

## CASE REPORT

# Maternal death due to COVID-19 and high BMI: A case report from Hamadan, Iran

Samereh Ghelichkhani<sup>1</sup> | Seyedeh Zahra Masoumi<sup>2</sup>  | Ebrahim Jalili<sup>3</sup> |  
Hamideh Parsapour<sup>4</sup> | Azam Ali Shirzadeh<sup>1</sup>

<sup>1</sup>School of nursing and midwifery, Hamadan University of medical sciences, Hamadan, Iran

<sup>2</sup>Midwifery Department, Mother and Child Care Research Center, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran

<sup>3</sup>Emergency Medicine Department, School of medicine, Hamadan University of medical sciences, Hamadan, Iran

<sup>4</sup>Clinical research development unit of Fatemeh hospital, Hamadan university of medical sciences, Hamadan, Iran

## Correspondence

Seyedeh Zahra Masoumi, Mother and Child Care Research Center, Midwifery Department, School of Nursing and Midwifery, Hamadan University of Medical Sciences, Hamadan, Iran.  
Email: Zahramid2001@gmail.com

## Funding information

None

## Abstract

Pregnant women suffering chronic illness or obstetric complications such as obesity are prone to severe pneumonia and COVID-19. Obesity in pregnancy is associated with many complications for both mother and fetus. Here, we report the death of an obese mother with COVID-19.

## KEYWORDS

coronavirus, Iran, maternal death, obesity, pregnant women, weight gain

## 1 | INTRODUCTION

Maternal death caused by the complications of pregnancy and delivery is a critical indicator of the status of women in society, access to care, adequacy and quality of health care, and the capacity of the service delivery system to meet the needs of the women community.<sup>1</sup> The general maternal death rate in the world was 17.4 deaths per 100000 live births in 2018. This rate increases with aging.<sup>2</sup> Coronavirus (COVID-19) is an emerging disease, which has resulted in a rapid increase in death rate since its first emergence in Wuhan, China, in December 2019. Emerging infections can have a significant impact on pregnant women and their fetuses.<sup>2</sup> Limited information is available on COVID-19 during pregnancy. However, information on other highly pathogenic diseases related to

coronavirus (e.g., acute respiratory syndrome (SARS) and middle east respiratory syndrome (MERS)) may provide insight into the effects of COVID-19 during pregnancy. According to the studies, angiotensin-converting enzyme (ACE-2) is a receptor for the SARS-CoV-2 virus receptor on alveolar epithelial cells of type II and other human cells such as enterocytes, endothelial cells, and bile duct cells. It is strongly stated that this can interfere with pregnancy.<sup>16</sup> Symptoms, ranging from colds such as fever and cough to severe respiratory illness and death, are considered as major symptoms of this disease<sup>2,3</sup> Although pregnancy does not seem to increase susceptibility to infection and most infected mothers recover without delivery, pregnant women seem to be at greater risk for severe disease, which increases the need for maternal intensive care and mechanical ventilation, and oxygenation may be necessary in

This is an open access article under the terms of the Creative Commons Attribution-NonCommercial-NoDerivs License, which permits use and distribution in any medium, provided the original work is properly cited, the use is non-commercial and no modifications or adaptations are made.

© 2022 The Authors. *Clinical Case Reports* published by John Wiley & Sons Ltd.

rare cases. Risk factors for severe disease include age over 35, obesity, hypertension, and diabetes.<sup>4,5</sup> Based on the studies, 42% of women admitted due to COVID-19 experience symptoms of preterm labor.<sup>6</sup> It seems that women with severe disease, especially those with pneumonia, experience increased preterm labor and cesarean delivery. Pregnant women with COVID-19 are more likely to be admitted to the ICU than non-pregnant women.<sup>4</sup>

Hence, due to the special conditions of pregnancy and possible obstetric problems in these mothers, special attention should be given to the type of delivery. Regarding a mother with the coronavirus, elective cesarean section is performed when the mother has severe respiratory involvement and has an urgent need for pregnancy. Accordingly, if more than 70% of the world's population is infected with the virus, a significant pressure may be applied on maternal and neonatal services sector. Thus, it is necessary to improve the management of maternal care in health centers with careful monitoring based on the conditions of a pregnant mother suspected or affected with this disease at all stages of screening, diagnosis, and treatment at antenatal, postnatal, and postnatal stages.<sup>6,7</sup> COVID-19 disease and researchers' data that pregnant women with chronic disease or obstetric complications pose significant challenges for countries to maintain maternal and neonatal health care at antenatal, postnatal, and postnatal stages. It highlights the importance of gaining knowledge and information of the potential for maternal death in pregnant women in the second or third trimester, so that health systems can benefit from continued maternal and neonatal health services and equipment (<sup>5,6,8</sup>). Here, we report a case of death of an obese pregnant mother with COVID-19 in 2020 in Iran. Data were collected from a review of medical records, prenatal records, and face-to-face interviews.

## 2 | PATIENT INTRODUCTION

The dead pregnant woman was 29-year-old with a BMI of 38.2 and with a pregnancy status of G5P2L2Ab2 and a history of one normal delivery and one previous cesarean section with a gestational age of 37 weeks and 4 days. She was a housewife who lived in Hamadan. She received government sector services. The patient was covered by a healthy reproduction program. She had an unwanted pregnancy and received pregnancy care in 6–10 weeks, 4 cares, 2 screenings, and 3 general practitioner visits. She was referred to physician and nutritionist at 16–20 weeks due to obesity and an internal physician immediately due to the impaired results of urine tests. At Weeks 31–34, she was referred to a nutritionist again due to improper weight gain. She had no history of hospitalization and underlying

disease in pregnancy care and was in the high-risk group due to pregnancy weight gain. On the delivery day, the patient went to the hospital emergency department at 8:40 a.m. complaining of pain and uterine contractions. Due to a history of previous cesarean section, she was prepared for emergency cesarean section at gestational age of 37 weeks and 4 days.

The patient had no problem on arrival. Her vital signs are stable: PR = 100, RR = 18, BP = 120.70, T = 37.5, and O<sub>2</sub> saturation = 97%. Initial tests results: HB = 10, HCT = 31.3, Plat = 16700, WBC = 6600 BG, RH = B-. Cesarean section was performed at 11:00 a.m. and transferred to recovery without any problems. The result was the birth of a live baby boy with Apgar 9/10 and seemingly healthy. In the next day, she was discharged with a good general condition with enoxaparin 60 mg DVT prophylaxis and warning signs. Three days after discharge at 06:47 p.m., she was referred to Corona Center Hospital with symptoms of fever, chills, cough, and myalgia, and she was hospitalized with vital signs T = 38.5, BP = 120.70, PR = 100, RR = 17, O<sub>2</sub> saturation = 88%, and initial diagnosis of COVID-19. Her CT showed lung involvement and turbidity of glass ground scattered in the peripheral parenchyma of both lungs, which is highly suggested for COVID-19 pneumonia.

### 2.1 | Initial laboratory tests

WBC = 4200, HB = 9.9, HCT = 30.5, PL<sub>a</sub> = 163000, CRP = 2 + AST = 45, ALT = 33, LDH = 619, Cre = 0.7, CPK = 330, NA = 140, K = 3.9, BS = 84, PT = 31.5, PTT = 28, INR = 1, PH = 7.42, PCO<sub>2</sub> = 32.8, PO<sub>2</sub> = 27 T, CO<sub>2</sub> = 22.5, SO<sub>2</sub>% = 52.8, and PCR-cov19 = +. The drugs of azithromycin, ceftriaxone, and corticosteroids were started for patient. Three days later, at 10:00 a.m., after consultation with an infectious disease specialist and referring to ICU, antibiotics were changed to meropenem, vancomycin, remdesivir, and dexamethasone and interferon B1 was added. During hospitalization, she received 2 enoxaparin 80 mg daily. Due to a decrease in O<sub>2</sub> saturation = 70%–60% PR = 100, RR = 25–30, at 10:40 a.m., she was transferred to the ICU with consultation of an anesthesiologist. At 01:30 p.m., due to O<sub>2</sub> saturation = 50% and drowsiness and restlessness, she was intubated. Based on the cardiac and echo counseling performed at the patient's bedside, PAP = 25 and lvef = 55%, indicating no evidence in favor of heart problems in HB = 9, ESR = 52, CRP = 2+ tests and leukocytosis = 29300, and FBS = 297 (NO RWMA at rest, normal Rv size, No evidence of tamponad Spap 25). One day after hospitalization in ICU, patient suffered cardiac and respiratory arrest at 10:00 a.m. and despite

CPR for one hour, she did not respond to resuscitation unfortunately and died. The result of COVID-19 test for newborn is reported to be negative.

### 3 | DISCUSSION

This study is a case report of the death of a mother with COVID-19 overweight, which emphasizes the importance of preventive measures against COVID-19 and special attention to prenatal care, especially in high-risk obese women and COVID-19 epidemics. In spite of many efforts made by international agencies to promote maternal health, maternal deaths, and disabilities remain a major public health problem in developing countries.<sup>9</sup> New strains of influenza and coronavirus causing severe respiratory disease and typically have affected pregnant women partly over the last few decades due to the immunological and cardiopulmonary incompatibilities of pregnancy physiology. In 1918, the rate of mortality caused by H1N1 epidemic was 27% in pregnant women.<sup>6</sup> In 2020, the percentage of maternal deaths caused by respiratory disease was reported at 32%. In contrast, respiratory disease accounted for 1.6% to 10.3% (average of 4.9%) of maternal mortality between the years 2011 and 2019. Epidemiological data suggest an increase in mortality in pregnant women with COVID-19.<sup>10</sup> Physiological changes during pregnancy have a significant impact on the immune system, respiratory system, cardiovascular function, and coagulation, which may have positive or negative impacts on progression of COVID-19 disease, making pregnant women vulnerable to the prevalence of infectious disease. Most women suffer a mild or asymptomatic disease without lasting consequences. However, some centers have reported an increase in ICU admissions and the need for mechanical ventilation in pregnant women.<sup>3,8,10,11</sup>

The present report is about the death of a pregnant mother with COVID-19 (with a positive result of PCR test). She was in the group of high-risk mothers due to obesity. It is consistent with the researchers' data on the exacerbation of risk factors for severe COVID-19 disease in obese mothers.<sup>3,4</sup> Similar studies have indicated that maternal obesity is a major risk factor for increased susceptibility of pregnant women to severe COVID-19. In obese people, cytokine signaling suppressors are re-regulated and interferon-type I and III responses are delayed, leading to the inactivation of viral clearance. Obesity also results in chronic inflammation by changing the systemic immune system, including a wide range of mechanisms. Moreover, lipid secretion of leptin is pro-inflammatory and high level of leptin in blood circulation is associated with mortality in patients with

acute respiratory distress syndrome. Synergistic effects of obesity-related delays in COVID-19 immunity control along with mechanical stress and increased adipose tissue may contribute to an increased risk of pulmonary involvement in obese pregnant women. These complex immunological, metabolic, endocrine, and physiological changes associated with obesity affect the immune response to viral infection and may lead to more severe pregnancy disease.<sup>3</sup>

Overweight and obese populations may be more susceptible to severe complications, especially those related to respiratory disease. Studies have indicated that obesity is associated with pulmonary complications such as pneumonia. Obesity negatively affects both respiratory function and the immune system and host defense, both of which are particularly threatened during COVID-19 and pregnancy.<sup>10</sup> Hence, it is important for pregnant women to take preventive actions to protect themselves against COVID-19 and to report any symptoms (including fever, cough, or difficulty breathing) to their health care provider.<sup>3</sup> Researchers believe that timely referral of women at risk and continuous monitoring of pregnant women with COVID-19, especially women with underlying diseases and high-risk symptoms, are crucial for improving maternal and neonatal health outcomes in this group of women.<sup>10,12</sup> Moreover, the progress course of this disease highlights the need for a faster response of triage, and providing available equipment to examine the patient's condition to prevent the transmission of the disease.<sup>10,12</sup>

In the present study, since mother had received a sufficient number of prenatal care and due to weight gain of the pregnant mother and being in the group of high-risk mothers, the need for high-risk patients and telephonic follow-ups by health care providers is highlighted. In addition, due to the challenge of receiving sufficient and effective training in the current pandemic in pregnant mothers, strengthening virtual and telephonic pregnancy training and the presence of medical staff at home for providing necessary trainings for at-risk women to prevent COVID-19 infection and training of risk signs are necessary. In similar studies, lack of prenatal care has been reported as another risk factor for maternal death.<sup>13</sup> All pregnant women, and especially those with pregnancy-related complications and chronic diseases such as obesity, should receive extensive prenatal care. Based on the results of studies, pregnant women and health care providers should be aware of the potential risks of severe COVID-19, especially in high-risk groups, including adverse pregnancy outcomes. Identifying COVID-19 during hospitalization at birth to guide preventive measures to protect pregnant women, parents, infants, and other patients and health care providers is crucial.<sup>12,14,15</sup>

## 4 | CONCLUSION

The death report of this study emphasizes the need for providing adequate trainings for pregnant mothers and paying attention to prenatal care, especially in high-risk groups of obese women and in the COVID-19 pandemic condition. In addition, given the global trend of increasing obesity over the past 3 decades, taking immediate action to address this important health condition is necessary for global health. In the current situation, pregnant women and health care providers should be aware of the potential risks of severe COVID-19, including unfavorable pregnancy outcomes. It is also necessary to identify COVID-19 patients during hospitalization at birth to take preventive actions to prevent infection. Pregnant women, parents, infants, and health-care providers should take steps to cope with COVID-19.

## ACKNOWLEDGEMENTS

The researchers would like to express their thanks to the Research Deputy of the Hamadan University of Medical Sciences, and we wish peace to the soul of this dead mother.

## CONFLICT OF INTEREST

None declared.

## AUTHOR CONTRIBUTIONS

SGH is the primary manuscript author. SZM involved in editing the manuscript. HP followed up the patient. AAS and EJ are an overall senior authors and followed up the patient.

## ETHICAL APPROVAL

In this study, medical patient's record was reviewed, and official permission has been obtained from Hamadan University of Medical Sciences to publish this report.

## CONSENT

None.

## DATA AVAILABILITY STATEMENT

Information about the deceased pregnant mother is kept by the corresponding author and will be provided upon reasonable request.

## ORCID

Seyedeh Zahra Masoumi  <https://orcid.org/0000-0002-2045-3707>

## REFERENCES

1. Sarami. *Danforth's Obstetrics and Gynecology*. CDC Interim considerations for infection prevention and control of coronavirus disease 2019 (COVID-19) in disease 2019 (COVID-19) in inpatient obstetric healthcare settings. 2020. <https://www.cdc.gov/coronavirus/2019-ncov/hcp/inpatient-obstetric-healthcare-guidance.html2020cMAf>
2. Asadi L, Tabatabaei RS, Safinejad H, Mohammadi M. New corona virus (COVID-19) management in pregnancy and childbirth. *Arch Clin Infect Dis*. 2020;15:e102938. doi: 10.5812/archc id.102938
3. Berghella V, Hughes B. *Coronavirus Disease 2019 (COVID-19): Pregnancy Issues and Antenatal Care*. UpToDate; 2020:12.
4. Mullins E, Evans D, Viner R, O'Brien P, Morris E. Coronavirus in pregnancy and delivery: rapid review. *Ultrasound Obstet Gynecol*. 2020;55:586-592.
5. Qiao J. What are the risks of COVID-19 infection in pregnant women? *Lancet*. 2020;395:760-762.
6. Hantoushzadeh S, Shamshirsaz AA, Aleyasin A, et al. Maternal death due to COVID-19. *Am J Obstet Gynecol*. 2020;223:109.e1.
7. Chua M, Lee J, Sulaiman S, Tan HK. From the frontline of COVID-19 - how prepared are we as obstetricians? a commentary. *BJOG*. 2020;127:786-788.
8. Oladapo OT, Adetoro OO, Fakeye O, et al. National data system on near miss and maternal death: shifting from maternal risk to public health impact in Nigeria. *Reproductive Health*. 2009;6:1-11.
9. Anna WM, MPH reviewing Lumbreras-Marquez MI, et al. Mortality and COVID-19 among pregnant women in Mexico :COVID-19 appears to be the leading cause of maternal death. 2020.
10. McCartney SA, Kachikis A, Huebner EM, Walker CL, Chandrasekaran S, Adams Waldorf KM. Obesity as a contributor to immunopathology in pregnant and non-pregnant adults with COVID-19. *Am J Reprod Immunol*. 2020;84:e13320.
11. Wastnedge EAN, Reynolds RM, van Boeckel SR, et al. Pregnancy and COVID-19. *Physiol Rev*. 2021;101:303-318.
12. Rancourt RC, Schellong K, Plagemann A. Coronavirus disease 2019 and obesity: one pandemic meets another. *Am J Obstet Gynecol*. 2021;224:121-122.
13. Galvão LPL, Alvim-Pereira F, de Mendonça CMM, et al. The prevalence of severe maternal morbidity and near miss and associated factors in Sergipe, Northeast Brazil. *BMC Pregnancy Childbirth*. 2014;14:1-8.
14. Delahoy MJ, Whitaker M, O'Halloran A, et al. Characteristics and maternal and birth outcomes of hospitalized pregnant women with laboratory-confirmed COVID-19—COVID-NET, 13 states, March 1–August 22, 2020. *Morb Mortal Wkly Rep*. 2020;69:1347.
15. Danforth DN. *Danforth's Obstetrics and Gynecology*. Lippincott Williams & Wilkins. 2008.
16. Nkeih C, Sisti G, Schiattarella A. Elevated transaminases in a COVID-19 positive patient at term of gestation: a case report. *Acta Biomed*. 2020;91(3):e2020002. doi:10.23750/abm.v91i3.9796

**How to cite this article:** Ghelichkhani S, Masoumi SZ, Jalili E, Parsapour H, Ali Shirzadeh A. Maternal death due to COVID-19 and high BMI: A case report from Hamadan, Iran. *Clin Case Rep*. 2022;10:e05704. doi:[10.1002/ccr3.5704](https://doi.org/10.1002/ccr3.5704)