

Maternal and Fetal Outcomes in Pregnant Women With COVID-19, A retrospective Study

Original
Article

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ABSTRACT

Background: The current coronavirus disease 2019 (COVID-19) pneumonia pandemic, caused by the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) is spreading globally at an accelerated rate. A serious public health emergency, it is particularly deadly in vulnerable populations and communities in which healthcare providers are insufficiently prepared to manage the infection. Pregnant women, their fetuses, and newborns are likely to represent a high-risk population during the current (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Approximately one-third of infected pregnant women died from severe acute respiratory syndrome coronavirus (SARS-CoV) and the Middle East respiratory syndrome coronavirus (MERS-CoV) epidemics of the past two decades.

The Aim of this Study: To assess the adverse maternal and neonatal outcomes of pregnant women with confirmed COVID-19 infection.

Patients and Methods: This is a retrospective analytical study that was conducted on the inpatient isolation wards' medical records, Obstetrics and Gynecology hospital Kasr Al- Ainy, Cairo University during period time from April 2020 to December 2021. A total of 70 pregnant women with confirmed COVID-19 between April, 2020 and December 2021 were identified. Maternal and neonatal outcomes were described from their archived medical records in details.

Results: Regarding mode of delivery, higher rates of CS were identified (57.1%). Most common symptom of COVID-19 was cough and loss of smell while 50% of patients were asymptomatic. There was a significant increase in the incidence of preterm births regarding pregnancy outcomes (28.5 %). A 20% of the patients have associated comorbidities, the most common was pregestational DM. There was a higher incidence of preeclampsia, HELLP syndrome and eclamptic fits (25.7%). Regarding adverse neonatal outcomes, the most prevalent was preterm birth (31.5%) and NICU admission (27.7%). It was noted a high percentage of ICU admission as a specific adverse maternal outcomes, also maternal mortality and venous thromboembolic events are reported.

Conclusion: The evidence collected showed that the symptoms, diagnosis, treatment and comorbidity factors associated with COVID-19 were the same in pregnant women as in non-pregnant women. It was, however, noticeable that morbidity especially preeclampsia, preterm and caesarean birth rates necessitating admission to the intensive care unit as well as maternal and perinatal death rates were higher in pregnant women with COVID-19 and their infants.

Key Words: COVID-19, fetal, maternal, outcomes, pregnancy.

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INTRODUCTION

The World Health Organization (WHO) was alerted on the 31st of December 2019 by Chinese authorities of a series of pneumonia-like cases in the city of Wuhan^[1]. The Chinese Centre for Disease Control and Prevention identified this infection as a novel coronavirus infection on Jan 7, 2020.

June of 2020, a United States population based study by the Centers for disease control and prevention (CDC) found that pregnant women are at an increased risk of

acquiring viral respiratory infection and developing severe pneumonia, due to the physiologic changes in their immune and cardiopulmonary systems^[2].

Pregnant women are particularly susceptible to adverse outcome, including hospitalization, admission to an intensive care unit (ICU), need for endotracheal intubation, renal failure and death^[3].

Data from MERS-CoV and SARS-CoV, indicate that infection in pregnancy tends to be severe and associated with adverse neonatal outcomes, including increased risk of miscarriage, fetal growth restriction, and preterm birth^[4].

PATIENTS AND METHODS

This is a retrospective analytical study that was conducted to inpatient isolation wards' medical records, Obstetrics and Gynecology hospital Kasr Al-Ainy, Cairo University, during period time from April 2020 to December 2021.

A total of 70 pregnant women with COVID-19 between April 2020 and December 2021 were identified. Maternal and neonatal outcomes were described from their archived medical records in details.

Data on maternal characteristics (such as maternal age, gestational age, parity, gravidity, abortion, living children and pregnancy outcomes) were entered in a data form.

Pregnancy outcomes included maternal health outcomes (such as preterm birth, miscarriage, antepartum hemorrhage, caesarean section, and maternal death) and neonatal health outcomes including (Preterm babies, intrauterine growth restriction, stillbirths, NICU admission rate, congenital anomalies and fetal distress).

Pregnancy complications such as gestational diabetes, pregnancy-induced hypertension, preeclampsia, and surgical complications were also encountered.

Clinical trial registration: NCT05608616

The study started from April 2022 to – September 2022.

We retrospectively reviewed medical records of pregnant women

who were admitted into the Kasr Al-Ainy Hospital, Obstetrics and Gynecology hospital, Cairo University, during March 2020 – December 2021. We followed the clinical diagnosis criteria for COVID-19 pneumonia in the New Coronavirus Pneumonia Prevention and Control Program (5th edition).

Throat swabs were collected from all these patients and sent to the laboratory for tests of SARS-CoV-2 using the standard kit.

Diagnosis criteria of COVID-19 infection include 1) typical chest CT imaging of patchy shadowing and ground-glass opacity, and 2) positive in reverse transcription polymerase chain reaction (RT-PCR) tests for SARS-CoV-2. However, false negative cases might be common for COVID-19 infection cases due to low virus titers, sampling at late stage of illness, and inappropriate swabbing sites. Seventy pregnant women who were tested positive for SARS-CoV-2 were classified as laboratory confirmed COVID-19 Infection.

Outcomes

Detection of maternal and neonatal adverse outcomes in COVID-19 pregnant patients.

Sample size calculations

As we include all pregnant women at any age and Gestational Age of pregnancy from March 2020 till December 2021 who were confirmed to be COVID 19 positive by Nasopharyngeal swab, CT or both, there is

No Sample size to be calculated.

Ethical considerations

This study was conducted after approval of the ethical committee of faculty of medicine, Cairo University. All data was collected from medical records.

RESULTS

Seventy patients were identified via searching the past medical records of the confirmed COVID-19 Pregnant women who had been admitted to Al Kasr Al Aini, Obstetrics and Gynecology Hospital, Isolation wards (Department 21) at the period between April 2020 to December 2021.

There were no exclusion criteria as all pregnant women confirmed positive COVID 19 are included regardless the maternal age, gestational age, gravidity, parity and other comorbidities (medical or surgical).

Regarding mode of Delivery

Cesarean section accounted for 57% of all deliveries including 2 twin pregnancies; successful vaginal delivery was reported in 14 of 70 cases (20%).

7 (10%) of pregnancies presented in earlier gestational weeks and were discharged, undelivered, without any major complications. The outcomes of these pregnancies are not known. As shown in (Table 1).

Table 1: Descriptive data regarding Age, Gestational Age, and mode of delivery to the current pregnancy (demographic Analysis)

		No.=70
Age	Mean±SD	29.23±6.00
	Range	18–44
	Mean±SD	30.87±9.46
	Range	5–41
Gestational Age (weeks)	Vaginal Delivery	14(20.0%)
	C.S.	40(57.1%)
Mode of Delivery	Abortion	6(8.6%)
	Suction/evacuation	1(1.4%)

28 patients out of 70 (40%) had live birth ,while 9(12.8%) patients had IUFD, 17 (24.3%) pregnancies ended by preterm labour.

2(2.9%) of patients were diagnosed as ectopic ended by salpingectomy.

6(8.6%) patients ended by miscarriage, one of them was septic abortion, 2 was missed abortion in 1st trimester and 3 were 2nd trimestric abortion.

1 patient was diagnosed as vesicular mole and ended by suction evacuation (1.4%) as shown in (Table 2)

Table 2: Descriptive data regarding pregnancy outcome

Pregnancy outcome	No.	%
Live birth	28	40.0%
PTL (preterm birth)	17	24.3%
IUFD (Still birth)	9	12.8%
Abortion	6	8.6%
Ectopic	2	2.9%
Vesicular mole	1	1.4%

It was found that 50% of patients are Asymptomatic.

Most common symptoms found of high incidence is Cough 35 patients out of 70 (50%), loss of smell 35 out of 70 patients (50%) followed by bony aches (42.8%) then loss of taste (41.7%).Fever contributed only to (35.7%). And the least symptom of incidence was diarrhea (7.1%).

Some patients have more than symptom and others are accidentally discovered as a routine of the hospital before admission .These results were shown in (Table 3,Figure 1)

Table 3: Descriptive Data regarding COVID-19 symptoms

Symptoms ofCOVID-19	Total (n=70)
Asymptomatic	35 (50%)
Bony aches	30 (42.8%)
Fever	25 (35.7%)
Cough	35 (50.0%)
Loss of smell	35(50.0%)
Loss of taste	29 (41.7%)
Sore throat	21 (30.0%)
Loss of appetite	19 (26.7%)
Dyspnea	12 (17%)
Diarrhea	5 (7.1%)

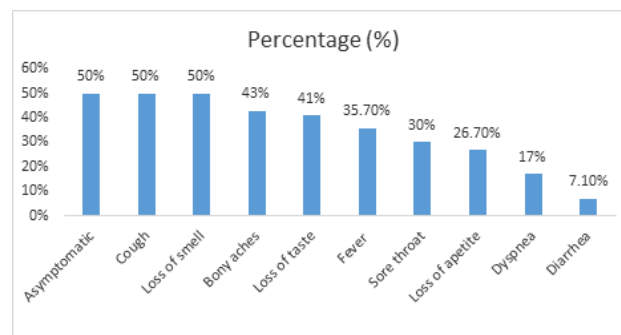


Fig. 1: Different symptoms presented during the study

Regarding maternal complications diagnosed after admission:

It is important to clarify that these complications including medical and surgical complications as the following:

Total number of complicated pregnancies were 54 out of 70 (80%).

Medical complications

17 patients were complicated by sever preeclampsia (24.3%), 2 of them presented by eclamptic fits.

Another 1 patient out of 70 developed HELLP syndrome (1.4%), 4 patients were complicated by anemia of pregnancy (5.7%), 3 patients were complicated by DKA (4.3%) due to un controlled pregestational diabetes mellitus,1 patient was complicated by UTI (1.4%) developed high grade fever.

Amniotic fluid disorders

11 patients developed PROMs (15.7%), 5 patients diagnosed with oligohydramnios (7.1%), 2 patients developed anhydramnios (2.9%).

Surgical complications

11 patients were diagnosed as Placenta Accreta Spectrum (PAS) (15.7%),4 patients had “hysterectomy” (5.7%).

2 patients were diagnosed as tubal ectopic pregnancy and had salpingectomy (2.9%).

1 patient was complicated by intestinal injury and temporary colostomy (1.4%) due to massive adhesions during Cs.

Another 1 patient complicated by bladder injury during Cs (1.4%) as shown in (Table 4).

Table 4: Descriptive data regarding incidence of complications diagnosed after admission

Complication	No.	%
No	14	20%
Yes	56	80%
Medical Complications		
Pre-eclampsia	17	24.3%
HELLP	1	1.4%
DKA	3	4.3%
Anemia	4	5.7%
UTI	1	1.4%
Surgical complications		
PAS	11	15.7%
Rupture Uterus	2	2.9%
Salpingectomy	2	2.9%
Hysterectomy	4	5.7%
Bladder injury	1	1.4%
intestinal injury	1	1.4%
Hypovolemic Shock	2	2.9%
Amniotic Fluid Disorders		
PROM	11	15.7%
Oligohydramnios	5	7.1%
Anhydramnios	2	2.9%

It is important to clarify that the total number of delivered babies after the age of viability = 54 of 70 (77.1%) as the age of viability = 22 weeks or more. The rest of patients were 7 discharged at early pregnancy without delivery, 6 miscarriages, 2 ectopic pregnancies and 1 vesicular mole.

Regarding adverse neonatal outcomes ; 17 babies out of 54 were preterm babies (31.5%).15 babies out of 54 admitted to NICU (27.7%), the majority (9 babies) were preterm, some (2 babies) had congenital anomalies, others (3 babies) were full term diagnosed as respiratory distress syndrome (RDS), and 1 was asymmetrical IUGR, while 9 babies were IUFD (16.6%). 3 babies had congenital anomalies (5.5%), these anomalies were an-anencephaly, congenital heart diseases and congenital kidney diseases. 2 babies develop fetal distress (3.7%) and required urgent CS, the cause of distress was not clearly identified as there was no clear data about cause of fetal distress. 1 baby was diagnosed as IUGR (1.4%) due to placental insufficiency as shown in (Table 5).

Table 5: Descriptive data regarding neonatal outcomes

	No= 54	%
Preterm	17	31.5%
NICU Admission	15	27.7%
IUFD	9	16.6%
Congenital anomalies	3	5.5%
Fetal distress	2	3.7%
IUGR	1	1.8%

Regarding adverse maternal outcomes

12 patients of 70 required ICU admission (17.1%), the cause of admission were sever preeclampsia, associated medical disorder mixed CT disease and surgical causes like PAS patients.

2 patients had maternal mortality (2.9%).,while 2 patients were on assisted ventilation (2.9%). 2 patients developed thrombo-embolic events as pulmonary embolism (2.9%).

It is important to note that the 2 patients who had died are the same 2 who had developed VTE and had been ventilated (Table 6).

Table 6: Descriptive data regarding specific maternal adverse outcomes

Adverse outcome	No= 70	%
ICU	12	17.1%
Mortality	2	2.9%
Assisted ventilation	2	2.9%
VTE(VenousThrombo embolic event)	2	2.9%

DISCUSSION

The present study aimed to investigate the effects of COVID-19 pneumonia among 70 SARS-CoV-2 positive pregnant women in Egypt with the median age of 30 years.

After reviewing many systematic reviews and meta-analyses it has been revealed that most common symptoms of pregnant women with COVID-19 were high fever, chills /shivers, fatigue/tiredness /myalgia, cough, dyspnea/shortness of breath, chest pain/tightness ,runny nose/ congestion, diarrhea, headache and sore throat^[5,6,7,8].

Similar symptoms have been reported in our study and the most common symptom was cough and loss of smell

50% and most common sign was fever(35.7%) concerning pregnant women.

In our study, it was found that COVID-19 was asymptomatic in approximately half of the pregnant women (50%). Lower percentages were reported in studies by Elshafeey *et al* and Mullins *et al.*(7.5% and 32%, respectively)^[6,9,10].

Our study found significant increase in incidence of preeclampsia (24.3%) with COVID-19, which is more than the incidence of general population (14%) according to a study done by Mou *et al.*,2021^[11].

Regarding perinatal outcomes of the newborns of pregnant women with COVID-19 ,Our study reported that preterm birth was observed in about(24.3%)of the total number (70) of pregnant women with COVID-19 and of (31.5%) of the total number of deliveries (54) after the age of viability .

While this percentage of preterm birth is lower in the studies of Della Gatta *et al.*, Elshafeey *et al.* and Yang *et al.* (12%,15%and 21%. respectively),and DeRose *et al.* And Smith *et al.* report higher rates (34% and64%respectively), These rates are also higher than what is reported for the general population (11%)^[12].

Preterm birth is closely associated with infant fatality and therefore this information must be carefully taken into consideration in the care and follow-up of infants with COVID-19^[13,14].

Our Study reported that most of the pregnant women with COVID-19 (57%) were delivered by caesarean section. In some of the studies examined, caesarean childbirth was implemented mostly for obstetric indications (43%) and for some women for COVID-19 indications (29%). El shafeey *et al.* ,De Rose *et al.* and Smith *et al.* reported higher caesarean rates in their studies (69%,77% and 80%,respectively)^[5,6,15].

Our study does not have enough data regarding vertical transmission as swabs were not routinely applied to infants born to COVID 19 positive mothers.

Regarding outcomes on admittance of pregnant women with COVID-19 and their infants into the intensive care unit and maternal–infant death, It was noted in this Study that a significant portion (17%) of the pregnant women were admitted into the intensive care unit (ICU), some were due to medical disorders like eclamptic fits, DKA, surgical causes like PAS and hypovolemic shock after massive bleeding, it was not clear if COVID 19 was the major cause of this rapid deterioration and admission to ICU or the coexisting complication was worse enough to make them admitted to ICU. As (2.9%) of patients acquired intubation

and mechanical ventilation due to venous thromboembolic events.

Elshafeey *et al.* reported that some women were admitted into intensive care (4.4%) and were administered mechanical ventilation (1.6%). In the study by Smith *et al.*, it was reported that one woman (4.3%) needed mechanical ventilation and was admitted in to the intensive care unit. These results indicated that COVID-19 is a serious health issue that threatens maternal/infant health during the period of pregnancy and beyond.

Regarding maternal mortality ,In all of the seventy patients in our study, two mothers were reported to have lost their lives (2.9%).

There was a study of 108 pregnant women, Zaigham and Andersson^[16] reported no incidents of maternal mortality.

Although the percentage we found was slightly higher than the general maternal mortality rate according to WHO 2019 (2.2%).

CONCLUSION

The evidence gathered showed that the symptoms ,diagnosis ,treatment and comorbidity factors associated with COVID-19 were significant. It was noticeable that morbidity especially preeclampsia ,preterm and caesarean birth rates necessitating admission to the intensive care unit as well as maternal and perinatal death rates were high in pregnant women with COVID-19 and their infants in our study.

CONFLICT OF INTERESTS

There are no conflicts of interest.

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