

# Covid-19 Infection, Pregnancy Outcomes and Maternal & Neonatal Complications

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## ABSTRACT

**Background:** Covid-19 infection potentially affects pregnancy, its outcomes and may lead to maternal and neonatal complications.

**Objective:** To investigate and compare the pregnancy outcomes and fetomaternal complications among covid-19 infected and non-infected women.

**Study Design:** Prospective study.

**Setting:** Shaikh Zaid Women Hospital, Shaheed Mohatama Benazir Bhutto Medical University, Larkana.

**Duration:** From August 2021 to February 2022.

**Material and Methods:** A sample of 204 pregnant women of age 18-50 years was taken and sorted as either having covid-19 (n= 90) or without covid-19 (n= 114). They presented in 3<sup>rd</sup> trimester with single fetus. Exclusion criteria were having haemoglobinopathy, malpresentation, placental abruption or other pregnancy risks. The rt-PCR used to test infection status. Data collected through a pre-designed questionnaire and analyzed through SPSS Version-25.

**Results:** The maternal age ranged between 28 to 39 years with a mean  $\pm$  SD age of 30.3  $\pm$  6.66 which did not differ in two groups. Lower gestational age was of the covid-19 infection group i-e; 34.75  $\pm$  1.54 weeks then covid-19 negative (37.01  $\pm$  2.14 weeks; p value < 0.001). Most common covid-19 symptoms were fever at admission (79%) dry persistent cough (51%), malaise (21%) and dyspnea (22%).

More caesarean sections (52.22%; n = 47) in covid-19 +ve group noted than covid-19 negative (34.21%; n = 39). PIH, preeclampsia/ eclampsia, preterm labor, infections which needed antibiotics therapy and referral for higher dependency care (p values = 0.059, 0.003, 0.893, 0.179 and 0.002 respectively) and preterm birth, LBW, SGA, fetal distress, admission for neonatal resuscitation/ ICU and fetal death (p values = 0.433, 0.136, 0.877, 0.79 0.436 and 0.428 respectively) were more frequent among covid-19 positive group.

**Conclusion:** Pregnancy with covid-19 face relatively more unwanted outcomes, maternal and neonatal complications compared to the covid-19 negatives. Antenatal and full range of obstetric and medical care of such cases is highly recommended to achieve better outcomes.

**Keywords:** Pregnancy, Covid-19, fetomaternal outcomes, preterm birth, caesarean section.

## INTRODUCTION

Coronavirus infection 2019 (SARS COV-2/ Novel coronavirus 2019) which turned into a pandemic in no time has opened doors to new possible threats.<sup>1</sup> Every aspect of life has been affected by the pandemic. The health is worst hit of all while the maternal and neonatal health has been particularly affected.<sup>2</sup> There are great fears and doubts about pregnant care, its outcomes as well as the maternal and neonatal health.<sup>3,4</sup>

Covid-19 has put millions of pregnancies to an exaggerated level of risk across the world. The vaccines for prevention from covid-19 infection were developed at a very rapid pace and proved with a range of effectiveness. No such vaccine has been approved for pregnancy which raised the concerns among healthcare providers regarding safety motherhood.<sup>5</sup> There was a very limited knowledge against a very high level of caution as the previous pandemics of other coronavirus infections (i-e; SARS and MERS)<sup>6,7</sup> proved to be a high risk for maternal and perinatal health. With covid-19 infection, the rates of hospital admissions for pregnancy and maternal deaths were documented as thrice to thirteen times of non-pregnant population respectively<sup>8</sup> however; these effects are still debatable and need more evidence from all corners of the world.<sup>9,10</sup>

Studies across the different countries have been conducted and published to highlight the importance of the issue and to share the knowledge. Some of the earlier studies documented that the pregnancy goes uneventful (except only a flu-like condition) in presence of covid-19 infection. Later on, a number of studies found a 22 times higher risk of maternal mortality. There was also chance of complication in every second pregnancy infected with covid-19 with a 10% needing intensive care.<sup>4,10-13</sup>

There is a relative dearth of evidence when focusing vulnerable conditions of safe motherhood and outcomes of pregnancy. Keeping the need of hour and relative scarcity of data on gravity of condition, within local context, there is needed to investigate the fetomaternal outcomes among covid-19 positive women. The current study aimed at observing, comparing and documenting the pregnancies affected with covid-19 with those non-infected in terms of pregnancies outcomes, maternal health, neonatal outcomes and related complications.

## MATERIAL AND METHODS

This prospective study was done at the Obs/ Gynaecology department in Shaikh Zaid Women Hospital, CMC- from August 2021, till February 2022 after seeking approval by the Research Evaluation Committee of SMBBMU- Larkana. A consecutive sample of 204 pregnant women was taken while taking a valid written consent from enrolled woman or the husband initially. The two groups made having either covid-19 infection positive or not based on rt-PCR test for covid-19 status. Criteria for selection were, a woman of 18-50 years of age, having single alive fetus. They were enrolled in their third trimester and followed till delivery & discharge home. Women having any haemoglobinopathy, malpresentation, diagnosed placental abruption or other risk for pregnancy were excluded.

The data was collected by the principle investigator. The variables on demographic data like maternal age, parity, BMI, gestational age and address were noted besides comorbid, clinical features (if covid-19 positive) and the pregnancy outcomes/ complications. For data entry/ analysis we used statistical software. The continuous variables were expressed as mean & standard deviation. Frequencies/ percentages used to interpret

data in categories i-e; pregnancy outcomes/ complications (like NVD, Caesarean section, APH/ PPH, Preterm labor, Low birth weight, Fetal distress, Fetal death). Bivariate stratified analysis with application of chi-square was a measure to ascertain association of covid-19 infection with the pregnancy outcomes/ complications. A p value <0.05 was considered significant.

**RESULTS**

Out of sampled 204 pregnant women; 90 were covid-19 positive and other 114 covid-19 negative and thus sorted as separate group. Both groups were identical in age as their mean ± SD age was 30.3 ± 6.66 years overall (Range: 28 to 39 years). Their mean ± SD gestational age was 36.21 ± 2.34 weeks (Range: 35-40). Covid-19 positives had smaller gestational age at time of presentation i-e; 34.75 ± 1.54 weeks than covid-19 negative i-e; 37.01 ± 2.14 weeks. (P value < 0.001; Table: 1). The BMI also differed significantly between the two groups (P value < 0.001; Table: 1). The neonatal birth weight differed between the covid-19 positive and covid-19 negative women. The mean ± SD neonatal birth weight of former was 3.12 ± 0.69 Kgs versus 2.91 ± 0.55 Kgs of the later. (P value < 0.0175; Table: 1).

History of comorbid among covid-19 positive and negative women i-e; hypertension (6.14% vs. 5.56%), Diabetes Mellitus/ GDM (8.77% vs. 8.89%) and anaemia (17.54% vs. 18.89%) were identical between the two groups. The most common presentation among women in covid-19 positive group was presence of fever at admission (79%) followed by dry persistent cough (51%), along with malaise (21%) and dyspnea (22%). A lower proportion also had diarrhea and GI disturbances (9%). About two thirds of covid-19 positive women had lymphocytopenia (65%), elevated CRP (>10 mg/L in 70%).

Regarding outcomes the figure: 1 compares the mode of delivery between the two groups. There were more caesarean sections (52.22%; n = 47) in covid-19 positive group while only 34.21%; n = 39 caesareans among covid-19 negative group. Eventually; there were more NVDs (54.39%; n = 62) in covid-19 -ve group while only 41.11%; n = 37 NVDs among covid-19 +ve group.

Regarding complication, it was noted that PIH, preeclampsia/ eclampsia, preterm labor, infections which needed antibiotics therapy and referral for higher dependency care (p values = 0.059, 0.003, 0.893, 0.179 and 0.002 respectively) were more frequent among covid-19 positive group while APH/ PPH, prelabor rupture of membranes & maternal death (p values = 0.921, 0.593 and 0.589 respectively) were more among covid-19 negative group. Table: 2.

Table: 1. Descriptive demographic details of all women (n = 204). Covid-19 +ve = 90 Covid-19 -ve = 114

Variable	Mean	SD	Minim	Maxim	P value
Maternal age (years)	30.3	6.66	28	39	
Covid-19 status					0.0932
+ve	31.71	7.12	30	39	
-ve	30.02	6.99	28	38	
Gestational age (wks.)	36.21	2.34	35	40	
Covid-19 status					< 0.0001
+ve	34.75	1.54	32	37	
-ve	37.01	2.14	36	40	
Parity	2.36	0.71	1	4	
Covid-19 status					0.0073
+ve	2.49	0.77	2	3	
-ve	2.21	0.69	1	4	
BMI (Kgs/m2)	34.5	4.91	27.12	41.41	
Covid-19 status					< 0.0001
+ve	32.52	5.31	25.32	38.25	
-ve	35.66	4.41	28.11	43.09	
Birth weight (Kgs)	3.03	0.54	1.84	3.62	
Covid-19 status					0.0175
+ve	3.12	0.69	2.13	4.11	
-ve	2.91	0.55	1.84	2.79	

Regarding neonatal health; it was also noted that preterm birth (<37 wk gestation), low birth weight (LBW), small for

gestational age (SGA), fetal distress, admission for neonatal ruscuscation/ ICU and fetal death (p values = 0.433, 0.136, 0.877, 0.79 0.436 and 0.428 respectively) were more frequent among infection group. Table: 2. There were two neonatal deaths in covid-19 +ve while one in covid-19 -ve group.

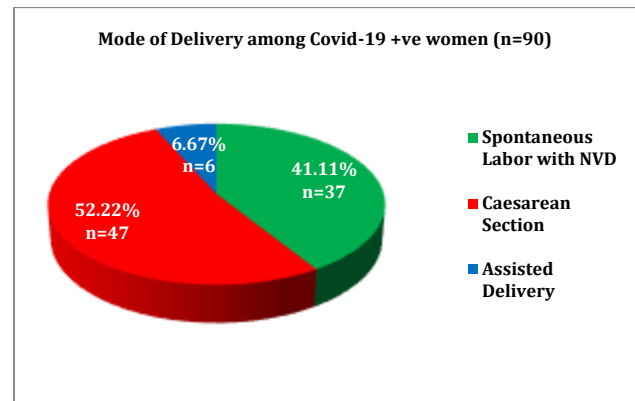
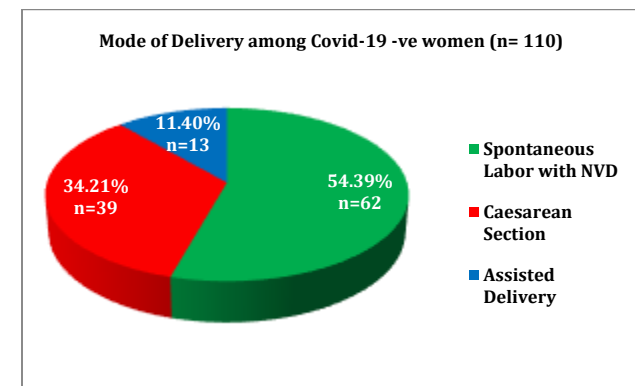


Figure: 1. Mode of deliveries among either covid-19 status all women.



The chi-square statistic = 6.9084.  
The p-value = 0.031.  
The result is significant at p < .05

Table: 2: Complications and outcomes of pregnancies presenting with or without covid-19 infection (n = 204).

Complications	Covid-19 +ve women (n=90) n (%)	COVID-19 -ve Women (n= 114) n (%)	P value
APH/ PPH	6 (6.67)	8 (7.02)	0.921
Pregnancy-induced hypertension	12 (13.33)	7 (6.14)	0.059
Preeclampsia/ Eclampsia	15 (16.67)	5 (4.39)	0.003
Preterm labor	10 (11.11)	12 (10.53)	0.893
Prelabor rupture of membranes	17 (18.89)	25 (21.93)	0.593
Infections requiring antibiotics	11 (12.22)	4 (3.51)	0.179
Referred for higher dependency care	9 (10)	1 (0.88)	0.002
Maternal Death	2 (2.22)	4 (3.5)	0.589
Complications	COVID-19 +ve Women (n=90)	COVID-19 -ve Women (n= 114)	P value
Preterm birth (<37 wk gestation)	18 (20)	18 (15.79)	0.433
Low birth weight (<2500 g)	21 (23.33)	12 (10.53)	0.136
Small for gestational age (<10th centile)	15 (16.67)	10 (8.77)	0.877
Fetal distress	12 (13.33)	7 (6.14)	0.79
Admitted to ICU	12 (13.33)	6 (5.26)	0.436
Fetal death	2 (2.22)	1 (0.88)	0.428

## DISCUSSION

The current study was conducted to contribute our experience to the pool of knowledge regarding pregnancy outcomes from covid-19 infection and fetomaternal health. Pregnancies affected with covid-19 were compared with unaffected pregnancies and their outcomes and found to be relatively adversely affected. The current study significantly noted that these pregnant women developed hypertension in pregnancy (PIH ~ 13.33%), preeclampsia/ eclampsia (16.67%), preterm labor (11.11%), infections (12.22%) and required referral for higher dependency care (10%) - more frequently than the covid-19 negative women (6.14%, 4.39%, 10.53%, 3.51% & 0.88% respectively with p values = 0.059, 0.003, 0.893, 0.179 and 0.002). Villar J, et al., reported more maternal complications with covid-19 like PIH, preeclampsia/ eclampsia, preterm labor, Infections requiring antibiotics, ICU admissions, maternal death, spontaneous initiation of labor, induced labor and cesarean delivery (3.62% to 49%).<sup>14</sup>

The adverse perinatal outcomes seen in covid-19 positive pregnancies significantly in current study, were preterm birth 20%, low birth weight 23.33%, small for gestational age 16.67%, fetal distress 13.33%, admission for neonatal resuscitation/ ICU 13.33%, and fetal death 2.22% (p values = 0.433, 0.136, 0.877, 0.79, 0.436 and 0.428 respectively) and all there were higher than the covid-19 negatives. Our findings are in match with other contemporary studies. Siddiqui et al.,<sup>11</sup> reported preterm birth (15.6%), low birth weight (26.7%), small for gestational age (6.2%), admission for neonatal resuscitation/ ICU (40%) and fetal death (6.7%). Other study by Villar J, et al., found that perinatal complications i-e; prelabor rupture of membranes (16.1%), fetal distress (12.3%), preterm birth (<37 wk gestation) (22.5%) and small for gestational age (<10th centile) (13.7%) were also more in covid-19.<sup>14</sup> Two percent of neonatal deaths, with an overall rate of perinatal death of 4.2% as found in a study<sup>13</sup> while in the current study we noted that 2.22% neonatal deaths among covid-19 while only 0.88% among non-covid-19 affected pregnancies.

Other studies reported an elevated burden of hospitalizations need and ICU admissions of pregnant women in presence of covid-19 infection compared to normal ones.<sup>8,11-15</sup> However; it could be due to the probable fear of adversity of outcomes if hospitalization ignored. Here it also pertinent to mention that current study area was largely rural where, relative delay to hospitalize the pregnant women until some obstetric emergency arises is a practice.

Contrary to this; some studies have found positive differences in outcomes of pregnancies in presence of covid-19.<sup>12,13</sup> A study conducted in Iran found lesser number of preterm births (p=0.001), and LBW neonates (p=0.005) during the pandemic period than the pre-pandemic period.<sup>15</sup> We also noted that some of the maternal conditions like prelabor rupture of membranes, maternal death and APH/ PPH were found less among covid-19 positive pregnancies however these findings lacked any statistical significance.

In current study the mean age was 30.3 ± 6.66 years while the mean gestational age at diagnosis was 36.21±2.34 weeks (all women were enrolled in third trimester). Siddiqui S, et al. reported relatively younger pregnant women in study where the mean age was 26.17±3.73 years while the mean gestational age 30.6±9.5 weeks;<sup>11</sup> The mean birth weight was 2.9±0.77 Kgs while in current study the mean birth weight was 3.03±0.54 Kgs however; it was found that mean birth weight among covid-19 cases was relatively higher i-e; 3.12±0.69 Kgs compared to 2.91±0.55 Kgs in non-covid cases. This reiterates the finding of previous referred Iranian study.<sup>15</sup> Neither any other study nor we comment about the relationship of maternal or gestational age with covid-19 infection or its pregnancy outcomes.<sup>16,17</sup>

It is also worth mention that in the current study, covid-19 positive pregnancies presented largely with fever at admission (79%) followed by dry persistent cough (51%), along with malaise (21%) and dyspnea (22%). About two thirds had lymphocytopenia (65%), rise in CRP (>10 mg/L in 70%) and a 10% of them required

referral for high dependency care (P value =0.002). Other studies reported fever, coughing, lymphocytopenia with elevated CRP (34%-75%) among covid infected pregnancies.

To the other extent, Siddiqui S, et al. reported 73% were asymptomatic covid-19 positive and there was no death in these patients.<sup>11</sup> Likewise; study by Yang et al. reported pregnancies did not show any symptoms however; their CT images proved it to be covid-19 infection. The effect of covid-19 on pregnancies depends on severity of infection. International Registry of Coronavirus Exposure in Pregnancy (IRCEP) study found that pregnancies in which symptoms were mild (41%) and moderate (52%) only seven percent need in patient care for covid-19 with only 1.7% ICU need.<sup>18</sup>

Universality of need of cesarean section was seen in covid-19 infected pregnancies reason being fetal distress.<sup>13,19-21</sup> The rate of CS among covid-19 affected women was more than a half. The current study also found that 52.2% women with covid-19 delivered through CS compared to 34.21% others (P value = 0.031). Other studies however; documented enormously high (91%) CS rate in covid-19 cases.<sup>19</sup> We did not observe any spontaneous vaginal delivery ending up in poorer outcomes.

Investigating the risk of transmission of virus from mother to newborn; some studies like Karimi-Zarchi et al., Sheth S, et al., and others have documented that risk of vertical transmission covid-19 yet; there is contradiction in findings of other studies.<sup>22-25</sup> We therefore; maintained a separation of mother from newborn. With cooperation of mother the expressed breast milk was fed to newborn. Mother upon being sero-negative was allowed to take baby otherwise baby kept at a 6 feet distance curtain (physical barrier), used face mask even in same room.

The current study brings a useful and novel piece of evidence on a relatively high impact issue of maternal and child health despite having certain limitations. It was a short duration, single location study. Most of the study participants belonged to rural areas. Secondly; all women enrolled were in the third trimester so there may be an underrepresentation of those diagnosed with covid-19. Overall; the results must be carefully referred.

## CONCLUSION

Pregnancies in rural and less developed areas are prone to multifold risk of complications and adverse outcomes. The covid-19 has added to this phenomenon. The current study found that pregnancies with covid infection have relatively higher obstetric risks and neonatal complications compared to the women not infected with covid-19. There may be higher need of intensive care for women as well as the neonates. Although the indication and need of caesarean section increases manifold yet; the maternal death events do not increase much while; there is great risk of neonates getting infected of covid-19. Antenatal and full range of obstetric and medical care of such cases is highly recommended to achieve better outcomes.

**Contributions:** M brought the idea, ethical approval and data collection. ISM wrote the concept note and manuscript. BKM data analysis and manuscript finalization. K wrote the concept note and manuscript. MM questionnaire design, manuscript writing. QSS Ethical approval and manuscript finalization.

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**Conflict of interest:** None declared.

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