

Research Article

COVID-19 in Pregnant Women: A Case Series

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Abstract

Objective: To examine the disease course in COVID-19 affected pregnant women.

Methods: A series of pregnant women with positive COVID-19 test result treated in a dedicated ward at a Teaching Hospital in Lahore, Pakistan, was collated between April and June 2020. A predesigned proforma was used for data collection concerning clinical characteristics, obstetric outcomes and vertical transmission to the newborn. Continuous variables were expressed as mean $\pm$ standard deviation (SD) and median with inter-quartile range. Categorical variables were expressed as frequency and percentages. The data was analyzed by using SPSS version 24.

Results: There were 26 COVID-19 positive pregnant women with mean gestational age of 31 ± 8.8 weeks and mean age of 27 ± 4 years. Of these, 10 (38.4%) were asymptomatic. Among symptomatic women 14/16 (87.5%) suffered fever and 11/16 (68.75%) had cough. One case of severe pneumonia experienced mortality. Of the 14 women delivered, 11 (78.5%) had caesarean section. There were no cases of miscarriage, spontaneous preterm labor, intrauterine demise, neonatal death or vertical transmission of COVID-19.

Conclusion: The majority of pregnant women with COVID-19 suffered mild disease. Pregnancy did not appear to aggravate or change the course of COVID-19, nor did COVID-19 appear to increase the risk of obstetric complications.

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Keywords | COVID-19; pregnancy; lung infiltrates; feto-maternal outcome; preterm birth; vertical transmission.

Introduction

Coronavirus, a disease that has affected millions of people worldwide with an exceptionally large death toll, has bewildered health authorities.¹ World Health Organization (WHO) officially named the newest member of the coronavirus family coronavirus disease or COVID-19.² The SARS-CoV-2 is a beta coronavirus having 79% nucleotide identity to SARS-CoV-1 and about 50% to MERS-CoV-3 with nosocomial transmission like other corona viruses.³ The low pathogenicity and high transmissibility are

unique features distinguishing it from other coronaviruses. These features appear to be instrumental in its rapid spread, quickly becoming a pandemic.⁴

COVID-19 has affected all age groups with a gender bias. Men are affected more than woman and there is high mortality in old age among patients with comorbidities.⁵ Pregnancy may make woman more susceptible to it just as it makes women prone to respiratory pathogens. The physiologic changes in the immune and cardiopulmonary systems like diaphragm elevation, increased oxygen consump-

tion, and edema of respiratory tract mucosa, increase intolerance to hypoxia in pregnancy.⁶ In the 1918 influenza pandemic the mortality rate during pregnancy was 37% compared to 2.6% in the general population.⁷ Similarly, in the 2003 SARS-CoV-1 outbreak about 50% of effected pregnant woman were admitted to the intensive care unit, 33% required mechanical ventilation with 25% mortality rate, though there was no vertical transmission.⁸ The literature has limited data regarding effect of COVID-19 in pregnancy.^{9,10&11} Based on these limited reports and the available data from related pathogens such as SARS and influenza, it is unknown whether pregnant women with COVID-19 will experience more severe disease.

The objective of this study was to observe and report the clinical characteristics, obstetrical outcome and maternal-fetal viral transmission in COVID-19 affected pregnant women.

Methods

A case series of COVID-19 reverse transcription polymerase chain reaction (RT-PCR) test positive pregnant women was collected in a two-month period (10 April 2020 to 09 June 2020). Women were admitted in a dedicated COVID-19 ward setup at Sir Ganga Ram Hospital, Lahore, Pakistan.

All pregnant women presenting with positive COVID-19 RT-PCR report with or without any symptom were enrolled in study. Informed verbal consent was obtained from enrolled women by the duty doctor observing stringent personal protective measures to avoid handling of pen and consent papers by the COVID-19 positive patients. Confidentiality and anonymity were ensured. We excluded women with suspicion of COVID-19 not confirmed by COVID RT-PCR.

A predesigned proforma was filled and information was obtained regarding patient characteristics and relevant symptoms of COVID-19 like fever, cough, shortness of breath, sore throat, etc. Detailed history related to current and past pregnancy including age, parity, gestational age, obstetrical complaints, any other risk factors like hypertension or diabetes and previous mode of delivery was also collected.

Investigations included complete blood count, coagulation parameters, C-reactive protein, bilirubin,

liver functions, blood urea, serum creatinine, and chest X-ray or CT chest according to need. Women were followed throughout their stay in hospital. The duration of hospital stay and obstetrical complications like miscarriage, preterm labor, preterm rupture of membranes, fetal distress, intrauterine death, postpartum hemorrhage, mode of delivery and indication of caesarean section was recorded. The neonatal outcome in terms of 1- and 5-minute APGAR score, need of resuscitation, admission to neonatal intensive care and nasopharyngeal swab for COVID-19 was collected.

The data were analyzed by using SPSS version 24. Quantitative variables i.e., age, parity, gestational age, duration of hospital stay, number of COVID-19 positive family members etc. were expressed as mean $\pm$ standard deviation (SD) and median with inter-quartile range. Categorical variables like symptoms, mode of delivery, obstetrical complications, COVID-19 status of neonate etc. were expressed as frequency and percentages.

Results

During the study period, 26 COVID-19 RT PCR positive pregnant women were admitted in the COVID-19 isolation ward. The age of women ranged from 19 to 35 years (mean $\pm$ SD 27.19 $\pm$ 4.280). The range of gestational age was 10 to 40 weeks (mean $\pm$ SD 31 $\pm$ 8.858 and median 35 weeks) (table 1). Out of 26 cases 6 (23.1%) were primiparous and 20 (76.9%) were multiparous. Epidemiology shows 50% of women were exposed to a COVID positive family member. Half of women got tested due to their symptoms (table 1).

At the time of admission 10/26 (38.4%) women were asymptomatic while 16/26 (61.5%) women had symptoms. The most common symptom was fever in 14(87.5%), followed by cough, myalgia and shortness of breath. All symptomatic women had mild nature of disease except one with severe pneumonia (table 1).

Pregnancy complications including placenta previa, pregnancy induced hypertension, APLS and twin pregnancy were unrelated to COVID-19 infection (Supplementary table). There was one case of maternal mortality where the woman was admitted with severe pneumonic symptoms and despite ventilator

support died 2 days after admission. She was in her fourth pregnancy with three previous children all born by cesarean section. She presented with fever (100°F), cough, and dyspnea for 3 days. She had

Table 1: Demographic Details and Clinical Outcome of COVID-19 Positive Pregnant Females

Clinical characteristics	All women n=26
Age (years)	
Mean± SD	27.19±4.280
Range	19-35
Gestational age on admission (weeks)	
Mean± SD	31± 8.858
Median	35
Range	10-40
<13+6	2 (7.7%)
14-27+6	7 (26.9%)
28-36+6	6 (23%)
>37	11 (42.3%)
Parity	
Primiparous	6 (23.1%)
Multiparous	20 (76.9%)
Working status	
Housewife	24 (92.3%)
Working	2 (7.7%) 1 doctor, 1 teacher
Average duration of hospitalization	12 days
Epidemiology	
Exposure to environment	6/26 (23.1%)
Contact with infected person	13/26 (50%)
How patient diagnosed for COVID-19	
Contact tracing	7 (26.9%)
Obstetrician advised before surgery	6 (23.1%)
Symptomatic	13 (50%)
Affected Family members (Average No)	2
Clinical presentation	
Asymptomatic	10 (38.4%)
Symptomatic	16 (61.5%)
Symptoms	
Fever	14 (87.5%)
Cough	11 (68.75%)
Body aches	3 (18.75%)
Shortness of breath	2 (12.5%)
Obstetric outcome	
Miscarriage	0
Preterm labour	0
Premature rupture of membranes	0
Fetal distress	2
Intrauterine death	0
Delivered during hospital stay	9 (34.6%)
Delivered after discharge	5 (26.9%)
Mode of Delivery	
Total delivered	14
Vaginal delivery	3/14 (21.4%)
Cesarean section	11/14 (78.6%)

Indication of cesarean section	
Previous scarred uterus	6/10 (54.5%)
Fetal distress	2/10 (18.2%)
Maternal wish	2/10 (18.2%)
Placenta previa	1/10 (9%)
Neonatal outcome (14 deliveries)	
Apgar score 1 minute (mean)	7
Apgar score 5 minute (mean)	9
Severe asphyxia	0
Death	0
Neonate COVID-19 status	
COVID -19 negative	14
COVID-19 positive	0
Clinical outcome	
Discharged	16 (61.5%)
Remained in hospital	9 (34.6%)
Died	1 (3.8%)

tachycardia with blood pressure of 150/80mm. There were bilateral infiltrates on X-ray chest. CT chest could not be done due to critical condition of patient. Her oxygen saturation was 78%, which dropped further requiring intubation and mechanical ventilation.

By the end of study period, 14/26 women were delivered, 11/26 women were in first or second trimester so decided to continue with pregnancy, and 1/26 patient experienced mortality before delivery at 27 weeks. Of the delivered women 9 delivered during hospital stay, 5 after recovery from COVID-19 were discharged from hospital and delivered in maternity home. Majority of women were delivered by cesarean section performed due to obstetric indications unrelated to COVID-19 (table 1). All cases delivered had no intrapartum or postpartum complication. There were no cases of early miscarriage, intrauterine fetal demise, preterm labor, neonatal asphyxia or death during the study period. All women were discharged after two negative RT-PCR reports in unremarkable clinical condition. All neonates delivered during hospital stay tested negative for nasopharyngeal COVID-19 RT-PCR. APGAR score at 1 and 5 minutes were normal in all newborns.

Laboratory tests revealed leukocytosis in 7 (26.9%) cases, lymphopenia in one case (3.8%) and lymphocytosis in 8/26 (30.8%) (table 2). Platelet count, blood urea, serum Creatinine, serum bilirubin, liver functions, and coagulation tests were normal in all women (Supplementary table). C-reactive protein was raised in 5/26 (19.2%) women. Positive

radiological findings were detected in 5/26 (19.2%) cases.

Table 2: *Laboratory and Radiological Findings of COVID-19 Positive Pregnant Females at Admission*

Total leucocyte count ($\times 10^3/\mu\text{L}$)	
Mean $\pm$ SD	9.1 $\pm$ 3.422
Median	8.05
Normal	18 (73.1%)
Decreased	0
Increased	7 (26.9%)
Neutrophils (Normal range 40-60%)	
Mean $\pm$ SD	50.4 $\pm$ 19.658
Median	58
Normal	9 (34.6%)
Decreased	7 (26.9%)
Increased	10 (38.5%)
Lymphocytes (normal range 20-40%)	
Mean $\pm$ SD	39.9 $\pm$ 19.618
Median	32
Normal	17 (65.3%)
Decreased	1 (3.8%)
Increased	8 (30.8%)
Chest X Ray	
B/L peripheral opacities	5 (19.2%)
Negative findings	21 (80.8%)
CRP	
Raised	5 (19.2%)
Normal	21 (80.8%)

Discussion

Since the onset of COVID-19 outbreak in Wuhan, China in December 2019, similarities have been between clinical features of COVID-19 and the SARS-CoV and MERS-CoV epidemics in the past with high mortality rate in pregnant women.^{1,6,10,11,12} Obstetricians have expressed concern about the possibility of similar trend of morbidity and mortality in COVID-19 positive pregnant women as they are supposed to be more susceptible during pregnancy.^{6,10,13} The emergence of SARS-CoV-2 is recent, so there are limited data regarding course of disease during pregnancy and fetomaternal outcome. The largest published case series, with 116 women, is from China.⁶ Our study adds the data of 26 pregnant women with COVID-19 bolstering this information by a fifth more.

The mean age and gestational age of our population was lower than reported by others.^{6,10,13,14} Majority of our sample was multiparous whereas half of another series was nulliparous.¹⁵ Yan et al found history of

relevant environmental exposure in 69/116 (59%) of cases and contact with infected person in 38/116 (32%) cases⁶ similar to other studies.^{11,16} In comparison, fewer women in our study had exposure to high-risk environments (hospital, school, travel history) and more women had contact with infected person (COVID-19 positive family members). A quarter of women could not comment on exposure and they may have contracted the illness from a family member going out to work.

It has been observed that the range of severity of symptoms of COVID-19 in pregnancy are same as in non-pregnant women. Fever and cough were the most common followed by fatigue, myalgia, sputum, dyspnea, diarrhea, and headache.¹ In our study a third of the women were asymptomatic. Among the rest the symptom distribution was in accordance with other studies.^{6,11,12,13,15} Almost all women had mild nature of disease, except one patient suffered with severe pneumonia. In comparison, majority of women 112/118 (95%) in Chen's case series were symptomatic, mostly with fever and cough.¹⁵ A plausible reason for a greater number of mild cases in our series is that these data was collected in early stage of outbreak. The public health policy was to hospitalize and isolate all COVID-19 women regardless to severity of symptom to restrict disease transmission. Other plausible explanations for the observed difference in disease severity may be related younger age, ethnicity, or different immune status. Further research should address these hypotheses.

Similar to Yan et al no miscarriage was noted in our series nor did any intrauterine death, preterm labor, or preterm rupture of membranes was observed.⁶ Few researchers have reported iatrogenic preterm delivery due to maternal deterioration yet some reported spontaneous preterm labour.^{10,11,12,17} In our series, most of women were delivered by caesarean (11/14) similar to other researchers.^{6,11,12,15,18} Viral transmission is of concern of mothers and obstetricians. Our literature search revealed one case report where COVID-19 IgM was detected in a neonate 2 hours after delivery suggesting intrauterine disease transmission¹⁹. However, in our study none of the newborns tested COVID-19 positive. Similar to our findings other case series have also reported no evidence of vertical transmission, intrauterine death, neonatal death or asphyxia.^{10,13,14,15,16,18,20} A limitation of

our study was that we could not test amniotic fluid, cord blood or placenta due to financial constraints and shortage of testing kits.

Due to asymptomatic status of the majority of women in our study raised C-reactive protein was found in only 19.2% of our cases as compared to 44% in Yan's case series.⁶ Lymphopenia is taken as an indicator of disease severity and predictor of disease prognosis²¹. According to Huang et al lymphopenia in severe disease could result from destruction of lymphatic tissue, direct lymphocyte infection, lymphocyte apoptosis due to inflammation, or inhibition of lymphocytes by metabolic disorders such as lactic acidosis.²² Yan et al also observed lymphopenia in 44% of 116 patient^{1,16}. Leucopenia was not found in any of our cases and lymphopenia in only one who suffered severe disease. To detect lung infiltrates CT chest is far more sensitive than X-ray. Lung infiltrate were found on CT chest in 96% of cases of Yan et al⁶. In our study due to mild nature of disease in the majority of the women lung infiltrates were detected in only a fifth of the cases.

In conclusion, the clinical characteristics of pregnant women were same as that expected of COVID-19 cases. Pregnancy did not appear to aggravate or change the course of disease. COVID-19 did not give rise to spontaneous abortion, intrauterine death or spontaneous preterm labor. There was no evidence of vertical transmission. This evidence will be helpful in better understanding the disease and its implications on pregnancy outcome.

Ethical Approval: Given

Conflict of Interest: The authors declare no conflict of interest

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References

- Huang C, Wang Y, Li X, et al. Clinical features of patients infected with novel coronavirus in Wuhan, China. *Lancet* 2020; 395: 497-506.
- World Health Organization. Coronavirus disease (COVID-19) outbreak. Available at: <https://www.who.int/emergencies/diseases/novelcoronavirus-2019>
- 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 ;395:565e74
- Zhao S, Lin Q, Ran J, et al. Preliminary estimation of the basic reproduction number of novel coronavirus (2019-nCoV) in China, from 2019 to 2020: a data-driven analysis in the early phase of the outbreak. *Int J Infect Dis* 2020;92: 214e7
- 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; 395:507
- Yan J, Guo J, Fan C, et al. Coronavirus disease 2019 in pregnant women: a report based on 116 cases. *Am J Obstet Gynecol* 2020;223:111.e1-14.
- Gottfredsson M. The Spanish flu in Iceland 1918. *Lessons in medicine and history. Laeknabladid.* 2008;94:737-45.
- Schwartz DA, Graham AL. Potential maternal and infant outcomes from Coronavirus 2019-nCoV (SARS- CoV-2) infecting pregnant women: Lessons from SARS, MERS, and other human coronavirus infections. *Viruses.* 555 2020;12:194.
- Sonja A. Rasmussen, John C. Smulian, John A. Lednický, Tony S. Wen, Denise J. Jamieson. Coronavirus Disease 2019 (COVID-19) and pregnancy: what obstetricians need to know. *American Journal of Obstetrics and Gynecology* May 2020;222(5):415-426
- 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;395:809-15.
- Liu Y, Chen H, Tang K, Guo Y. Clinical manifestations and outcome of SARS-CoV-2 infection during pregnancy. *J Infect.* 2020;. doi:10.1016/j.jinf. 2020.02.028
- Mullins E, Evans D, Viner R.M, Brien P.O, Morris E. Coronavirus in pregnancy and delivery: rapid review. *Ultrasound Obstet Gynecol* 2020; 55: 586–592.
- Qiancheng X, Jian S, Lingling P, et al. Coronavirus disease 2019 in pregnancy. *Int J Infect Dis.* 2020; 95:376-383. doi:10.1016/j.ijid.2020.04.065
- Cao D, Yin H, Chen J et al. Clinical analysis of ten pregnant women with COVID-19 in Wuhan, China: A retrospective study. *Int J Infect Dis.* 2020;95: 294–300.
- Chen L, Li Q, Zheng D, et al. Clinical Characteristics of Pregnant Women with Covid-19 in Wuhan, China. *N Engl J Med.* 2020;382(25):e100. doi: 10.1056/NEJMc2009226
- Abdollahpour S & Khadivzadeh T. Improving the

- quality of care in pregnancy and childbirth with coronavirus (COVID-19): a systematic review. *The Journal of Maternal-Fetal & Neonatal Medicine* 2020. DOI: 10.1080/14767058.2020.1759540
17. 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(1):292-297. doi:10.1016/j.ajog.2003.11.019
18. Ziyi Yang, Min Wang, Ziyu Zhu & Yi Liu. Coronavirus disease 2019 (COVID-19) and pregnancy: a systematic review. *The Journal of Maternal-Fetal & Neonatal Medicine* 2020. <https://doi.org/10.1080/14767058.2020.1759541>
19. Dong L, Tian J, He S et al. Possible Vertical Transmission of SARS-CoV-2 From an Infected Mother to Her Newborn. *Journal of American Association (JAMA)* May 2020; 323(18):1846-8.
20. Sun M, Xu G, Yang Y et al. Evidence of mother-to-newborn infection with COVID-19. *Br J Anaesth.* 2020. doi: 10.1016/j.bja.2020.04.066
21. Tan L, Wang Q, Zhang D, et al. Lymphopenia predicts disease severity of COVID-19: a descriptive and predictive study. *Signal Transduction and Targeted Therapy.* 2020 Mar;5(1):33. DOI: 10.1038/s41392-020-0148-4.
22. Huang G, Kovalic AJ, Graber CJ. Prognostic Value of Leukocytosis and Lymphopenia for Coronavirus Disease Severity [published online ahead of print, 2020 May 8]. *Emerg Infect Dis.* 2020; 26(8): 10.3201/eid2608.201160. doi:10.3201/eid2608.201160