

Maternal and Fetal Outcome among Pregnant Women with COVID-19 in Falluja, Iraq

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ABSTRACT

Background: During pregnancy, the respiratory system undergoes physiological changes like increased congestion and secretions of the upper airways, increase in the transverse diameter of the chest wall with an elevation of the diaphragm and this make pregnant woman more susceptible for infection.

Objective: To assess the possible association between COVID 19 infection and fetomaternal outcome.

Patients and Method: This descriptive study includes 60 pregnant females admitted at Al-Fallujah Teaching Hospital for Maternity and Children, Iraq. Blood samples were collected from pregnant women and sera were analyzed using COVID-19 IgG/IgM rapid test. All positive cases (60 cases) during the study period were followed for two weeks for fetal and maternal complications.

Results: Our study showed that 38.3% of the infected pregnant women have no symptoms, and 8.3% develop severe symptoms. There was one maternal death (1.67%). Our study showed that COVID-19 infection does not increase the miscarriage rate (5%). However, the current study showed a higher incidence of intrauterine fetal death (6.7%) in comparison with that in pregnancy in general (3.9%). All the adverse maternal and fetal outcomes were significantly associated with severe COVID-19, and asymptomatic pregnant women or those with mild or moderate symptoms have no added complications due to COVID-19 infection.

Conclusion: Pregnancy does not cause worsening of the COVID-19 course. Apart from the increased risk of intrauterine fetal death, pregnant women with COVID-19 infection do not cause a higher adverse fetal outcome.

Keywords: COVID-19 infection, Fetomaternal outcome, Pregnancy.

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INTRODUCTION

Coronavirus 2019 is a highly transmissible disease that caused in December 2019 an outbreak of grave pneumonia in Wuhan, China.¹ This highly contagious disease rapidly spread to many countries worldwide, which led the world health organization in January 2020 to state that this new Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-COVID-2) is an international health emergency.²

The SARS-COVID 2 is an enveloped single-stranded RNA that is thought to be zoonotic. It is transmitted by contact with or inhalation of infected droplets and the virus can persist for days on surfaces making the disease highly contagious. The virus has protein spikes, which bind to angiotensin-converting enzyme 2 receptors at the pneumocytes at the early phase of infection.³⁻⁵ There are multiple strains of this virus, and the virus has undergone many changes with time.³

The incubation period of the disease ranging between 2 to 14 days. There are three main clinical presentations: asymptomatic but infectious carrier, patients with variable pneumonia severity, and patients with acute respiratory distress.^{6,7} Although the respiratory system is the main target making fever and cough the most common complaints but other systems may be involved, like gastrointestinal system causing diarrhea and vomiting and the neurological system causing headache or confusion.¹ The mortality rate ranges between 3% to 6.3% depending on the quality of the health care system.⁷

To diagnose the disease, two major techniques are in use. First, molecular tests are based on reverse transcriptase-polymerase chain reaction (RT-PCR) detect the virus-specific RNA molecule. However, this test cannot differentiate between highly infectious viruses and neutralized viruses by patient immune response nor assess state of immunity against the virus.

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Second, serological tests can detect potential immunity against this disease in which plasma cells produce IgM antibodies at the early phase of the disease while IgG antibodies produce a large amount at later stages and may give immunity for an unknown duration.⁸ Other important advantage of serological tests is higher accuracy in detecting this infection in asymptomatic persons or before the symptoms.⁹

During pregnancy, the respiratory system undergoes physiological changes like increased congestion and secretions of the upper airways, increase in transverse diameter of the chest wall with elevation of the diaphragm, which makes pregnant women more susceptible to infection.^{10,11}

PATIENT AND METHODS

Our study was conducted in Al-Fallujah hospital for maternity and pediatric child health, Al-Fallujah, Al-Anbar, Iraq. Data was collected over three months, starting from first of August to the end of October 2020. About 60 pregnant females were enrolled in this study. They all attend the outpatient clinic, labour room, and those admitted for the elective and emergency caesarian section with symptomatic and Asymptomatic for of COVID-19 patients (Table 1). All patient in our hospital who are admitted to the emergency, labour room and theatre are screened for COVID-19 infection using serology (rapid test for covid IGg and IGm). 5 cc of venous blood was drawn from all patients admitted to the hospital. The sera of blood samples were separated by centrifuging them 2163.33 × g for 10 minutes and analyzed using COVID-19 IgG/IgM rapid test from CTK biotech-UAS (onSite Rapid test).

All positive cases (60 cases) during the study period were followed for two weeks for fetal and maternal complications. Detailed medical history and demographic data were recorded for each patient. Informed verbal consent was obtained for each patient after explaining the aim and benefits of the study. Characteristics, Diagnosis, and Management of COVID-19.

Statistical Analysis

Data analysis was carried out using the available statistical package of SPSS-27 (Statistical Packages for Social Sciences-version 27). Data were presented in simple measures of frequency, percentage, mean, standard deviation, and range (minimum-maximum values).

Table 1: Symptomatic and asymptomatic features of COVID-19 patients

<i>Types of clinical symptoms</i>	<i>Clinical symptoms</i>
Asymptomatic	Positive rapid test; no symptoms
	<i>Symptomatic</i>
Mild	Mild symptoms (cough, fever, or change smell); no dyspnea
Moderate	Clinical or radiographic evidence of lower respiratory tract disease; oxygen saturation ≥94%
Severe	Respiratory rate ≥30 breaths/min; lung infiltrates >50% Oxygen saturation <94%

The significance of difference of different percentages (qualitative data) were tested using Pearson Chi-square test (χ^2 -test) with application of Yate’s correction or Fisher Exact test whenever applicable. Statistical significance was considered whenever the p-value was equal to or less than 0.05.

RESULTS

Results in Table 1 shows the distribution of maternal age, parity, gestational age and medical history.

The results in the Table 2 shows the percentage of asymptomatic as 38.3%, while 36.7 as Moderate mild, as well as positive results as (25, 6.7 and 20) % for Feto-maternal outcomes, Maternal outcome and Fetal outcome respectively. Hence, the percentage for Fetal outcome as Preterm labour and mode of delivery as normal vaginal delivery (NVD) was (8.3, 68.4)%, respectively.

Table 3 shows the relation of maternal age, parity, gestational age, medical history, the severity of COVID-19, fetal outcome and mode of delivery to the poor maternal outcome.

There is no significant difference between poor maternal outcome and maternal age: parity, gestational age, medical history, fetal outcome, and mode of delivery. There is a statistically significant difference between the severity of covid 19 infection and poor maternal outcome (*p-value* 0.009).

Table 1: Percentage of maternal age, parity, medical history, mode of delivery, and Gestational age (weeks) at COVID-19

	<i>Parameter</i>	<i>No (n = 60)</i>	<i>%</i>
Maternal age (years)	20–24	18	30.0
	25–29	10	16.7
	30–34	17	28.3
	35–39	9	15.0
	≥ 40	6	10.0
		<i>Mean ± SD (Range)</i>	<i>29.0 ± 6.6</i>
Gestational age (weeks) at COVID-19	<24	9	15.0
	24–27	6	10.0
	28–35	11	18.3
	≥36	34	56.7
		<i>Mean ± SD (Range)</i>	<i>32.6 ± 8.3</i>
Parity	Para 0	18	30.0
	Para 1–4	34	56.7
	Para 5&more	8	13.3
		<i>Mean ± SD (Range)</i>	<i>2.2 ± 2.0</i>
Medical history	Positive	8	13.3
	Negative	52	86.7
	Asthma	1	
	DM	1	
	HT	4	
	Hypothyroid	2	

The Table 4 shows the relation of maternal age, parity, medical history, maternal outcome, and mode of delivery to the poor fetal outcome. There is no significant difference between poor fetal outcome and maternal age, gestational age, medical history, maternal outcome and mode of delivery.

There is statistically significant difference between the severity of covid 19 infection and poor fetal outcome ($p < 0.0001$). There is statistically significant difference between the gestational age and poor maternal outcome ($p < 0.0001$). There is a poorer fetal outcome at gestation 28 to 35 weeks.

DISCUSSION

The immune system undergoes many modifications during pregnancy to tolerate the paternally derived antigens expressed by the fetus. That’s why a pregnant woman may have a different response to infection.¹² One of these physiological changes is decreased in natural killer cells percentage during second and third trimesters, which may predispose to increased susceptibility of the pregnant women to have COVID-19 disease.¹³

Although our study showed that 38.3% of the infected pregnant women have no symptoms, which is less than seen in a study in USA on women attending maternity unit (88% asymptomatic)¹⁴ and less than in the general population

Table 2: Percentage of asymptomatic, feto-maternal outcomes, maternal outcome, fetal outcome and mode of delivery

Parameter		No (n=60)	%
Symptoms	Asymptomatic	23	38.3
	Mild	10	16.7
	Moderate	22	36.7
	Severe	5	8.3
Feto-maternal outcomes	Positive	15	25.0
	Negative	45	75.0
Maternal outcome#	Positive	4	6.7
	Negative	56	93.3
Fetal outcome	Positive	12	20.0
	Negative	48	80.0
Fetal outcome	IUD	4	6.7
	Miscarriage	3	5.0
	Preterm labour	5	8.3
	Alive	48	80.0
Mode of delivery (n = 57)	NVD	39	68.4
	CS	18	31.6

#Maternal outcome includes 2 Acute RDS, 1 PPH and 1 Death

Table 3: Relationship between the maternal outcome with maternal age, parity, medical history, mode of delivery and Gestational age (weeks) at COVID-19

	Maternal outcome				p-value	
	Positive		Negative			
	No	%	No	%		
Maternal age (years)	20–24	-	-	18	100	0.300
	25–29	2	20.0	8	80.0	
	30–34	1	5.9	16	94.1	
	35–39	1	11.1	8	88.9	
	≥ 40	-	-	6	100.0	
Gestational age (weeks) at COVID-19	<24	-	-	9	100.0	0.327
	24–27	1	16.7	5	83.3	
	28–35	1	9.1	10	90.9	
	≥36	2	5.9	32	94.1	
Parity	Para 0	2	11.1	16	88.9	0.555
	Para 1–4	2	5.9	32	94.1	
	Para 5 and more	-	-	8	100	
Symptoms	Asymptomatic	-	-	23	100	0.009*
	Mild	-	-	10	100	
	Moderate	2	9.1	20	90.9	
	Severe	2	40.0	3	60.0	
Medical history	Positive	-	-	8	100	0.417
	Negative	4	7.7	48	92.3	
Medical history	Asthma	-	-	1		
	DM	-	-	1		
	HT	-	-	4		
	Hypothyroid	-	-	2		

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	Maternal outcome					p-value
	Positive		Negative			
	No	%	No	%		
Fetal outcome	Positive	1	8.3	11	91.7	0.796
	Negative (alive)	3	6.3	45	93.8	
Fetal outcome type	IUD	1	25.0	3	75.0	0.433
	Miscarriage	-	-	3	100	
	Preterm labour	-	-	5	100	
	Alive	3	6.3	45	93.8	
Mode of delivery (n=57)	NVD	3	7.7	36	92.3	0.769
	CS	1	5.6	17	94.4	

*Significant difference between percentages using Pearson Chi-square test (χ^2 -test) at 0.05 level.

Table 4: Relationship between the poor fetal outcome with maternal age, parity, medical history, maternal outcome, mode of delivery

	Fetal outcome					p-value
	Positive		Negative			
	No	%	No	%		
Maternal age (years)	20–24	2	11.1	16	88.9	0.405
	25–29	4	40.0	6	60.0	
	30–34	4	23.5	13	76.5	
	35–39	1	11.1	8	88.9	
	≥ 40	1	16.7	5	83.3	
Gestational age (weeks) at COVID-19	<24	3	33.3	6	66.7	0.004*
	24–27	-	-	6	100	
	28–35	6	54.5	5	45.5	
	≥36	3	8.8	31	91.2	
Parity	Para 0	4	22.2	14	77.8	0.842
	Para 1–4	7	20.6	27	79.4	
	Para 5&more	1	12.5	7	87.5	
Symptoms	Asymptomatic	0	.0	23	100	0.0001*
	Mild	0	.0	10	100	
	Moderate	9	40.9	13	59.1	
	Severe	3	60.0	2	40.0	
Medical history	Positive	1	12.5	7	87.5	0.569
	Negative	11	21.2	41	78.8	
Maternal outcome	Positive	1	25.0	3	75.0	0.796
	Negative	11	19.6	45	80.4	
Mode of delivery (n=57)	NVD	8	20.5	31	79.5	0.150
	CS	1	5.6	17	94.4	

*Significant difference between percentages using Pearson Chi-square test (χ^2 -test) at 0.05 level.

(41% asymptomatic) as in a study in Iceland,¹⁴ but only 5 out of 60 pregnant women (8.3%) develop severe symptoms while the risk of severing COVID-19 is 14% in adults having this infection,¹⁵ and there was one maternal death (1.67%) in the current study in comparison with a mortality rate of 2.9% in general.¹⁶ So, our study revealed that pregnancy is not a risk factor for developing severe COVID-19 and this in agreement

with a study undertaken in China which found that pregnancy did not cause worsening of the course of COVID-19.¹⁷

Current study showed that COVID-19 infection does not increase miscarriage rate (5%) in comparison with its rate (8–15%) in all pregnancies¹⁸ nor preterm labor (8.3%), which is less than that in pregnancy (9.3–11.8%).¹⁹ However, the current study showed a higher incidence of intrauterine fetal

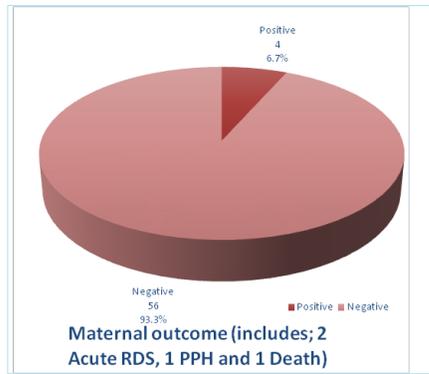


Figure 1: Percentage of poor maternal outcome

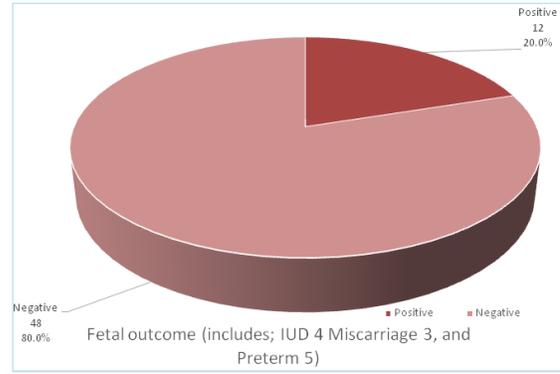


Figure 2: Percentage of a patient with of poor fetal outcome

death (6.7%) in comparison with that in pregnancy in general (3.9%).²⁰

All the adverse maternal and fetal outcomes were significantly associated with severe COVID-19, and asymptomatic pregnant women or those with mild or moderate symptoms have no added complications due to COVID-19 infection. These studies showed that apart from increased risk of intrauterine fetal death, pregnant women with COVID-19 infection do not have higher maternal or fetal adverse outcome and this is in agreement with a study done in a neighboring country Kuwait²¹ and review about pregnancy and COVID-19 by Elizabeth A. N. Wastnedge *et al.*²²

CONCLUSION

Pregnancy does not cause worsening of the COVID-19 course. Besides the increased risk of intrauterine fetal death, pregnant women with COVID-19 infection do not have higher adverse fetal outcomes.

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