International Journal of Research Publication and Reviews

Maternal Covid 19 Infection, it's clinical manifestation and It's effect on Maternal and Newborn outcomes: An observational follow-up study at a tertiary care hospital of Gujarat

Dr. Eshwar Kumar Gupta[1], Dr. Hardi P. Lakhtaria[2], Dr. Jitesh P. Mehta[3], Dr. Sumit Unadkat[4], Dr. Dipesh V. Parmar[5],

Senior Resident[1], 2nd Year Resident Doctor[2], Associate Professor[3,4], Professor and Head[5], Department of Community Medicine, Shree M. P. Shah Government Medical College, Jamnagar, Gujarat

*Corresponding Author:Dr. Hardi P. Lakhtaria, 2nd Year Resident Doctor, Department of Community Medicine,
Shree M. P. Shah Government Medical College, Jamnagar, Gujarat E-mail ID: hlakhtaria@gmail.com

INTRODUCTION:

Severe acute respiratory syndrome (SARS) has caused a worldwide epidemic since November 2002. It is one of the emerging and re-emerging viral outbreaks throughout the world.[1]The World Health Organisation (WHO) was alerted on the 31st of December 2019 by Chinese authorities of a series of pneumonia like cases in the city of Wuhan. The Chinese Centre for Disease Control and Prevention identified this infection as a novel beta coronavirus infection on Jan 7, 2020 and on Feb 11, 2020, the WHO announced a new name for the pandemic disease as 2019- new coronavirus disease (COVID-19)[2]that was subsequently termed "severe acute respiratory syndrome coronavirus 2" (SARS-CoV-2)[3].

Coronaviruses (CoVs) are one of the major pathogens that are grouped in the family of Coronaviridae, which primarily target the human respiratory system [4]. The mode of transmission is by droplets which can occur when the patient sneezes or coughs. The incubation period varies from 2 days to 2 weeks following exposure to the virus[5].The main clinical symptoms are fever, myalgia, dry cough, shortness of breath, and fatigue.

The pandemic caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) has exposed vulnerable populations to an unprecedented global health crisis.[6] The increasing mortality rate warrants that vulnerable populations in the society be identified and protected.

In particular, this novel coronavirus has caused special concerns in pregnant women, because both SARS-CoV and MERS-CoV have been found to cause severe complications in pregnant women [7]. Previous data from multiple studies of influenza and other respiratory infectious diseases have demonstrated an increased risk of maternal obstetrical complications when compared with nonpregnant women due to physiological changes occurring during pregnancy[8].

Pregnant women are more susceptible to respiratory pathogens, viral pneumonia is one of the leading causes of pregnancy deaths worldwide. Physiological changes during pregnancy, such as reduced functional residual volumes, diaphragm elevation, and oedema of respiratory tract mucosa, as well as changes in cell immunity can lead to increased susceptibility to viral infections and can have worsened outcomes [9].The main clinical symptoms are fever, myalgia, dry cough, shortness of breath, and fatigue. Some of these symptoms overlap with those of normal pregnancy and so high clinical suspicion is necessary even in afebrile women [10].

There is legitimate concern, however, that pregnant women might have a different disease course and outcome, given the physiological changes in respiratory and immunological systems[1].Current studies on the susceptibility of pregnant women to infection by COVID-19 are still incipient and adopt poor methods, and although transmission of the virus to the fetus or baby during delivery or pregnancy has not been proven, the presence of antibodies has already been identified, namely, specific IgG for viruses in neonatal serum samples [11].In addition, previous research suggests infants under 1 year old are susceptible to COVID-19 when in contact with infected family members . However, for neonates born to infected women, little is known about their susceptibility [12].

Clinical and epidemiological features of COVID-19 infection have been widely reported. However, clinical reports on maternal and neonatal outcomes of pregnant women with SARS-CoV-2 infection remain sparse[7].Due to the need to provide evidence for clinical practice involving pregnant women, this study's objective is to assess potential risks of COVID-19 infection among pregnant women, its clinical manifestations ,effect on maternal, perinatal, neonatal outcomes and consequent fetal transmission[13].

AIM AND OBJECTIVES OF THE STUDY

1. To study the effect of covid 19 infection on maternal and new-born outcomes
2. To study the clinical manifestation of covid 19 in pregnant women
3. To study whether vertical transmission of covid 19 occurs or not.

MATERIAL AND METHOD:

A. **Study Design:** Observational follow-up Study
B. **Study Participants:** Covid-19 Positive Mothers and their Neonates
C. **Study Setting:** A Tertiary Care Hospital of Gujarat
D. **Sample Size:** All Covid 19 infected mothers and their neonates admitted from April 2020 to October 2020 in the studied hospital. (Total sample size was 42)
E. **Data Collection and Method of Study**: An Observational follow-up Study was done for a period of 7 months. Data was collected by convenient Sampling, using pre-formed semi structured questionnaire by the investigator himself. Before conducting study permission from MS of the hospital and concerned HOD was taken. Any additional investigations or procedure was not recommended or done by the investigator. Data was entered and analyzed in Microsoft Excel. Quantitative data was represented using Mean and SD while qualitative data was represented using percentage and graphs.
F. **Inclusion Criteria:**
   a. All Covid 19 Positive Mother detected by RTPCR/RAT METHOD was included in the study hospital within period of the study.
   b. Those who give their consent.
G. **Exclusion Criteria:**
   a. All mothers who have not been tested by RTPCR/RAT.
   b. All mothers who tested negative by RTPCR/RAT.
   c. Those who are not willing to give their consent.

RESULT

Maternal outcomes

Table-1 General characteristics

Total no. of mothers	42	
	Range	**Mean ± SD**
Age of mother (in years)	21-40	27.95 ± 4.56
Gestational age of mother on admission	34 weeks 3 days – 39 weeks 4 days	36 weeks 5 days ± 7.85 days

Out of 42 pregnant women all were in their 3rd trimester ranging from 34 weeks 3 days to 39 weeks 4 days with mean gestational age of 36 weeks and std. deviation of 7.85 days. The age of women ranges from 21 to 40 years with mean age of 27.95 years and std. deviation of 4.56 years.

Fig.- 1 Maternal Morbidity

- No Maternal Morbidity 86%
- DM 7%
- HTN 5%
- HypoT 2%
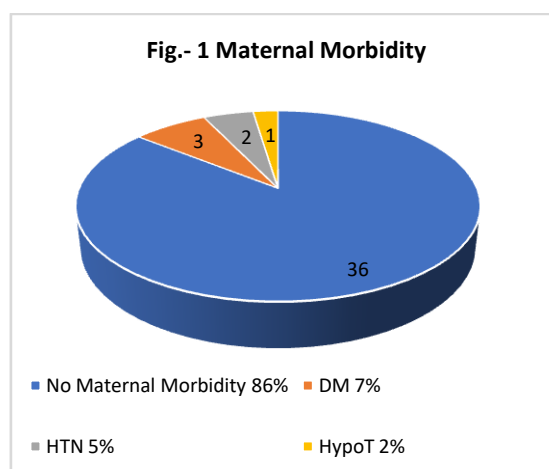
(DM- diabetes malitus, HTN- hypertension, HypoT- hypothyroidism,
CAD- coronary artery disease, CKD- chronic kidney disease)

Out of total 42, 6 pregnant women had maternal morbidity among which 3 had DM, 2 had HTN, 1 had HypoT. None of them had CAD, CKD as co-morbidity.
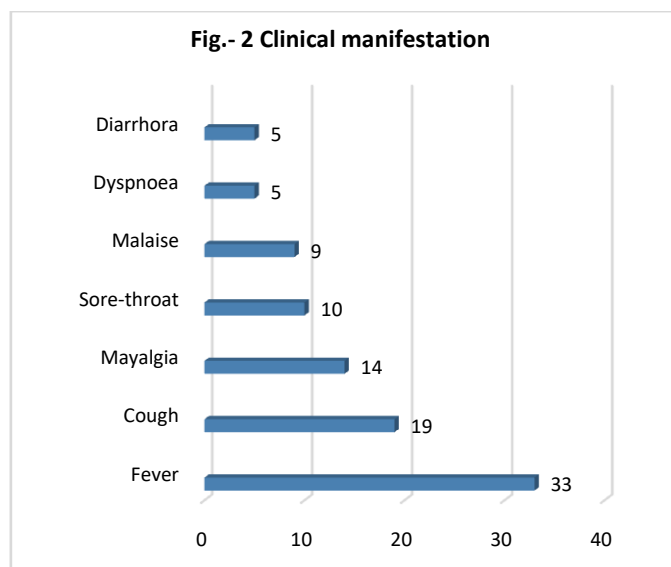
33 pregnant women were presented with fever on admission. Other symptoms were also observed in which 19 had cough, 14 had myalgia, 10 had sore-throat, 9 had malaise, 5 had dyspnoea, and 5 had diarrhoea. None of them had chest pain and rigors.

Table-2 Maternal Outcomes

		Yes	%	No	%
Mode of delivery	**C-section**	13	30.95	29	69.04
	Normal vaginal delivery	29	69.04	13	30.95
ICU admission		8	19.04	34	80.95
Maternal death		1	2.38	41	97.61

(C-section: caesarean section, ICU- intensive care unit)

Out of 42 women 13 women underwent caesarean section and rest delivered baby by normal vaginal delivery. 8 women required IUC admission because of shortness of breath due to pneumonia among them one woman developed severe pneumonia, requiring mechanical ventilation and died due to covid-19 pneumonia.

Neonatal outcomes

Table-3 General characteristics

Total no. of new-borns		42	
		Range	Mean ± SD
Gestational age at delivery		35 weeks 3 days - 39 weeks 5 days	37 weeks 4 days ± 7.11 days
Range of birth weight (in grams)		1640-3820	2907.85 ± 546.60
Range of Apgar score	**At 1 min**	8-9	8.64 ± 0.486
	At 5 min	9-10	9.71 ± 0.457

Range of gestational age at delivery for all 42 new-borns was 35 weeks 3 days to 39 weeks 5 days with mean of 37 weeks 4 days and std. deviation of 7.11 days. All new-borns weight ranges from 1640 to 3820 grams with (mean ± SD) 2907.85 ± 546.60 grams. Apgar score at 1 min. ranges from 8-9 with mean of 8.64 and SD of 0.486 and at 5 min. it ranges from 9-10 with mean of 9.71 and SD of 0.457.

Table-4 Neonatal outcomes

	Yes	%	No	%
Low birth weight	10	23.80	32	76.19
Premature delivery	19	45.23	23	54.76
New-born asphyxia	0	0.0	42	100
New-born death	0	0.0	42	100
Still birth/fetal death	0	0.0	42	100
ICU requirement at the time of birth	0	0.0	42	100
Total new-borns tested positive	0	0.0	42	100

Out of 42 new-borns 10 new-borns had low birth weight (<2500 grams). Among them 2 new-borns weigh <1800 grams. 19 out of 42 new-borns were delivered premature. Out of 19 premature delivery 1 child born <36 weeks. No fetal death, stillbirth, new-born deaths, new-born asphyxia and ICU admission required at the time of birth.All new-borns were tested for covid 19 by RTPCR and all were tested negative for covid 19.

DISCUSSION

Worldwide, SARS-CoV-2 is taking its toll on health systems and has caused hospitals and healthcare providers to rearrange facilities and habits to ensure the highest degree of safety to patients and workers. the paucity of supporting data impedes to draw conclusions at this point. To date, the vast majority of neonatal information is scattered and fragmented, since it is derived from case reports or small case series.

Maternal outcomes:

- In our study mean age of women admitted was 27.95 ± 4.56 years while in study (1)mean age in the pregnant group was 31.6 years and in study (16) mean age of women admitted was 30 years while age ranged from 26 to 37 years in study (7). The lower mean age in our population may be attributed to early marriage in India.

- Gestational age ranges from 34 weeks 3 days to 39 weeks 4 days with mean 36 weeks 5 days in our study while in study (15) median gestation at symptom onset was 34 weeks with IQR of 29-38 weeks, in study (7) gestational weeks on admission ranged from 33 weeks plus 6 days to 40 weeks plus 4 days and in study (1) it ranges from 26–32 weeks.

- 78.57% women had fever on admission in our study while 77.78% women had fever on admission in study (14), 60.86% women had fever on admission in study (2), 25% women had fever on admission in study (7), all (100%) women had fever on admission in study (1) and 90% women had fever on admission in study (16).

- In our study we found that cough is most common symptom after fever and similar result was found in various studies [(14), (2), (15), (16)]

- In our study we have 2.38% maternal mortality which is higher than 1.17% found in study (15) and lower than 4.34% in study (2).

- In our study most common maternal morbidity is DM and similar finding is found in studies [(7), (2)] while study (14) shows HTN and pre-eclampsia as most common.

- Rate of ICU admission is 19.04% in our study which is higher than 9.36% in the study (15) and lower than 17.39% in study (2) and 60% in study (1).

- Rate of C-section in our study was 30.95% which is lower than study (14) where rate is 100%, study (2) where rate is 84.21%, study (7) where rate is 87.5% and study (16) where rate is 70%.

Neonatal outcomes:

- In our study 42 new-borns were delivered to 42 mothers which is similar to study (14) where all singletons were born to all mothers where as in study (2) 1 mother delivered twins making the total of 20 new-borns for 19 mothers similarly it was seen in study (7) 17 new-borns for 16 mothers and study (16) 10 new-borns for 9 mothers while study (15) shows 240 new-borns for 247 mothers.

- Range of gestational age at delivery in our study was 35 weeks 3 days - 39 weeks 5 days with mean of 37 weeks 4 days ± 7.11 days, whereas study (14) has range of 36 weeks – 39 weeks 4 days, study (2) has range of 29 weeks 3 days – 40 weeks 2 days, study (15) has range of 22 weeks – 37 weeks, study (7) has mean of 38 weeks ± 2 days and study (16) has range of 31 weeks – 39 weeks.

- In our study birth weight ranges from 1640 to 3820 grams with mean of 2907.85 ± 546.60 grams which is almost similar to the range in study (16), whereas in study (14) it ranges from 1880 – 3820 grams, in study (2) 2240 – 4450 grams, in study (15) 3066.7 ± 560.2 grams.

- In our study 23.80% of new-borns had low birth weight which is almost similar to study (14), higher than study (7) and lower than study (16).

- 45.23% new-borns had pre-mature delivery in our study which is almost similar to study (14) and higher than study (2) and study (7).

- No neonatal Asphyxia and any other complications were seen in our study, this also found in study (14) whereas study (2) and study (7) had 5% and 11.76% neonatal asphyxia respectively.

- In our study as well as in study (14), (2) and (7) no neonatal death and still death were found whereas in study (15) 2 neonatal deaths, 3 still births and 4 abortions were present.

- In our study as well as in study (14) no new-borns required ICU admission, in compared to that 5% in study (2) and 26.66% in study (15) new-borns required ICU admission.

- None of the new-borns were tested positive for Covid-19 in our study and similar results were seen in study (14) and study (2), but 3.34% of new-borns were tested positive for Covid-19 in study (15).

Conclusion:

We conducted an observational follow-up study among 42 covid-19 positive mother admitted at the study setting in which clinical manifestation was similar to normal adult population with fever, cough being most common symptoms. No unusual clinical symptoms and signs were observed. There was no vertical transmission found from covid-19 positive mother to new-borns.

Limitations:
1. Single setting study
2. Sample size was small
3. No comparison group

Recommendations: While our study observed that there is no adverse maternal and neonatal outcomes of covid-19 infection, further study at larger scale is needed to understand exact manifestations of covid-19 in pregnancy and it's maternal and neonatal outcomes.

References:

- 1.BJOG: an International Journal of Obstetrics and Gynaecology August 2004, Vol. 111, pp. 771– 774 DOI: 1 0 . 1 1 1 1/j . 1 4 7 1 - 0528.2004.00199.x A case-controlled study comparing clinical course and outcomes of pregnant and non-pregnant women with severe acute respiratory syndrome Chui MiuLam,a Shell FeanWong,aTse Ngong Leung,b Kam Ming Chow,a Wai Cho Yu,c Tin YauWong,cSik To Lai,c Lau Cheung Hoa

- 2.Maternal COVID-19 infection, clinical characteristics, pregnancy, and neonatal outcome: A prospective cohort study Lina Antouna, *, Nashwa El Taweelb,c , Irshad Ahmedc , Shalini Patnic , Honest Honest

- 3. Wang Y, Wang Y, Han X, Ye J and Li R (2020) Potential Effect of COVID-19 on Maternal and Infant Outcome: Lesson From SARS. Front. Pediatr. 8:511. doi: 10.3389/fped.2020.00511

- 4.The effect of coronavirus infection (SARS-CoV-2, MERS-CoV, and SARS-CoV) during pregnancy and the possibility of vertical maternal–fetal transmission: a systematic review and meta-analysis Kuma Diriba, Ephrem Awulachew & Eyob Getu European Journal of Medical Research volume 25, Article number: 39 (2020)

- 5. Impact of the Coronavirus Infection in Pregnancy: A Preliminary Study of 141 Patients Arun Harishchandra Nayak,1Deepali Swapnil Kapote, ✉1Michelle Fonseca,1Niranjan Chavan,2Rahul Mayekar,2Meenal Sarmalkar,2 and Amarjeet Bawa2Author informationArticle notesCopyright and License informationDisclaimerhttps://www.ncbi.nlm.nih.gov/pmc/articles/PMC7340730/

- 6. Acta ObstetGynecolScand. 2020 Jul;99(7):823-829.doi: 10.1111/aogs.13867. Epub 2020 Apr 20. Maternal and perinatal outcomes with COVID-19: A systematic review of 108 pregnanciesMehreenZaigham 1, Ola Andersson 2 3

- 7.Maternal and Neonatal Outcomes of Pregnant Women With Coronavirus Disease 2019 (COVID-19) Pneumonia: A Case-Control Study Na Li, 1,aLefei Han, 2,a Min Peng, 3,b YuxiaLv, 3 Yin Ouyang, 3 Kui Liu, 3 Linli Yue, 1 Qiannan Li, 1 Guoqiang Sn, 3 Lin Chen, 1 and Lin Yang2,b

- 8.The effect of coronavirus infection (SARS-CoV-2, MERS-CoV, and SARS-CoV) during pregnancy and the possibility of vertical maternal–fetal transmission: a systematic review and meta-analysis Kuma Diriba, Ephrem Awulachew & Eyob Getu European Journal of Medical Research volume 25, Article number: 39 (2020)

- 9. [COVID-19 (SARS-CoV-2) Infection in Pregnancy: A Systematic Review Hubba Akhtara Chandni PatelaEyadAbuelgasimb Amer Harkyc, d a Department of Medicine, St George's, University of London, London, UK; bFaculty of Medicine, Imperial College London, London, UK; c Department of Cardiothoracic Surgery, Liverpool Heart and Chest Hospital, Liverpool, UK; dDepartment of Integrative Biology, Faculty of Life Science, University of Liverpool, Liverpool, UK]

- 10.[https://www.rgare.com/knowledge-center/media/covid-19/the-impact-of-covid-19-on-pregnancy-and-childbirth

- 11. Effects of COVID-19 Infection during Pregnancy and Neonatal Prognosis: What Is the Evidence Álvaro Francisco Lopes de

Sousa,[1,2,*]Herica Emilia Félix de Carvalho,[2]Layze Braz de Oliveira,[2]Guilherme Schneider,[2]Emerson Lucas Silva Camargo,[2]Evandro Watanabe,[2]Denise de Andrade,[2]Ana Fátima Carvalho Fernandes,[3]Isabel Amélia Costa Mendes,[2] and Inês Fronteira[1]https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7313049/]

➢ 12.[Wu, Y. T., Liu, J., Xu, J. J., Chen, Y. F., Yang, W., Chen, Y., Li, C., Wang, Y., Liu, H., Zhang, C., Jiang, L., Qian, Z. X., Kawai, A., Mol, B. W., Dennis, C. L., Xiong, G. P., Cheng, B. H., Yang, J., & Huang, H. F. (2020). Neonatal outcome in 29 pregnant women with COVID-19: A retrospective study in Wuhan, China. PLoS medicine, 17(7), e1003195. https://doi.org/10.1371/journal.pmed.1003195]

➢ 13. International Journal of Environmental Research and Public Health — Open Access Journal https://www.mdpi.com/journal/ijerph]

➢ 14.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;395(10226):809-815.

➢ 15.Knight M, Bunch K, Vousden N, Morris E, Simpson N, Gale C et al. Characteristics and Outcomes of Pregnant Women Admitted to Hospital With Confirmed SARS-CoV-2 Infection in the UK: National Population-based Cohort Study. Obstetric Anesthesia Digest. 2021;41(1):22-23.

➢ 16.Zhu H, Wang L, Fang C, Peng S, Zhang L, Chang G, Xia S, Zhou W. Clinical analysis of 10 neonates born to mothers with 2019-nCoV pneumonia. TranslPediatr 2020;9(1):51-60. doi: 10.21037/tp.2020.02.06