there are limited studies pertaining to the outcomes of COVID-19 during pregnancy, differences in clinical course, and the potential risks to the unborn child. Studies have so far shown that the clinical, radiological, and laboratory characteristics of COVID-19 pneumonia in pregnant women are similar to those reported for non-pregnant patients.^[22,23] Moreover, currently there has been no evidence of intrauterine vertical transmission of SARS-CoV-2 infection in pregnant women with COVID-19.^[13,22-25]

SARS-CoV-2 is a new virus and so not much is studied about its effects on pregnant women. According to the American College of Obstetricians and Gynecologists, there is no data on COVID-19 to suggest that pregnant women are at higher risk of getting the virus as compared to non-pregnant women. It is believed that both pregnant and non-pregnant women in the same age group will develop mild to moderate symptoms if infected with the SARS-CoV-2. However, Siston et al,^[26] suggested that pregnant women are at a greater risk of harm if they get respiratory infections. Reports from various influenza studies have suggested that during pregnancy, there are higher chances of mortality and morbidity as compared to a non-pregnant woman and similar results were also obtained for the other two coronaviruses- SARS-CoV and MERS-CoV.^[6]

MATERIALS AND METHODS

Participants & setting: The analytical study was conducted on 100 females who were tested positive with SARS-Cov-2 during their pregnancy to study their clinical, physiological and psychological health. The study was conducted from 1st April to 15 May 2021. The Survey was directed via Google form whose link was sent to the participant's personal email IDs. This protocol was exercised in order to follow strict social distancing protocol and to avoid direct contact. All the participants were explained about the objective of the study and were informed that the participation was voluntary, and confidentiality will be maintained. The survey included five sections; first section had a detailed description of the purpose of the study, along with the informed

consent. This section explained the importance and benefits of the survey in the current pandemic, highlighting the voluntary nature of participation and assurance of confidentiality of the collected data. Only after consenting to the study, the participants could access the remaining sections. The successive sections collected responses for demographic details, symptoms of the disease, and the changes in their emotional and behavioral pattern due to COVID-19. Cross-sectional and longitudinal comparison of overall parameters recorded from the study was done. A descriptive statistic was performed. Data was analyzed to assess the statistical significance.

RESULTS

The total of 100 females who were tested positive for COVID-19 during their pregnancy was included in this study. Data collected and analyzed from the study presented that 35% females were in first trimester of pregnancy, 33% were in second trimester, and 32% were in third trimester of pregnancy when they got infected with SARS-CoV 2 viral infection. Among them 64% females were expecting their first child and 36% females were expecting their second child. When enquired about how distressed they were due to change in their pre-natal care due to pandemic, 34% females reported to be mildly distressed, 36% were moderately distressed, and 30% reported to be severely distressed. When the changes they have experienced as a result of COVID-19 pandemic during their pregnancy were enlisted, 56% females reported to change their delivery from vaginal birth to C-section, 69% females reported that their planned C-section or labor induction was changed, 73% females reported that their routine visits to doctor changed from in person to tele-medicine and 22% females presented with no change in their routine pre natal care. The participants of the study showed varied clinical symptoms during the disease manifestation such as fever/ chills in 65%, loss of smell & taste in 50%, cough 59%, shortness of breath 27%, sore throat 46%, headache 47%, runny nose 20%, muscle & body aches 48%, diarrhea 75%, fatigue 73%, nausea & vomiting 64%. All the participants presented with complain of mental, physical, emotional & financial stress due to pandemic. However, none of the participant reported of any severe symptom due to COVID-19. All were home isolated and no one required hospitalization.

DISCUSSION

The health of pregnant women needs to be taken into account during this rapidly changing coronavirus pandemic. It is important to provide critical interventions necessary for pregnant women. These carefully evaluated decisions must be extensively discussed while considering both maternal and fetal outcomes in the context of the potential impact of COVID-19 on the pregnancy. World Health Organization (WHO) has reported that there is no apparent difference in the risk of developing clinical symptoms between non-pregnant and pregnant women of reproductive age.^{16,27} It seems the

latter is also not at a higher risk of developing severe disease. Patients most commonly present with mild symptoms of the infection including fever, cough, fatigue, and shortness of breath; however, some may be asymptomatic.^[5, 8,15,28] These findings are similar to findings of our study. In concordance with our study, a retrospective review by Liu et al.^[28] exhibited a comparison of 59 patients, which included both pregnant and non-pregnant adults. This review reported no significant difference between the various groups regarding the development of the clinical features of SARS-CoV-2. Pregnant women undergo physiological changes, which lead to altered immune systems.^[29] This does not necessarily make them more susceptible to viral infection; hence, their response to COVID-19 may be similar to any other viral infection. Similar with our study, three other studies have reported no maternal complications, such as postpartum COVID-19 infection and preterm labor.^[16,30,31] However, various other studies have reported both maternal and fetal complications including preterm delivery, respiratory distress, fetal distress, and PROM.^[32] Baud et al.^[33] reported a case of miscarriage during the second trimester of pregnancy in a woman with COVID-19, which appeared to be related to placental infection with SARS-CoV-2. Shanes et al.^[34] examined the placentas of 16 women with severe COVID-19 infection (15 live births in the third trimester and 1 delivered in the second trimester after intrauterine foetal demise). The study found that pregnant women who were infected with COVID-19 and delivered in the third trimester were more likely to have placentas that show features of maternal vascular mal-perfusion and intervillous thrombi. No pathognomonic features were identified; however, these findings suggest abnormal maternal circulation that is associated with adverse perinatal outcomes. Liu et al.^[28] and Fan et al.^[35] reported that most pregnant women acquired the infection in the third trimester of pregnancy. However in our study, 35 % of the females got infected with the SARS CoV 2 infection in their first trimester of pregnancy.

Few emerging studies have reported the probability of in utero COVID-19 transmission by measuring the fetal IgM blood level.^[16,23,32] The IgM antibody is not transferred via the placenta; therefore, it is suggested that this may possibly be the foetal immune response to the infection. Therefore, caesarean deliveries would be the recommended mode of delivery to decrease length of exposure to these tissues and thus decrease likelihood of possible vertical transmission.

Strengths and limitations

The main strength of our analysis is that we have provided the diverse effects of COVID-19 involving clinical, physiological and psychological impacts in SARS-CoV-2 positive pregnant females in detail. The main weakness is small sample size of the study. The justification behind our study is that the spread of the disease dictates the need to rapidly evaluate and discuss the treatment protocol, vaccination and to generate

methods to safeguard and improve the maternal and child health care in this pandemic.

CONCLUSION

Data on COVID-19 in pregnancy so far has been very sparse, with most being small-scale reviews/isolated case reports to comprehensively fathom risks attributable to COVID-19 infection. In-fact, information on pregnancy is still in its incipient stage, with plausible repercussions of the virus on mother and fetus still rapidly evolving. Thus, a novel attempt is made to study the impact of COVID-19 infection on suspect/positive pregnant women with an objective to appraise the current situation, besides augmenting preparedness of the maternity services for the long haul against this relatively unknown entity. This will also promulgate awareness of SARS-COV2 behavior both in Indian pregnant women, and primary care physicians encountering more antenatal women due to movement restrictions, with respect to fetal and maternal outcome, and clinical characteristics, in order to initiate optimal control measures and effective therapeutic decisions, outlining principles of management guided by multidisciplinary approach, to prevent its adverse upshots and long-term complications. It is essential that future studies provide more detailed information on maternal and fetal conditions, as well as the rationale for obstetrical interventions. The fetal consequences of long-standing infections occurring in early gestation are unknown.

Disclosure Statement

The authors have no conflicts of interest to declare.

Funding Sources

None of the authors have received funding relevant to this study.

REFERENCES

1. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. *N Engl J Med*, 2020; 382(8): 727-733.
2. Lu R, Zhao X, Li J, Niu P, Yang B, Wu H, et al. Genomic characterisation and epidemiology of 2019 novel coronavirus: implications for virus origins and receptor binding. *Lancet*, 2020; 395(10224): 565-574.
3. Jamieson DJ, Theiler RN, Rasmussen SA. Emerging infections and pregnancy. *Emerg Infect Dis.*, 2006; 12: 1638-43.
4. Favre G, Pomar L, Musso D, Baud D. 2019-nCoV epidemic: what about pregnancies? *Lancet*, 2020; 395(10224): e40.
5. Schwartz DA, Graham AL. Potential Maternal and Infant Outcomes from (Wuhan) Coronavirus 2019-nCoV Infecting Pregnant Women: Lessons from SARS, MERS, and Other Human Coronavirus Infections. *Viruses*, 2020; 12(4): 194

6. Yang J, Zheng Y, Gou X, Pu K, Chen Z, Guo Q, et al. Prevalence of comorbidities in the novel Wuhan coronavirus (COVID-19) infection: a systematic review and meta-analysis. *Int J Infect Dis.*, 2020; 94: 91-95.
7. Zaigham M, Andersson O. Maternal and perinatal outcomes with COVID-19: A systematic review of 108 pregnancies. *Acta Obstet Gynecol Scand*, 2020; 99(7): 823-829.
8. Rasmussen SA, Smulian JC, Lednický JA, Wen TS, Jamieson DJ. Coronavirus Disease 2019 (COVID-19) and Pregnancy: What obstetricians need to know. *Am J Obstet Gynecol*, 2020; 222(5): 415-426.
9. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*, 2020; 395: 497– 506
10. Andersen KG, Rambaut A, Lipkin WI, Holmes, EC, Garry RF. The proximal origin of SARS-CoV-2. *Nat Med*, 2020 Apr; 26(4): 450–2.
11. 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 Mar; 382(13): 1199– 207.
12. Wu J, Liu J, Li S, Peng Z, Xiao Z, Wang X, et al. Detection and analysis of nucleic acid in various biological samples of COVID-19 patients. *Travel Med Infect Dis.*, 2020 Apr: 101673.
13. Yan J, Guo J, Fan C, Juan J, Yu X, Li J, et al. Coronavirus disease (COVID-19) in pregnant women: a report based on 116 cases. *Am J Obstet Gynecol*. doi: 10.1016/j.ajog.2020. 04.014 [Epub ahead of print], 2019.
14. Di Mascio D, Khalil A, Saccone G, Rizzo G, Buca D, Liberati M, et al. Outcome of Coronavirus spectrum infections (SARS, MERS, COVID- 19) during pregnancy: a systematic review and meta-analysis. *Am J Obstet Gynecol MFM*, 2020; 100107.
15. Lamouroux A, Attie-Bitach T, Martinovic J, Leruez-Ville M, Ville Y. Evidence for and against vertical transmission for SARS-CoV-2 (COVID-19). *Am J Obstet Gynecol*. doi: 10.1016/j.ajog.2020.04.039 [Epub ahead of print].
16. 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 Mar; 395(10226): 809–15.
17. Wang W, Xu Y, Gao R, Lu R, Han K, Wu G, et al. Detection of SARS-CoV-2 in different types of clinical specimens. *JAMA*. doi: 10.1001/jama.2020.3786 [Epub ahead of print].
18. Lauer SA, Grantz KH, Bi Q, Jones FK, Zheng Q, Meredith HR, et al. The Incubation Period of Coronavirus Disease 2019 (COVID-19) From Publicly Reported Confirmed Cases: estimation and Application. *Ann Intern Med*, 2020 Mar; 172(9): 577.
19. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*, 2020 Mar; 395(10229): 1054–62. 395(10226): 809–15.
20. Dashraath P, Jing Lin Jeslyn W, Mei Xian Karen L, Lim ML, Li S, Biswas A, et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *Am J Obstet Gynecol*, 2020; 222(6): 521–31.
21. Liu W, Wang Q, Zhang Q, Chen L, Chen J, Zhang B, et al. Coronavirus disease 2019 (COVID- 19) during pregnancy: a case series, 2020.
22. Zhu H, Wang L, Fang C, Peng S, Zhang L, Chang G, et al. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. *Transl Pediatr*, 2020; 9: 51–60.
23. Liu Y, Chen H, Tang K, Guo Y. Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy. *J Infect*, 2020.
24. Zhang L, Jiang Y, Wei M, Chen BH, Zhou XC, Li J, et al. [Analysis of the pregnancy outcomes in pregnant women with COVID-19 in Hubei Province]. *Zhonghua Fu Chan Ke Za Zhi*, 2020; 55: 166.
25. Lei D, Wang C, Li C, Fang C, Yang W, Chang B, et al. Clinical characteristics of COVID-19 in pregnancy: analysis of nine cases. *Chin J Perinat Med*, 2020; 23(03): 159–65.
26. Siston AM, Rasmussen SA, Honein MA, Fry AM, Seib K, Callaghan WM, et al. Pandemic 2009 influenza A(H1N1) virus illness among pregnant women in the United State. *J Am Med Assoc*, 2010; 303(15): 1517–25.
27. Li N, Han L, Peng M, Lv Y, Ouyang Y, Liu K, et al. Maternal and neonatal outcomes of pregnant women with COVID-19 pneumonia: a case-control study. *Clin Infect Dis.*, 2020.
28. Liu H, Liu F, Li J, et al. Clinical and CT imaging features of the COVID-19 pneumonia: focus on pregnant women and children. *J Infect*, 2020; 80: e7–13.
29. Coronavirus (COVID-19) Infection in Pregnancy| Guidance |RCOG [Internet]. Rcof.org.uk, 2020. [cited 29 April 2020]. Available from: <https://www.rcog.org.uk/globalassets/documents/guidelines/2020-04-17-coronavirus-covid-19-infection-inpregnancy.pdf>.
30. Wang X, Zhou Z, Zhang J, Zhu F, Tang Y, Shen X. A case of 2019 novel coronavirus in a pregnant woman with preterm delivery. *Clin Infect Dis.*, 2020.
31. Yu N, Li W, Kang Q, Xiong Z, Wang S, Lin X, et al. Clinical features and obstetric and neonatal outcomes of pregnant patients with COVID- 19 in Wuhan, China: a retrospective, single-centre, descriptive study. *Lancet Infect Dis.*, 2020; 20(5): 559–64.
32. Zhu H, Wang L, Fang C, Peng S, Zhang L, Chang G, et al. Clinical analysis of 10 neonates born to

- mothers with 2019-nCov pneumonia. *Transl Pediatr*, 2020; 9: 51–60.
33. Baud D, Greub G, Favre G, Gengler C, Jaton K, Dubruc E, et al. Second-trimester miscarriage in a pregnant woman with SARS-CoV-2 Infection. *JAMA*, 2020; 323(21): 2198–200.
34. Shanes ED, Mithal LB, Otero S, Azad HA, Miller ES, Goldstein JA. Placental pathology in COVID-19. *Am J Clin Pathol*, 2020; 154(1): 23–32.
35. Fan C, Lei D, Fang C, et al. Perinatal transmission of COVID-19 Associated SARSCoV- 2: should we worry? *Clin Infect Dis.*, 2020. <https://doi.org/10.1093/cid/ciaa226>.