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Maternal and early neonatal outcomes in pregnant women with Covid-19 in Duhok city

Loura Omer Mohammed* Maeda Yousif Shamdeen Suad Taher Yasen*****

Abstract:

Background and objectives: Global pandemic brought on by new coronavirus (SARS-CoV-2) infection (COVID-19). The virus's effects on pregnancy, the fetus, and the newborn are among the many unanswered questions.

The study's objective is to assess the effects of COVID-19 during pregnancy on maternal and newborn outcomes.

Methods: A cross sectional study design with retrospective information was used at the Obstetrics and Gynecology teaching hospital in Duhok city from 1st August 2020 to 1st August 2021. The study included 100 pregnant women all of whom were COVID-19-positive (by reverse transcription polymerase chain reaction) admitted to the hospital in the study period. Data were collected from patients' medical files and case sheets including information about pregnancy, past history, delivery and intrapartum complication, and postnatal maternal and neonatal outcome.

Results: The mean age of the pregnant women was 31.6 years ranging between 22-43 years. More than two thirds of them (70%) were multiparous. Nineteen percent of the involved women were admitted to intensive care units with a maternal death of 9%. Nearly, 60% of those pregnant women delivered by caesarian section. Neonatal outcomes were as follow, 29% preterm birth, 49.5% neonatal intensive care units admission, 9% intrauterine fetal death, 15.4% neonatal infection with Covid-19 and 5% neonatal death.

Conclusions: Infection with COVID-19 during pregnancy could have adverse maternal and neonatal outcomes. Most significant effects include maternal death, intensive care unit admission, intrauterine fetal death, preterm birth, neonatal infection and death.

Keywords: Covid-19, Maternal outcome, Neonatal outcome, Pregnancy

Introduction

In 2019, Wuhan City, China, saw the start of the novel coronavirus SARS-CoV-2 pandemic. Within a short period of time, the diseases produced by that virus (COVID-19) spread globally, with most of the world's nations reporting cases. On January 30, 2020, the World Health Organization Emergency Committee designated COVID-19 a global health emergency. On March 11, 2020, it was classified as a pandemic.[1] Later on, it became clear that particular groups of patients, primarily the elderly, immune-compromised, and those with specific medical conditions, experienced more severe issues as a result of infection.

*MBChB, Senior house officer at Duhok Obstetrics and Gynecology Teaching Hospital
**MRCOG/FRCOG. Emeritus Professor.
Maida_yousif@yahoo.com
***MBChB/FIBMS / KHCMS/ University of Duhok, Duhok Obstetrics and Gynecology teaching hospital
Suad.yasen@uod.ac *Corresponding author: Loura Omer Mohammed
louraomar@yahoo.com

Among the susceptible groups to COVID-19 infection were the pregnant women also. This vulnerability is brought on by lower lung capacity, decreased functional residual capacity, and suppressed cytotoxic activity of lymphocytes caused by elevated progesterone.[2,3] Early in the pandemic, the general knowledge about the disease and its effects was low, and specifically regarding pregnancy and newborn outcomes, when the mother is infected with COVID-19, the knowledge was minimal. However, with the progress and continuation of the pandemic, evidence on how COVID-19 could affect the mother and the neonate gradually emerged. Numerous studies have demonstrated the negative effects of COVID-19 on pregnancy, including a higher risk of preeclampsia, death of the mother, disseminated intravascular coagulopathy, intrauterine death of the fetus, intrauterine growth retardation, preterm labour, spontaneous abortion and stillbirth. [4-8] These adverse effects on the mother and the baby had been documented in many studies on COVID-19 and pregnancy. [9]

More documented evidence was from a systematic review and meta-analysis of 77 studies. That review showed that there is increased risk of admission to intensive care units of pregnant ladies infected with COVID-19. In addition, they ran a higher risk of having preterm births and of having to admit their newborns to a neonatal care facility. [10,11]

In 2021, numerous research and meta-analyses found that pregnant women with COVID-19 were admitted to the ICU at higher rates than the general population. Preterm birth, preeclampsia, and cesarean sections all reported greater rates. In the UK the incidence of stillbirth is significantly increased from the beginning of the pandemic. A newborn is at risk of contracting an active infection from the mother through intrauterine transmission caused by transplacental hematogenous spread, intrapartum transmission following contact with infected maternal secretions during delivery, or postnatal transmission caused by droplet infection from infected family members or caregivers. [3,12-14]

The aim of the study was to evaluate maternal and neonatal outcomes related to COVID-19 infection. The objective outcomes include complications during pregnancy, mode of delivery, intrapartum and postpartum complications, ICU admission, need for respiratory support, maternal death, birth weight, APGAR score, respiratory distress, NICU admission, neonatal infection with the virus and neonatal death.

Patients and methods

A cross sectional study design with retrospective information was conducted on 100 pregnant women with confirmed Covid-19 infection. The patients were those admitted to the labor ward of Duhok obstetrics and Gynecology Teaching hospital, Duhok city, Kurdistan region, Iraq from 1st August 2020 to 1st August 2021. The inclusion criteria include pregnant women with positive polymerase chain reaction (PCR) test who delivered in the hospital for a gestational age ≥28 weeks of gestation (whether live birth, stillbirth, or medical terminations of pregnancy ≥28 weeks of gestation). Patients with negative Covid-19 PCR test and those with gestational age < 28 weeks were excluded.

The needed data for the study were collected retrospectively from patient's medical files and case sheets. Detailed information was taken including during pregnancy as age, parity, gestational age, antenatal care, past medical history of the mother, symptoms on admission, period between symptoms and delivery, also mode of delivery and any intrapartum complications. The maternal data after birth

includes postpartum complications, ICU admission, requirement for respiratory assistance, and mother death. Birth weight, APGAR score, respiratory distress, admission to the neonatal intensive care unit (NICU), neonatal infection, and neonatal death were among the information about the newborn that was recorded.

This study was approved by the Kurdistan Higher Council of Medical Specialties (KHCMS) ethics and scientific committee (approval No.1182 on September 8, 2021). The consent and permission were also taken from the hospital administration in order to access to patients' files.

The numerical continuous variables like age were presented in mean and standard deviation. The categorical variables related to mothers and newborns outcomes were summarized using frequency tables. The associated factors to maternal and neonatal mortality were examined in Pearson Chi square test. The significant level of difference was determined in a p-value of <0.05. The statistical calculations were performed in JMP Pro 14.3.0.

Results

Hundred women with COVID-19 were included in the study. Their mean age (SD) was 31.6 (5.52) years, and the age range was 22-43 years as presented in Table (1). Around one third (32%) of the women were aged ≥ 35 years, and 30% were aged 30%. The table shows that the majority (70%) of the women were multiparous. The majority (70%) of the pregnancies were term pregnancies, and 73% were attending antenatal care clinics. Only 21% of women had past medical history.

Table (1): Basic characteristics of women with COVID-19

Characteristics	No.	(%)
Age (22-43 years)	Mean: 31.61	SD: 5.52
Age (years) 20-24 25-29 30-34 ≥ 35	 11 27 30 32	 (11.0) (27.0) (30.0) (32.0)
Parity category Primiparous Multiparous Grand multiparous	 15 70 15	 (15.0) (70.0) (15.0)
Gestational age Preterm Term	 30 70	 (30.0) (70.0)
Antenatal care No Yes	 27 73	 (27.0) (73.0)
Past medical history No Yes	 79 21	 (79.0) (21.0)
Total	100	(100.0)

regards to o clinical presentation, around half (43%) of the women had uterine contraction, 24%
had shortness of breath, and 20% had cough. The other symptoms are presented in Table 2. Regarding the period between appearance of symptoms and delivery, it was 7-13 days in 38% of women and 0-6 days in 23% of women. More than half (58) of the women delivered by Cesarean section (Table 2).

Table (2): Clinical presentation of women with COVID-19

Clinical presentation	No.	(%) n = 100
Symptoms *		
Uterine contraction	43	(43.0)
Shortness of breath	24	(24.0)
Cough	20	(20.0)
Fever	15	(15.0)
No fetal movement	6	(6.0)
Leaking	5	(5.0)
Vaginal bleeding	2	(2.0)
Chest pain	1	(1.0)
Decreased fetal movement	1	(1.0)
Anosmia	1	(1.0)
Period between symptoms and delivery (days)		
0-6	23	(23.0)
7-13	38	(38.0)
14-20	17	(17.0)
21-27	4	(4.0)
28-59	9	(9.0)
≥ 60	9	(9.0)
Mode of delivery (n = 98) **		
Cesarean section	58	(59.2)
Normal vaginal delivery.	40	(40.8)
*****A woman may have more than one symptom. **Two patients died before delivery		

The intra and post-operative complications were as follows: Complications during pregnancy (35%), intrapartum complications (12%), preterm delivery (12%), post-partum complications (9%), ICU admission (19%), and death (9%) as presented in Table 3.

Table (3): Intra and post-delivery complications of women with COVID-19

Intra and post-delivery complications	No.	(%)
Complications during pregnancy		
No	65	(65.0)
Yes	35	(35.0)
Intrapartum complications		
No	88	(88.0)
Yes	12	(12.0)
Preterm delivery		
No	71	(71.0)
Yes	29	(29.0)
Post-partum complications		
No	91	(91.0)
Yes	9	(9.0)
ICU admission		
No	81	(81.0)
Yes	19	(19.0)
Outcomes of mothers		
Death	9	(9.0)
Discharge	91	(91.0)

It is evident in the table that the death rate was 23.3% among women with pre-term delivery, compared with 2.86% among women with term delivery (p = 0.001) (Table 4).

No significant association was detected between the outcome (death/discharge) with age (p = 0.988), parity (p = 0.292), antenatal care (p = 0.653), and past medical history (p = 0.104) as presented in Table 4.

Table (4): Association of maternal outcomes with socio-demographic information

	Outcome		
Socio-demographic information	Death No. (%)	Discharge No. (%)	p value*
Age (years)			
20-24	1 (9.09)	10 (90.91)	
25-29	2 (7.41)	25 (92.59)	0.988
30-34	3 (10.00)	27 (90.00)	
≥ 35	3 (9.38)	29 (90.63)	
Parity category			
Nulliparous	3 (20.00)	12 (80.00)	
Primiparous	3 (12.00)	22 (88.00)	0.292
Multiparous	2 (4.44)	43 (95.56)	
Grand multiparous	1 (6.67)	14 (93.33)	
Gestational age category			
Preterm	7 (23.33)	23 (76.67)	0.001
Term	2 (2.86)	68 (97.14)	
Antenatal care			0.653
No	3 (11.11)	24 (88.89)	

Yes	6 (8.22)	67 (91.78)	
Past medical history No Yes	 9 (11.39) 0 (0.00)	 70 (88.61) 21 (100.00)	 0.104
*Pearson Chi-squared test was performed for statistical analyses.			

Regarding neonatal outcomes, the majority (75%) of the neonates were of normal birth weight, 15% were of low birth weight, and 9% were of intra-uterine fetal death. Only 4.4% of the alive neonates had low APGAR score, and 49.5% of them had been admitted to NICU admission. The rate of neonatal COVID-19 infection was 15.4% as presented in Table 5.

Table (5): Neonatal outcomes of study population

Neonatal outcomes	No.	(%)
Birth weight Normal weight Very low birth weight Low birth weight Intra-uterine fetal death	 75 1 15 9	 (75.0) (1.0) (15.0) (9.0)
Neonatal and intra-uterine death No Yes Intra-uterine fetal death	 86 5 9	 (86.0) (5.0) (9.0)
APGAR score category (n = 91) Low APGAR score Acceptable APGAR score	 4 87	 (4.4) (95.6)
NICU admission (n = 91) * No Yes	 46 45	 (50.5) (49.5)
COVID-19 Neonatal infection (n = 91) No Yes	 77 14	 (84.6) (15.4)
*The total number of NICU admission is 91 due to IUFD.		

Discussion

It is obvious that a pregnant woman will experience various physiological changes that could make her more vulnerable to severe respiratory infections and eventual respiratory collapse. This is a major worry when it comes to COVID-19 infections. One of the most prevalent pathogens causing respiratory infections in humans is the coronavirus. SARS-CoV-2 includes enclosed variants with a single positive-sense RNA genome that range in size from 50 to 200 nm.[15]

In this study, 100 COVID-19-positive mothers were included, all of them were in the third trimester. Their ages were between 22-43 years with their mean age was 31.6 years. The majority of the women (70%) were multiparous, and the majority of the pregnancies (70%) were term pregnancies.

Only 21% of women had positive past medical history. Clinical presentations of women with covid-19 were varied. Around half of them (43%) had presented with uterine contractions, (24%) presented with shortness of breath, (20%) with cough, (15%) with fever. Other presentations were no fetal movement which were (6) cases, vaginal leaking (2) cases, vaginal bleeding, chest pain, decreased fetal movement and anosmia. [16,17]

Some of patients presented with more than one symptom. Regarding the period between appearance of symptoms and delivery varied, it was 7-13 days in 38% of women, and 0-6 days in 23%. With 9% of them delivered after 60 days from infection. In our study we also seek complications that developed during pregnancy, intrapartum and postpartum. 35% developed complications during period of pregnancy in the form of pre-eclampsia, diabetes mellitus, polyhydramnios, preterm delivery, intrauterine fetal death, maternal hypoxia and ICU admission. 12% developed intrapartum complications which include eclamptic fit, uterine atony and 9% developed postpartum complications like postpartum hemorrhage, and ICU admission. In our study out of 100 Covid-19 positive women 98 delivered, with 58 patients delivered by cesarean section, 48 by vaginal delivery and 2 patients died with their fetuses still intrauterine (before delivery). Out of 100 cases 19 of them admitted to ICU, maternal death occurs in 9 patients, and 91 patients discharged to home. The death rate was 23.3% among women with preterm delivery, compared with 2.86% among women with term delivery (p-value 0.001). No significant association was detected between maternal outcome with the maternal age, parity, antenatal care and past medical history of the mother. About early neonatal outcomes in the study, we follow up the neonates for one week either by contacting their families by phone or during their admission to NICU. In our study we encountered a high rate (29%) of preterm births. Along with high incidence of preterm births the incidence of low birth weight was 15% and 1% of very low birth weight. The majority of neonates were of normal birth weight 75%, 49.5% of neonates had been admitted to NICU, only 4.4% of alive neonates had low APGAR score, 95.6% had acceptable APGAR score. The rate of intrauterine fetal death was 9%, and neonatal death was 5%. In our study too, nasal swabs were taken from 91 alive neonates the incidence of neonatal infection with Covid-19 was 15.4%, but it was unknown whether the infection transmitted intrauterine, during labor, through breastfeeding or from maternal-neonatal contact. Studies done at the beginning of the pandemic suggested that there is no possibility of transmission of SARS-CoV-2 infection from the mother to the baby. They suggested also that the virus is not detected in the placenta, amniotic fluid, cord blood, and neonatal throat swab sample. Later on, clear evidence come to the ground suggesting that vertical transmission from mother to baby is possible. [17-21]

Conclusions

The clinical presentation of Covid-19 differs; it is severe in some patients that lead to ICU admission and maternal death. The rate of the cesarean section is high whether due to obstetric indications or due to maternal medical condition. There is high rate of preterm deliveries and Covid-19 infection of the neonate is possible.

Conflict of interest

The author declares no conflict of interest

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