Saúde e Pesquisa

Promoção da Saúde
DOI: 10.17765/2176-9206.2023v16n3.e11615

Sociodemographic and clinical-obstetric profile of pregnant women diagnosed with COVID-19 and outcome after birth

Perfil sociodemográfico e clínico-obstétrico de gestantes com diagnóstico de COVID-19 e desfecho após nascimento

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Received in April 06, 2023
Accepted on April 10, 2023

ABSTRACT
To describe the sociodemographic and clinical-obstetric profile of pregnant women diagnosed with COVID-19, as well as the outcome, after birth, of pregnant women and newborns-seen at the University Hospital of the West of Paraná. A quantitative, descriptive, documentary, retrospective research. Data collection was performed by a structured script, based on medical records of pregnant women seen at the study institution. The variables concerned sociodemographic and clinical-obstetric characteristics, complications, puerperium and newborn data. The data were analyzed using a simple descriptive analysis. The women were mainly in the age group of 20 to 39 years, asymptomatic, diagnosed with COVID-19 at admission, gestational age at term, and prevalence of cesarean section; among the complications, respiratory was the highest one. Of the causes of hospitalization of newborns in an intensive care unit, prematurity and respiratory discomfort deserved highlight. It is recommended that widespread immunization of the maternal population is recommended to prevent complications and a consequent reduction of morbidity and mortality rates due to this disease.

Keywords: COVID-19. Pregnancy. Newborn. Women's health. Children's health.

RESUMO
Descrever o perfil sociodemográfico e clínico-obstétrico de gestantes com diagnóstico de Covid-19, bem como o desfecho, após o nascimento, das gestantes e dos recém-nascidos atendidos no Hospital Universitário do Oeste do Paraná. Pesquisa quantitativa, descritiva, documental, retrospectiva. Coleta de dados realizada por roteiro estruturado, com base em prontuários de gestantes atendidas na instituição do estudo. As variáveis foram sobre características sociodemográficas, clínico-obstétricas, complicações, puerpério e dados do recém-nascido. Os dados foram analisados mediante análise descritiva simples. As mulheres estavam, principalmente, na faixa etária de 20 a 39 anos, assintomáticas, diagnosticadas com Covid-19 na admissão, idade gestacional a termo, prevalência de cesárea; dentre as complicações, a respiratória foi maior. Das causas de internação dos recém-nascidos em unidade de tratamento intensivo, preponderaram prematuridade e desconforto respiratório. Recomenda-se ampla imunização da população materna para prevenção de complicações e consequente redução das taxas de morbimortalidade por essa doença.

Palavras-chave: COVID-19. Gestantes. Recém-nascido. Saúde da mulher. Saúde da criança.

INTRODUCTION

COVID-19 is a disease caused by the new coronavirus, named SARS-CoV-2, a ribonucleic acid virus (RNA) that is highly likely to mutate and is able to spread quickly. Clinical manifestations are commonly fever and flu-like respiratory symptoms[1]. This virus is usually transmitted from person to person by means of saliva droplets eliminated in speech, cough and sneezing; and by touching contaminated people and/or objects and consequent contact with eyes, nose or mouth[2].

People from risk groups, such as patients with chronic diseases, the elderly, pregnant women, puerperal women and children under 5 years of age, are more likely to contract the most severe form of the disease[3]. Regarding the group of pregnant women, the physiological and hormonal changes specific to pregnancy make the immune system fragile to the response to viral infections, which can cause more severe symptoms, both to mothers and newborns (NB) — to them, because they still have their immune system immature[4].

The women's immune system during pregnancy adapts actively, especially in the first and third gestational trimesters. Among the adaptations, proinflammatory ones are highlighted, which make them susceptible to viral infections, particularly respiratory infections, such as COVID-19[5]. On a global scale, there is a high number of infected pregnant women, and in the United States, the SARS-CoV-2 infection and related symptomatology occurred at similar or higher rates among pregnant women compared to those of non-pregnant reproductive age[6.7]. In Brazil, between 2020 and 2021, 35,106 cases of SARS-CoV-2 were recorded in both pregnant and postpartum women[7].

In addition, comorbidities such as hypertension, diabetes or chronic lung diseases, particularly asthma and chronic obstructive pulmonary disease (COPD), can raise the risk of complications in the presence of COVID-19. Complications include severe acute respiratory syndrome (SARS), respiratory distress syndrome, disseminated intravascular coagulopathy, renal failure, bacterial pneumonia, sepsis, chronic kidney disease, chronic kidney disease, bacterial pneumonia, sepsis, among others[8.9], which may compromise pregnancy and delivery.

In view of the foregoing, COVID-19 was responsible for an increase in hospitalizations in Intensive Care Units (ICU), requiring ventilatory support and, consequently, an increase in maternal deaths in Brazil in 2021 compared to 2020[10]. The diagnosis of the disease in pregnant women increased the rates of cesarean section, initially indicated in the confirmation or suspicion of pneumonia, thus raising the maternal-fetal risks[11].

During the pandemic, there was a concern in the scientific community regarding maternal and child care, since the growth in cesarean rates and the separation of the mother-child dyad could probably lead to problems in the generation of the bond, a decrease in

breastfeeding, postpartum depression, and suicides[12]. These challenges were already observed and were already in concerns before the pandemic, but were aggravated during this period. Thus, health professionals had to adapt and promote the health of this population, favoring the discussion and implementing measures to deal with the possibility of intercurrences in childbirth, a risk of vertical transmission, fear about the impossibility of choosing between normal delivery or cesarean section, maintenance of a companion in childbirth, encouragement of maternal care and fighting fake news[13].

Knowing that the population of pregnant women who was contaminated in the pandemic and the outcomes of this infection for pregnancy allows subsidies to health services that serve this population segment, to propose actions aimed at reducing the risk of this contamination in such a group with the use of prevention and health promotion measures. Therefore, it is pertinent that there are researches describing the profile of a disease in a specific group. Finally, this study aimed to describe the sociodemographic and clinical-obstetric profile of pregnant women diagnosed with COVID-19, as well as the outcome, after birth, of pregnant women and newborns-seen at the West Paraná University Hospital.

METHOD

This study is an exploratory research, descriptive, documentary, retrospective, with a quantitative approach, based on medical records of all pregnant women diagnosed with COVID-19 admitted for childbirth in a university hospital in West Paraná, from March 2020 to March 2022. Electronic records of the Tasy system and printed medical records were consulted.

For data collection, a script with closed questions was used, with variables related to pregnant women and NB. As for pregnant women, sociodemographic data were obtained, which included variables of age, ethnicity, marital status, level of education and occupation; clinical-obstetric data on admission for childbirth, and childbirth. These data included variables regarding gestational age, a COVID-19 diagnosis, obstetric conditions at admission (dilation, uterine dynamics, state of amniotic membranes), way of birth, indication of cesarean section, type of anesthesia for a cesarean section, and place of delivery.

Data on complications were also used: Procedures, readmissions and outcome after delivery, which included variables of respiratory complications, use of oxygen therapy and, if so, what device, use of mechanical ventilation, pulmonary involvement identified by chest computed tomography (CT), use of invasive procedures, and readmission. Also, clinical evaluation data of women in the puerperium: Evaluation of the uterus, lochia, breasts, perineum, and surgical incision by nurses and doctors.

Regarding the NB, data were obtained for characterization, treatment and outcome, such as sex, gestational age classification, Apgar score, weight, need for local oxygen therapy for hospitalization, need for intubation and mechanical ventilation, need for surfactant, use of umbilical catheter, and central peripheral insertion catheter (PICC), feeding, testing for COVID-19, method used and result, as well as outcome of birth.

The Microsoft Excel® software was used for the organization, tabulation and analysis of descriptive data. A descriptive analysis of quantitative variables was used.

This research is part of a larger (funded), multicenter project entitled "Confronting COVID-19 and Maternal and Child Care", approved by the Ethics Committee in Research with Human Beings of the West Paraná State University, no. 4.730.796 and CAAE no. 39060120.1.0000.0107. The ethical precepts of Resolution 466/12 were respected at all stages of the research.

RESULTS

We identified 95 medical records of women admitted for delivery with COVID-19, mostly aged between 20 and 39 years, of race/color white (74;78%), who lived with a partner (68; 72%), had finished high school (45; 48%), and were workers (42;44%) (Table 1).

Table 1. Socio-demographic data of women with COVID-19 admitted for childbirth in a university hospital in — Cascavel, Paraná, Brazil, 2020-2022

Variable	Categories	N	%
Maternal age	≤ 19 years	7	7%
	20 to 39 years	79	83%
	≥ 40 years	9	10%
Ethnicity	White	74	78%
	Black	4	4%
	Yellow	0	0%
	Mixed race	15	16%
	Indigenous	0	0%
	No record	2	2%
Marital status	Partnered	68	72%
	Not partnered	25	26%
	No record	2	2%
Occupation	Remunerated	42	44%
	No remuneration	31	32%
	No record	22	23%
Education	Incomplete Junior High School	16	17%
	Incomplete High School	23	24%
	Completed High School	45	48%
	Incomplete Higher Education	4	4%
	Complete Higher Education	2	2%
	No record	5	5%

Source: The authors (2022)

The symptomatology was present in 55 (58%) pregnant women at admission to the hospital. Cough was the prevalent symptom, followed by respiratory discomfort and coryza; 63

(66%) had a diagnosis of COVID-19 after admission, and 81 (86%) were in ambient breathing at admission (Table 2).

Regarding obstetric conditions (Table 2), 65 (69%) were at term gestational age; 44 (44%) had cervical dilation from 0 cm to 4 cm; 41 (43%) had uterine dynamics present; 34 (36%) had intact amniotic membranes.

The predominant route of delivery and birth was cesarean section, 52 (55%) of the cases; of these, 36 (69%) had obstetric indication as iterative (10; 28%); worsening in the respiratory situation (9; 25%), failed induction (4; 11%), fetal suffering (3; 8%), pre-eclampsia (3; 8%), Pelvic presentation (2; 6%), inaudible fetal heart rate (BCF) (2; 6%), cephalopelvic disproportion (2; 6%) and premature amniorrhexis (1; 2%).

Regarding the place of birth and the birth in itself, 58 (61%) occurred in the obstetric center. It should be noted that a room of the hospital surgical center was reserved for surgeries on people diagnosed with COVID-19, among them, the cesarean section. However, some births also occurred in this environment (Table 2).

Table 2. Clinical-obstetric data on admission for delivery of women with COVID-19 in a university hospital in — Cascavel, Parana, Brazil, 2020-2022

Variable	Categories	N	%
COVID-19 diagnosis	Before admission	33	34%
	After admission	63	66%
	Rapid molecular test	59	61%
	RT-PCR‡	19	20%
	Not tested	17	19%
Symptoms	Cough	24	25%
	Respiratory discomfort	18	19%
	Coryza	13	14%
	Asymptomatic	40	42%
Respiration	In ambient air	81	86%
	Oxygen therapy by catheter	7	7%
	Ventury mask	7	7%
Gestational age	At term	65	69%
	Preterm	30	31%
Cervical dilatation	0 cm to 4 cm	42	44%
	5 cm to 10 cm	24	26%
	No record	29	30%
Uterine dynamics	Present	41	43%
	Absent	37	39%
	No record	17	18%
Condition of membranes	Intact membrane	34	36%
	Ruptured membrane	20	21%
	No record	41	43%
Way of birth	Normal delivery	43	45%
	Cesarean section	52	55%
If cesarean section, type of anesthesia	Rachidian	44	85%
	General	8	15%
If cesarean section, indication	Suspicion/confirmation of COVID-19	16	31%
	Clinical-obstetric indication	36	69%
Place of birth	Screening	3	3%
	Obstetric clinic	58	61%
	Surgical center	31	33%
	COVID-19 ICU†	3	3%

Source: The authors (2022)

During hospitalization, of the total number of women, 18 (19%) had respiratory complications and needed oxygen therapy. Of these, 8 (50%) used mask with reservoir, 11 (12%) used mechanical ventilation, 3 (3%) died (Table 3), and the mean length of hospitalization was 7 days.

Among the main causes of pulmonary involvement (14; 15%), the following were identified-: Viral pneumonia; pleural effusion and a bilateral interstitial, alveolar infiltrate.

As for invasive procedures, it is pointed out that 83 (86%) had a peripheral venous access puncture, 21 (22%) used an intermittent vesical probe, 10 (10%) used a central venous catheter, and 10 (10%) used an orotracheal tube. These were the main procedures (interventions) performed in women during hospitalization (Table 3).

It should be reported that 17 (18%) women needed readmission. Of the causes of readmission, five (5%) were pulmonary/respiratory; five (5%) were vascular; and four (4%) were neurological (Table 3).

Table 3. Clinical-obstetric data on admission for childbirth of women with COVID-19 in a university hospital in — Cascavel, Parana, Brazil, 2020-2022

Variable	Categories	N	%
Respiratory complications	Yes	18	19%
	No	77	81%
Use of oxygen therapy	Yes	16	17%
	No	79	83%
If so, which device	Nasal catheter	5	31%
	Mask with reservoir	8	50%
	Ventury mask	3	19%
Use of mechanical ventilation	Yes	11	12%
	No	84	88%
Pulmonary impairment (by CCT[§])	Yes	14	15%
	No	81	85%
Invasive procedures	Peripheral venous access	83	86%
	Intermittent vesical probe	21	22%
	Central venous catheter	10	10%
	Orotracheal tube	10	10%
	Tracheostomy	3	3%
	Invasive pressure	9	9%
	ECMO[††]	1	1%
	Nasoenteral probe	7	7%
	Nasogastric tube	2	2%
	Intermittent vesical probe	2	2%
	Chest drain	1	1%
	Blood transfusion	1	1%
Readmission	Yes	17	18%
	No	78	82%
Causes of readmission	Vascular	5	5%
	Pulmonary	5	5%
	Neurological	4	5%
	Others	3	3%
Outcome	Discharge	92	97%
	Death	3	3%

§ CTT: Chest computed tomography
†† ECMO: Extracorporeal membrane oxygenation
Source: The authors (2022)

Recording the puerperal clinical evaluation of the uterus, lochia, and breasts was performed in the medical records of all women by doctors and nurses. The perineum evaluation was performed in 53 (56%) women. It is observed that 52 (55%) of them had cesarean section, which may justify, in part, this result. However, there is a record of the surgical incision evaluation in 49 (52%) of them. Therefore, it was found that not everyone who had cesarean section had their evaluation recorded. Most of the records were made by medical professionals (Table 4).

Table 4. Clinical evaluation of women in the puerperium with COVID-19 admitted to a university hospital — Cascavel, Paraná, Brazil, 2020-2022

Variables	Categories	N	%
Uterus evaluation	Yes	95	100%
	No	0	0%
Uterus evaluation by nurses	Yes	79	82%
	No	16	18%
Uterus evaluation by doctors	Yes	91	95%
	No	4	5%
Lochia evaluation	Yes	95	100%
	No	0	0%
Lochia evaluation by nurses	Yes	87	92%
	No	8	8%
Lochia evaluation by doctors	Yes	92	97%
	No	3	3%
Breast evaluation	Yes	95	100%
	No	0	0%
Breast evaluation by nurses	Yes	82	86%
	No	13	14%
Breast evaluation by doctors	Yes	93	98%
	No	2	2%
Perineum evaluation	Yes	53	56%
	No	42	44%
Perineum evaluation by nurses	Yes	25	26%
	No	70	74%
Perineum evaluation by doctors	Yes	48	51%
	No	47	49%
Surgical incision evaluation	Yes	49	52%
	No	4	4%
	Not applicable	42	44%
Surgical incision evaluation by nurses	Yes	33	35%
	No	20	21%
	Not applicable	42	44%
Surgical incision evaluation by doctors	Yes	47	50%
	No	6	6%
	Not applicable	42	44%

Source: The authors (2022)

The NBs of women diagnosed with COVID-19 admitted for delivery had a mean gestational age of 39 weeks; mean Apgar of 7 at the first minute and 8 at the fifth minute; mean weight of 3,113 grams; mean hospitalization period of three days. There were two (2%) perinatal deaths.

It was pointed out that 16 (17%) NBs needed hospitalization in the Neonatal Intensive Care Unit (ICU-Neo) and Intensive Care Unit (ICU), and 5 (5%) of them died. ICU and ICU admissions were mainly due to prematurity and respiratory discomfort. Intubation and mechanical ventilation were necessary in nine (9%) of them. The mean gestational age of these NBs was 32 weeks; mean Apgar of 6 at the first minute and 8 at the fifth minute; mean weight of 1,960 grams; mean hospitalization time of 19 days.

As for NBs, 54 (57%) of them were male, 68 (72%) of them were classified as suitable for gestational age, 23 (24%) of them required oxygen therapy, 77 (81%) of them remained in joint accommodation, 16 (17%) of them were admitted to NICU-N or ICU. Of these, 9 (9%) needed mechanical ventilation, 9 (9%) of surfactant, 13 (14%) used umbilical catheter, two (2%) used PICC (Table 5).

Among the NBs, 50 (53%) of them received exclusive breastfeeding (EBF), 28 (29%) of them received breastfeeding (AM) and complement of the human milk bank (HMB), and 17 (18%) of them received only HMB milk (Table 5).

For the detection of COVID-19, 79 (83%) RNs passed the test, with negative results for all; and the method used was RT-PCR in the 79 (100%) cases (Table 5).

Table 5. Characterization of the newborn, treatment and outcome in a university hospital in — Cascavel, Paraná, Brazil, 2020-2022

Variables	Categories	N	%
Sex	Female	41	43%
	Male	54	57%
Gestational age classification	Small for gestational age	5	5%
	Adequate for gestational age	68	72%
	Large for gestational age	3	3%
	No record	19	20%
Oxygen therapy	Yes	23	24%
	No	72	76%
Place of hospitalization	Intermediate care unit	3	3%
	Neonatal Intensive Care Unit	13	14%
	Housing assembly	77	81%
	Not applicable	2	2%
Mechanical ventilation	Yes	9	9%
	No	86	91%
Surfactant	Yes	9	9%
	No	85	89%
	Not applicable	2	2%
Umbilical catheter	Yes	13	14%
	No	82	86%
PICC	Yes	2	2%
	No	93	98%
Nourishment	EB[‡‡]	50	53%
	BF[§§] + HMB[†††]	28	29%
	HMB[#]	17	18%
Testing for COVID-19	Yes	79	83%
	No	7	8%
	No record	9	9%
COVID-19 test result	Positive	0	0%
	Negative	79	83%

	No record	16	16%
Method:	PCR	79	83%
	No record	16	17%
Outcome	Discharge	90	95%
	Death	5	5%

‡‡ EB: Exclusive breastfeeding
§§ BF: Breastfeeding
††† HMB: Human milk bank
Source: The authors (2022)

DISCUSSION

Regarding the sociodemographic profile, it has been observed that the maternal age group, marital status and race/color corroborate the data presented by the Maternal and Child Care Network, of the Ministry of Health (MH). It is confirmed that young, married or partnered women (steady union) are among the most susceptible to SARS-CoV-2 contamination. It is noteworthy that the prevalent age of pregnant women who were diagnosed with the disease and/or died in Brazil and China was 20 to 37 years[11,14].

Most women had gestational age at term, ratifying data from the MH Information System, which indicates that 3,028 (62%) pregnant women who had tested positive for COVID-19 were in the third trimester[15]. The fragility of the immune system of women during pregnancy is also confirmed, which makes them susceptible to viral infections; among them, SARS-CoV-2 infection[5].

As for clinical conditions at admission, most pregnant women were symptomatic. The prevalent symptoms indicated by the MH regarding the most frequent symptomatology in pregnant women were the following: Cough, fever, dyspnea and respiratory discomfort[15].

Regarding testing, in the initial period of the COVID-19 pandemic, the MH indicated that the rapid test result (TR) should not be a parameter to verify if there was contamination by SARS-CoV-2. According to this organ, the immunochromatographic test (TR) is limited, since it brings only a qualitative result, that is, whether or not there is the IgM or IgG antibody. The RT-PCR molecular test is gold standard for concrete diagnosis, as it detects the RNA of the SARS-CoV-2 virus. Therefore, the chances of a false-positive/false-negative are minimal[16].

Conducting CCT in cases of severe acute respiratory syndrome (SARS) clinically detects SARS-CoV-2, whose pulmonary image presents a ground glass pattern[17]. The same condition is identified in an image of one of the puerperae of this study.

Maternal death rates due to COVID-19 were compatible with those of non-pregnant women. The worsening of maternal respiratory conditions was what led them to the need for hospitalization in the pre-delivery period, and this extended the period of hospitalization[18]. This fact may result from the initial reduction of scheduled appointments in Primary Health Care (PHC) in the years 2020 and 2021, including, among them, prenatal care. In the pandemic

context, given the possibility of viral transmission, restrictive measures were implemented. Associated with this, misinformation and fear of contamination led to a reduction in the search of pregnant women for routine care in PHC. In addition, there was limited accessibility of medical resources, which were focused on emergency care, imposed by the disease[19].

During the emergency period of the pandemic, pneumonia was observed during hospitalization in most women; fetal deaths and neonatal deaths; and high rates of cesarean sections during the period. The mean gestational age of births was within the "term" classification, but preterm births had an increase in the national average from 11% to 23%, although they were of late preterm infants, that is, of an average gestational age of 35.74 weeks[18]. These findings are similar to those found in the university hospital studied.

Still, according to the data, it is evident that COVID-19 is an indicator of increased maternal morbidity and mortality in the context of the study. This condition corroborates maternal mortality ratio data in Brazil, which was 57.9/thousand inhabitants in 2019, increasing to 74.7 in 2020 and to 99.3 in 2021[14].

The highest rates of incidence, lethality and mortality due to COVID-19 occurred in the North and Northeast regions, considered to be of greater socioeconomic vulnerability, compared to the Southeast, South and Center-West Regions[20]. However, although the South Region, this study site, presents better socioeconomic conditions, it was found that this disease contributed to the increase in maternal morbidity and mortality.

Although COVID-19 was not an indication for cesarean section, the prevalent birth path in our study was cesarean section (52; 55%), corroborating another study[21]. The clinical evolution of parturients may define the appropriate conduct, and anticipation of delivery or cesarean section are indicated when there is clinical or obstetric decompensation that puts maternal or fetal vitality at risk[2.22]. Normal delivery is recommended to prevent postoperative complications in already debilitated women.

Regarding premature birth, it is noticed that it occurred due to the worsening of the maternal condition, route bag and spontaneous delivery. It is not clear whether COVID-19 was the main cause of premature labor[18]. It is well established that viral infections can affect the function of the placenta, which results in complications such as miscarriage, intrauterine growth restriction, and preterm birth[23]. Regarding the admissions of NBs in a Neonatal ICU, it is confirmed that they are mainly related to respiratory problems and an Apgar score smaller than 7 at the fifth minute of life[18].

The COVID-19 pandemic directly impacted the practice of exclusive breastfeeding in Brazil. At first, the recommendations were to keep NBs in the incubator until they were transferred to the joint housing or intensive care unit. In addition, the puerpera should bathe, be

wearing a mask, wash hands and wear a cap to start breastfeeding[24-25]. Therefore, breastfeeding in the first hour of life was certainly compromised.

In view of the above, health promotion is also important for the breastfeeding process. Support networks fostering safe information and social and emotional support can function as stabilizers for the maintenance of exclusive breastfeeding[26].

This study findings can subsidize health service professionals and managers in planning actions to prevent COVID-19, to promote health and to treat complications related to infection, which affect the population under study. Although the data were collected from a single hospital, it should be noted that it is a reference in care for high-risk pregnant women for 25 municipalities that make up the tenth health region of the Paraná state.

CONCLUSION

It was found that COVID-19 is added to the causes of maternal and neonatal morbidity and mortality, especially in women aged 20 to 39 years. Testing at admission played an important role in identifying the disease in asymptomatic carriers. However, the diagnosis was also responsible for increasing cesarean rates.

In order to reduce cases of COVID-19 among pregnant women and the risks to which they are vulnerable, a prevention measure is broad immunization of the maternal population in order to avoid complications and provide the consequent reduction of morbidity and mortality rates due to this disease.

This study was limited to analyzing medical records. For this reason, missing information that could have been recorded by health professionals may have compromised the results.

ACKNOWLEDGEMENTS

To the National Council for Scientific and Technological Development (*Conselho Nacional de Desenvolvimento Científico e Tecnológico* - CNPq) for the scientific initiation grant and to the Araucária Foundation for Supporting Scientific and Technological Development of the State of Paraná (*Fundação Araucária* - FA), for funding this research — Public Call 11/2020 – Research for SUS Program: Health Shared Management, Protocol No. SUS2020131000085.

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