

Epidemiological study of COVID-19 pneumonia in pregnant woman and their neonates; report of thirteen confirmed COVID-19 pregnant women

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Abstract

Background: In new pandemic, the probable effects of COVID-19 pneumonia on pregnant woman and their infant is one of new critical challenge for health care. Here we presented clinical symptoms, laboratory findings and outcome of COVID-19 pneumonia in pregnant woman.

Methods: In a case series study, from 15 Feb to 15 June 2020, all women with RT-PCR COVID-19 who referred to two hospitals (Taleghani and Qods Hospital) affiliated to Arak University of Medical Sciences were selected. The epidemiological and demographic variables, laboratory test and outcomes obtained from patient's medical records.

Results: In this case series, we presented thirteen confirmed COVID-19 pregnant women. Their mean age was 34.6 (S.D.: 5.9) years and the mean gestational age was 32.4 (S.D.: 7.3) weeks. Most of patient didn't show any maternal complication and intrauterine vertical transmission. The large number of pregnant women had normal HRCT and also in terms of laboratory most of the patients had normal laboratory tests. Amniotic fluids, cord blood, the throat swab of neonate in our pregnant woman with delivery were tested for COVID-19 and all of them were negative.

Conclusion: The COVID-19 mothers and their infant didn't have higher risk for morbidity and mortality and this virus didn't associate with intrauterine vertical transmission.

Key word: COVID-19; Epidemiology; Pneumonia; Pregnancy.

1. Introduction

COVID-19 pneumonia is a new contagious atypical pneumonia which has emerged since December 2019 and considered as a new global pandemic (1). According to evidences, COVID-19 virus like to SARS(Severe Acute Respiratory Syndrome) coronavirus and MERS (the Middle East Respiratory Syndrome) coronavirus (2) that's way it considered SARS-Cov2. Until now, SARS-Cov2 pandemic associated with a rapid increase in cases and deaths. According to last evidences about infection pandemic, pregnant woman considered as a high-risk group have been infected with viral infections such as influenza A, H1N1, SARS-Cov, MERS-Cov, and Ebola and these infections are due to changes in immune response (3)

mainly associated with poor prognosis conditions like maternal death, preterm delivery and spontaneous abortion (4-7). In other hand, pneumonia in pregnancy, regardless of its causes associated with considerable mortality/morbidity in the mothers (8, 9), maternal infection transmission and fetal death (10).

Now, the probable effects of COVID-19 pneumonia on pregnant woman and their infant is one of new critical challenge for health care. Most of available study focused on general population and evidence about outcome of COVID-19 in pregnancy and infancy is limited (11). Here we presented clinical symptoms, laboratory findings and outcome of COVID-19 pneumonia in pregnant woman.

2. Methods

In this case series study, the data were obtained from two hospitals (Taleghani and Qods Hospital) affiliated to Arak University of Medical Sciences. Patients were admitted from 15 Feb to 15 June 2020. The suspected pregnant woman (symptomatic cases) and their infant, were admitted and quarantined, then oropharyngeal/nasopharyngeal swab specimens were transferred in viral transport media (VTM) to the Specialized Virology laboratory of Emam Reza clinic (Arak University of Medical Sciences, Arak, Iran). Viral RNA was extracted using QIAamp DSP Virus Kit (Qiagen, Hilden, Germany) in QIAcube extractor machines (Qiagen), based on the standard protocol of the manufacturer. Reverse-transcription Real-time PCR (RT-qPCR) assays were performed using 2019-nCoV Nucleic Acid Diagnostic kit (Sansure biotech, Changsha, China), according to the manufacturer's protocol (12).

The epidemiological and demographic variables, laboratory test and outcomes obtained from patient's medical records.

This study was approved by the Ethical Committee of Arak University of Medical Sciences (Code: IR.ARAKMU.REC.1399.011) and informed consent was obtained from all patients or their guardian. The data were analyzed by Stata statistical software (Stata Corp LP, College Station, TX Stata).

3. Results

In this case series, we presented thirteen confirmed COVID-19 pregnant women. Their mean age was 34.6 (S.D.: 5.9) years and the mean gestational age was 32.4 (S.D.: 7.3) weeks. All cases had reported a history of Iranian routine vaccination. In terms of maternal complication, 11 cases (84.62%) reported no complication; one case had PROM and one case sever preeclampsia (Table 1). The most frequent blood groups were A (38.5%) and B (38.5%) and the rarest was O (7.7%).

Table1: The baseline characteristics of thirteen confirmed COVID-19 pregnant women

| Cases | Age | Gravid | GA | Past medical history | Maternal complication | Blood Group |
|-------|-----|----------------|--------|----------------------|-----------------------|-------------|
| 1 | 36 | G6P1Ab4L1 | 32W+1D | Anemia | No complication | O + |
| 2 | 37 | G3P2L2(NVD) | 18W+5D | No history | No complication | B + |
| 3 | 49 | G4P2L2Ab2(NVD) | 37W+5D | Hypothyroidy/GDM | No complication | B + |
| 4 | 36 | PG | 37W+6D | No history | No complication | AB- |
| 5 | 26 | G2P1L1(NVD) | 39W+1D | No history | No complication | B+ |

| | | | | | | |
|----|----|-------------------|--------|--------------------------------------|-----------------------|-----|
| 6 | 38 | G4P3L3(1NVD+CS*2) | 30W+4D | Anemia | No complication | A+ |
| 7 | 28 | G1P1L(NVD) | 30W+6D | Hypothyroidy | PROM | B+ |
| 8 | 32 | G4P1L1Ab2 | 34W+2D | GDM/chronic HTN/ PCOD/infertility | Sever Preeclampsia | A- |
| 9 | 35 | Primary Gravid | 38w+3d | No history | No complication | A+ |
| 10 | 32 | G3P1L1AB1(NVD) | 16W+3D | No history | No complication | A+ |
| 11 | 28 | PG | 30W+3D | No history | No complication | A+ |
| 12 | 35 | G3P3Ab0 | 38w | No history | No complication | B+ |
| 13 | 38 | PG | 36w+2d | No history | No complication | AB+ |

Of these 13 cases, 6 had deliveries, 3 had cesarean sections and 3 had normal vaginal deliveries. For every 6 newborns, PCR were performed and all of them were negative and no maternal-to-fetal transmission was observed. The average Apgar score of 1 and 5 minutes was 9 and 10, respectively. The average number of days with COVID-19 among mothers was 16.8 (S.D.: 4.7) days. High resolution computed tomography (HRCT) was done and one case of mild bilateral pleural effusion and two cases of bilateral GGO was reported.

The frequency of symptoms at the first day was reported in Table 2. The most prevalent symptoms were fever (61.5%) and head ache (61.5%) followed by cough (53.8%) and shortness of breath (46.2%). The results of CRP declared that four cases (33.3%) were negative, two cases (16.7%) were 1+, three cases (25%) were 2+ and three cases (25%) were 3+ and it should be highlighted that no case of death was observed among pregnant women, so case fatality rate (CFR) was 0.

Amniotic fluids, cord blood, the throat swab of neonate in our pregnant woman with delivery were tested for COVID-19 and all of them were negative.

Table 2: The frequency of symptoms among confirmed COVID-19 pregnant women

| Signs | N | Percent |
|---------------------|---|---------|
| Fever | 8 | 61.5 |
| Cough | 7 | 53.8 |
| Shortness of breath | 6 | 46.2 |
| Tachycardia | 3 | 23.1 |
| Muscle ache | 5 | 38.5 |
| Sweating | 3 | 23.1 |
| Sore throat | 3 | 23.1 |
| NV | 2 | 15.4 |
| Headache | 8 | 61.5 |
| Decrease of FHR | 1 | 7.7 |
| Decrease of FM | 1 | 7.7 |
| Dizziness | 2 | 15.4 |
| Weakness | 1 | 7.7 |
| Labor pain | 1 | 7.7 |

The laboratory findings of our cases are presented in Table 3. The most common condition of leukocytes was normal (78.41%- 109/139); However almost all of them had normal WBC

(normal range; 3.5-9.5*10⁹/L). In terms of neutrophil (PMN), 92.30% (12/13) were above the normal range and only 7.30% (1/13) had normal PMN (the normal range 40-60%). Also in terms of lymphocyte; only 38.46% (5/13) of patients showed lymphopenia (normal range: 1.1-3.2*10⁹/L). The most of the patients had normal hemoglobin (Hb) (Mean: 12.2 (SD:1.4), normal range; 12-16g/L), platelet (Plt) count (Mean:227.7 (SD:69.5), normal range; 125-350*10⁹/L), partial thromboplastin time (PTT) (Mean: 32.5 (SD:3.0) normal range;31.5-43.5s), international normalized ratio (INR) (Mean: 1.0 (SD:0.0), normal range;0.9-1 index), creatinine (Cr) (Mean: 0.8 (SD:0.2), normal range;0.8-1.3mg/l) and blood urea nitrogen (BUN) (Mean: 19.1 (SD:7.1), normal range;17-45mg/l). Furthermore 30.76% of COVID-19 patient had a high ESR (normal range; 0.0-15 mm/hr) and also liver function tests, LDH in all of patients were normal.

Table3: Laboratory signs of COVID-19 pregnant woman.

| Variable | Mean | S.D. | Min | Max |
|--------------------|-------|-------|-------|-------|
| WBC | 8.7 | 3.3 | 3.8 | 16.6 |
| PMN | 72.6 | 8.8 | 55.0 | 85.0 |
| Lymph | 20.1 | 7.8 | 8.0 | 36.3 |
| Hb | 12.2 | 1.4 | 9.4 | 14.0 |
| Plt | 227.7 | 69.5 | 150.0 | 404.0 |
| ESR | 38.7 | 20.8 | 17.0 | 85.0 |
| Bun | 19.1 | 7.1 | 7.0 | 32.0 |
| Cr | 0.8 | 0.2 | 0.6 | 1.2 |
| BS | 102.4 | 9.5 | 85.0 | 120.0 |
| LDH | 385.3 | 135.2 | 270.0 | 758.0 |
| ALT | 17.7 | 6.5 | 9.0 | 30.0 |
| AST | 22.0 | 14.2 | 12.0 | 59.0 |
| Alkp | 296.2 | 91.8 | 178.0 | 462.0 |
| Direct Bilirubin | 0.2 | 0.1 | 0.1 | 0.4 |
| Indirect Bilirubin | 0.9 | 0.1 | 0.8 | 1.0 |
| PT | 13.3 | 0.7 | 12.0 | 14.4 |
| PTT | 32.5 | 3.0 | 26.0 | 38.0 |
| INR | 1.0 | 0.0 | 1.0 | 1.1 |

4. Discussion

The results of our study showed that COVID-19 pneumonia in most of pregnant woman didn't induce any serious pregnancy complication. Among our pregnant woman, 6 mothers delivered and none of their infant were positive for COVID-19 and the average Apgar score of their infant were normal. That's way it seem COVID-19 don't associated with intrauterine vertical transmission and infants of COVID-19 mothers don't in high risk for getting infection during pregnancy these finding have reported and confirmed by last publications (10, 13).

Another findings of our study is that most of the COVID-19 pregnant woman has mildest infectious which confirmed by Chinese studies (14, 15). The noticeable point of our study is that no case of death was observed among pregnant women and so case fatality rate (CFR) was 0 like the available evidences in this field (10, 14, 15).

The most of the symptoms were fever>headache>cough>shortness of breath and like typical symptoms of COVID-19 patients (16, 17). That's way it seems that COVID-19 pneumonia doesn't have any specific sign or symptoms in pregnant woman. In our study large number of pregnant women had normal HRCT and also in terms of laboratory most of the patients had normal laboratory tests.

One of important aspect of our results is that the COVID-19 pneumonia is a less sever and it maybe indicated this fact that the COVID-19 mothers and their infant didn't have higher risk for morbidity and mortality by COVID-19. One of concerning about COVID-19 pandemic is the probably vulnerability of mothers and their infants to this infection like past pandemic such as MERS and SARS-Cov1 (4-7). The recent studies (18, 19) about COVID-19 in pregnancy haven't reported any serious complication or die in pregnant woman and confirmed the results of our study.

The second finding in our study is that there isn't any intrauterine vertical transmission which confirmed by recent studies on pregnant woman and their neonates (20, 21). and neonate of COVID-19 mothers didn't be infected, and also we didn't find any fetal or mother problems during the pregnancy which confirmed by last evidences (18). That's way it may be indicated that COVID-19 doesn't induced more mortality or morbidity in pregnant woman their neonates. However, last pandemic with viruses more similar to COVID-19 (e.g. SARS-cov1) associated with higher morbidity and mortality in COVID-19 mothers and their neonate (8, 9).

In summary it seems that in contrast with last pandemic, in COVID-19 global spread, neonates and pregnant woman didn't vulnerable than populations. And also, this new virus doesn't have intrauterine vertical transmission. Nevertheless there are some reports about sever COVID-19 infection in pregnancy (22) because of this controversy about the severity of COVID-19 infection in pregnant woman and also due to the limitation in current available evidences and the probable future change of virus to convert to more infectious form (23) the future study most considerate on different aspect of COVID-19 pneumonia in pregnancy.

Our results have some limitation: 1. we evaluated primary laboratory, HRCT and symptoms of pregnant woman while it recommended that the future study evaluated the changes of laboratory, duration of primary symptoms and HRCT. 2. In our study we selected only the pregnant woman who need hospitalized while some of patients were quarantined at home without the need for hospitalization.

5. Conclusions

Pregnant woman has mildest COVID-19 infectious and this virus didn't associate with intrauterine vertical transmission. COVID-19 pneumonia doesn't have any specific sign or symptoms in pregnant woman. In general, the COVID-19 mothers and their infant didn't have higher risk for morbidity and mortality.

Abbreviations

WBC; White blood cell count, **PMN**; Neutrophil count, **Lymph**; Lymphocyte, **Hb**; hemoglobin, **PLT**; Platelet, **Na**; Sodium, **K**; Potassium, **PTT**; **Partial** thromboplastin time **PT**; Prothrombin Time **INR**; **International** normalized ratio **FBS**; Fast blood sugar, **Cr**; Creatinine, **BUN**; Blood Urea Nitrogen. **ALT**= Alanine aminotransferase, **AST**= Aspartate transaminase, **Bili T & D**; Bilirubin total and Direct, **Alb**= Albumin, **CPK**; Creatine phosphokinase, **LDH**; Lactate dehydrogenase

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Ethical approval

Ethical approval for the study was provided by the Arak University of Medical Sciences Research Ethics Committee with code: IR.ARAKMU.REC.1399.011.

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Declaration of Competing Interests

The authors declare that they have no competing interests with respect to the authorship and/or publication of this article.

Declaration of interests

We declare no competing interests.

Conflict of Interest

There is no contradiction in the article.

6. References

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