

## "Characteristics of Neonates Born to Mothers Related to COVID-19 at KRMT Wongsonegoro Hospital Semarang Indonesia"

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### ABSTRACT

**Background:** Research on the characteristics of neonates born to mothers related to COVID-19 is still very limited. This study aims to provide an overview of the characteristics of neonates born to mothers related to COVID-19.

**Method:** A retrospective descriptive study used medical records of neonates born to mothers related to COVID-19 at KRMT Wongsonegoro Hospital Semarang for the period March 2020 - August 2020. It was carried out using a non-random sampling technique. The data collected were maternal age, gestational age, maternal gravida, maternal disease, method of delivery, sex, birth weight, birth length, APGAR score, whether or not there was asphyxia, condition at birth fit, or not and neonatal swab results. Data processing was performed using SPSS version 25 and displayed the frequency, percentage, mean, and median values.

**Result:** There are thirty-five neonates born to mothers related to COVID-19 at RSUD KRMT Wongsonegoro Semarang during the period March-August. From these data, most of the neonates were born by cesarean section, at term, in a fit condition, normal birth weight and there were five neonates with positive swab test results.

**Conclusion:** There were five neonates who had SARS-CoV-2, but it has not been proven whether the infection was due to transmission from the mother.

**Keyword:** Characteristic of neonate born, COVID-19, Maternal disease

## INTRODUCTION

On December 31, 2019, the Chinese Health authorities were on alert World Health Organization (WHO) regarding several pneumonia cases with unclear etiology in Wuhan City, Hubei Province, Central China. On January 7, 2020, COVID-19 was identified from a sample of a patient's throat swab. SARS-CoV-2 comes from the family Coronaviridae and order Nidovirales. Human-to-human transmission occurs by close contact, mostly as a result of respiratory droplets when an infected person coughs or sneezes. The incidence of SARS-CoV-2 infection is mostly seen in adult male patients aged 34-59 years. SARS-CoV-2 also made it easier to infect people with comorbid diseases such as cardiovascular disease and cerebrovascular disease and diabetes.(1)

The clinical manifestations of SARS-CoV-2 that mostly complained of were fever, dry cough, shortness of breath, chest pain, fatigue, and muscle aches. Other symptoms that can arise include headache, dizziness, abdominal pain, diarrhea, nausea, and vomiting.(1,2) Patient who meet the diagnostic criteria are tested for SARS-CoV-2. The Centers for Disease Control and Prevention (CDC) recommends collecting specimens from the upper respiratory tract (nasopharyngeal and oropharyngeal swabs), and if possible, the lower respiratory tract (sputum, tracheal aspiration, lavage bronchoalveolar).(1)

On March 26, 2020, case report first, regarding the possibility of vertical transmission of COVID-19 infection from COVID-19 positive mothers in neonates with increased antibody levels and abnormal cytokine test results two hours after birth. Increased levels of IgM antibodies suggest that the neonate is infected in utero.(3) The symptoms of SARS-CoV-2 infection in neonates, especially premature neonates, are highly nonspecific and comprehensive acute respiratory distress syndrome, temperature instability, dysfunction gastrointestinal tract, and cardiovascular dysfunction. All newborns with a suspected COVID-19 should be isolated, and monitored, symptomatic or asymptomatic. (4) On April 3, 2020, in Semarang Indonesia, the first case of a preterm infant with SARS-CoV-2 was found. The clinical symptoms found are fever, poor mouth sucking, cyanosis, polypnea and moderate chest retraction.(5)

A study reported that 17-day-old neonates diagnosed with COVID-19 infection showed symptoms of fever, cough and vomiting of milk. Furthermore, the second neonate had fever five days after birth where the mother was confirmed with COVID-19, and the third neonate was

born to an infected mother without symptoms and was diagnosed 30 hours after birth by testing the nucleic acid virus. Shortness of breath, vomiting of milk, cough and fever occur in neonates. Another study of six neonates with COVID-19 showed symptoms of fever, tachypnea, and vomiting, but no cough symptoms.

This study describes the characteristics of neonates born to mothers related to COVID-19 at KRMT Wongsonegoro Hospital Semarang. Given the lack of research data on this matter, this research is expected to help provide an overview of the characteristics of neonates born to mothers related to COVID-19.

## METHODS

This study is a descriptive retrospective study using medical record data in RSUD KRMT Wongsonegoro Semarang. The study population included all mothers and neonates born to mothers related to COVID 19 for the period March 2020 - August 2020, totaling 35 births.

A sampling of the study was carried out using a non-random sampling technique by including all neonatal patients born to mothers related to COVID-19 at KRMT Wongsonegoro Hospital, Semarang Indonesia for the period March 2020 - August 2020.

The statistical analysis of this study is in the form of a descriptive analysis which includes maternal age, gestational age, maternal gravida, maternal disease, method of delivery, gender, birth weight, birth length, APGAR score, the presence of asphyxia or not, condition at birth fit or not and neonatal swab results. Data processing was performed using SPSS version 25 and displayed the frequency, percentage, mean, and median values.

## RESULT

This study was conducted by collecting medical record data of mothers and neonates born to mothers related to COVID 19. Based on the medical record data that was collected, there were 35 deliveries from mothers related to COVID-19 between March and August 2020.

**Table 1.** Distribution of mothers and neonates born to mothers related to COVID-19

Variable	Frequency (n = 35)	Percentage (%)	Mean	Median
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<b>Mother's Age</b>				
20 - 35 years	<b>27</b>	77.1%	29.63	30
> 35 years	<b>8</b>	22.9%		
<b>Method of Labor</b>				
Vaginal	<b>11</b>	31.4%		
Sectio Caesarea	<b>24</b>	68.6%		
<b>Gestational Age</b>				
Fewer Months (<37 weeks)	<b>9</b>	25.7%	37.49	38
Enough Month (37 - 42 weeks)	<b>26</b>	74.3%		
<b>Gravid</b>				
Primigravida	<b>16</b>	45.7%		
Multigravida	<b>19</b>	54.3%		
<b>Mother's Disease</b>				
Suspect COVID-19	<b>17</b>	48.6%		
Probable COVID-19	<b>0</b>	0%		
Confirm COVID-19	<b>18</b>	51.4%		
<b>Gender of Neonates</b>				
Man	18	51.4%		
Women	17	48.6%		
<b>Birth Weight</b>				
LBW (<2,500 grams)	<b>8</b>	22.9%	2,890	2,900
BBLN (> 2,500 grams)	<b>27</b>	77.1%		
<b>Birth Body Length</b>				
<50 cm	<b>24</b>	68.6%	48.03	48
> 50 cm	<b>11</b>	31.4%		
<b>APGAR 1 "</b>				
≥ 7	<b>26</b>	74.3%		
4 - 6	<b>4</b>	11.4%		
≤ 3	<b>5</b>	14.3%		
<b>APGAR 5 "</b>				
≥ 7	<b>29</b>	82.9%		
4 - 6	<b>5</b>	14.3%		
≤ 3	<b>1</b>	2.9%		

**APGAR 10 "**

≥ 7	<b>31</b>	88.6%
4 - 6	<b>3</b>	8.6%
≤ 3	<b>1</b>	2.9%

**Asphyxia**

Yes	<b>8</b>	22.9%
Not	<b>27</b>	77.1%

**Fit Neonates**

Yes	<b>27</b>	77.1%
Not	<b>8</b>	22.9%

**Neonate Swabs**

Positive	<b>5</b>	14.3%
Negative	<b>15</b>	42.9%
No Swab	<b>15</b>	42.9%

Table 1 shows the groups of mothers and neonates born to mothers related to COVID-19. The number of mothers who gave birth related to COVID-19 at RSUD KRMT Wongsonegoro for the period March 2020 - August 2020 was 35, with a maternal age between 20 - 35 years of 27 (77.1%) and age > 35 years as many as 8 (22.9 %). There are 11 methods of vaginal delivery (31.4%) and by cesarean section as many as 24 (68.6%). With preterm gestation as much as 9 (25.7%) and at term as much as 26 (74.3%). And it was found that mothers with primigravida were 16 (45.7%) and multigravidas were 18 (54.3%). The condition of maternal illness during childbirth obtained data from 17 mothers with suspected COVID-19 status (48.6%) and 18 (51.4%) confirmed COVID-19. On the sex of the neonate, it was found that 18 neonates were female (51.4%) and male as much as 17 (48.6%). Neonates birth weight <2500 grams was 8 (22.9%) and birth weight > 2500 was 27 (77.1%). The length of the birth body for neonates <50 cm was 24 (68.6%) and those > 50 cm were 11 (31.4%). APGAR score on the minute one ≥ 7 as many as 26 (74.3%), between 4 - 6 as many as 4 (11.4%), and ≤ 3 as much as 5 (14.3%). For APGAR the score in the fifth minute is ≥ 7 as many as 29 (82.9%), between 4 - 6 as many as 5 (14.3%), and ≤ 3 as much as 1 (2.9%). While APGAR scores in the tenth minute ≥ 7 as many as 31 (88.6%), between 4 - 6 as many as 3 (8.6%), and ≤ 3 as much as 1 (2.9%). In neonates born to mothers related to COVID-19, 8 (22.9%) had asphyxia and 27 (77.1%) did not. For the condition

of the neonates at birth, 27 (77.1%) were born fit and 8 (22.9%) were not fit. As well as neonates who did swab with positive results as much as 5 (14.3%), negative swab results as many as 15 (42.9%) and neonates who did not do swab as many as 15 (42.9%). Some neonates with a positive swab test during treatment show symptoms such as respiratory distress, spasms, tachypnea, cough, tachycardia, and increased body temperature. All neonates with a positive or negative swab test can be discharged in good condition.

## **DISCUSSION**

The total sample in this study amounted to 35 patients. Of the 35 patients, 27 were mothers aged 20 - 35 years and 8 of them were > 35 years old with a median age of 30 years. According to the Basic Health Research (Riskesdas) in 2018, this age is part of the highest age group for pregnancy in Indonesia.(6) Until now there have been no reports of research on the age of pregnant women as a risk factor or comorbid from COVID-19 infection. Things that can increase the risk or worsen symptoms of COVID-19 infection include diseases that accompany mothers during pregnancy such as hypertension, diabetes mellitus, and obesity.(7)

Most of the neonates in this study were born with the method of delivery by cesarean section, namely 24 neonates and 11 neonates born using the vaginal method. To date, there is no strong evidence that one method of delivery has a better outcome than the other. The cesarean section method was carried out under the indication and infection with COVID-19 was not an indication for cesarean section.(8) According to the recommendations issued by The Royal College of Obstetricians and Gynecologists in 2020 for neonates born to mothers related to COVID-19 it was agreed that the method of delivery was cesarean section was chosen, this is to reduce the risk of transmission from mother to neonate or to health workers. Although there is no prohibition for vaginal delivery, as long as safety requirements are met to prevent horizontal transmission.(9)

A sample of 26 neonates was born to mothers with term gestation, and 9 neonates were born to mothers with preterm gestation. And in this study, most of the births of the second child. In the group of neonates who were born preterm to mothers related to COVID-19, the background for termination of pregnancy was a medical indication from both the mother and the fetus, such as the presence of severe pre-eclampsia in the mother. This is in accordance with the research conducted by Zhu N, et al, Chen L, et al, Chow N, et al.(10–12) While the increased risk

of preterm birth occurred in mothers with pneumonia symptoms reported by Della Gatta AN, et al. (13)

The birth weight of neonates born to mothers related to COVID-19 with normal birth weight was 27 and with low birth weight was 8. The neonates born underweight were mostly due to preterm birth. This is by the epidemiological research conducted by Marim F, et al and Chen H, et al that until now most of the mothers related to COVID-19 will give birth to neonates with normal birth weight because there is no evidence that COVID-19 virus infection in pregnant women will interfere with fetal growth, unless there are other factors that interfere with fetal growth during pregnancy, such as pregnant women accompanied by preeclampsia, diabetes mellitus or other intrauterine infections such as HIV. (14,15)

The management of neonates born to mothers related to COVID-19 is carried out in a special isolation room for COVID-19 and the resuscitation team uses grade 3 PPE, both those born with the cesarean section method or the vaginal method. During the golden hour period for neonates born to mothers related to COVID-19, if the neonate is in good condition, then continued with observation and treatment in the transition room, special isolation for COVID-19. If the neonate is experiencing asphyxia, then the treatment is continued at the NICU (Neonatal Intensive Care Unit) a special COVID-19 isolation based on clinical procedure guidelines for each hospital. Meanwhile, the Royal College of Obstetricians and Gynecologists (RCOG) recommends that after the neonate is born in a stable state, the neonate should be bathed with water and soap to remove viruses that could potentially lie on the surface of the skin before being transferred to the treatment room.(9)

Then in the intra to extra-uterine transition period at 0 - 6 hours after birth, in fit neonates the officer uses grade 1 PPE, then essential neonatal care is performed without early initiation of breastfeeding, while in neonatal emergencies (cyanosis, bleeding, jaundice, biliary vomiting, seizures) officers using PPE level 2 and neonates transferred to the special isolation NICU COVID-19.(16,17)

According to the latest COVID-19 management guidelines, for asymptomatic neonates born to suspected, probable and confirmed COVID-19 mothers, screening tests with swabs should be carried out immediately, ideally twice with intervals of at least 24 hours. A diagnosis of COVID-19 is ruled out if the swab is negative twice in a row. Meanwhile, for symptomatic neonates, apart from swab examination, laboratory and imaging tests are also performed.(18)

In this study, not all neonates were subjected to swab examinations. In the case of neonates with symptoms, a swab was carried out while in a fit neonate there was no swab examination. In neonates who were subjected to swab examination, five neonates had a positive swab and a negative swab in 15 neonates. Three of the neonates with positive swab results were born by cesarean section and two of them were born vaginally. Until now, intrauterine vertical transmission from mother to neonate is still being studied. The data states that vertical transmission of COVID-19 infection is still possible.(9)Research conducted by Hosier H, et al. Found ACE-2 receptors in small numbers on the placenta that allow vertical infection through the placenta.(19) When SARS CoV - 2 binds to the ACE - 2 receptors, the transmembrane protease serine 2 enzyme (TMPRSS2) is activated, allowing the virus to pass through cells. The immunity of pregnant women can cross the placental blood barrier which causes the formation of passive immunity in the fetus.(20)This allows the discovery of the SARS CoV-2 RNA virus in the placenta or amniotic membrane as reported by Panfield, et al.(21) Whereas in neonates with negative swab results, there were neonates who had previously been carried out rapidly with positive IgM and IgG SARS-CoV-2 results. This is like the case reported by Dong, et al. there were SARS-CoV-2 IgM and IgG results positive in newborns, but negative on the swab test results.(22)

## **CONCLUSION**

There are thirty-five neonates born to mothers related to COVID-19 at RSUD KRMT Wongsonegoro Semarang during the period March-August. Most of the neonates were born by cesarean section, term, in good condition, normal birth weight and there were five neonates with positive swab test results. In this study it is not certain whether there is a relationship between five neonates who were positive for SARS-CoV-2 and the transmission of the infection from their mother.

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**CONFLICT OF INTEREST:** There is no conflict of interest

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**ETHICS COMMITTEE APPROVAL:** The study was approved by the ethics committee K.R.M.T. Wongsonegoro Hospital Semarang Indonesia.

## REFERENCES

1. Harapan H, Itoh N, Yufika A, Winardi W, Keam S. Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company's public news and information. *J Infect Public Health*. 2020;13(January):667–73.
2. Zhang X, Cai H, Hu J, Lian J, Gu J, Zhang S, et al. Epidemiological, clinical characteristics of cases of SARS-CoV-2 infection with abnormal imaging findings. *Int J Infect Dis* [Internet]. 2020;94:81–7. Available from: <https://doi.org/10.1016/j.ijid.2020.03.040>
3. Fornari F. Perinatology and Child Health 7 Citation: Federico Fornari. Vertical Transmission of Covid-19-A Systematic Review. *J Pediatr Perinatol Child Heal*. 2020;4(2):7–013.
4. Rose DU De, Piersigilli F, Ronchetti MP, Santisi A, Bersani I. Current knowledge of COVID19 in new borns. *Ital J Pediatr*. 2020;4–11.
5. Neni Sumarni, Lilia Dewiyanti, Madeline Hari Kusmanto CP. A case of 2019 novel coronavirus infection in a preterm infant with severe respiratory failure. *Int J Pharm Res*. 2020;12(4):1935–8.
6. Kesehatan BP dan PK. Laporan Nasional Riskesdas 2018. Kementerian Kesehatan RI. 2018;
7. Berghella V. Coronavirus disease 2019 (COVID-19): Pregnancy issues. UpToDate [Internet]. 2020;1:1–22. Available from: [https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-pregnancy-issues/print?search=coronavirus&source=search\\_result&selectedTitle=3~150&usage\\_type=default&display\\_rank=3](https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-pregnancy-issues/print?search=coronavirus&source=search_result&selectedTitle=3~150&usage_type=default&display_rank=3)
8. Alamsyah Aziz EGD. REKOMENDASI PENANGANAN INFEKSI VIRUS CORONA (COVID-19) PADA MATERNAL (HAMIL, BERSALIN DAN NIFAS). *POGI*. 2020;
9. Coronavirus (COVID-19) Infection In Pregnancy, Information For Healthcare Professionals. The Royal College of Obstetricians and Gynaecologist. 2020;
10. Ma X, Ph D, Wang D, Ph D, Xu W, Wu G, et al. A Novel Coronavirus from Patients with Pneumonia in China, 2019. 2020;727–33.
11. Clinical Characteristics of Pregnant Women with Covid-19 in Wuhan, China. 2020;100(1):2020–2.
12. Report MW. Preliminary Estimates of the Prevalence of Selected Underlying Health Conditions Among Patients with Coronavirus Disease 2019 — United States. 2020;69(13):382–6.
13. Nunzia A, Gatta D, Rizzo R, Pilu G, Simonazzi G. Coronavirus disease 2019 during pregnancy: a systematic review of reported cases. *Am J Obstet Gynecol* [Internet]. 2020;223(1):36–41. Available from: <https://doi.org/10.1016/j.ajog.2020.04.013>

14. Marim F, Karadogan D, Eyuboglu TS, Emiralioglu N, Gurkan CG, Toreyin ZN, et al. Lessons Learned so Far from the Pandemic : A Review on Pregnants and Neonates with COVID-19. 2020;52(2):202–10.
15. Chen H, Guo J, Wang C, Luo F, Yu X, Zhang W, et al. Clinical characteristics and intrauterine vertical transmission potential of COVID-19 infection in nine pregnant women: a retrospective review of medical records. *Lancet* [Internet]. 2020;395(10226):809–15. Available from: [http://dx.doi.org/10.1016/S0140-6736\(20\)30360-3](http://dx.doi.org/10.1016/S0140-6736(20)30360-3)
16. Erlina Burhan, Agus Dwi Susanto, Sally Aman Nasution, Eka Ginanjar C, Wicaksono Pitoyo, Adityo Susilo D. PEDOMAN TATALAKSANA COVID-19. 3rd ed. Erlina Burhan, Agus Dwi Susanto, Fathiyah Isbaniah, Sally Aman Nasution E, Ginanjar, Ceva Wicaksono Pitoyo D, editors. Jakarta; 2020.
17. WHO. Tatalaksana klinis infeksi saluran pernapasan akut berat (SARI) suspek penyakit COVID-19. 2020;
18. Erlina Burhan, Agus Dwi Susanto, Sally Aman Nasution, Eka Ginanjar C, Wicaksono Pitoyo, Adityo Susilo D. PEDOMAN TATALAKSANA COVID-19. 3rd ed. Erlina Burhan, Agus Dwi Susanto, Fathiyah Isbaniah, Sally Aman Nasution E, Ginanjar, Ceva Wicaksono Pitoyo, Adityo Susilo, Isman Firdaus AS, Dafsah Arifa Juzar, Syafri Kamsul Arif, Navy G.H Lolong Wulung FM, Aman B Pulungan, Hikari Ambara Sjakti, Yogi Prawira NDP, editors. Jakarta;
19. Hosier H, Reddy UM, Lipkind HS, Hosier H, Farhadian SF, Morotti RA, et al. SARS – CoV-2 infection of the placenta SARS – CoV-2 infection of the placenta. 2020;130(9):4947–53.
20. Deniz M, Tezer H. Vertical transmission of SARS CoV-2 : a systematic review. *J Matern Neonatal Med* [Internet]. 2020;0(0):1–8. Available from: <https://doi.org/10.1080/14767058.2020.1793322>
21. Brubaker SG, Limaye MA, Lighter J. Detection of severe acute respiratory syndrome coronavirus 2 in placental and fetal membrane samples. 2019;1–2.
22. Zhang S. Possible Vertical Transmission of SARS-CoV-2 From an Infected Mother to Her Newborn. 2020;323(18):2020–2.