Evaluation of the Clinical and Laboratory Status of Pregnant Women with COVID-19

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Abstract

Introduction: The prevalence of the COVID-19 virus has been very high, so that in a short period of time, due to its contagiousness, it has infected a large number of people around the world. Pregnant women are more sensitive to infectious diseases than the general population and are especially at risk of respiratory diseases and severe pneumonia. Considering the importance of mother and fetus management, assessment and management of pregnant women infected with COVID-19, the present study was conducted with the aim of investigating the clinical and laboratory status of pregnant women infected with SARS-CoV-2 referring to Imam Hassan and Bentolhoda hospital in Bojnurd.

Methods: In this cross-sectional study, pregnant women with COVID-19 referred to Imam Hassan and Bentolhoda Hospital in Bojnurd between March 2020 and the beginning of Desember 2021 were studied. In order to collect information, an information form containing demographic and obstetric characteristics, evaluation of symptoms (fever, cough, abdominal pain, bloody secretions, rupture of fetal membranes in term pregnancy, chest tightness, asthma, fatigue, loss of appetite, headache, nausea and vomiting), laboratory status and outcomes pregnancy and childbirth was used. Statistical analysis was done with SPSS 24 software.

Results: The age range of the studied women was 15-48 years and the average gestational age was 26.21±9.4 weeks. The type of delivery in 46.2% was normal vaginal delivery, 53.8% was cesarean section. LBW, admission to NICU, need for resuscitation, meconium-stained AF were 5.71%, 4.76%, 3.80%, 0.95%, respectively. The average number of referrals to the hospital due to COVID-19 in the studied women was 1.6 ± 1.1 times, the average number of days in the hospital was 5.1 ± 3.1 days, and the average number of days in the intensive care unit was 4.08±2.1 days. The most common clinical symptoms in the studied women were related to cough (76.19), dyspnea (72.38), fever (56.19), and myalgia (33.33).

Conclusions: Based on the results obtained from this study, clinical symptoms and laboratory results in pregnant women with COVID-19 are similar to infected adults. Common symptoms of COVID-19 disease in pregnant women included fever, cough, and myalgia.

INTRODUCTION

The COVID-19 disease is a rapidly spreading acute respiratory disease that emerged in Wuhan, China at the end of 2019 [1]. This disease is transmitted through droplets of airborne particles and everyone in the community is susceptible to it. Pregnant women are not exempt from this rule [2]. Currently, there is no valid evidence on the probability and chance of infection in pregnant women compared to the general population [3]. It is believed that due to the physiological changes made during pregnancy, pregnant women may be more susceptible to SARS-CoV-2 [4]. Immune changes during pregnancy place pregnant women in the high-risk group [5]. In respiratory viral infections such as influenza, pregnant women are at a high risk of developing a more severe disease, which is most likely to occur in the next pregnancy [6, 7]. The results of studies showed a high rate of maternal mortality, stillbirth, abortion, and premature birth after viral pneumonia caused by influenza, MERS, and SARS viruses [8-10]. On the other hand, according to the previous experiences of exposure to SARS and MERS, pregnant women are probably at high risk of contracting SARS-CoV-2 and its complications [3]. In the influenza epidemic of 1918, mortality in the whole population was more than 2.6%, but it reached 37% among pregnant women [11, 12]. Also, an increased risk of complications in pregnant women was also reported during the H1N1 influenza pandemic in 2009, and pregnant women were hospitalized more than four times more often than the general population [13]. Wong et al reported that 50% of pregnant women with SARS were admitted to the intensive care unit. About 33% needed mechanical ventilation and the mortality rate reached 25% (9). It is not clear whether the COVID-19 infection shows a similar trend or not. Although the number of COVID-19 cases is increasing worldwide, the clinical status of COVID-19 in pregnant women remain unknown [14]. The results of various studies showed cases of fetal death, neonatal asphyxia, premature delivery, contamination of amniotic fluid and umbilical cord blood [15, 16]. Therefore, considering the importance of mother and fetus management, evaluation and management of pregnant women infected with COVID-19, due to the lack of clinical experience in the prevent and treatment of this disease during pregnancy, in order to improve the understanding of the disease and its consequences in pregnancy, the present study aims to evaluate the clinical and laboratory status of pregnant women infected with SARS-CoV-2 referring to Imam Hassan and Bentolhoda Hospital in Bojnurd. It was done from March 2020 to December 2021.

METHODS

The present study is a cross-sectional study that's population consists of pregnant women with COVID-19 referred to Imam Hassan and Bentolhoda Hospital in Bojnurd. The census sampling method includes the evaluation of 105 cases of pregnant women infected with SARS-CoV-2 admitted to Imam Hassan Hospital (Imam Hassan is COVID-19 Center located in Bojnurd) and Bentolhoda in the period of March 2020 to the beginning of December 2021. The inclusion criteria for this study included the records of all pregnant women with COVID-19 admitted to Imam Hassan and Bentolhoda Hospital in Bojnurd, and the exclusion criteria included incomplete information, including the absence of laboratory values. In order to collect information, an information form containing demographic and obstetrical characteristics, evaluation of symptoms, tests and outcomes of the current pregnancy and childbirth, and a telephone interview were used. After receiving the code of ethics and research introduction letter from the research assistant of North Khorasan University of Medical Sciences, the researcher attended the research environment and based on the designed form, the demographic, obstetric and clinical characteristics of pregnant women such as age, underlying disease, number and type delivery, number of pregnancies, gestational age, initial symptoms (fever, cough, abdominal pain, bloody secretions, rupture of fetal membranes in term pregnancy, chest tightness, asthma, fatigue, loss of appetite, headache, nausea and vomiting); and chronic diseases, type of treatment, laboratory tests including the number of white blood cells, the number of platelets, PH, PCO2, FIO2, HCO3, BE, BB, lactate dehydrogenase and indicators of liver and kidney function, CRP, LDH, Ca, P, , Na , K, SGPT, SGOT, VBG, CR, PT, PTT, Alkaline, Mg, their extraction and pregnancy outcomes were entered into the checklist through a telephone interview(Consent to participate in the study was obtained by telephone). Statistical analysis was done with SPSS 24 software. To describe the characteristics of the research units, descriptive statistics including central tendency and dispersion indices (mean and standard deviation) and frequency distribution were used.

RESULTS

The age range of the studied women was 15 to 48 years, the average gestational age was 26.21±9.4 weeks, the type of delivery was cesarean section in 53.8%. Vaccination during pregnancy against COVID-19 in the studied women was 61.7%, and the type of vaccine injected was Sinopharm in all cases. Other obstetric and clinical characteristics of pregnant women are listed in Table 1.

The average number of referrals to the hospital due to COVID-19 in the studied women was 1.6±1.1 times, the average number of days hospitalized due to COVID-19 in the studied women was 5.1±3.1 days, the average number of days hospitalized in the special care department due to COVID-19 in the studied women was 4.08±2.1.

2.85% of the studied women were admitted to the intensive care unit for intubation (tracheal intubation). LBW, admission to NICU, need for resuscitation,

meconium-stained AF were 5.71%, 4.76%, 3.80%, 0.95%, respectively.

The most common clinical symptoms in the studied women were related to cough (76.19), dyspnea (72.38), fever (56.19), myalgia (33.33), and none of the studied women had the symptom of Ageusia. Anticoagulant (82.85) and remdesivir (64.76) were the most prescribed drugs in the studied women. The mean and standard deviation of the laboratory parameters in the studied women are listed in Table 2.

Table 1. Obstetrical and Clinical Characteristics of the Studied Women

Variable	Standard Deviation ± Mean	Minimum	Maximum
Gestational age (weeks)	26.2± 9.4	6	40
Number of pregnancy	2.69±1.4	1	7
Number of birth	1.36±1.1	0	5
Number of abortion	0.76±0.63	0	3
1 minute APGAR	8.6± 0.82	6	9
5 minute APGAR	9.66±0.82	7	10

Table 2. Mean and Standard Deviation of Laboratory Parameters in Studied Women

Unit	Normal Range	Mean±Standard Deviation	Variable
A Thousand White Blood Cells Per Milliliter	3.5-9.5	7.16± 2.4	White blood cells
-	4.7-7.35	7.39 ±0.35	PH
Millimeters Of Mercury	35-45	33.20 ±9.20	PCO2
Milliequivalents Per Liter	21-100	21.73 ± 4.82	FIO2
Milliequivalents Per Liter	21-28	21.83 ± 4.21	HCO3
Milliequivalents Per Liter	-2+2	2.59±2.02	BE
Millimole Per Liter	42-45	45.65±9.73	BB
Units Per Liter	80-285	401± 0.41	Lactate Dehydrogenase
Second	12-14	12.91 ± 0.90	Pt
Second	30-45	33.72±7.70	Ptt
Cubic Millimeter	125-350	196.07± 8.7	Platelet
A Thousand Red Blood Cells Per Milliliter	4-5.4	4.24± 1.53	Red Blood Cells
Grams Per Deciliter	11-13	12.39±4.06	Hemoglobin
Units Per Liter	<31	31.78± 17.07	Sgot
Units Per Liter	<31	28.38±17.86	Sgpt
Units Per Liter	44-247	235.61±147.15	Alkaline
Milligrams Per Deciliter	1.8-2.6	3.60±1.3	Magnesium
Milligrams Per Deciliter	3.6-5.2	5.24±1.46	Potassium
Milligrams Per Deciliter	8.5-11	8.62±1.40	Calcium
Milligrams Per Deciliter	2.5-5	3.84±0.71	Phosphorus
Milligrams Per Deciliter	135-145	136.17±23.2	Sodium

DISCUSSION

This descriptive study was conducted with the aim of evaluating the clinical and laboratory status of pregnant women infected with SARS-CoV-2 who referred to Imam Hassan and Bentolhoda Hospital in Bojnurd from March 2020 to December 2021. According to our study, pregnant women with COVID-19 pneumonia showed a similar pattern of clinical features to non-pregnant adult patients, as recently reported [17, 18]. The common symptoms at the onset of COVID-19 pneumonia for these women include fever and cough, while the less common symptoms were myalgia, weakness, sore throat, diarrhea, and dyspnea. In the study by Chen et al., the clinical symptoms were such that 70% had fever during hospitalization and 57% after delivery. Also, 44% experienced cough, 33% dyspnea and weakness [19]. In the study by Liu et al., who analyzed the clinical symptoms in 10 women with COVID-19, the most

common symptoms were fever (13.15%), cough (9.15%), fatigue (4.15%), myalgia (13.15%) and sore throat and diarrhea (1.15%) [20]. In Zhu et al.'s study, the first symptom in pregnant women was fever or cough, one case of cholecystitis and one case of diarrhea were also reported [21]. Yu et al., in their study on 7 pregnant women with this disease, stated that the most common symptom was fever (86%) and 14% of them had cough, dyspnea, and diarrhea [22]. Akbarzadeh and colleagues reported that the most common clinical symptom in pregnant women with COVID-19 was fever, cough, sore throat, and digestive symptoms, and the time between maternal symptoms and delivery was 1 to 13 days [23]. In general, based on the present study and the results obtained from similar studies that are in line with our study, it can be stated that the common manifestations of the COVID-19 disease in pregnant women include fever, cough, and myalgia. The results of the present study showed that all the tests except LDH

were in the normal range. However, a series of evidences have shown that the clinical symptoms and laboratory findings of infected pregnant women are unusual compared to non-pregnant adults. Liu et al. reported that leukocytosis and an increase in neutrophil ratio can be observed in pregnant women infected with COVID-19, but there is no significant difference in terms of lymphopenia between pregnant and non-pregnant groups [24]. In Wang et al.'s study, laboratory findings included high leukocyte count, increased neutrophil ratio, lymphopenia, and increased CRP, D-dimer, and LDH. However, aminotransferase and creatinine levels have been reported to be within a normal range [25]. In addition, Liu et al reported that leukocytosis and increased neutrophil ratio, increased CRP and interleukin-6, and low albumin were the main laboratory findings in pregnant women, while ALT, AST, ferritin, and ESR values were reported to be normal [26]. High CRP, leukocytosis, and high neutrophil ratio seem to be the most reliable markers of COVID-19 among pregnant women, and other tests are conflicting. Therefore, it is recommended that in addition to using nucleic acid tests as the gold standard for the diagnosis of COVID-19 pneumonia, relevant clinical examinations such as blood count and chest CT and a comprehensive evaluation of the patient's medical history, epidemiological exposure and symptoms should be performed. To be However, physiological findings of leukocytosis and increased neutrophil ratio due to adaptation to pregnancy can complicate the situation. To better understand the impact of COVID-19 on maternal and birth outcomes, comprehensive data on a larger population of pregnant women with COVID-19 are needed.

CONCLUSION

Based on the results obtained from this study, clinical symptoms and laboratory results in pregnant women

with COVID-19 are similar to infected adults. Common manifestations of covid-19 disease in pregnant women included fever, cough, and myalgia. The symptoms of pregnant women with COVID-19 pneumonia are diverse, considering the importance of this global public health emergency. Although our conclusions are limited by the small sample size, we believe that the findings reported here are useful for understanding clinical features.

CONFLICT OF INTEREST

The authors declare that they have no conflict of interests.

ETHICAL CONSIDERATION

In the writing of the article, the confidentiality of the patient's personal information, records were respected. Also the study is registered with code of ethics IR.NKUMS.REC.1400.143.

AUTHOR CONTRIBUTION

Conceptualization: FRF, SP, KA, AA, MRT, EF; Collected the data: FRF, SP, EF; Contributed data or analysis tools: FRF, SP, KA, EF; Wrote the paper and editing: FRF, AA, MRT, EF.

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