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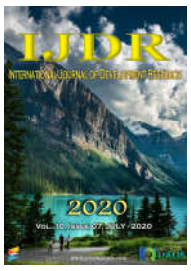

RESEARCH ARTICLE OPEN ACCESS

NEONATES HOSPITALIZED DUE TO COVID-19 IN PARÁ, AMAZON REGION OF BRAZIL: A CASE SERIES

[1]Ariella Cristina Rego Lobato, [2]Sâmela Miranda da Silva, [3]Gabriela Caroline Lobato Pontes, [4]Emanuele Rocha da Silva, [5]Daniel Figueiredo Alves da Silva, [6]Rodrigo Santiago Barbosa Rocha, [7]Aurimery Gomes Chermont and [8]Katiane da Costa Cunha

[1]Postgraduate Student of Intensive Care Physiotherapy in Neonatology and Pediatrics. Faculty Inspirar. Maternidade Saúde da Criança. Belém, Pará, Brazil; [2]Msc in Pathology of Tropical Diseases. Tropical Medicine Nucleus. Federal University of Pará. Maternidade Saúde da Criança. Belém, Pará, Brazil; [3]Medical Resident in Pediatrics. Federal University of Pará, Belém, Pará, Brazil; [4]Medical Student. Federal University of Pará, Belém, Pará, Brazil; [5]Msc in Health Education in the Amazon. State University of Pará. Maternidade Saúde da Criança. Belém, Pará, Brazil; [6]PhD in Human Movement Science. State University of Pará. Maternidade Saúde da Criança. Belém, Pará, Brazil; [7]PhD Professor on Management and Health in the Amazon Post Graduation Program. Federal University of Pará. Maternidade Saúde da Criança. Belém, Pará, Brazil; [8]PhD and Post Doctorate in Behavior Theory and Research. State University of Pará. Maternidade Saúde da Criança. Marabá, Pará, Brazil

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****Corresponding author:***
Ariella Cristina Rego Lobato,

ABSTRACT

Introduction: The novel coronavirus pandemic has specific outcomes according to the age group infected; however, perinatal and clinical data on neonates with COVID-19 pneumonia are still limited. **Methods:** Retrospective analysis of maternal data and clinical, laboratory and image characteristics of five newborns with COVID-19 confirmed by the Reverse Transcription-Polymerase Chain Reaction of pharyngeal swab. Information was obtained from electronic medical records. Data analysis was performed using SPSS (Statistical Package for the Social Sciences) version 25.0. **Results:** Between April 16 and May 16, 2020, there were five admissions of newborns to the intensive care unit, from home environment, with primary sign of fever. They did not present respiratory discomfort during the entire hospitalization or significant laboratory and / or image changes. **Conclusion:** This experience of COVID-19 pandemic in neonates in Pará State was similar to the experience in other countries, presenting mild symptoms.

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INTRODUCTION

The novel Coronavirus disease 2019 (COVID-19), the cause for severe acute respiratory syndrom by coronavirus 2 (SARS-CoV-2), was first detected in Wuhan, China, in December 2019 and fastly spread worldwide (Adhikari *et al.,* 2020). Was declared by the World Health Organization (WHO) as a public health emergency and, to date, more than 10,533,779 cases had been confirmed, with 512,842 deaths reported to WHO (WHO, 2020). Its fast progression to a global pandemic had profound consequences worldwide, with social, economic and health repercussions (Chandrasekharan *et al*., 2020).

Brazil is the developing country with most confirmed cases and the second one in the world, after the United States of America (WHO, 2020). The first case in Brazil was confirmed on February 26, in São Paulo state. In Pará state, northern Brazil, located in the Amazon region, the first case was confirmed on March 18 and to date, the state has current 110,411 confirmed cases and 5,050 deaths. Within the confirmed cases, over 800 were in children under 1 year old (Brasil, 2020); state offers exclusive hospital beds to COVID-19, among which there are 24 for neonatal intensive care unit, with occupating rate at 79,17% (Brasil, 2020). Pregnant women are included in the risk groups for SARS-CoV-2, and may develop acute respiratory failure and need for premature

birth, in addition to the potential risk of transmitting the disease to the baby, either by rupture of the placental barrier in the placental detachment, or maternal-fetal hemorrhage repercussions (Chandrasekharan *et al*., 2020). Children affected show less severe clinical signs, however, data on neonates with COVID-19 pneumonia are still limited (Otto *et al*., 2020). Chen *et al*, (2020) conducted a survey of six Chinese pregnant women with SARS-CoV-2, and collected: amniotic fluid at birth, SWAB of the newborn immediately after delivery and samples of breast milk after the first lactation; all samples were negative for SARS-COV-2, suggesting a low risk of vertical transmission and / or infection through breast milk (Chandrasekharan *et al*., 2020).

METHODS

Observational descriptive study, obtained through secondary data from medical records of neonates admitted to a reference maternity hospital in Pará state, Amazon region of Brazil. The present research obeyed the ethical criteria contained in the Nurenberg Code (1947) and Declaration of Helsinki (1964) and was authorized by the infants parents through signature of Free and Informed Consent Term.

Participants: The study included five newborns admitted from home environment to the Intensive Care Unit of the maternity hospital, between April 16 and May 16, 2020, diagnosed with SARS-COV-2 by RT-PCR (Reverse Transcription-Polymerase Chain Reaction) test, through pharyngeal swab.

Instruments: A data collection form was used to obtain maternal data: age, comorbidities, previous pregnancies / births, abortion and type of delivery. Newborns' data were gestational age, Apgar, weight, head circumference, apparent malformations, height, length of hospitalization, respiratory muscle pattern, breathing rhythm, auscultation, symptoms, Neonatal Infant Pain Scale (NIPS) and the Bulletin Silverman-Andersen(BSA), laboratory results (Hemoglobin, Hematocrit, PCR) and image (X-Ray) extracted from the medical records of neonates admitted to the neonatal intensive care unit due to the infection. The NIPS scale, developed by Lawrence *et al.* (1993), contains six indicators that consider categories of behavior: facial expression, crying, breathing patterns, arm movement, leg movement and alertness. Crying has three response categories (0, 1, 2), and the rest of them have two (0,1). The total score ranges from 0 to 7, considering 0 to 2 no pain, 3 to 4 moderate pain and pain if a score > 4. BSA (Silverman, Andersen, 1956) is a method that contains 5 clinical parameters to evaluate respiratory distress (upper intercostal retraction, lower intercostal retraction, xiphoid retraction, nasal wing beat and expiratory moan) for which are given scores from 0 to 2. The sums quantify respiratory distress degree and estimate the severity of pulmonary impairment: from 1 to 3 mild respiratory distress, 4 to 6 moderate respiratory distress and > 7 in severe respiratory distress.

Data analysis: Data analysis was performed using SPSS (Statistical Package for the Social Sciences) version 25.0. The data were distributed as mean and standard deviation, maximum and minimum values. The Shapiro-Wilk test was used for the normality analysis and the Spearman correlation test was used for the correlation of data.

Case series: Five neonates were admitted to the neonatal intensive care unit of a maternity hospital in Brazillian Amazon, with primary sign of fever. Table 1 shows the maternal and neonates with COVID-19 characteristics, obtained from medical records data collection.

Table 1. Maternal and neonates' characteristics. Pará- Amazon Region, Brazil. (n=5)

Characteristics	Minimum - Maximum	Mean ± SD
Maternal		
Age	20,1 - 33,4	26,9 ± 4,87
Previous gestations	0,0 - 3,0	1,4 ± 1,34
Previous births	0,0 - 1,0	0,6 ± 0,55
Abortion	0,0 - 1,0	0,4 ± 0,55
Children alive	0,0 - 2,0	0,8 ± 0,84
Neonates	18,0 – 27,0	22,8 + 3,27
Days alive at hospitalization		
Gestational Age	36,0 - 40,1	38,6 ± 1,69
1'Apgar	8,0 - 9,0	8,6 ± 0,55
5'Apgar	9,0 - 10,0	9,2 ± 0,45
Temperature (ºC)	35,0 - 38,4	36,7 ± 1,30
Hospitalization (days)	2,0 - 3,0	2,4 ± 0,55
BSA[1]	0,0 - 0,0	0,0 ± 0
NIPS[2]	0,0 - 3,0	0,6 ± 1,34
Hb[3]	10,2 - 17,1	12,5 ± 2,90
Ht[4]	38 - 52,6	40,6± 6,84
CRP[5]	0,2 - 19,7	0,6 ± 9,67

[1]Bulettin Silverman-Andersen, [2]Neonatal Infant Pain Scale, [3]Hemoglobin(g/dL), [4]Hematocrit(%), [5]C-Reative Protein (mg/L)
Souce: The authors, SPSS Analysis

According to table 1, average age among mothers was 26.9 years old. The newborns were considerated at term (gestational age at 38.6 weeks), with normal Apgar and an approximate hospitalization lenght of 2.4 days. The neonates did not present respiratory distress during the entire hospitalization (according to BSA) or significant laboratory alterations, except for C-reative protein of 16mg in one of the neonates. On the NIPS scale, the maximum score was 3, which suggests that one of them showed signs of moderate pain at the time of the assessment.

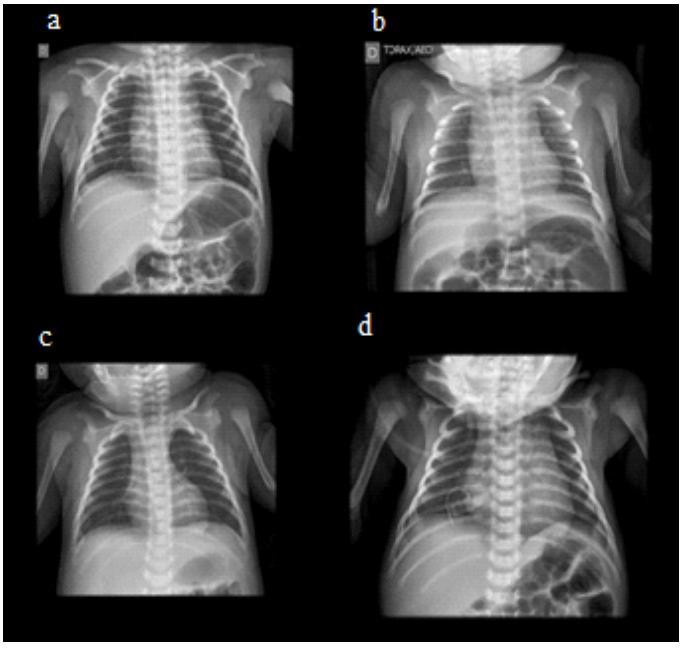

Figure 1. X-Ray from newborns "a", "b", "c" and "d"

X-Ray for the "a", "b", "c" and "d" newborns were considered normal.

X-ray of "e" newborn presented mist opacities in the interstitial alveoli of the right lung upper lobe and perihilar opacities on right.

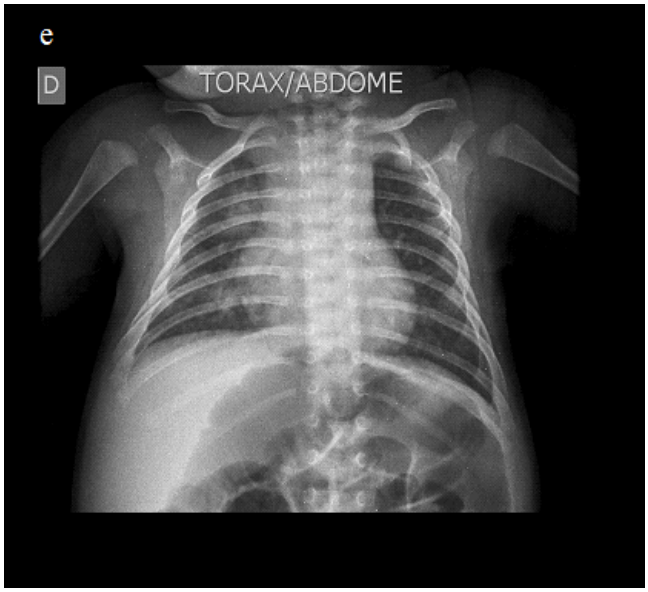

Figure 2. X-Ray from newborn "e"

DISCUSSION

The clinical aspect of SARS-CoV-2 pneumonia varies from mild to severe, in adults. While some of the infected people are asymptomatic, others may progress to more advanced stage, requiring oxygen support and / or mechanical ventilation (Zhou *et al*., 2020). In newborns, the SARS-CoV-2 classification was based on the disease classical presentation as described by Dong et al (2020): mild (acute upper respiratory infection, with cough and in some cases fever and diarrhea); moderate (pneumonia, fever and dry cough, which may be followed by productive cough); severe (respiratory symptoms with disease progression of average one week, with dyspnea, central cyanosis, hypoxia - oxygen saturation <92% - and / or diarrhea); and critical (acute respiratory distress syndrome, shock, myocardial injury, changes in coagulation and kidney function, which can cause death). In the reported cases, all newborns had a mild degree of the disease, with fever as primary sign, followed by diarrhea. None of the newborns had respiratory distress, so it was not necessary to use any type of ventilatory support. Although there are few studies related to neonatal and pediatric patients, these findings are compatible with the study performed by Dong et al. (2020), which evaluated 2,135 pediatric patients in China, and the main symptoms were fever, diarrhea and nausea; and also with a survey conducted in the USA with 149,082 people, of whom 2,572 were under 18 years old, and the majority (73%) had fever and cough as their main symptoms (Noel *et al.,* 2020).

Futhermore, the newborns included in this study showed less agressive effects of SARS-CoV-2 were when compared to adults, which corroborates the research performed by Marlains et al 2020 (Marlais *et al.,* 2020), that had mortality rate lower than 1% of the population affected. C-reactive protein (CRP) is a nonspecific marker for persistant inflammatory stimulus, and usually has high valus in patients with COVID-19 and may reflect the extent of lung lesions and disease severity, being an important and simple laboratory parameter in the pandemic (Ling, 2020). In newborns, CRP normal values are up to 10mg/L and if higher than that may be correlated to adverse clinical conditions such as sepsis (Tao *et al.,* 2015). The neonate who had CPR of 19,7mg/L in this study may show favorable condition to more complicated clinical situation, compatible with inflammatory stimulus. Maternal age, whose average in this study is considered physiologically favorable to pregnancy, according to Aldrighi *et al* (2016), associated with gestational age at term, must be taken into account when analyzing the mild outcome of the reported cases. The World Health Organization, the Brazilian Ministry of Health, the Brazilian Federation of Gynecology and Obstetrics Associations and the Brazilian Society of Pediatrics (Brasil, 2020) recommend preventive measures to mantain care procedures in home enviroment, such as wearing a mask and avoid touching the baby's hands. The fact that the newborns admitted to the neonatal intensive care unit in the study came from home environment symptomatic for COVID-19 suggests post-discharge contagion and emphasizes the need for maintenance of such specific care in this environment by the parents and / or caregivers. The small sample in this study can be considered a limitation for the results extrapolation, due to the fact that the newborns remain hospitalized for a short amount of time, which generated a difficulty in the clinical evaluation. However, in view of the limited number of researches related to newborns and the need to understand the characteristics of SARS-CoV-2, the study was carried out in order to contribute to future research.

Conclusion

The clinical data of newborn infected by COVID-19 are still limited. It is not yet clear whether SARS-CoV-2 can transmit vertically across the placenta and its short and long-term damage, but we know that all newborns in this study were admitted coming from home environment, which suggests post-perinatal infection. The x-ray proved not to be sufficient to monitor and assess changes in lung lesions, especially in the case of co-infection with other pathogens. This Covid-19 pandemic experience in the neonatal group, in Pará state, in the Amazon region of Brazil, was similar to other countries experiences in which the group had COVID-19 mild pneumonia, with fever as a primary sign.

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