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Clinical findings, treatments and obstetric results of pregnant women diagnosed with coronavirus disease 2019

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Abstract

Background/Aim: Coronavirus disease 2019 (COVID-19), which causes acute respiratory disease, is an emergency that concerns global public health. Limited data are available on coronavirus disease 2019 in pregnant women. We aimed to evaluate the characteristic features and perinatal results of pregnant women diagnosed with COVID-19.

Methods: This retrospective cohort study was conducted in a Training and Research Hospital. Clinical records and perinatal results of 84 pregnant women and 46 newborns diagnosed with coronavirus disease 2019 in a pandemic hospital on the Asian side of Istanbul between March 29-June 30, 2020, were retrospectively analyzed.

Results: The mean maternal age of the patients was 28.8 (5.6) (17-43) years. The most common symptoms were cough (41.7%), shortness of breath (26.2%), fever (19%), myalgia and malaise (19%). Fifteen percent of patients were in the first trimester, 20.2% were in the second and 64.3% were in the third trimester. Sixty-two percent of the pregnant women were PCR positive and 38.1% had clinical or radiological findings. CT was performed in 27 patients, and lung findings were observed in 23. Among all, 29.8% of the patients received inpatient treatment and 70.2% received outpatient treatment or follow-up. Medical treatment was given to 42.9% of the patients. Sixty percent of the hospitalized pregnant women were admitted to the adult intensive care unit and 3.6% (3/84) resulted in maternal death. Thirteen newborns (28.2%) were admitted to the neonatal intensive care unit. Fever was seen in 6.5% (3/46), dyspnea, in 15.2% (7/46), and pneumonia, in 13% (6/46) of the hospitalized newborns. PCR was performed only in newborns admitted to the neonatal unit. All neonatal PCR tests were negative. Death due to sepsis was seen in 3 newborns.

Conclusion: COVID-19 can cause preterm labor in pregnant women. Lymphocyte, thrombocyte, and CRP values may be useful in clinical follow-up and treatment. PCR positivity decrease and CT findings increase with clinical severity.

Keywords: COVID-19, Pandemic, Pneumonia, Pregnancy, Pregnancy outcomes, Pregnant women, Preterm birth, SARS-CoV-2, Vertical transmission

Introduction

Due to suppressed immunity and physiological changes during pregnancy, the transmission of viral infections poses a risk for the mother and the baby [1]. Suppression of the mother's immunity to prevent the fetus from being affected and physiological dyspnea caused by changes in the lung complex render pregnant women more vulnerable to viral diseases [1]. An enveloped, segmented, and single-stranded RNA virus from the betacoronaviridae family, coronavirus disease 2019 (COVID-19) causing Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-COV-2) emerged in Wuhan in 2019 and caused major health problems all over the world. SARS (severe acute respiratory syndrome) in 2003 and MERS (Middle East respiratory syndrome) in 2012 caused high mortality among pregnant women. Coronavirus disease 2019 (COVID-19) poses a risk in pregnant women due to the above-mentioned physiological reasons [2]. The coronavirus can cause illness ranging from a mild cold to pneumonia and is spread mainly by droplets [3]. Mothers infected with the virus may be asymptomatic or may present with clinical symptoms such as fever, dry cough, dyspnea, and myalgia [4]. Radiological demonstration of lung involvement is helpful in diagnosis [4]. The gold standard for definitive diagnosis is the real-time reverse transcriptase-polymerase chain reaction (RT-PCR) test [5]. With this study, we aimed to evaluate the clinical features, laboratory, and radiological findings and perinatal results of 84 pregnant women and 46 newborns with suspected or diagnosed COVID-19.

Materials and methods

This retrospective cohort study was conducted in Health Sciences University, Umraniye Training and Research Hospital, Department of Obstetrics and Gynecology. All pregnant women with a diagnosis or suspicion of COVID-19 who visited our hospital since the beginning of the pandemic were included in the study. Data were collected between March-June 2020. Ethical approval was obtained from the local Ethics Committee of Health Sciences University Umraniye Training and Research Hospital (Approval number 2020 / 308).

Of the pregnant women, 52 patients with positive RT-PCR tests and 32 patients with symptoms and radiological findings but negative RT-PCR tests were included in the study. Asymptomatic pregnant women with negative RT-PCR tests were excluded.

Complaints of pregnant patients (fever, cough, shortness of breath, weakness, myalgia, etc.), demographic (age, BMI, additional disease) details, week of gestation according to last menstrual period, the severity of infection (asymptomatic, mild, moderate, severe), patient follow-up data (outpatient, inpatient, intensive care need), laboratory values (complete blood count, liver and kidney functions, electrolytes, CRP, ferritin, fibrinogen, D-dimer, coagulation tests), treatments administered, data regarding the pregnancy and its complications (abortus, stillbirth, preterm birth, maternal mortality), gestational age at birth, mode of delivery, cesarean section indication, complications, neonatal birth weight, Apgar scores, neonatal intensive care unit (NICU) admission data and neonatal outcomes were collected. Pregnant women with a positive real-time reverse transcriptase-polymerase chain reaction (RT-PCR) test evaluated with nasal and pharyngeal swab samples, and those with negative PCR tests but having symptoms or positive CT findings were diagnosed with COVID-19.

Patients were evaluated according to the severity of symptoms and test results. Asymptomatic or mildly symptomatic patients were followed at home under quarantine. The patients were divided into Group 1 (asymptomatic, mild) and Group 2 (moderate and severe) according to their symptoms. The mild form of COVID-19 was characterized by fever with a body temperature below 38.5°C, cough, fatigue, sore throat, and the absence of clinical signs of moderate to severe disease. Those with moderate/severe clinical symptoms were followed up in the hospital. Moderate disease symptoms included a fever of 38.5°C and higher, respiratory rate of more than 22/minute, shortness of breath during physical activity, pneumonia confirmed by CT scan, and an oxygen saturation of more than 95%. Severe symptoms of the disease included a respiratory rate of more than 30/minute, an oxygen saturation of 94% and lower, $PaO_2 / FiO_2 \leq 300$ mmHg, progression of lung damage ($\geq 50\%$ increase of damaged tissue in 24-48 hours), impaired consciousness and unstable hemodynamics [6].

Patients were advised to visit the emergency department if their symptoms increased, or their general condition deteriorated. Radiological imaging was performed with posteroanterior (PA) chest radiography or Thoracic CT scan in eligible patients during pregnancy. The consent form was obtained before the procedure, and the entire abdomen was covered with a lead blanket during scanning and the fetus was protected from radiation. Thoracic CT scans were performed in the postpartum period in symptomatic patients with positive RT-PCR tests who did not undergo imaging. Thoracic CT scan and posteroanterior (PA) chest radiography findings were evaluated by a radiologist and/or chest diseases specialist.

In light of the recommendations of the Scientific Committee of the Ministry of Health, the treatments of the patients were determined by the infection and chest diseases specialists. Daily laboratory tests were requested from the hospitalized patients and weekly PCR tests were performed. Oxygen support was given to all patients with nasal cannula/face mask, and patients were monitored with ECG.

Medical treatment included lopinavir/ritonavir, 2 tablets twice daily for 10 days (Kaletra 200 mg/50 Tab), or favipravir at a loading dose of 1600 mg twice a day and a maintenance dose of 600 mg twice a day for 5 days (Favicovir 200 mg Tab), or Hydroxychloroquine 200 mg twice a day for 5 days (Plaquenil 200mg Tab) administered orally. In addition, 4000IU Enoxaparin sodium (Enox 4000/0.4 ml) was administered subcutaneously once a day, azithromycin 500 mg tablet was given perorally on the first day, and 250 mg perorally daily on the following 4 days, ceftriaxone 1000 mg was administered intravenously twice a day. Plasma therapy was given to eligible patients and patients with clinical worsening. Mothers whose clinical conditions worsened and those with viable pregnancies (24 weeks) were delivered by cesarean section. Necessary isolation measures were taken during the operation. The newborns were isolated and 1st and 5th minute Apgar scores, birth weight, neonatal sepsis findings, neonatal

intensive care admission, clinical symptoms, and RT-PCR results were noted.

Statistical analysis

Continuous variables were expressed as Mean (SD), and categorical variables were given as numbers and percentages. The paired-sample t-test and Wilcoxon Signed Rank test were used to compare the laboratory findings both before and after treatment. Pearson`s chi-square, likelihood chi-square (for the tables when expected values in cells were less than 5), and Fisher`s exact tests were used to assess qualitative variables. A P-value <0.05 was considered statistically significant. Statistical Package for the Social Sciences (SPSS) (version 22) was used for analysis.

Results

The demographic characteristics of patients with diagnosed or suspected COVID-19 are summarized in Table 1. The mean age and BMI of the patients was 28.8 (5.6) (17-43) years and 25.4 (3.1) kg/m^2, respectively. The mean week of gestation was 28.2 (11.1). Out of 84 patients, 13 (15.5%) were smokers and 19 (22.6%) had concomitant diseases. Among all, 15.5% of the patients were in the first trimester, 20.2% were in the second and 64.3% were in the third trimester. PCR test positivity rate was 61.9% and 38.1% had clinical or radiological findings. CT was performed in 27 patients and positive lung findings were observed in 23.

Table 1: Demographic and baseline characteristics, and clinical outcomes of coronavirus disease-2019 in pregnant women

	Values
Age (years)	28.7 (5.6) (17 - 43)
BMI (kg/m^2)	25.4 (3.1) (20 - 35)
Gestational age on admission (week)	28.1 (1.1) (4 - 40)
1st Trimester	13 (15.5%)
2nd Trimester	17 (20.2%)
3rd Trimester	54 (64.3%)
Parity	1.1 (1.1) (0 - 5)
Comorbidities	19 (22 6%)
Diabetes mellitus	4 (4.8%)
Hypothyroidism	4 (4.8%)
Chronic hypertension	3 (3.6%)
Asthma	2 (2.4%)
Other	6 (7.4%)
Smoking	
Yes	13 (15 5%)
No	71 (84 5%)
Symptoms	
Cough n (%)	35 (41.7%)
Shortness of breath n (%)	22 (26.2%)
Fever n (%)	16 (19%)
Myalgia and weakness n (%)	16 (19%)
Headache n (%)	12 (14 3%)
Sore throat n (%)	8 (9.5%)
Loss of taste n (%)	3 (3.6%)
Diarrhea n (%)	3 (3.6%)
No symptoms n (%)	18 (21.4%)
Diagnosis	
RT-PCR	52 (61.9%)
CT	23 (27.3%)
Diagnosed by Symptom Only	9 (38.1%)
Thorax CT findings (n=27)	
Ground-glass opacity n (%)	22 (74%)
Patchy shadowing n (%)	15 (55%)
Atelectasis or pleural effusion n (%)	10 (37%)
No finding n (%)	4 (14%)
No treatment n (%)	48 (57.1%)
Treatment n %	36 (42.8%)
Supplemental O2 n (%)	25 (29.8%)
Hydroxychloroquine n (%)	7 (8.3%)
Invasive mechanical ventilation n (%)	5 (6%)
Antiviral therapy n (%)	29 (24.4%)
Antibiotic therapy n (%)	18 (21.3%)
Anticoagulant therapy n (%)	36 42.8%
Disease severity	
Moderate to severe n (%)	25 (29.8%)
Asymptomatic and mild n (%)	59 (70.2%)
Follow-up	
Inpatient n (%)	25 (29.8%)
Outpatient n (%)	59 (70.2%)

The mean time between the onset of complaints and hospital admission was 2.1 (1.62) (0-7) days. Cough, fever, sore throat, headache, shortness of breath, myalgia and malaise, diarrhea, loss of taste and other symptoms were seen in 41.7%, 19%, 9.5%, 14.3%, 26.2%, 19%, 3.6%, 3.6%, and 7.1% of the patients. The rate of asymptomatic patients was 21.4%.

29.8% of the patients received inpatient and 70.2% received outpatient treatment. Medical treatment was administered to 42.9% of the patients. Five patients (6%) were admitted to the adult intensive care unit and 3 (3.6%) died. The mean duration of hospitalization was 6.6 (4.9) (range 18) days. Pregnancy and fetal results are summarized in Table 2.

Table 2: Perinatal outcomes of coronavirus disease-2019 in pregnant women

	Values
Pregnancy complications	
Preeclampsia n (%)	4 (4.8 %)
Oligohydramnios n (%)	3 (3.6%)
Cholestasis n (%)	3 (3.6%)
Gestational Diabetes Mellitus n (%)	1 (1.2%)
Preterm labor n (%)	23 (27.4%)
PROM n (%)	2 (2.4%)
Delivery method	
Ongoing pregnancy n (%)	35 (41.6%)
Abortus n (%)	3 (3.6%)
Vaginal delivery n (%)	14 (16.7%)
Cesarean delivery n (%)	32 (38.1%)
Indication of cesarean delivery	
Previous uterine surgery	10 (12%)
Fetal distress	7 (8.3%)
Clinical outcomes of newborns (n=46)	
Neonatal birthweight (g) mean (SD)	3190.7 (773.5)
Apgar 1st min. mean (SD)	7.8 (1.8)
Apgar 5th min. mean (SD)	9.3 (0.9)
Transferred to NICU n (%)	13 (28.2%)
Neonatal symptoms	
Fever n (%)	3 (6.5%)
Dyspnea n (%)	7 (15.2%)
Pneumonia n (%)	6 (13%)
Neonatal death n (%)	3 (5.3%)
Neonatal RT-PCR(+)	0

PROM: Preterm Rupture of Membranes, RT-PCR: The real-time reverse transcription polymerase chain reaction

Pregnancies of 41.7% (35/84) of the patients continued, 3.6% (3/84) had an abortion and 54.8% (46/84) gave live births. Cesarean section was performed in 31.12% of deliveries, while 16.7% had normal birth. Forty-six babies were born.

The mean 1st and 5th minute Apgar scores of the newborns were 7.8 (1.8) (3-9) and 9.3 (0.9), respectively. The mean birth weight was 3190.7 (773.5) grams. Thirteen of the forty-six of newborns (28.2%) were admitted to the neonatal intensive care unit, among which fever was observed in 6.5% (3/46), dyspnea in 15.2% (7/46), and pneumonia in 13% (6/46). The COVID-19 PCR tests of the newborns admitted to the intensive care were negative. Mortality was observed in 3 newborns.

Comparison of demographic characteristics and laboratory values is summarized in Table 3. Significant differences were observed between Group 1 and Group 2 in terms of PCR and CT results (P=0.045, P=0.002). There was less PCR positivity and more CT findings in Group 2 compared to Group 1. Significant differences were observed between the groups in terms of fetal distress (p=0.001), birth weight of the newborns and neonatal intensive care need (p=0.002, p=0.006, respectively).

Table 3: Comparison of groups according to the clinical severity of the patients

	Total	Group 1 asymptomatic/ mild	Group 2 moderate/ severe	P-value
Age (years) mean (SD)	28.7 (5.6) (17-43)	28.4 (5.7) (17-43)	29.6 (5.3) (20-38)	0.702
BMI (kg/m^2) mean (SD)	25.4 (3.1) (20-35)	25.2 (2.9) (21-34)	26 (3.5) (20-30)	0.483
Gestational age on admission (week) mean (SD)	28.1 (11.1) (4-40)	28.2 (11.7) (4-40)	26.6 (10.6) (6-39)	0.297
1st Trimester	13 (15.5%)	10 (11.9%)	3 (3.6%)	
2nd Trimester	17 (20.2%)	11 (13.1%)	6 (7.1%)	
3rd Trimester	54 (64.3%)	38 (45.2%)	16 (19%)	
Parity mean (SD) range	1.1 (1.1) (0-5)	1.1 (1) (0-5)	1.2 (1.1) (0-4)	0.883
Additional disease	19 (22.6%)	11 (13.1%)	8 (9.5%)	0.181
Diabetes mellitus	4 (4.8%)	2 (2.4%)	2 (2.4%)	
Hypothyroidism	4 (4.8%)	3 (3.6%)	1 (1.2%)	
Chronic hypertension	3 (3.6%)	1 (1.2%)	2 (2.4%)	
Asthma	2 (2.4%)	-	2 (2.4%)	
Other	6 (7.4%)	4 (4.8%)	2 (2.4)	
Smoking				0.566
Yes	13 (15.5%)	10 (11.9%)	3 (3.6%)	
No	71 (84.5%)	49 (58.3%)	22 (26.2%)	
Symptoms				
Cough n (%)	35 (41.7%)	21 (35.6%)	14 (56.0%)	0.083
Shortness of breath n (%)	22 (26.2%)	15 (17.9%)	7 (8.5%)	0.806
Fever n (%)	16 (19%)	12 (14.3%)	4 (4.8%)	0.643
Myalgia and weakness n (%)	16 (19 %)	11 (13.1%)	5 (6%)	NS
Headache n (%)	12 (14.3%)	7 (8.5%)	5 (6%)	NS
Sore throat n (%)	8 (9.5%)	5 (6%)	3 (3.6%)	NS
Loss of taste n (%)	3 (3.6%)	2 (2.4%)	1 (1.2%)	NS
Diarrhea n (%)	3 (3.6%)	1 (1.2%)	2 (2.4%)	NS
No symptoms n (%)	18 (21.4%)			
Diagnosis				
RT-PCR	52 (61.9%)	31 (36.9%)	19 (22.6%)	0.045*
CT	23 (27.3%)	13 (15.5%)	14 (16.7%)	0.002*
Diagnosed by Symptom Only	9 (38.1%)			
Delivery method				
Ongoing pregnancy	35 (41.6%)			
Abortus n (%)	3 (3.6%)	2 (2.4%)	1 (1.2%)	NS
Vaginal delivery n (%)	14 (16.7%)	9 (10.7%)	5 (6%)	0.594
Cesarean delivery n (%)	32 (38.1%)	23 (27.4%)	9 (10.7%)	0.797
Indication of cesarean delivery				
Previous uterine surgery	10 (12%)	7 (8.3)	3 (3.5%)	0.986
Fetal distress	7 (8.3%)	-	7 (8.3%)	0.001*
Clinical outcomes of newborns (n=56)				
Neonatal birthweight (gr)	3190.7 (773.5)	3397.6 (748.9)	2681 (591.5)	0.002*
Transferred to NICU n (%)	14 (25%)	5 (9%)	9 (16%)	0.006*
Neonatal death n (%)	3 (5.3%)	2 (3.5%)	1 (1.7%)	NS
Laboratory findings				
Leucocytes (10^9/L) mean (SD)	9.6 (3.45)	9.8 (3.3)	9.2 (3.7)	0.472
Lymphocytes(10^9/L) mean (SD)	1.55 (0.64)	1.68 (0.63)	1.25 (0.57)	0.004*
Platelets 10^3/mm3 mean (SD)	226.8 (68.8)	240.1 (59.7)	195.4 (79.3)	0.016*
CRP (mg/dL) mean (SD)	3.1 (4.11)	2.02 (3.40)	5.7 (4.49)	0.001*
Ferritin (ng/ml) mean (SD)	102.6 (134)	75 (121.3)	98.3 (135.9)	0.870
Fibrinogen (mg/dl) mean (SD)	498 (131)	528.5 (134.1)	478.7 (123.6)	0.311
D-dimer (ng/ml) mean (SD)	2073.4 (1310.7)	2005.1 (1323.9)	2043.5 (1246.9)	0.941
AST (U/L) mean (SD)	59.8 (115.8)	23.2 (14.7)	92.9 (153.4)	0.051
ALT (U/L) mean (SD)	53.1 (105)	22.5 (35.9)	99.1 (151.4)	0.033*

AST: Aspartate aminotransferase enzyme, ALT: Alanine aminotransferase enzyme, CRP: C-reactive protein, CT: Computer Tomography, RT-PCR: The real-time reverse transcription polymerase chain reaction, NICU: neonatal intensive care unit, (*) There is significant difference between the Group 1 and the Group 2 (P<0.05).

Discussion

In the literature, the average age of pregnant women with COVID-19 positive ranges between 29-32 years. It has been reported that pregnant women positive for COVID-19 are mostly in the 3rd trimester [7]. In a study conducted on 50 pregnant women with a positive COVID-19 PCR tests, the mean age was 30 years, and the mean week of gestation was 36 weeks [8]. In a case series of 116 patients, the mean age was reported as 30.8 (24-41) years and the gestational week as 38 (IQR 36-39) weeks [9]. In addition, in a study involving 388 patients from 22 different cities and 73 centers, the mean age of the patients was 32.2 years, and the mean week of gestation was 30.6 (9.5) weeks [10]. In our study, the mean age of the patients was 28.8 (5.6) years, and the mean gestational week was 28.2 (11.1) weeks. Among them,

15.5% were in the first trimester, 20.2%, in the second trimester and 64.3%, in the third trimester.

The data of symptomatic patients differ in the literature. While fever was observed in 87% of patients in Yang et al.'s study [11], another study found fever in 17.3% [12]. Jie et al. [9] reported that the most common symptom was fever with a rate of 50.9% (59/116), which was followed by cough (28.4%, 33/116). In a systematic review of 108 pregnant women, 68% of the patients had fever, 34% had persistent dry cough, 12% had dyspnea, and 6% had diarrhea. [13]. In another publication, 52.1% of the patients had cough, 44.1% had fever, 15.5% had shortness of breath, and 24% of the patients were asymptomatic [10]. In our study, the rates of cough, shortness of breath and headache were 41.7%, 26.2%, and 14.3%, respectively. The rate of asymptomatic patients was 21.4%.

Although the diagnosis of COVID-19 was made by PCR, the value of diagnosis with thoracic CT is higher due to the high PCR false negativity [12]. In another study, 96.3% (104/108) of pregnant women with a clinical diagnosis of COVID-19 had pneumonia in thoracic CT scans [9]. In a study conducted on 388 pregnant women, CT was obtained in 56 patients (14.4%), among which bilateral multifocal involvement was observed in 80.4% (45/56) [10]. In our study, 52 (61.95%) patients were diagnosed by PCR tests, and 32 (38%) were diagnosed clinically and radiologically. Chest CT was performed in 27 patients, and COVID-19 lung findings were observed in 23. The most common lung findings included ground-glass opacity (74%) and patchy shadowing (55%). The diagnostic value of CT was high. PCR positivity decreased and thorax CT findings increased with disease severity.

It has been reported that laboratory values of IL-6 and CRP can provide information about the severity and course of the disease in a study conducted on 140 patients [14]. In another study of 58 patients, CRP and procalcitonin values were significantly associated with disease severity [12]. In a study by Naudi et al. [7], 70% of the patients who gave birth by cesarean section had high CRP values and 59% had lymphopenia. In another study involving 116 pregnant women, lymphopenia was observed in 44% of the patients, leukopenia in 24.1%, and high CRP in 44% [9]. Comparing with the control group in 61 patients, Justin et al. [15] reported that low WBC and platelet counts in COVID-19 positive patients indicated the severity of the disease. The majority of patients had decreased white blood cell, platelet, and lymphocyte count and increased alanine aminotransferase and aspartate transaminase values. In our study, lymphocyte and platelet count decreased, and CRP and ALT values increased with disease severity. We think that lymphocyte, CRP, and platelet count are valuable in the follow-up and treatment of the disease.

It has been reported that antibiotics, antivirals, anticoagulants, corticosteroids, and plasma are given in the treatment of the disease since it is a viral infection [16]. In a study conducted with 61 COVID-19 positive pregnant women (n = 54), they did not give any treatment to those who were not severely ill (supplemental O$_2$, hydroxychloroquine, remdesivir, antibiotics, steroid use, mechanical ventilation, ICU admission). In a multicenter study of 388 patients, 222 (57.2%) patients were not treated. Among the rest, hydroxychloroquine was given to 90 patients (23.2%), antibiotics, to 79 (20.4%), azithromycin to 58

(14.9%), LMWH to 87 (22.4%), and antiviral agents (lopinavir / ritonavir) were given to 72 patients (18.6%) [10]. Studies suggest administering a prophylactic dose of low molecular weight heparin (LMWH) for hospitalized patients due to the increased risk of intravascular thrombosis in COVID-19 positive patients [17]. In our study, 36 patients received treatment, and low molecular weight heparin (LMWH) was administered to all. Medical treatments given in addition to LMWH were favipravir (21.4% of patients), lopinavir/ritonavir (13%), hydroxychloroquine (8.3%), ceftriaxone (16.6%), and azithromycin (4.7%).

In a study, only 2 of 48 COVID-19 positive pregnant women gave birth via normal vaginal delivery and 39% had premature birth [8]. In another study involving 52 pregnant women, preterm labor occurred in 15.3% of the patients [12]. In a small series of 5 cases, stillbirth was reported as a result of chorioamnionitis, secondary to infection [18]. In the study of Yang et al. including 118 pregnant women, the rates of preterm labor, neonatal asphyxia and stillbirth were 21.3%, 1.2%, and 1.2%, respectively [11]. There was one spontaneous abortion in 116 cases, preterm labor in 21.2%, and Preterm Rupture of Membranes (PROM) in 6.1%. Severe asphyxia occurred in 1 out of 100 newborns [11]. The worldwide preterm birth rate is estimated to be around 11% (5% in Europe, 18% in Africa) [19]. In our study, 41.6% of pregnancies continued, 27.4% resulted in preterm labor, 3.6% in abortion, and 2.4% in PROM. We noticed that the rate of preterm birth increased with COVID19.

In a study, 85 (85.9%) of pregnant women with COVID-19 gave birth by cesarean section and 14 (14.1%) by vaginal delivery [20]. In other studies, 92% of COVID-19 pregnant women gave birth by cesarean section and 8% by vaginal delivery. Fetal distress was reported as the most common cesarean indication [21, 22]. In our study, 38.1% of women delivered by cesarean section and 16.7% by normal vaginal delivery. The most common cause of cesarean section in clinically severe COVID-19 patients was fetal distress.

Recent studies have shown that most newborns born to infected mothers are asymptomatic and there is only limited evidence of vertical transmission [23]. However, many studies have shown that there is no vertical transition (amniotic fluid, cord blood, neonatal throat swab samples, Breastmilk samples) [8, 20, 21, 24]. Neonatal death was reported in 5 (2.0%) of 251 COVID-19 pregnancies (3 due to prematurity and 2 due to sepsis), and only one (0.4%) of 251 live-born newborns was RT-PCR positive after birth [10]. In the study conducted by Zhu et al., one of the babies of nine COVID-19 positive mothers died, while five were hospitalized in the neonatal intensive care unit [25]. In their study, Yang et al. reported neonatal death in only 1.2% [11]. In our study, 28.2% (13/46) of the neonates were admitted to the neonatal intensive care unit. Three newborn mortalities were observed (2 due to sepsis, 1 prematurity), none of which were COVID-19-positive. The rate of low birth weight (LBW) and hospitalization in the neonatal unit significantly increased in the infants of mothers with severe symptoms.

In a multi-center study, 11.1% of 388 pregnant women with COVID-19 were hospitalized in the intensive care unit, 9.3% required mechanical ventilation (36/388), and maternal death occurred in 0.8% [10]. In another study, 7 pregnant women were reported, 2 were admitted to the intensive care unit, and all survived [26]. In a COVID-19 series of 116 cases, 8 patients were admitted to the intensive care unit, but the authors reported maternal death [9]. In a study conducted in Turkey, 4 of 56 pregnant women who were positive for COVID-19 died, 2 of which were admitted to the intensive care unit [12]. In our study, 5 pregnant women were admitted to the intensive care unit, 3 maternal deaths were observed and among them, only 1 pregnant woman had an additional disease.

Conclusions

The coronavirus disease 2019 may cause preterm labor. In pregnant women, radiological diagnosis with thorax CT scans may be more accurate than PCR tests. Based on our results, lymphocyte, CRP, and thrombocyte values may be useful laboratory findings in clinical follow-up and treatment.

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