

Feto-maternal outcome of COVID-19 positive pregnant patients in Bangladesh: a comparative study

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Abstract

Objective: Study the effect of COVID-19 on pregnancy and neonatal outcomes. **Design & Setting:** Prospective cohort study in Combined Military Hospital (CMH) Bogura, Obstetrics and Gynaecology department. **Methods:** Collected and analysed data of 29 pregnant ladies positive for COVID-19 between June to October 2020 inclusive to assess the effect of COVID-19 on pregnancy, and neonatal outcomes. Control group was COVID negative pregnant patients. Nasopharyngeal swab was taken for real time polymerase chain reaction for detection of COVID-19. **Main outcome measures:** Compared age, symptoms, any complication in mother and fetus, mode of termination, and duration of hospital stay. **Results:** Mean age was 27.45 years in case and 28.10 years in control group (P value <0.503). Only six were asymptomatic (10.3%). Fifteen (25.9%) had fever, six had weakness (10.3%), five (8.6%) had sore throat, three (5.2%) had nausea and five (8.6%) presented with loss of smell. Among twenty-nine patients, five (8.6%) delivered normally, twenty four (41.4%) were delivered through caesarean section which was significantly higher than control group (P value <0.001) No mother became critical or expired, neonatal death was also absent. Mean duration of hospital stay was 14.13 ± 6.192 days in case and 5.18 ± 4.99 in control which was significantly (P value <0.001) higher. Breast feeding was significantly higher in control group (P value <0.001). **Conclusion:** Present study shows feto-maternal outcome of COVID pregnancy does not vary to a great extent in comparison with normal pregnancy. **Funding:** No funding was required. **Keywords:** COVID-19, Maternal morbidity, Pneumonia, Pregnancy, COVID-19 in pregnancy

Fetomaternal outcome of COVID-19 positive pregnant patients in Bangladesh: a comparative study

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Abstract

Objective

Study the effect of COVID-19 on pregnancy and neonatal outcomes.

Design & Setting

Prospective cohort study in Combined Military Hospital (CMH) Bogura, Obstetrics and Gynaecology department.

Methods:

Collected and analyzed data of 29 pregnant ladies positive for COVID-19 between June to October 2020 inclusive to assess the effect of COVID-19 on pregnancy, and neonatal outcomes. Control group was COVID negative pregnant patients. Nasopharyngeal swab was taken for real time polymerase chain reaction for detection of COVID-19.

Main outcome measures:

Compared age, symptoms, any complication in mother and fetus, mode of termination, and duration of hospital stay.

Results

Mean age was 27.45 years in case and 28.10 years in control group (P value <0.503). Only six were asymptomatic (10.3%). Fifteen (25.9%) had fever, six had weakness (10.3%), five (8.6%) had sore throat, three (5.2%) had nausea and five (8.6%) presented with loss of smell. Among twenty-nine patients, five (8.6%) delivered normally, twenty-four (41.4%) were delivered through caesarean section which was significantly higher than control group (P value <0.001)

No mother became critical or expired, neonatal death was also absent. Mean duration of hospital stay was 14.13 ± 6.192 days in case and 5.18 ± 4.99 in control which was significantly (P value <0.001) higher. Breast feeding was significantly higher in control group (P value <0.001).

Conclusion:

Present study shows fetomaternal outcome of COVID pregnancy does not vary to a great extent in comparison with normal pregnancy.

Funding:

No funding was required.

Keywords: COVID-19, Maternal morbidity, Pneumonia, Pregnancy, COVID-19 in pregnancy

Introduction:

In December 2019, the novel coronavirus disease (COVID-19) caused by SARS-CoV-2 emerged in China. It has now spread in many countries. Pregnant women are thought to be more prone to susceptible population of COVID-19 which are more likely to have complications and even progress to severe illness. Coronaviruses cause variety of respiratory tract illness from the common cold to pneumonia and death. The usual presentation is with fever, weakness, anosmia, cough, myalgia, headache, and diarrhea and constipation. Overall case fatality rate appears to be 1%. Person-to-person transmission of COVID-19 is thought to be similar to transmission of influenza and other respiratory infections; by direct contact, indirect contact and droplets.¹

Study of outcome of COVID positive pregnant patients compared to non-COVID pregnant patients are still rare. The World is yet in shadow whether COVID-19 positive pregnant patients has different symptoms than other pregnant patients, whether pregnancy and parturition adversely affect the infection and what will be their proper regimen of antiviral medication.

Bangladesh reported its first case of confirmed COVID-19 positive on 8th March 2020 and first death confirmed COVID-19 on 18th March. We had a quick increase in confirmed cases during that time in comparison to India, Sri Lanka, and Thailand.²

According to the Royal College of obstetricians and gynecologist (RCOG), pregnant women rarely contract the COVID-19 infection than the general population.³ If a pregnant women is infected with viruses from the same family as the SARS CoV-2 virus and from other respiratory tract viruses, it may manifest a more severe illness, it is stated by the centers for disease control and prevention (CDC).⁴ Due to altered immunity during pregnancy, it is assumed that Corona virus infection may lead to more severe symptoms. These findings of increased severity of clinical manifestations in pregnancy are more prominent towards the end of pregnancy. Hence, COVID-19 positive may potentially develop more severe symptoms such as pneumonia and marked hypoxia. Such type of severe infection may develop in elderly, immunosuppressed or have existing morbidity such as diabetes, cancer or chronic lung disease patients. However, the RCOG guidelines have contrastingly reported that the absolute risk of this is low.⁵

The purpose of this study was to describe the clinical manifestations and fetomaternal outcome of pregnant women infected with COVID-19, monitor for changes before and after delivery, and provide some initial evidence for highlighting the management of pregnant women with COVID-19 infection.

Method:

This was a prospective cohort study based on collected data on clinical and fetomaternal pregnant women infected with COVID-19 from June 2020 to October 2020 in Combined CMH Hospital, Bogura. A confirmed case of COVID-19 was defined as a positive result by laboratory. Reverse transcriptase polymerase chain reaction (RT-PCR) assay was carried on the specimen of maternal nasopharyngeal swab. It was taken before meal in early morning. All the mandatory safety precaution measures- personal protective equipment (PPE) including jumpsuit, gloves, N-95 mask, face shield, eye goggles were used by all the health care professionals in antenatal wards, labour wards and operation theatres.

Control group

COVID -19 negative age matched and of almost similar gestational age admitted in Bogura CMH for on the same or near date.

Complete demographic history, obstetric history, clinical symptoms, signs, specific obstetric condition, laboratory investigations, complications and outcome data were collected in pre-designed questionnaire. All laboratory investigations according to the clinical care needs of the present pregnancy. Laboratory investigations included complete blood cell count (CBC), renal function test (RFT). Data on pregnancy and neonatal outcome, including demographic data, gestational age at delivery, mode of delivery, indication for cesarean delivery, complications, neonatal birth weight and neonatal intensive care unit (NICU) admission, neonatal affection were analyzed. The date stopping data collection for outcomes was 10th June 2020. Neonatal pharyngeal and nasopharyngeal swab samples were collected immediately after delivery and second sample after 48 hours in the NICU and tested for SARS-CoV-2 using RT-PCR. Data were compiled, tabulated,

analyzed, and interpreted by the authors. All the authors involved in the study reviewed the manuscript and ascertained for the precision and completeness of the data.

The data was analyzed by software Statistical Package for Social Sciences version 20 (SPSS version 20). Variables of interest were age, weight, gestational age at presentation, fetomaternal outcome and vertical transmission. Quantitative variables like age, parity and gestational age were analyzed by simple descriptive statistics like mean and standard deviation while qualitative variables like fetal and maternal outcome, and vertical transmission were calculated by frequency and percentage.

Results:

Out of 29 pregnant ladies in both case and control group, mean age of case were 27.45 years and that of control was 28.10 years. Mean weigh of case was 73.93 kg and mean weigh of control was 71.61 kg. Mean gestational week was 37.73 weeks in case and 38.05 weeks in case of control (shown in Table-1, 2 and 3).

Table 4 Shows six (10 %) patients were asymptomatic. Fever was most prevalent symptom 15 (25.9%) followed by weakness 6(10.3%), sore throat 5(8.6%), loss of smell 5(8.6%), nausea 3 (5.2%), body ache 2 (3.4%) and cough 2 (3.4%).

Gestational diabetes mellitus was present in three (5.2%) patients in both groups. Diabetes mellitus (DM) was found in three (5.2%) cases. Pregnancy induced hypertension (PIH) was found in three (5.2%) in both groups. Two (3.4%) patients were hypothyroidism in control group. Bronchial asthma was one (1.7%).No significant difference found between two groups.

Haemoglobin was 11.6 ± 1.14 SD in cases and 11.5 ± 1.1 in control. WBC count was 9.6 ± 2.5 in cases and 9.5 ± 2.4 in control. Platelet count was 2.3 ± 0.5 in cases and 2.2 ± 0.7 in controls. Serum creatinine was 0.745 ± 0.15 in cases and 0.67 ± 0.12 in controls. No significant differences were there in blood parameters of two groups.

Pregnancy outcome:

Table-7 shows, out of 29 cases, 5 (8.6 %) patients were delivered by normal vaginal delivery and 24 (41.4 %) were delivered by LSCS. In control group, 9 patients (15.5%) were delivered by vaginal delivery and 20 (34.5%) patients were delivered by LSCS. LSCS is significantly (P value < 0.05) higher in COVID-19 positive group.

No COVID -19 positive patients develop severe symptoms. None required intensive care and none of them died.

Mean duration of hospital stay was significantly higher in COVID positive patients 13.79 ± 6.0 days than control 5.54 ± 5.0 days. These was due to post-operative observation and anti-coagulant administration.

Neonatal outcome

Both case and control group had one preterm labour. No preterm rupture of membrane was found in COVID-positive group. Three congenitally abnormal baby was found in COVID-19 positive group (Cleft lip and palate, synductyly, congenital meconium ileum). Neonatal ICU (NICU) was required in 5 (8.6%) in case group and 2 (3.45 %) in control group.

Not a single baby was COVID positive. No mother to fetus transmission was seen in this study.

Mean birth weight in case group was 3.1 ± 0.08 SD kg and in control group it was $3.0 \pm .06$ SD kg. No significant difference was found between two groups.

Table 11 shows us breastfeeding of neonates 5(8.8%) of COVID positive mother was significantly less than neonates of control group 28 (49.1%).

Artificial feeding was higher in cases than control 40.4 % in cases and 1.8% in control group which was statistically significant (P value <0.001 %).

Discussion:

In COVID-19 pandemic, pregnant woman and neonate were in need of special care. Keeping it in mind that pregnant lady and neonates are more vulnerable to SARS CoV-2 infection, Combined Military Hospital (CMH) Bogura prepared a COVID dedicated ward for antenatal patients. Patients were managed by a multidisciplinary team consisted of obstetrician, medicine specialist, anaesthetist, neonatologist, nurse and hospital authority support for logistics. We compared the COVID positive pregnant patients to non-pregnant COVID patients to compare the effect of COVID on fetomaternal outcome.

In the study, we have analysed the mean age, weight, and gestational week for both situations in case and in control where there were no significant difference between case and control group in terms of age, body weight and gestational weeks of delivery. This result is similar to Munir S⁶ et al in their study conducted in Sir Gangaram Hospital in Pakistan where mean age was 29 ± 4.17 years SD. In that study, mean gestational age was 29 ± 9.53 weeks. Another study conducted in Wuhan reported the mean age of the patients between 29 to 35 years, and the gestation ranged from 33 to 41 weeks.⁷

In current study, when analyzing the asymptomatic versus the noticeable symptoms, fever was most prevalent symptom in fifteen (25.9%) followed by weakness, sore throat, loss of smell, etc. These results are almost similar to results of a recent study by Chen et al⁸ reported nine COVID positive women diagnosed in their third trimester of pregnancy. The common symptom was fever in seven, cough in four, myalgia in three, and sore throat and malaise each of two women. None of the patient required ventilator and none expired, these results are similar to the current study.

In this study, there was minimal investigations as most patients were either asymptomatic or had mild symptoms. Ultrasonography of pregnancy profile in each patient was done but not chest X-ray. Haemoglobin, WBC, Platelet count for both case and control can be seen in Table 6. Serum creatinine was 0.745 ± 0.15 in cases and 0.67 ± 0.12 in controls. No significant differences were there in blood parameters of two groups. It was quite different from the study conducted by Parul T⁹ et al where she showed increased leucocyte count during admission in COVID positive patients.

We found some comorbidities in our patients such as gestational diabetes mellitus was present in three (5.2%) patients in both groups. Pregnancy induced hypertension (PIH) was found in three (5.2%) in both groups. Two (3.4%) patients had hypothyroidism in control group. One (1.7%) had Bronchial asthma. Parul Shah et al⁹ showed in her study, out of 125 cases, 6 (4.8%) GDM, 7 (5.6 %) PIH, and 2 (1.6%) pre-eclampsia cases were found. In a systematic review by Gajbhiye R. et al involving 441 pregnant women, the most common co-morbidities associated with women with COVID-19 were hypertensive disorders (10%), diabetes (9%), placental disorders (2%), co-infections (3%), and hypothyroidism (3%).¹⁰

Analysing the mode of termination in Table 7, we can see that LSCS is significantly higher in case group (P value < 0.05). Additionally, time of delivery in cases were 37.2- 40.4 weeks and in control was 34.3-40.4 weeks (Table 10). In the study of Yu et al¹¹ of seven patients, all were delivered by caesarean section. A total of 97 pregnant women including 2 twins delivered their babies of whom 53.6% underwent caesarean delivery and 43.26% had vaginal delivery including 2 preterm vaginal delivery ,this I found in study by Shah PT⁹ et al. Caesarean section is found to be significantly higher in all the studies.

In present study, both case and control group had one preterm labour. No preterm rupture of membrane was found in COVID-positive group. Three congenitally abnormal baby was found in COVID-19 positive group (Cleft lip and palate, synductyly, congenital meconium ileum).

Analysing the Neonatal ICU admission rate in Table 9, the reasons for admission in ICU in COVID positive mother's babies were umbilical sepsis one, neonatal asphyxia two, transient tachypnea (TTN) of newborn in one and feeding difficulties in one neonate. Mean birth weight in case group was 3.1 ± 0.08 SD kg and in control group it was 3.0 ± 0.06 SD kg. No significant difference was found between two groups. No baby died in our study. All had good Apgar Score but two of them later developed perinatal asphyxia.

It is known to all that any kind of viral pneumonia in pregnant women, put the patient in a higher risk

of preterm birth, intrauterine fetal growth restriction (IFGR), and perinatal mortality by Madinger et al.¹² It is reported by Chen et al that pregnant patients infected with viral pneumonia other than SARS-CoV-2 have increased risk of fetal growth restriction (FGR), preterm delivery, low birth weight and Apgar score <7 at 5 minutes.¹³ This finding was quite dissimilar to our study. Entoun L.¹⁴ et al showed in their study varies from 2.24 to 4.45 kg with mean of $3.139 \text{ kg} \pm 437$ which is in a body with our study.

Each newborn was tested for COVID using nasopharyngeal sample immediately after birth. All were negative which is contrary to study by Yu et al.¹¹ in which one out of three neonates was tested positive for COVID-19, but the RT-PCR test for COVID-19 virus of the placenta and cord blood in these cases were negative. Another study showed that Ninety-six (96.9%) of neonates were tested for COVID-19 viral nucleic acid on nasopharyngeal and pharyngeal samples and 16.67% (16 of 96) were positive⁹. So, possibilities of vertical transmission is still there. There are studies reported on 3 neonates born to confirmed COVID-19 women, who tested positive for immunoglobulin G and immunoglobulin M antibodies despite having a negative viral nucleic acid result, raising the possibility of vertical transmission. But it requires more data¹⁵.

In present study, breastfeeding of neonates of COVID positive mother was significantly less than neonates of control group (Table 11). Artificial feeding was higher in cases than control 40.4 % in cases and 1.8% in control group which was statistically significant (P value <0.001 %). This was due to early isolation of baby from mother to prevent contact transmission. WHO guidelines states that 'the benefits of skin-to-skin contact and breastfeeding substantially outweigh the potential risks of transmission and illness associated with COVID-19 infection' while guidance from China states that 'Infants shouldn't be given feeding with the expressed breast milk from confirmed or suspected COVID-19 mothers'.¹⁶

Mean duration of hospital stay was significantly higher in COVID positive patients with 13.79 ± 6.0 days than control with 5.54 ± 5.0 days. This was due to post-operative observation and anti-coagulant administration.

Conclusion:

Due to altered immunity during pregnancy, women are more likely to be affected adversely by COVID-19 virus. In our study, neither any pregnant patient needed admission in ICU, nor did anyone die. Their pregnancy outcome was almost similar to that of normal pregnancy. There were no increase requirement of neonatal ICU and no vertical transmission was seen from mother to fetus. It is encouraging that worldwide different studies are going on fetomaternal outcome on COVID positive pregnant women, but many questions are yet to solve as congenital infection, ideal management during labour, neonatal management.

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Disclosure of Interest:

None to declare. There were no personal interest or conflict involved in this research.

Contribution of Authorship:

1. Lt. Col. Dr. Umme Ruman: The main author of the research (corresponding author). Significant and majority contributor in the design of study, collection of data from the hospital, drafting the initial article, and reviewing the final article for any required change.
2. Colonel Dr. Khondker Iqbal Karim: First hand contribution in the design of the study, and improvement in data sheet. He has also assisted in the reviewing and revising of the article before submission.
3. Mir Masudur Rhaman: Responsible for data analysis and interpretation. Additionally, Dr. Mir Masudur contributed in writing of the first draft, and reviewing the final article before submission.

4. Prof. Ferdousi Begum: Contributed largely in the revisal of the study design, and additionally assisted in revising the research, and advising on necessary changes for the final article before submission.

Ethical Approval:

Ethical approval was taken from the Ethical Review Committee of the Combined Military Hospital Bogura, Bangladesh.

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None to declare. No funding was necessary or provided.

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Table/ Figure Caption List:

Table: 1- Age distribution of case and control group and mean age

	Covid Status	Mean	Std. Deviation	Sig
Age	Case	27.45	3.897	0.503
	Control	28.10	3.488	

Table: 2- Weigh distribution of case and control group

	Covid	Mean	Std. Deviation	Sig
Weight in Kg	Case	73.93	9.161	0.358
	Control	71.61	9.914	
	Control	38.05	1.160	

Table: 3- Gestational week range in case and control group

	Covid	Mean	Std. Deviation	Sig
Gestational week	Case	37.73	2.455	0.524
	Control	38.05	1.160	

Table: 4- Frequency of presenting symptoms

	Sore throat Absent	Sore throat Present	Nausea Absent	Nausea Present	Body ache Absent	Body ache Present	Cough Absent	Cough Present	Loss of smell Absent
Case	24(41.4%)	5(8.6%)	26(44.8%)	3(5.2%)	27(46.6%)	2(3.4%)	27(46.6%)	2(3.4%)	24(41.4%)
Sig	0.026	0.026	0.118	0.118	0.246	0.246	0.246	0.246	0.026

Table: 5- Comorbidities present in study population

Study population	GDM Absent	GDM Present	DM Absent	DM Present	PIH Absent	PIH Present	Hypothyroidism Absent	Hypothyroidism Present
Case	26(44.8%)	3(5.2%)	26(44.8%)	3(5.2%)	26(44.8%)	3(5.2%)	29(50.0%)	0(0%)
Control	26(44.8%)	3(5.2%)	28(48.3%)	1(1.7%)	26(44.8%)	3(5.2%)	27(46.6%)	2(3.4%)
Total	22(89.7%)	6(10.3%)	54(93.1%)	4(6.9%)	52(89.7%)	6(10.3%)	56(95.6%)	2(3.4%)

Table: 6- Blood parameters of study population

Blood parameters	Blood parameters	Mean	SD	95% CI Lower	95% CI Upper	Sig
Hb	Case	11.607	1.141	-0.502	0.709	0.733

WBC	Control	11.503	1.160	-0.502	0.709	0.904
	Case	9.662	2.518	-1.237	1.396	
PC	Control	9.582	2.487	-1.237	1.396	0.540
	Case	2.351	0.586	-0.245	0.462	
S. Creatinine	Control	2.262	0.747	-0.245	0.462	0.166
	Case	0.745	0.155	-0.021	0.117	
	Control	0.697	0.102	-0.021	0.117	

Table: 7- Mode of pregnancy termination of study population

	Termination of Pregnancy NVD	Termination of Pregnancy LSCS	Sig
Case	5 (8.6%)	24 (41.4%)	0.001
Control	9 (15.5%)	20 (34.5%)	

Table: 8- Duration of hospitalization in case and control group

		N	Mean	SD	95% CI	95% CI	Sig
Duration	Case	28	13.79	6.082	5.076	11.047	<0.001
	Control	29	5.72	5.140	5.065	11.058	

Table: 9- Neonatal outcome of study population

Study population	PTL	PTL	PROM	PROM	Congenital Anomaly	Congenital Anomaly	NICU	NICU
	No	Yes	No	Yes	No	Yes	No	Yes
Case	28(48.3%)	1(1.7%)	29(50%)	-	26(44.8%)	3(5.2%)	24(41.4%)	5(8.6%)
Control	28(48.3%)	1(1.7%)	28(48.3%)	1(1.7%)	29(50.0%)	-	27(46.6%)	2(3.4%)
Sig	0.754	0.754	0.5	0.5	0.118	0.118	0.211	0.211

Table: 10 - Comparison of birth weight between case and control groups

		N	Mean	Std. Deviation	Sig
Baby weight	Case	29	3.104	0.081	0.394
	Control	29	3.010	0.067	

Table: 11- Frequency of breastfeeding in cases and control groups

Study population	Breast feed	Breast feed	Sig
	Breast feed	Artificial feed	
Case	5(8.8%)	23(40.4%)	<0.001
Control	28(49.1%)	1(1.8%)	



