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**Address for Correspondence:**Editorial Room Andalas Obstetrics and Gynecology Journal, 3<sup>rd</sup> floor of KSM of Obstetrics and Gynecology, RSUP DR. M. Djamil Padang, Jl. Perintis Kemerdekaan Padang, Sumatera Barat 25127**Website:**<http://jurnalobgin.fk.unand.ac.id/index.php/JOE>**RESEARCH****Mode of delivery does not correlate fetal outcome in pregnancy with Covid-19 at Dr. M. Djamil Hospital Padang**Heri Farnas<sup>1</sup>, Roza Sriyanti<sup>2</sup>*Affiliations: 1. Tengku Mansyur General Hospital Tanjung Balai, East Sumatera, Indonesia; 2. Sub Division of Fetomaternal Medicine, Obstetrics and Gynecology Department, Faculty of Medicine, Andalas University, Dr. M. Djamil Central General Hospital Padang, West Sumatera, Indonesia**Correspondence: Heri Farnas email: [farnasheri@gmail.com](mailto:farnasheri@gmail.com), Hp: 085275847685***Abstract*****Introduction:** Corona Virus Disease 2019 (COVID-19) was first reported in Wuhan, China. Knowledge about COVID-19 infection in relation to pregnancy and the fetus is still limited. Report from China shows high rate of caesarean delivery (> 90%) due to the suspicion for vertical transmission. Globally there is an increase of caesarean delivery in women with COVID-19 infection. Clinical implications mode of delivery in pregnancies with COVID-19 infection are not fully understood.****Objective:** The aims of this study to assess differences in fetal outcome based on the mode of delivery in pregnancies with COVID-19 infection.****Methods:** This observational analytic study with cross sectional study design was conducted in single center at dr. M. Djamil General Hospital Padang from March 2020-March 2021. All study subjects qualified to inclusion and exclusion criteria included. The fetal outcome analyzed based on APGAR scores and COVID-19 status in newborn baby using Mann-Whitney test.****Results:** A total of 49 patients were analyzed. The results showed mean APGAR score 1 minute in the vaginal delivery was lower than caesarean delivery (6.87±1.06 vs 7.38±0.82) but not significant (p=0.09). No significant difference between vaginal delivery and caesarean delivery based on APGAR score 5 minutes (p=0.19). None newborn babies infected with COVID-19 in both groups.****Conclusions:** There was no difference of fetal outcome based on the APGAR score in pregnancies with COVID-19 infection by mode of delivery. There were no cases of infants with COVID-19 infection in both groups.****Keywords:** COVID-19, mode of delivery, APGAR score***INTRODUCTION**

Corona Virus Disease 2019 (COVID-19) caused by Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2) first reported in Wuhan, China.<sup>1</sup>This virus then spreads almost all over the world quickly. On May 11, 2020 World Health Organization (WHO) declared COVID-19 a pandemic.<sup>1,2</sup>

Case Fatality Rates (CFR) on COVID-19 ranges from 0.4%-3.6% depending on the ability of a country to detect and carry out tests.<sup>3</sup> In the previous corona virus outbreak caused by Severe Acute Respiratory Syndrome (SARS) and Middle East Respiratory Syndrome (MERS) provide data showing an increased risk of death in infected pregnant women and an adverse



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effect on pregnancy outcomes.<sup>4, 5</sup> There are concerns that COVID-19 infection in pregnant women will have adverse effects on the mother and the fetus in her womb such as stillbirth, fetal distress, 5 minute APGAR score <7, including concerns about the risk of vertical transmission from mother to fetus.<sup>2, 6</sup>

This virus works by infecting cells through receptors Angiotensin-Converting Enzyme2 (ACE-2) which specifically together with type II alveolar cells present in the lungs then pass through the aerodigestive tract. According to data from countries affected early in the pandemic, 40% of cases will experience mild illness, 40% will develop moderate illness including pneumonia, 15% of cases will develop severe illness, and 5% of cases will develop critical condition. Patients with mild symptoms reported recovering after 1 week. In severe cases, they will experience Acute Respiratory Distress Syndrome (ARDS), sepsis and septic shock, multi-organ failure, including kidney failure or acute heart failure which can lead to death.<sup>7, 8</sup>

Until now, knowledge about COVID-19 infection in relation to pregnancy and the fetus is still limited and there are no specific recommendations for the management of pregnancy with COVID-19 infection. Based on these limited data and several examples of cases in previous Corona virus treatments (SARS-CoV and MERS-CoV) and several cases of COVID-19, it is believed that pregnant women have a higher risk of serious illness, morbidity and mortality compared to the general population.<sup>9, 10</sup>

Until now, based on existing reports and research, it is still unclear whether COVID-19 infection can pass the transplacental route to the baby. Although there are several reports where babies on examination have a positive examination after birth, but this study needs further validation of whether this transmission occurs in the womb or during the postpartum period. There is no strong clinical evidence to recommend one method of delivery. Delivery is selected based on obstetric indications by taking into account the wishes of the mother and family, except for mothers with respiratory problems who require immediate delivery in the form of Sectio Caesarea (SC) or vaginal surgery.<sup>9, 11</sup>

Data from China shows the high rate of cesarean delivery (>90%) due to the alleged potential for vertical transmission from mother to fetus.<sup>12</sup> Globally, there is an increase in the number of SCs in women with COVID-19 infection reported by Giaxi 2020 where the increase is already above the general population. Protecting mothers from unnecessary medical technology is one of the goals of WHO in its strategy for the promotion of maternal health.<sup>13</sup> The clinical implications of the preferred method of delivery in pregnancies with COVID-19 infection are still not fully understood.<sup>14</sup> So it is necessary to do further analysis to assess whether there are differences in fetal outcomes based on the method of delivery performed.

## METHODS

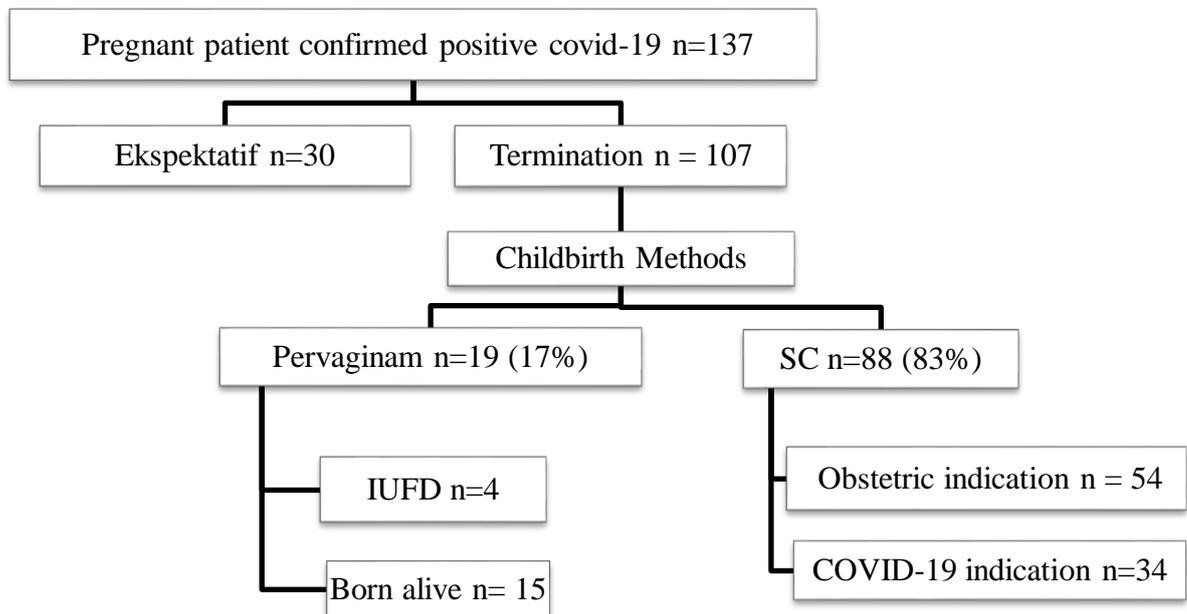
This research is an observational analytic study with a design *cross sectional*. The study was conducted in a single center at RSUP dr. M. Djamil Padang starting from March 2020-March 2021. The research sample was taken using the total sampling method, where all



research subjects according to the inclusion and exclusion criteria were included. The sample inclusion criteria were all pregnant patients infected with COVID-19 as evidenced by the Reverse Transcriptase–Polymerase Chain Reaction (RT-PCR) examination and gave birth at dr. M. Djamil Padang. Patients were grouped according to the method of delivery (vaginal or CS). Patients with cesarean delivery due to COVID-19 infection without obstetric indications were included in the study subjects. Pregnant patients who experienced intrauterine fetal death were excluded from the sample. Then an analysis of the fetal outcome was carried out based on the APGAR score at minute 1 and minute 5, and the status of COVID-19 in newborns. Data were analyzed using test *Mann-Whitney* to assess whether there are differences in fetal outcomes based on the method of delivery.

## RESULTS

A total of 137 pregnant patients with COVID-19 infection as evidenced by examination *RT-PCR* treated in the isolation room of dr. M. Djamil Padang since March 2020-March 2021. Termination of pregnancy was carried out in 107 patients, vaginal delivery in 19 patients and cesarean section in 88 patients. There were 4 patients experiencing intrauterine fetal death since the patient's initial admission. A total of 54 patients receiving CS with obstetric indications and 34 patients receiving CS with COVID-19 indications without obstetric indications. So that the total sample of the research analyzed was 49 patients.



**Figure 1. Schematic of Research Samples Conducted by Data Analysis**

Obtained the average age of research subjects  $26.73 \pm 4.06$  years for vaginal delivery and  $30.65 \pm 4.66$  years for CS. Body mass index of both vaginal and SC groups ( $22.71 \pm 2.82$  and  $22.38 \pm 2.47$ ), these values were still in the normal weight range. The mean gestational age of



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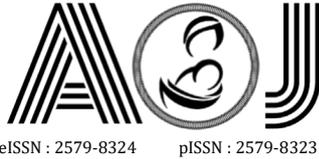
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vaginal delivery was lower than that of caesarean section ( $36.40 \pm 4.27$  and  $37.53 \pm 2.03$ ). In general, the maternal symptoms found were asymptomatic cases (77.6%) and only 4.2% with severe cases. The hemoglobin levels of both groups were in the normal range ( $11.55 \pm 1.44$  g/dL and  $11.34 \pm 1.18$  g/dL). Leukocyte levels in vaginal delivery were higher than SC ( $16,374.67 \pm 5360.95$  mm<sup>3</sup> and  $11306.47 \pm 6479.63$  mm<sup>3</sup>). The value of D-dimer in both groups was found to be higher than the normal range ( $1.864.07 \pm 1003.20$  and  $1.953.12 \pm 790.60$ ). Maternal characteristics of research subjects are summarized in table 1.

**Table 1. Maternal Characteristics**

Characteristics	Vaginal N= 15(30.6%)	SC N= 34 (69.4%)
	Mean $\pm$ SD / N(%)	Mean $\pm$ SD / N(%)
age (29.45 $\pm$ 4,8)	26.73 $\pm$ 4.06	30.65 $\pm$ 4.66
BMI (22.48 $\pm$ 2.56)	22.71 $\pm$ 2.82	22.38 $\pm$ 2.47
Gestational Age (37.18 $\pm$ 2.9)	36.40 $\pm$ 4.27	37.53 $\pm$ 2.03
Maternal Symptoms		
Asymptomatic (77.6%)	11 (22.5%)	27 (55.1%)
Mild (10.2%)	1 (2%)	4 (8.2%)
Medium (8.2%)	2 (4.1%)	2 (4.1%)
Weight (4.2%)	1 (2.1%)	1 (2.1%)
Critical (0%)	0	0
hemoglobin (11.40 $\pm$ 1.26)	11.55 $\pm$ 1.44	11.34 $\pm$ 1.18
Leukocytes (12,857.96 $\pm$ 6,543.49)	16,374.67 $\pm$ 5360.95	11,306.47 $\pm$ 64 79.63
D-dimer (1,925.86 $\pm$ 851,454)	1,864.07 $\pm$ 1003.20	1,953.12 $\pm$ 790. 60

Of the 49 babies born, 47% were male and 53% were female. With the mean birth weight in vaginal delivery is lower than in CS ( $2,577.00 \pm 637.30$  grams and  $2,987.41 \pm 525.87$ ). Similarly, the body length of babies born vaginally was smaller than that of SC ( $46.73 \pm 2.49$  cm and  $47.94 \pm 2.03$  cm). The minute 1 APGAR score for vaginal delivery was lower than that of CS ( $6.87 \pm 1.06$  and  $7.38 \pm 0.82$ ) but the 5 minute APGAR score was the same in both methods of delivery ( $8.33 \pm 0.62$  and  $8.56 \pm 0.61$ ). There were no cases of COVID-19 in infants born either vaginally or by cesarean section. General characteristics of babies born can be seen in table 2.



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Characteristics	Vaginal N= 15	SC N= 34
	Mean $\pm$ SD / N(%)	Mean $\pm$ SD / N(%)
Gender		
Male (47%)	6 (12%)	17 (35%)
Female (53%)	9 (18%)	17 (35%)
Birth Weight	2,577.00 $\pm$ 637. 30 gr	2,987.41 $\pm$ 525.87 gr
Baby Body Length	46.73 $\pm$ 2.49 cm	47.94 $\pm$ 2.03 cm
APGAR score minute 1	6.87 $\pm$ 1.06	7.38 $\pm$ 0.82
APGAR score 5 minutes	8.33 $\pm$ 0.62	8.56 $\pm$ 0.61
Baby COVID-19 Status	0	0

Performed data analysis using test *Mann-Whitney* to assess whether there are differences in fetal outcomes in vaginal and cesarean delivery methods based on the 1 and 5 minute APGAR scores and the baby's COVID-19 status. The mean 1 minute APGAR score for vaginal delivery was lower than SC (6.87 $\pm$ 1.06 and 7.38 $\pm$ 0.82). However, from the results of the statistical calculation of scores, there was no significant difference ( $p = 0.09$ ). The same thing was found in the 5 minute APGAR score where there was no significant difference between vaginal delivery compared to CS ( $p = 0.19$ ). In both methods of delivery, there were no infants infected with COVID-19 based on RT-PCR examination. The results of the data analysis of the method of delivery with fetal outcomes can be seen in table 3.

**Table 3. Analysis of Delivery Methods with Fetal Outcomes**

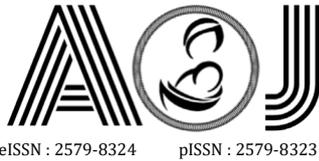
Variable	N	Delivery Method	Mean $\pm$ SD	P value
APGAR score minute 1	15	Vaginal	6.87 $\pm$ 1.06	<b>0.09</b>
	34	SC	7.38 $\pm$ 0.82	
APGAR score 5 minutes	15	Vaginal	8.33 $\pm$ 0.62	<b>0.19</b>
	34	SC	8.56 $\pm$ 0.61	

a. Grouping Variable: Delivery Method

b. Mann-Whitney

**DISCUSSION**

The results of this study showed that most of the mothers had no symptoms/asymptomatic or had mild symptoms (77.6% and 10.2%) and only 4.2% showed severe symptoms. The same thing was reported by Chen 2020, where 92% of pregnant women with COVID-19 infection had mild symptoms and only 8% had severe symptoms.<sup>12, 15</sup>



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Of the 49 samples analyzed, 30.6% underwent vaginal delivery and 69.4% by cesarean section. A higher rate of cesarean delivery than vaginal delivery in pregnancies with COVID-19 infection was reported by Chen 2020 where as many as 63 of 68 patients or 93% underwent CS and only 7% vaginally. Likewise, the study reported by Debrabandere 2021 from a total of 203 pregnant patients infected with COVID-19 as many as 140 patients (68.9%) gave birth by caesarean section and the remaining 63 patients (31%) gave birth vaginally.<sup>16</sup> The high rate of cesarean delivery is found globally, especially at the beginning of the pandemic because there are still few studies and reports related to COVID-19 infection in pregnancy and the suspicion of vertical transmission intrauterine or during delivery. This is the reason for performing CS in pregnancies with COVID-19 infection.<sup>17</sup>

The 1 minute APGAR score was found to be lower in the vaginal delivery method compared to the CS. However, statistically this is not significant ( $P=0.09$ ). Similarly, the 5 minute APGAR score on the two delivery methods did not show a significant difference ( $p=0.19$ ). The Debrabandere 2021 report showed a decrease in APGAR scores at 1, 5, 10, and 15 minutes related to the degree of maternal symptoms that appeared. The more severe the maternal symptoms, the lower the APGAR score. In this study, most of the patients were asymptomatic or had mild symptoms. Thus, there was no significant difference between the APGAR scores at minute 1 and minute 5 in both methods of delivery. In addition to maternal symptoms, another factor that causes a decrease in the mean APGAR score is preterm delivery. Compared to SC ( $36.40 \pm 4.27$  and  $37.53 \pm 2.03$  weeks) the mean gestational age of the entire sample was  $37.18 \pm 2.9$  weeks. This indicates that the mean of the study sample is term pregnancy.<sup>16</sup>

In infants who were born vaginally or by cesarean section, no COVID-19 infection was found based on RT-PCR examination. The same thing was reported by Diriba 2020 by analyzing various specimens taken from aspiration of amniotic fluid during labor, umbilical cord blood and umbilical cord segments, fetal and placental membranes, nasopharyngeal and baby throat swabs, gastric aspiration and fetal meconium which gave negative results for COVID-19, this shows that the alleged occurrence of vertical transmission in pregnant patients with COVID-19 has not been proven.<sup>18, 19</sup>

This study provides different results from the research conducted by Fenizia 2020 where the results of the study found: *SARS-CoV-2 genome* on the vaginal mucosa and the placenta at term. The Vivanti 2020 study also proves the possibility of uteroplacental transmission in COVID-19 infection in the last weeks of pregnancy.<sup>17, 20</sup> The presence of COVID-19 found in various specimens including maternal plasma, vaginal mucosa, umbilical cord, and placenta led to the hypothesis that the virus is spread haematogenously through blood vessels throughout the body.<sup>17</sup> However, the results of this study are still controversial.

The study, conducted in London, reported cases of newborns infected with COVID-19 from mothers with COVID-19 where the RT-PCR test was performed 36 hours after birth. The results of the examination of the placenta and umbilical cord blood showed negative COVID-



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19, so it was confirmed that the baby was infected from the mother or other family members through close post-delivery contact, not through the uteroplacental.<sup>18</sup>In a study conducted by Martinez 2020, of 72 babies who were examined for COVID-19 by RT-PCR 6 hours after delivery, there were 3 babies who were positive for COVID-19. Repeat examinations were carried out within 48 hours and all examination results were negative. None of the infants showed symptoms of the disease within 10 days. This is thought to be because newborns are in close contact with the mother immediately after delivery.<sup>21</sup>

**CONCLUSIONS**

There was no difference in the outcome of newborns based on the APGAR score in pregnancies with COVID-19 infection with vaginal or cesarean delivery methods. There were no cases of infants with COVID-19 infection in both methods of delivery.

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