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DIAGNOSES AND COMPLICATIONS OF NEONATES OF COVID-19 POSITIVE MOTHERS

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ABSTRACT

Introduction: Pregnant women and newborns were characterized as a risk group during the SARS-CoV-2 virus pandemic. Vertical transmission from mother to newborn still seems to be unlikely, and there is a gap in the literature on the subject. Objectives: To identify the diagnoses of newborns born to mothers who were infected with SARS-COV-2 at the time of delivery, admitted to rooming-in or Neonatal Intensive Care Unit in a hospital in the interior of the state of São Paulo. Methodology: The research will be developed in a Tertiary Hospital in the interior of the state of São Paulo, through a cross-sectional study through the documentary analysis of medical records of newborns with 0 days of life until their discharge, admitted to Rooming-in and Neonatal ICU, whose mothers were positive with COVID-19 at birth, from December 31, 2019 to September 30, 2022.

Keywords: Neonatology. Newborn. COVID-19.

INTRODUCTION

The *Severe Acute Respiratory Syndrome-related coronavirus 2* (SARS-CoV-2) virus emerged in China at the end of 2019, spreading rapidly around the world and making this situation a global pandemic decreed by the World Health Organization (WHO) in March 2020 (WORLD HEALTH ORGANIZATION, 2022). This scenario represented a serious public health problem with serious health, social, economic and political impacts, mainly saturating health systems, depleting supplies and human resources. Among the most affected countries, the following stand out: United States, India, Italy, China, Spain and Brazil (DE ROSE, PIERSIGILLI *et al.*, 2020, DOS SANTOS, *et al.*, 2020, MASCARENHAS, CAROCI-BECKER, *et al.*, 2020)element.

Transmission by the SARS-CoV-2 virus is much higher when compared to other viruses. Consequently, its mortality rate is higher due to its rapid transmissibility (COSTA, SANTOS, *et al.*, 2021)element. According to the WHO, as of September 2022, 606,459,140 cases have been confirmed worldwide, with a total of 6,495,110. In Brazil, these data represent around 34,526,148 confirmed cases and 684,853 deaths as a consequence of COVID-19 (WORLD HEALTH ORGANIZATION, 2022). To control contamination by the virus, the WHO and the Ministry of Health (MS) recommended social isolation, early detection of infection, notification, investigation and proper management of cases.

Most patients contaminated by the SARS-CoV-2 virus have fever, nasal congestion, runny nose, dry cough, dyspnea, myalgia, loss of taste and bilateral irregular pattern and/or ground-glass opacities, which can be seen on chest CT scans. In some cases, severe symptoms such as Severe Acute Respiratory Syndrome (SARG) may appear, being more common in the elderly and people with comorbidities (GÓES, DOS SANTOS, *et al.*, 2020, MASCARENHAS, CAROCI-BECKER, *et al.*, 2020, PESSOA, DO VALE, *et al.*, 2020)element.

There were many uncertainties about the COVID-19 pandemic, especially in relation to the treatment and prevention of contamination of the disease. However, it is important to mention that even in the face of the pandemic scenario, the cycle of life continued, which generated doubts regarding the care to be taken in relation to pregnant women and newborns (NB) (GÓES, DOS SANTOS, *et al.*, 2020, MIMOUNI, LAKSHMINRUSIMHA, *et al.*, 2020, MINISTRY OF HEALTH, 2020)element.

Because of this, the Ministry of Health included women during the pregnancy-puerperal cycle and NB in the classification as risk groups (MASCARENHAS, CAROCI-BECKER, *et al.*, 2020)element. In pregnant women, symptoms can be present in a mild or moderate form and mostly asymptomatic. This scenario can lead to a high risk of neonatal

contamination during labor (PT) (COSTA, SANTOS, *et al.*, 2021, MASCARENHAS, CAROCI-BECKER, *et al.*, 2020)element.

Vertical transmission from mother to newborn still seems to be unlikely, but there is a gap in the present literature on the subject, most of which are carried out in China and with little scientific evidence. Pessoa et al, published a case study in 2020 where a 33-week-old pregnant woman with proven COVID-19 infection presenting with dry cough, dyspnea, and tomographic findings of ground-glass opacity and bilateral consolidations, underwent emergency cesarean section due to respiratory decompensation. The newborn was transferred to the Neonatal Intensive Care Unit (NICU) soon after birth and kept in respiratory and contact isolation. After 6 hours of life, his RT-PCR was collected, testing positive. Although there is such a gap regarding these findings, the positive result of this NB is worrying, and further investigations are needed (PESSOA, DO VALE, *et al.*, 2020)element.

According to a systematic review published in 2021 where the objective was to evaluate the relationship between COVID-19, pregnancy and neonates, it was possible to identify that all included studies diagnosed the SARS-CoV-2 virus in parturients through RT-PCR testing. However, most studies have highlighted the possibility of a false negative result in patients who could be infected with the virus. The false negative result can occur due to insufficient viral load, sampling in the initial or late stage of the disease, and unstructured collection sites (FORATORI-JUNIOR, MOSQUIM, *et al.*, 2021)element. In the same study, of the 279 neonates evaluated, only ten tested positive for SARS-CoV-2 after at least 30 hours of delivery.

Some authors believe that vaginal delivery may carry a risk of vertical transmission of COVID-19, however, the hypothesis that best explains the non-viral transmission from mother to child is due to the fact that the receptor of angiotensin-converting enzyme 2 (ACE2) of COVID-19 has low expression in all precursor cells of the maternal-fetal interface. In some studies, the placenta, umbilical cord, amniotic fluid, and breast milk were tested and there were no positive results for the presence of the virus. However, it should be noted that there may have been a false negative result as previously mentioned (FORATORI-JUNIOR, MOSQUIM, *et al.*, 2021, SALVADOR-PINOS, MARTINEZ, *et al.*, 2022)element.

Knowing that the transmission of the virus occurs through contamination by droplets, aerosols and contact, during labor of women who are suspected or contaminated with SARS-CoV-2, the team must be aware of the diagnosis and prepared to follow all safety recommendations (SILVA, ROCHA, *et al.*, 2021)element.

According to the study published in 2021, two stages are extremely important during the birth process, namely: hand hygiene with water and liquid soap or alcohol gel preparation (70%) and use of personal protective equipment (disposable apron, surgical mask or upper, procedure gloves, goggles, face shield, caps and shoe covers). Some studies have recommended early clamping of the umbilical cord and separation of mother and child after birth for 14 days, however, there is not enough evidence to confirm the benefit of this action. In addition, separating mother and baby can negatively impact the adaptation of the NEWBORN (SILVA, ROCHA, *et al.*, 2021)element.

According to a publication by the Ministry of Health, it is recommended that in cases of asymptomatic or symptomatic pregnant women who do not have clinical changes, the routine of clamping the umbilical cord should be maintained. Regarding skin-to-skin contact and breastfeeding, it is recommended that these should be performed on asymptomatic mothers who have not had home contact with people contaminated by the virus. Otherwise, it is recommended that skin-to-skin contact and breastfeeding be carried out after all the parturient's hygiene care, such as bathing, changing masks, caps, nightgowns, and sheets (SILVA, ROCHA, *et al.*, 2021)element.

Thus, after all the information cited, it is necessary to highlight the importance of investigating the profile of these NB, children of mothers who were diagnosed with COVID-19. It is necessary to characterize how these NB presented themselves after birth so that there is a better understanding of the association between COVID-19, pregnancy and NB.

OBJECTIVES

GENERAL OBJECTIVE

To analyze the diagnoses of newborns born to mothers infected with SARS-CoV-2, who were within the period of viral transmissibility at the time of delivery, encompassing rooming-in and NICU neonates admitted to a public and tertiary hospital in the interior of the State of São Paulo, from December 31, 2019 to September 30, 2022.

SPECIFIC OBJECTIVES

- To determine, through documentary analysis, through medical records, the outcome of neonates born to mothers infected with COVID-19 and compare them with current scientific evidence.
- To evaluate whether the variables to be studied of the newborns (birth weight, Apgar, gestational age – New Ballard, weight gain/loss, RT-PCR, laboratory and imaging tests, length of stay in rooming-in and NICU, breastfeeding, respiratory

distress, prematurity, sepsis, and other possible pathologies) may be related to maternal infection.

- To analyze the data regarding demographic aspects, need and type of ventilatory support used, complications, length of hospital stay, main diagnosis and clinical outcome.
- To correlate the results found with those of other studies of the same profile.
- To contribute, based on the discussion of the data collected, in the process of forming the cultural repertoire of health professionals, about COVID-19 and its relationship in neonatology, to improve care in the service.

MATERIALS AND METHODS

RESEARCH DESIGN

This will be a cross-sectional analytical observational epidemiological study, which will be developed through the documentary analysis of medical records of pregnant women and newborns from a public hospital in São Paulo.

PROCEDURES

The study will be developed from the documentary analysis of the medical records of pregnant women with positive SARS-CoV-2 and within the period of transmission at the time of delivery admitted to the Obstetric Center, and of their neonates in the Rooming-in and NICU, in the period between December 2019 and September 2022. According to information from the hospital's Department of Technology and Informatics (IT), in the aforementioned period, 112 occurrences of mothers with a positive COVID test at the time of delivery were recorded. This corresponds to the size of the population whose electronic medical records will be analyzed to compose the results of this research.

Data will be collected regarding maternal infection, birth weight, Apgar score, sex, gestational age – New Ballard, weight gain/loss, RT-PCR, laboratory and imaging tests, length of stay in rooming-in and NICU, breastfeeding, respiratory distress, prematurity, sepsis, and other possible complications (Appendix 1)

INSTRUMENTS

The data will be collected from the Rooming-in and NICU admissions record book of the hospital where the study will be carried out and the analysis of the collected data will be done by computing them in Excel tables and the results will be evaluated through statistical analysis.

STATISTICAL ANALYSIS

Statistical analysis will be performed using specialized software, with normality tests applied to the data to determine the choice between parametric or non-parametric methods. Continuous variables will be described by means and standard deviations. Comparisons between groups will be made by chi-square or Fisher's exact for categorical variables. A significance level of 5% ($p < 0.05$) will be considered. Multivariate analyses will be conducted to adjust for potential confounders.

ETHICAL ISSUES

The research will be submitted to the approval of the Research Management System of the University of Western Paulista (UNOESTE) and the Plataforma Brasil to later begin the study of the medical records strictly following the current ethical standards, ensuring confidentiality of the name of the institution from which the documents, mentioned above, were analyzed. Due care will be taken so that the data does not identify the participants in the research and in future publications.

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ATTACHMENTS

1. Form with data to be extracted from the medical records for the research

maternal infection, birth weight, Apgar score, gender, gestational age – New Ballard, weight gain/loss, RT-PCR, laboratory and imaging tests, length of stay in rooming-in and NICU, breastfeeding, respiratory distress, prematurity, sepsis, and other possible complications (Appendix 1)

Chart:	
Maternal COVID-19 infection	( ) YES ( ) NO
Birth weight (g)	
APGAR	1st min: / 5th min
Sex	( ) male ( ) female
Gestational age – New Ballard (weeks)	
Weight gain or loss (g/day)	
RT-PCR COVID of the newborn	( ) Positive ( ) Negative
Laboratory or Imaging Tests (write down reports):	
Length of stay in the Rooming-in (days)	
Length of stay in the NICU (days)	
Breastfeeding or formula	( ) Breastfeeding ( ) formulas
Was there respiratory distress?	( ) yes ( ) no
Prematurity?	( ) yes ( ) no
Sepsis?	( ) yes ( ) no
Other complications or relevant information:	