

MATERNAL MORTALITY DUE TO COVID-19 IN A REFERENCE UNIT IN GOIÂNIA - GO

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ABSTRACT

INTRODUCTION: The SARS-CoV-2 coronavirus has been impacting society since late 2019 and Brazil since early 2020, causing a global pandemic. Physiological changes during pregnancy can increase the severity of respiratory infections in these patients, leading to an increased risk of obstetric complications and mortality. Therefore, pregnant women and postpartum women are now considered at risk, requiring proper prevention and management.

OBJECTIVES: To evaluate maternal deaths due to COVID-19 at a reference unit in Goiânia - GO and to outline a profile of these patients.

METHODOLOGY: Observational, descriptive, and cross-sectional study conducted at the Hospital and Maternity Municipal Célia Câmara between November 2020 and December 2021, analyzing data from pregnant women hospitalized for COVID-19 who died.

RESULTS: Twenty-five maternal deaths due to COVID-19 were identified, out of a total of 908 hospitalized patients and 481 live births in the unit. The maternal mortality rate was 5.2 deaths per 100 live births. Half of the women were from Goiânia and the other half from cities in the interior of Goiás. Deaths in women aged 20 to 29 years accounted for 44% of the total, as did deaths in women aged 30 to 39 years, and 12% occurred in women aged 40 to 49 years. Of the deaths, 72% occurred in pregnant women in the third trimester, 16% in the second trimester, 4% in the first trimester, and 8% in the postpartum period. Comorbidities were identified in 80% of the patients, with 68% overweight or obese and 28% having hypertensive disease. Of the deliveries, 80% were cesarean sections and 8% were induced vaginal deliveries, with 8% maternal death with intrauterine fetal demise and 4% spontaneous abortion. Live births accounted for 79% of the outcomes of embryos or fetuses, 17% evolved with intrauterine fetal death, and 4% spontaneous abortion. Obstetric complications were reported in 48% of patients (oligohydramnios/fetal distress, bleeding/placenta previa, wound dehiscence, and amniorrhexis).

CONCLUSION: The maternal mortality rate from COVID-19 at the Hospital and Maternity Municipal Célia Câmara was alarming when compared to pre-pandemic deaths in Goiás. The highest prevalence of maternal deaths occurred among women aged 20 to 39, with comorbidities such as overweight/obesity and hypertensive disease, in the third trimester of pregnancy. The majority underwent cesarean delivery, with live-born infants, and obstetric complications occurred in about half of the cases.

Keywords: COVID-19; Pregnant Women; Maternal Mortality; SARS-CoV-2.

INTRODUCTION

The new coronavirus, named SARS-CoV-2, has been plaguing the world since late 2019 and Brazil since early 2020. During this period, healthcare systems have experienced a different dynamic from

usual, with acute respiratory syndromes overwhelming Health Units and leading thousands of patients to death, directly or indirectly. Until the twenty-ninth epidemiological week of 2023, data from the Coronavirus Panel indicate about 37 million confirmed cases and 704,000 deaths from SARS-CoV-2, demonstrating the impact of the disease.¹

With the progression of the pandemic and the conduct of new studies, the proportion of women affected during pregnancy and the postpartum period increased. More publications have been made correlating SARS-CoV-2 infection with obstetric complications. Brazilian studies have shown a high number of maternal deaths, associated with both comorbidities and serious failures in health-care. Therefore, pregnant and postpartum women have come to be seen as a high-risk group for severe disease.²

Pregnancy is associated with physiological changes in the female body, including cardiovascular, immune, and respiratory system alterations, which can potentially favor more severe cases of infections, especially respiratory ones. From the analysis of past coronavirus epidemics and studies available in the literature on SARS-CoV-2, it is observed that these viruses cause more severe diseases in the pregnant women population, which presents a higher risk of morbidity and mortality due to SARS-CoV-2 infection compared to the non-pregnant population.³⁻⁵

The literature indicates that about 94% of Brazilian pregnant and postpartum women diagnosed with Severe Acute Respiratory Syndrome caused by the virus needed to be hospitalized⁶. Additionally, evidence indicates that pregnant women are more likely to be admitted to the ICU, require ventilation, and die compared to non-pregnant women.⁷ Epidemiological data from the COVID-19 Observatory Bulletin published in June 2021 placed Brazil as the country with the highest number of maternal deaths from the disease, with a mortality rate among pregnant and postpartum women of 7.2%, about three times higher than the mortality rate from the virus in the Brazilian population during that period, which was 2.8%.⁸

In light of these increased risks, vaccination of pregnant women against COVID-19 is a strong recommendation, supported by a wide range of data confirming its safety and efficacy. The literature does not show higher risks of negative obstetric outcomes due to vaccination. Furthermore, the non-detection of IgM in the umbilical cord or spike protein or mRNA of SARS-CoV-2 in the placenta or umbilical cord after vaccination of the pregnant woman suggests that there is no stimulation of the immune response in the fetus, indicating that the vaccine does not cross the placental barrier.⁹

A retrospective cohort study involving 472 pregnant women showed that vaccinated patients did not progress to severe disease, compared to 7.2% of unvaccinated pregnant women who developed more severe cases, and had a lower likelihood of hospitalization.¹⁰ Therefore, the role of vaccination in preventing more severe cases of the disease and improving clinical outcomes in pregnancy is already well established in the scientific literature, and it is the role of the physician to encourage this practice.¹¹

OBJECTIVES

1. General objective

To evaluate maternal deaths due to COVID-19 at the reference unit Hospital e Maternidade Municipal Célia Câmara in Goiânia - GO.

2. Specific objectives

- 2.1. Calculate the maternal mortality rate due to COVID-19 at the hospital.
- 2.2. Identify the place of residence and age of the deceased pregnant women.
- 2.3. Identify the gestational age and comorbidities of the deceased pregnant women.
- 2.4. Identify the obstetric complications and outcomes of the cases studied.

METHODOLOGY

This is an observational, cross-sectional, retrospective, and descriptive study based on the data collected from the medical records of pregnant women admitted to the Hospital and Maternity Célia Câmara Municipal between November 2020 and December 2021.

1. Procedimentos

The medical records of pregnant patients who died from COVID-19 at the Hospital and Maternity Municipal Célia Câmara between November 2020 and December 2021 were fully analyzed. Access to the records was done through the Tasy system after approval from the Municipal School of Public Health (EMSP), according to protocol 07/2022.

2. Study population

The sample of the present study consisted of 25 medical records. The collected data were stored in Microsoft Excel.

3. Inclusion criteria

Women admitted to Hospital e Maternidade Municipal Célia Câmara between November 2020 and December 2021, with confirmed COVID-19 by laboratory test during any period of pregnancy and immediate postpartum, who died, were included in the study. Pregnant women with a positive test but whose outcome was not death, as well as those with causes of death not related to SARS-CoV-2, were excluded.

4. Study variables

- 4.1. Maternal age
- 4.2. Place of residence
- 4.3. Comorbidities
- 4.4. Gestational age
- 4.5. Obstetric complications
- 4.6. Obstetric outcome
- 4.7. Type of delivery
- 4.8. Outcome of the embryo/fetus

5. Approval by the Ethics Committee

This study was approved by the Research Ethics Committee of the Hospital das Clínicas of the Federal University of Goiás, under protocol number 5,538,191.

RESULTS

During the analyzed period, 25 pregnant or postpartum patients died from COVID-19, out of a total of 908 pregnant women who were hospitalized during this period. The total number of maternal deaths between 2020 and 2021, regardless of cause, was 27 women. In total, 502 births were performed, resulting in 481 live births in the unit. The maternal mortality rate from this disease was 5.2% (5.2 deaths per hundred live births).

Twelve women were from the municipality of Goiânia. Each of the other patients was from one of the following municipalities, with no repetitions: Indiara, Trindade, Araguapaz, Niquelândia, Iporá, Alexânia, Rio Verde, Caldas Novas, Orizona, Quirinópolis, Uruaçu, and Itajá. The municipality of origin was not reported for one of the patients in the medical records.

It was observed that 44% of maternal deaths occurred in the age group of 20 to 29 years (11/25), 44% were in women aged 30 to 39 years (11/25), and 12% of these deaths occurred in the 40 to 49 years age group (3/25).

Regarding gestational age, it was observed that 72% of maternal deaths occurred in those infected in the third trimester of pregnancy (18/25), 16% in the second trimester (4/25), and 4% in the first trimester (1/25). Women in the postpartum period accounted for 8% of deaths (2/25).

Among these women, 20% did not have any comorbidity (5/25). 68% of the patients were overweight or obese (17/25), which represents 59% of the comorbidities found (17/29). Hypertensive disease was associated with 28% of maternal deaths from COVID-19 (7/25), representing 24% of the comorbidities (7/29). Two patients had hypothyroidism, one had gestational diabetes mellitus, one had Chagas disease, and one had a history of Hodgkin's lymphoma, totaling 29 comorbidities identified.

Twenty-two deliveries were performed among the pregnant women who died from COVID-19. Regarding the type of delivery in this group of patients, 20 cesarean sections were performed, accounting for 80% of the obstetric outcomes (20/25). Two vaginal deliveries were induced by the medical team due to fetal death, resulting in the birth of a non-viable fetus, corresponding to 8% of the cases (2/25). Additionally, 8% of the patients had maternal death with an intrauterine fetus (2/25), and 4% had a spontaneous abortion (1/25).

Regarding the outcomes of the embryos or fetuses, 79% of them were born alive (19/24), with one death in the delivery room among the newborns; 17% had intrauterine fetal death (4/24), two of which were due to maternal death; and 4% were spontaneous abortions (1/24). The status of one of the fetuses could not be identified because the patient was already admitted to the hospital in the immediate postpartum period.

Obstetric complications were not reported in 44% of women (11/25). Fifteen complications were identified among the 14 patients who presented them. Among the complications, it was observed that 36% of women had oligohydramnios and/or fetal distress (9/25), which corresponds to 60% of the observed complications; 12% had vaginal bleeding and/or placenta previa (3/25), 20% of the total complications; 8% had wound dehiscence (2/25), responsible for 13% of the complications; and 4% of women had amniorrhexis (1/25), quantifying 7% of the complications.

DISCUSSION

The maternal mortality rate from COVID-19 found in this study was 5.2 deaths per hundred live births (5.2%), with a total of 25 maternal deaths. When calculating the overall maternal mortality rate

in the state of Goiás in 2019, based on data obtained from DATASUS, there were 67 deaths, which corresponds to a rate of 0.07%.¹² Even with data referring to a single cause of maternal death in a single health unit in the state, the mortality rate found in this study was quite high compared to the pre-pandemic period. This justifies the need to assess the impact of SARS-CoV-2 infection on maternal mortality.

In a cohort study that included 18,715 infected pregnant women, Chinn described that these women had an increased mortality rate of 0.13% compared to pregnant women without the disease, with a peripartum mortality rate of 0.1%.

Half of the women were from the municipality of Goiânia. There is a diversity in the other places of origin of the patients, demonstrating that the Hospital and Maternity Célia Câmara is a reference unit in obstetric management. Leung, Simões e Silva and Oliveira¹⁴ observed that, in Brazil, women with more advanced gestational age were more likely to be referred for hospitalization in health units with greater structure, usually in metropolitan areas, and with the presence of an obstetric center.

There was a prevalence of maternal deaths in the age group of 20 to 29 years, representing 44%, and in the age group of 30 to 39 years, also representing 44%. In the literature, Smith¹⁵ associated older maternal age, from 35 to 40 years, with a higher risk of intensive care treatment, ICU admissions, ventilation, pneumonia diagnosis, premature placental abruption, and cesarean delivery.

Maternal deaths in pregnant women occurred in 72% of cases in the third trimester. Januszewski¹⁶ reported that the majority of pregnant patients infected with SARS-CoV-2 require hospital medical care if infected in the third trimester. Stock¹⁷ found that 33.5% of pregnant women in the third trimester required hospitalization and 4.3% required intensive care unit care, compared to 6.7% hospitalizations in the first trimester and 10.7% in the second trimester.

The immunological changes that occur in the third trimester, characterized by a pro-inflammatory state that prepares the maternal body for delivery, make pregnant women more susceptible to severe systemic inflammatory manifestations in a disease characterized by a "cytokine storm," such as COVID-19. This maternal inflammatory response is also associated with the need for improved oxygenation, contributing to a higher incidence of preterm births in infected patients.¹⁸

However, the cohort study by Leung, Simões e Silva and Oliveira¹⁴, based on data from 7,461 Brazilian pregnant women, described similar risks of mortality and morbidity among hospitalized pregnant women with COVID-19 at different gestational ages, with no greater risk perceived in the third trimester.

Comorbidities were present in 80% of the patients, with overweight or obesity and hypertensive disorders being the most common among pregnant women who died in this study. These conditions, along with diabetes, were also identified by Takemoto¹⁹ as the most associated with maternal mortality in Brazil at the beginning of the pandemic. As with other populations, the presence of comorbidities associated with SARS-CoV-2 infection is a risk factor for severe outcomes in pregnant women.

The meta-analysis by Smith¹⁵ included 21,977 cases of this disease in pregnancy or the postpartum period. It found a 3.8 times higher risk of maternal mortality for pregnant women with pre-existing diabetes mellitus, 2.75 times higher for those with chronic hypertension, and 16.8 times higher for those with cardiovascular diseases, compared to pregnant women without these chronic diseases. An increased risk of maternal morbidities was also observed, including hypertensive disorders of pregnancy, preterm birth, and cesarean delivery.

Regarding weight, pregnant women with obesity showed an increased risk for severe disease, with a body mass index (BMI) greater than or equal to 30 being a determinant for increased risk of ICU admission, ventilation, and pneumonia, but it was not related to maternal mortality in the study by Smith¹⁵. On the other hand, Mihajlovic²⁰ described that obese pregnant patients infected with SARS-CoV-2 showed a higher frequency of complications and lethality, since, when associated with physiological changes of pregnancy, it can lead to a more pronounced reduction in respiratory function.

When evaluating maternal deaths from COVID-19 in Latin America, Maza-Arnedo²¹ identified obesity in 49.4% of these patients, chronic hypertension in 8.4%, and preeclampsia in 7.4% of deaths. In the present study, the rates were higher, with 68% of women having BMI alterations, characterized as overweight or obese, and 38% having hypertensive disorders.

The main obstetric outcome found in this study was cesarean section, evidenced in 80% of cases that resulted in death in the analyzed health unit. In agreement with this finding, Marchand²² described that in the analysis of 42,754 pregnant women hospitalized with COVID-19, 53.2% of them underwent cesarean section. Metz⁵ also identified a higher risk of cesarean section in patients with severe disease.

It is suggested that these higher rates of cesarean section are related to emergency indications due to maternal health conditions in the context of severe SARS-CoV-2 infection, such as worsening respiratory status, in an attempt to improve cardiopulmonary function. Additionally, obstetric indications for this mode of delivery, such as fetal distress, were also reported, aiming to prevent fetal mortality.^{5,22,23}

The vaginal deliveries observed in this study were associated with intrauterine fetal death, both being induced by the medical team. This corresponded to 8% of the obstetric outcomes, a value lower than that reported by Maza-Arnedo²¹, who reported a rate of 15.6% of vaginal deliveries in pregnant women who died from COVID-19 in Latin America.

The fetal prognosis was favorable in this study, with the majority of fetuses being born alive (79%). However, intrauterine deaths were observed in 17% of cases, and spontaneous abortion occurred in 4%. Maza-Arnedo²¹ highlighted stillbirth as a perinatal complication arising from maternal infection with SARS-CoV-2. Similarly, Boettcher and Metz²⁴, in a literature review, reported a higher likelihood of stillbirth in pregnant women with the condition, especially during the period of the Delta variant. It is suggested that fetal and neonatal deaths in the context of this viral infection may result from direct fetal infection through vertical transmission, severe maternal disease, preterm labor in intrauterine infection, and placental insufficiency secondary to placental damage, highlighting the complexity of the maternal-fetal relationship.

Wei²⁵ conducted a systematic review in which the finding of vascular malperfusion in the placenta on histological analysis of women infected with SARS-CoV-2 at the time of delivery was described, suggesting that this factor would contribute to fetal deaths and preterm births. Regarding vertical transmission, the literature reinforces that it is a rare mechanism of transmission, occurring in a minority of cases during the third trimester, although it is associated with other congenital infections. In the absence of scientific evidence, it cannot be characterized as the transfer of SARS-CoV-2 from the mother to the fetus through vaginal secretions, amniotic fluid, breast milk, or umbilical cord and placental blood.²⁶⁻³⁰

Obstetric complications were present in 52% of the pregnant women in this study, with oligohydramnios being a significant factor contributing to complications and fetal distress. Medeiros²⁶ evidenced that symptomatic pregnant women with SARS-CoV-2 infection are more likely to have adverse fetal outcomes, with histopathological findings of poor vascular and fetal perfusion, which is a contributing factor to obstetric complications. Additionally, Giuliani³¹ infer that pregnant women with COVID-19 present more pregnancy-related complications, such as fetal distress, than women without this diagnosis.

Medeiros²⁶ also mention the prevalence of oligohydramnios (11/358), amniorrhexis (5/359), and non-reassuring fetal status (62/363) in an observational study in Latin America, suggesting that they were more present in women who had fever and shortness of breath during the viral infection process, as well as Singh³² observed a significant increase in severe oligohydramnios in the second wave of the disease.

CONCLUSION

The present study identified a maternal mortality rate due to COVID-19 of 5.2% (5.2 deaths per hundred live births). Half of the patients were from Goiânia, and the other half came from other municipalities in the interior of the state of Goiás. Among the deaths, 44% occurred in women aged 20 to 29, 44% in women aged 30 to 39, and 12% in women aged 40 to 49. Regarding gestational age, 72% of the deaths occurred in women in the third trimester, 16% in the second trimester, 4% in the first trimester, and 8% in the immediate postpartum period. The majority of women had comorbidities (80%); 68% were overweight or obese, and 28% had hypertensive disease. Of the deliveries, 80% were cesarean sections, 8% were induced vaginal deliveries, 8% were maternal deaths with intrauterine fetal death, and 4% were spontaneous abortions. As a neonatal outcome, 79% of the embryos or fetuses were born alive, 17% had intrauterine fetal death, and 4% were spontaneous abortions. Obstetric complications were reported in 56% of patients, including oligohydramnios, fetal distress, vaginal bleeding, placenta previa, surgical wound dehiscence, and amniorrhexis.

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