

Conference Paper

Erythrocyte Profile and Platelet Count description based on severity scale of COVID-19 on Pregnant Women at RSUD Dr. M. Haulussy Ambon in 2020

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ABSTRACT

Coronavirus disease 19, better known as COVID-19 is a disease caused by the SARS-CoV-2. Pregnant women are susceptible to infection because during pregnancy there are physiological changes and body mechanisms that affect immunity. This study aims to describe the erythrocytes profile and platelet counts on the severity of COVID-19 in pregnant women at RSUD Dr. M Haulussy Ambon in 2020. This is an analytical study with a cross-sectional design and using a total sampling method with a total of 31 samples. The result of the study shows from 31 samples, there are 30 people (96,8%) have mild severity, 1 person (3,2%) has moderate severity, and severe severity is not found. The erythrocyte level based on the mild, moderate, and severe is dominated by decreased erythrocyte (anemia) with 19 cases (63,3%). The hemoglobin level is dominated by normal hemoglobin with 15 cases (50%). The MCV level is dominated by decreased MCV with 17 cases (56,7%). The MCH level is dominated by normal MCH with 25 cases (83,3%). The platelet level is dominated by normal platelets with 29 cases (96,7%).

Keywords: COVID-19, erythrocytes indices, pregnant women, SARS-CoV-2, thrombocytes

Introduction

On December 31, 2019, Wuhan, China reported the first case of the Coronavirus Disease 2019 (COVID-19) (Gunardi, 2021). Severe Acute Respiratory Syndrome Coronavirus-2 (SARS-CoV-2) from the Beta Genus Coronavirus is a type of virus that affects the respiratory system and is the cause of a disease known as Corona Virus Disease 2019 (Kementrian Kesehatan RI, 2020). According to the World Health Organization, COVID-19 is a global pandemic because it has spread to numerous countries as of March 11th, 2020 (Kementrian Kesehatan RI, 2020). COVID-19 has spread to 21 million people worldwide, including Indonesia, and has so far been diagnosed in 216 nations (Christyani & Padang, 2021).

On March 2, 2020, Indonesia experienced its first two cases, which grew to 244,676 cases and 9.553 deaths by September 2020 (Safitri, 2021). By January 16, 2022, there had been an additional 1,745 cases, bringing the overall number of confirmed cases—based on a total of 34 provinces, including Maluku—to 4,275,528 (Covid19.go.id., 2022). According to the data, there were 144,192 deaths, 4,120,540 recoveries, and 10,796 current confirmed cases [5]. The first incidence of COVID-19 was reported by the Maluku Province on March 22, 2020; the patient, a resident of Bekasi, West Java, who was on assignment in Ambon City, was not a Maluku native (CNN Indonesia, 2020). Ambon City had 14,654 confirmed cases of COVID-19 as of January 17, 2022, making it the province with the most confirmed cases of COVID-19 patients at the time (Maluku tanggap COVID-19, 2021). Although it is known that anyone can contract COVID-19, the prevalence has increased over time (Manopo et al., 2021). Risk factors for COVID-19 transmission include old age, pregnancy, individuals with chronic illnesses like diabetes or cancer, immune system problems, heart disease, chronic lung disease, and blood clotting problems (Manopo et al., 2021).

How to cite:

Resnawaldi, A., Rahman, S. A., & Hutagalung, I. A. (2023). Erythrocyte profile and platelet count description based on severity scale of COVID-19 on pregnant women at RSUD Dr. M. Haulussy Ambon in 2020. *The 1st International Conference on Health and Medicine*. NST Proceedings. pages 105-113. doi: 10.11594/nstp.2023.3514

Patients with COVID-19 usually experience malaise, a dry cough, and a high fever (Sun et al., 2021). The COVID-19 symptom list has recently been expanded by the US Centers for Disease Control and Prevention (CDC) to include headaches, chills, sore throats, muscle aches, and loss of smell (Zhang et al., 2020). COVID-19 is classified into four categories according to the intensity of the symptoms: no symptoms, mild symptoms, moderate symptoms, and severe symptoms (Burhan et al., 2020). There are variations in the laboratory parameters of COVID-19, as well as variations in the severity of the symptoms among several types (Burhan et al., 2020; Lippi & Plebani, 2020).

Pregnant women are patients who have a high risk of being infected because there is a vulnerable physiological condition of the body, affecting the decrease in the body's immunity (Ibrahim et al., 2021). Data from Chinese Clinical Guidance for COVID-19 Pneumonia Diagnosis and Treatment shows that in 118 cases, 71% of the infected cases are pregnant women, and from the 118 cases there are 112 symptomatic cases and 6 asymptomatic ones (Ibrahim et al., 2021). The results of Imelda's research at RSUD DR. M Haulussy Kota Ambon in 2020–2021 revealed that there are 68 confirmed cases of pregnant women with COVID-19, with 26 cases being excluded and the research being done in 42 cases. According to the study, 26.2% of people had anosmias, 19.% experienced coughing, 4.8% had a fever, 23.8% had dysgeusia, 35.7% had a cold, and 14.2% had muscle pain (De Kock, 2021). Patients with COVID-19 also experience hematological changes such as variations in the platelet count and erythrocyte profile (Yang et al., 2020; Paules et al., 2020; Liu & Li, 2020). According to Liu W. and Li H.'s research (Liu & Li, 2020). SARS-CoV-2 can combine with porphyrin, a molecular component of heme, and attack the heme in the I-beta chain of hemoglobin to separate iron, preventing the heme chain of erythrocytes from carrying oxygen (Liu & Li, 2020). According to Mortaz et al. (2020), in 14 COVID-19 cases at Tehran, Iran's Deneshvari Hospital, the level of nitric oxide in erythrocytes contributed to the vasodilation of blood vessels in COVID-19 patients who had a significant increase (Mortaz et al., 2020). In one example of a pregnant lady in Al Ahssa, Saudi Arabia, Alomran et al. (2020) performed another study, which revealed that the MCV, MCH, and MCHC in pregnant women with COVID-19 were normal.

Another study was conducted to examine the alterations in platelet counts by Lippi and Plebani (2020) in China 2020. Lippi and Plebani (2020) stated that there are platelet count differences between COVID-19 patients with mild and severe symptoms (Lippi & Plebani, 2020). Similar results were found in Zheng et al. (2020) stating that the hematology examination showed that the platelet count decreased significantly on COVID-19 with severe symptoms. The different results of a meta-analysis of 6 studies with 1379 patients with platelet count reaching $>450.000/\text{mm}^3$, concluded that the platelet count increased (Rusdiana & Akbar, 2020). Because pregnant women are among the most susceptible populations to the current coronavirus disease 2019, as well as the fact that there is a lack of data on COVID-19 in pregnant women and an increase in COVID-19-related deaths, researchers believe it is crucial to carry out this study, particularly in Ambon, Maluku, which serves as a benchmark for health professionals to monitor the prognosis of pregnant women with COVID-19 in Ambon City. Therefore, researchers are interested in examining the platelet count and erythrocyte profile based on the severity of COVID-19 in pregnant women at the RSUD Dr. M. Haulussy Hospital in Ambon City, Maluku.

Material and Methods

Study design

This study is a descriptive cross-sectional study, meaning that each variable is only examined once.

Study design and location

This research was conducted at RSUD Dr. M. Haulussy Ambon which takes place from February 2022 to March 2022.

Study population and sample

The target population for this study was all pregnant women patients who were confirmed to have COVID-19 in Ambon City. The reachable population is all pregnant women patients with confirmed COVID-19 at RSUD Dr. M. Haulussy Ambon 2020.

Sampling technique

The sampling method used is total sampling, meaning that the sample used is the total population.

Study variable

The variables in this study were the erythrocyte profile and platelet count in pregnant women suffering from COVID-19.

Data presentation

The data obtained is presented in tabular form accompanied by an explanation and arranged and grouped according to the research objectives.

Data analysis

Data that has been entered and grouped into Ms. Excel will be analyzed in the form of a frequency distribution table with descriptive statistics. The distribution data from the researched variables is then generated by Ms. Excel.

Results and Discussion***Description of research locations***

Ambon City is the capital of Maluku province, with a land area of 359.45 km², waters of 17.55 km², and a population of 368,987 people[22]. Geographically, the city of Ambon is immediately bordered by Petuanan Hitu, Hila, and Kaitetu Villages from Leihitu District, Central Maluku Regency in the North, the Banda Sea in the South, Petuanan Suli Village from Salahutu District, Central Maluku Regency in the east, and Petuanan Hatu Village from West Leihitu District, Central Maluku in the western part (Akhter et al., 2020).

This research was conducted in the medical records room of RSUD Dr. M Haulussy Ambon, a COVID-19 referral hospital that has been established by the government. Rumah Sakit Umum (Regional Public Hospital) Dr. M Haulussy has various health service facilities including the Emergency Room (ER), Intensive Care Unit (ICU and ICCU), Pharmacy Installation, Medical Rehabilitation Installation, Inpatient Installation, Outpatient Installation, Laboratory Installation, Special Services (Hemodialysis Unit and Endoscopy Unit), Radiology Installation, Central Surgery Installation, Nutrition Installation, Medical Records Installation and Hospital Facility Maintenance.

Description of the Frequency Distribution of Pregnant Women with COVID-19 Based on Severity.

According to Figure 1's results, there were 30 cases (96.8%) of patients with mild severity, followed by 1 case (3.2%) with moderate severity. There were no cases with severe severity.

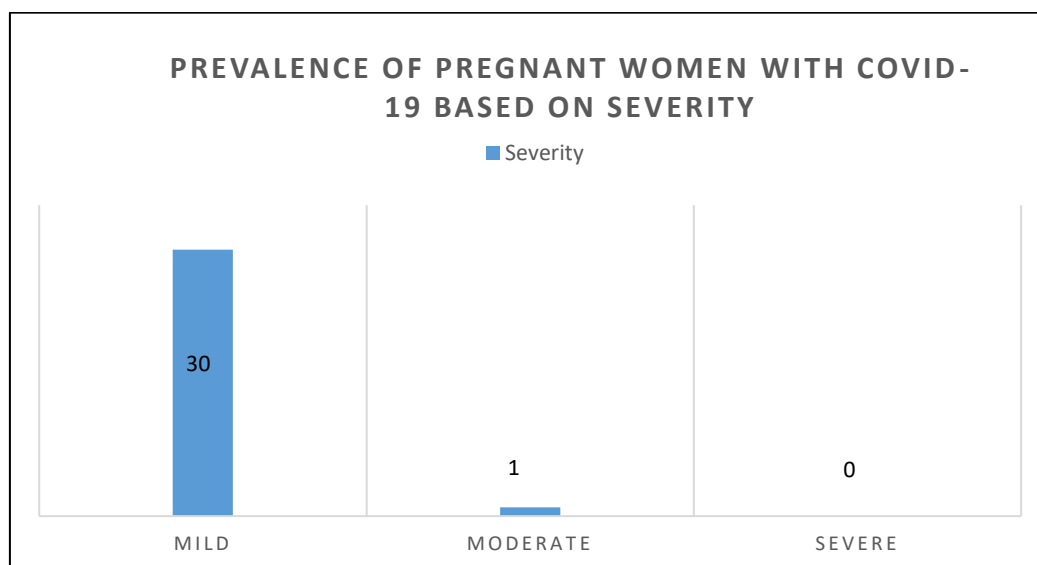


Figure 1. Diagram of the Prevalence of Pregnant Women with COVID-19 Based on the Degree of Severity of 31 Patients at RSUD Dr. M Haulussy Ambon 2020

Overview of Erythrocyte Profiles in Pregnant Women with COVID-19 Based on Severity

Based on Figure 2, it can be shown that the majority of erythrocyte count were found to be decreased (anemia) in 19 cases (63.3%), while erythrocytosis and normal erythrocyte count were not discovered in data analysis. The moderate cases have normal erythrocyte count in one case (100%), and both anemia and erythrocytosis were not found. There was no description found of severe cases in data analysis.

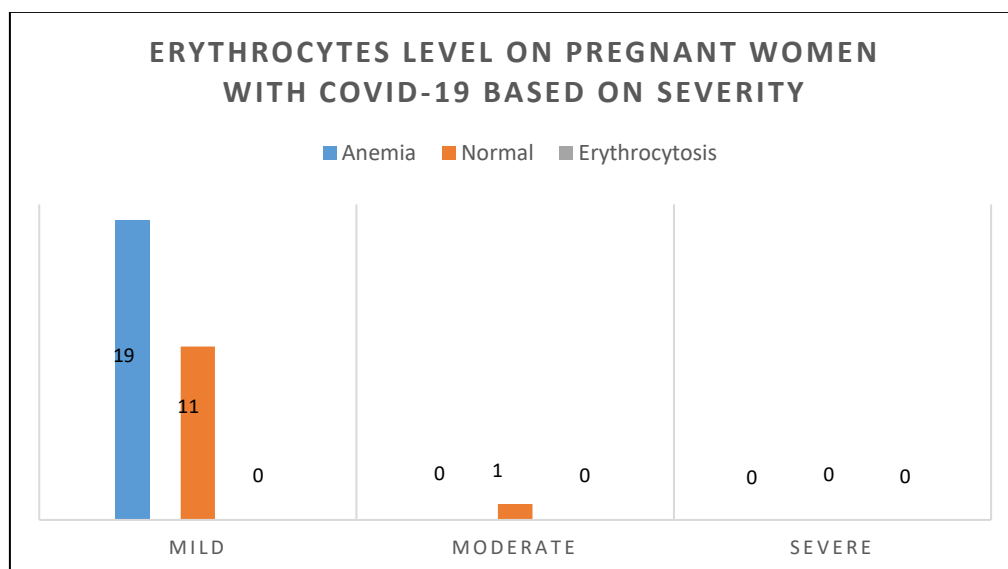


Figure 2. Diagram of Erythrocyte Count in Pregnant Women with COVID-19 Based on the Severity of 31 Patients at Dr. M Haulussy Ambon 2020

Description of Hemoglobin Count in Pregnant Women with COVID-19 Based on Severity

Figure 3 shows that for mild cases, the majority of the hemoglobin count was normal, namely 15 cases (50%), mild anemia 8 cases (26.7%), moderate anemia 7 cases (23.3%), and severe anemia the data analysis was not detected. The description for moderate instances acquired normal

hemoglobin count, specifically 1 case (100%) and data analysis did not reveal mild anemia, moderate anemia, or severe anemia. There was no description found of severe cases in data analysis.

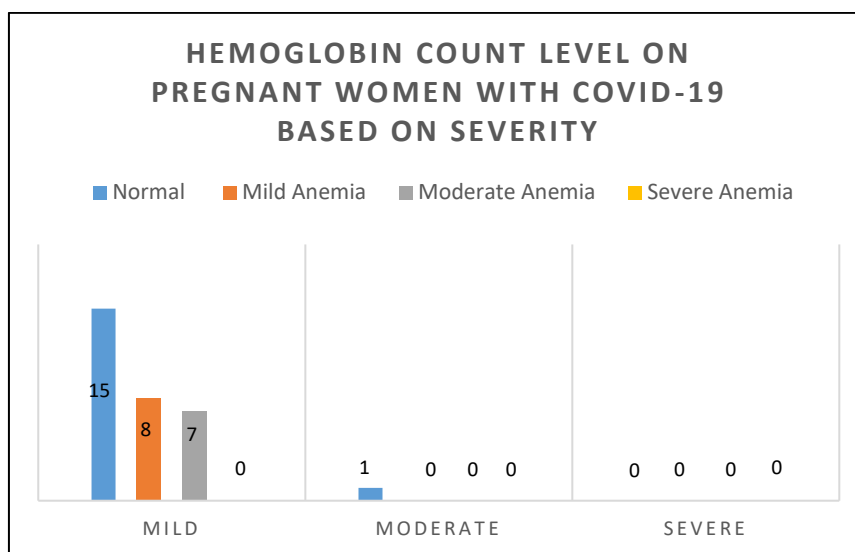


Figure 3. Diagram of Hemoglobin Count in Pregnant Women with COVID-19 Based on the Degree of Severity of 31 Patients at RSUD Dr. M Haulussy Ambon 2020

Description of MCV count in pregnant women with COVID-19 based on severity

On MCV count, Figure 4. showed that most of the MCV count decreased in mild cases, namely 17 cases (56.7%), normal MCV count in 13 cases (43.3%) and increased MCV count in data analysis were not found. The description for moderate cases showed decreased MCV count, namely 1 case (100%) and normal MCV count, and increased MCV count in data analysis were not found. There was no description found of severe cases in data analysis.

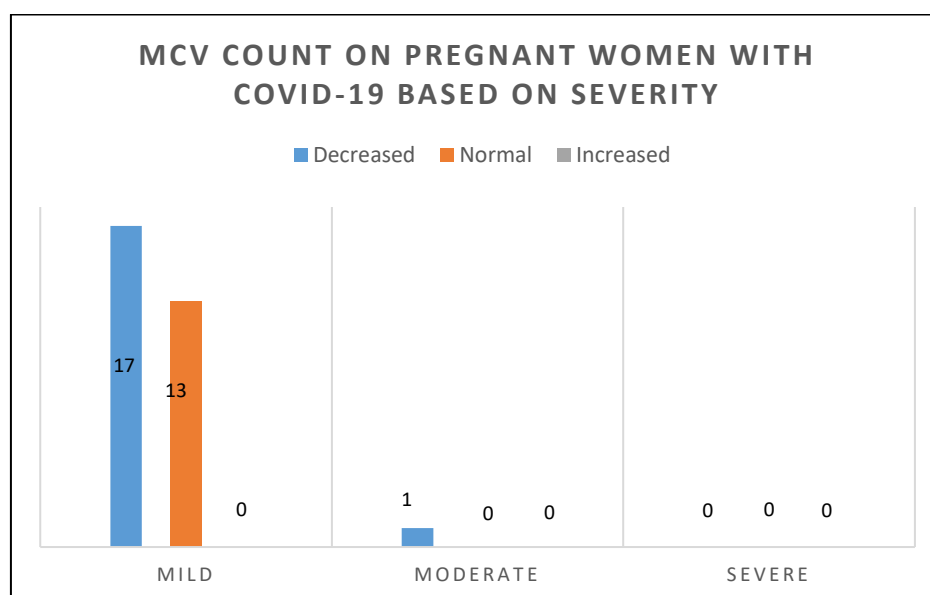


Figure 4. Diagram of MCV Count in Pregnant Women with COVID-19 Based on the Degree of Severity of 31 Patients at Dr. M Haulussy Ambon 2020

Description of MCH count in pregnant women with COVID-19 based on severity

Based on the results in Figure 5, it shows that for mild cases, the majority of MCH levels were normal, namely in 17 cases (56.7%), MCH levels decreased in 13 cases (43.3%) and MCH levels increased in data analysis. The description for moderate cases showed decreased MCH levels, namely 1 case (100%), and normal MCH levels and increased MCH levels were not found in data analysis. There was no description found of severe cases in data analysis.

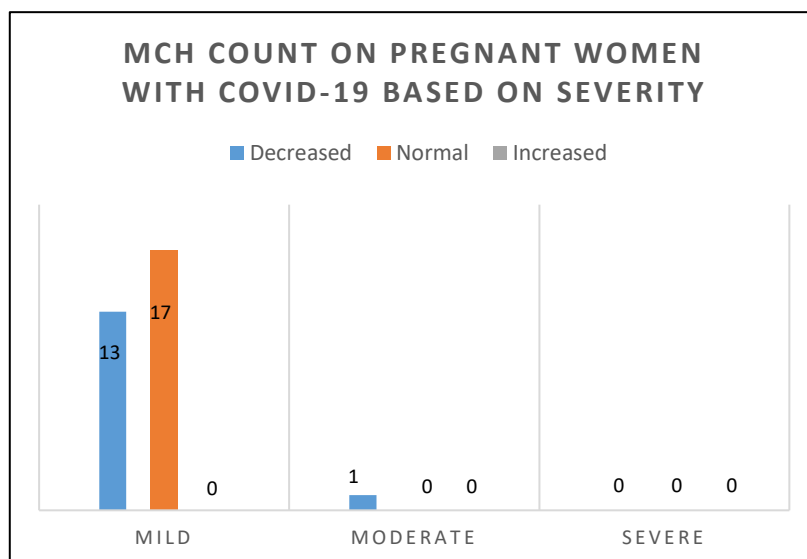


Figure 5. Diagram of MCH Count in Pregnant Women with COVID-19 Based on the Degree of Severity of 31 Patients at Dr. M Haulussy Ambon 2020

Description of MCHC count in pregnant women with COVID-19 based on severity

The results from Figure 6 showed that for MCHC, for mild cases the MCHC normal levels were mostly found normal in 25 cases (83,3%), decreased MCHC levels in 5 cases (16,7%), and no results were found in increased MCHC levels. In moderate cases, the decreased MCHC level was found in 1 case (100%), and both normal and increased MCHC levels were not found in data analysis. There was no description found of severe cases in data analysis.

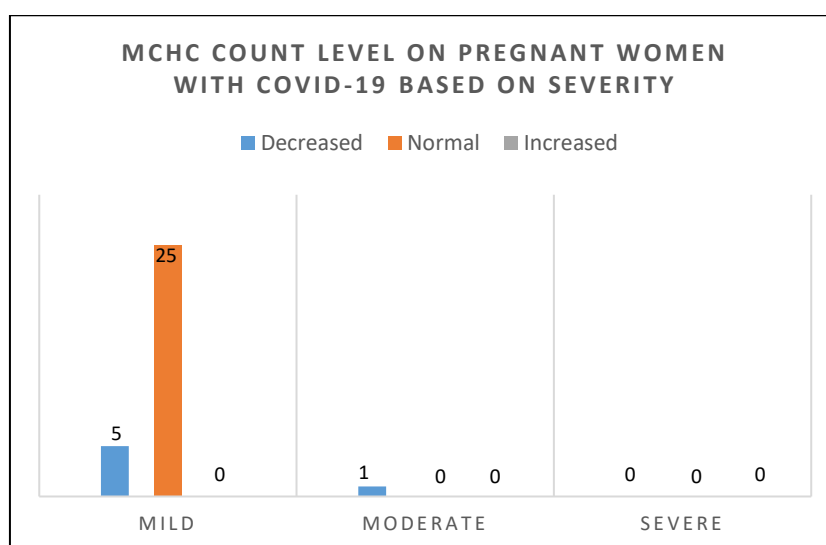


Figure 6. Diagram of MCHC Count in Pregnant Women with COVID-19 Based on the Degree of Severity of 31 Patients at Dr. M Haulussy Ambon 2020

Description of platelets count in pregnant women with COVID-19 based on severity

Based on Figure 7, it can be shown that in mild cases, the majority of thrombocyte levels were normal in 29 cases (96,7%), one case of thrombocytosis (3,3%), and no cases of thrombocytopenia were discovered in data analysis. The moderate cases have normal thrombocyte levels in one case (100%), and both thrombocytosis and thrombocytopenia were not found. There was no description found of severe cases in data analysis.

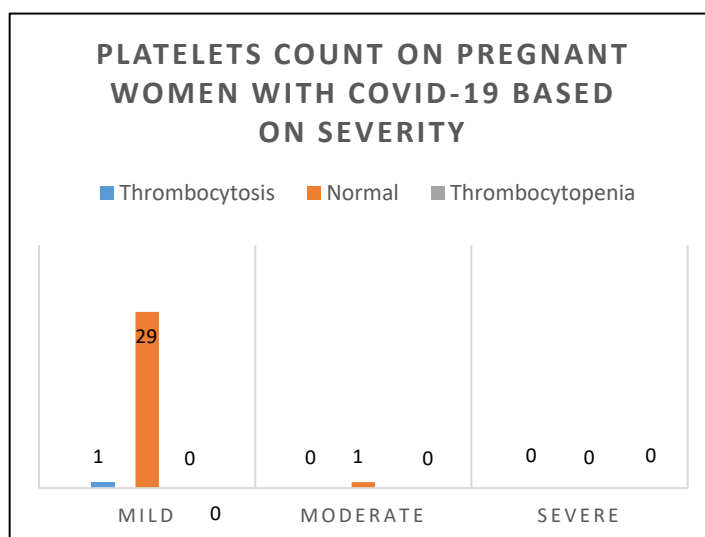


Figure 7. Diagram of platelets count in pregnant women with COVID-19 based on the degree of severity of 31 patients at Dr. M Haulussy Ambon 2020

The results of the study on the description of the erythrocyte profile based on the degree of severity in pregnant women with COVID-19 found that in cases with a mild degree of severity the majority showed decreased erythrocyte count (anemia) with a total of 19 cases (63.3%), hemoglobin levels were found to be mostly normal 15 cases (50%), MCV values were found to be mostly decreased in 17 cases (56.7%), MCH values were found to be mostly normal in 17 cases (56.7%), MCHC values were found to be mostly normal in 25 cases (83,3%). Studies on moderate severity cases found normal erythrocyte and hemoglobin levels with the same number of cases, namely 1 case (100%) while MCV, MCH, and MCHC values were found to decrease with the same number of cases 1 case (100%) and no study was found on severe cases.

The findings of this study are consistent with the results of a 2020 study in Iran by Motlagh et al. (2020), which revealed a decrease in erythrocyte and MCV count. Another study conducted by Qalaba and Wardana (2021) at Wangaya Bali Hospital in 2020 on 67 pregnant women revealed that the majority of the patients (65.7%) had normal hemoglobin readings (Qalaba & Wardana, 2021). Alomran et al. (2020) also did a study on the case of pregnant women in Al Ahssa, Saudi Arabia, and found that MCH and MCHC were normal for pregnant women who had COVID-19.

Decreased erythrocyte levels are associated with pregnant women (who experience changes in erythrocytes) which can lead to a state of anemia (Virnandasari, 2019; Nugraheni et al., 2018). This is further strengthened if the pregnant women are infected with COVID-19, because the cytokine storm caused by COVID-19 can have an impact on the kidneys which causes deformability of erythrocytes and reduced production of renal erythropoietin, so the patient will experience anemia (Akhter et al., 2020).

Anemia in patients with COVID-19 is also caused by several mechanisms, namely the interaction between SARS-CoV-2 and molecules from hemoglobin via CD147, CD26, and other receptors located on erythrocytes results in hemoglobinopathy, which causes hemolysis and hemoglobin

dysfunction in COVID-19 patients (Gusti et al., 2021). Another mechanism that occurs is the activity of the viral spike hepcidine mimetic, which induces ferroportin inhibition, resulting in iron dysmetabolism with hyperferritinemia and ferroptosis (Gusti et al., 2021). Patients with mild cases of COVID-19 were found to have lower hemoglobin count (Gusti et al., 2021). Thrombocyte levels based on severity degrees in pregnant women with COVID-19 were found in mild cases, the majority of whom show normal thrombocyte count in 29 cases (96,7%).

The study results on moderate cases show normal platelets count in one case (100%) and no cases found in severe cases. Coronavirus 2019 can trigger cytokine storms and systemic hyperinflation, increasing coagulation activation and causing hypercoagulation (Fatimah, 2021). The coagulation disorder causes a prothrombotic state which triggers an increased risk of venous or arterial thrombosis and thromboembolism (Fatimah, 2021). Thrombocytopenia or decreased platelets that occur in people with COVID-19 can occur in several mechanisms, namely cytokine storms that destroy bone marrow progenitor cells, inhibition of hematopoiesis that occurs directly by viral inflammation in the bone marrow, disruption of platelet production and disruption of megakaryocyte fragmentation, increased autoantibodies and immune complexes that lead to platelet destruction and increased consumption of platelets that lead to reduced platelets in circulation (Fatimah, 2021). Thrombocytopenia is most commonly seen in critically ill patients who have severe organ damage or physiological decompression, vascular coagulation, and disseminated intravascular coagulopathy (Nugraheni et al., 2018). In COVID-19 patients, the decreased platelet count also has a significant impact on mortality since a lower platelet count is associated with a greater mortality risk (Fatimah, 2021).

Initially, thrombocytopenia was not listed among the common symptoms of COVID-19 patients (Fatimah, 2021). However, a meta-analysis published in early March 2020 included 9 studies with a total sample of 1779 individuals who were reported to have thrombocytopenia, indicating that thrombocytopenia in COVID-19 can be a predictor of COVID-19 severity (Fatimah, 2021). This is consistent with the author's previous research, which revealed that the majority of study participants had mild to moderate disease severity, resulting in platelet counts that were largely within the normal range. The same outcome was observed in a study by Manopo et al. (2021) who reported 100% normal platelet counts in all samples. Other studies also stated that COVID-19 patients with severe degrees also showed lower platelet counts compared with patients with mild severity (Gusti et al., 2021).

Conclusion

Based on the results of a study regarding the description of the erythrocyte profile and platelet count on the degree of severity of COVID-19 in pregnant women at Dr. M. Haulussy Ambon, several points can be concluded as follows:

1. The results showed that most of the samples were third-trimester pregnant women patients who had confirmed COVID-19 with a mild degree of severity, namely 30 cases (96.8%).
2. The results showed that the erythrocyte levels in pregnant women with COVID-19 were dominated by decreased erythrocyte levels (anemia), namely 19 cases (63.3%) in mild severity. The hemoglobin value in pregnant women with COVID-19 was dominated by normal hemoglobin, namely 15 cases (50%) at a mild degree of severity. The MCV value in pregnant women with COVID-19 was dominated by decreased MCV, namely 17 cases (56.7%) in mild severity. The MCH value in pregnant women with COVID-19 was dominated by normal MCH, namely 17 cases (56.7%) with mild severity. The MCHC value in pregnant women with COVID-19 was dominated by the normal MCHC, namely 25 cases (83.3%) at a mild degree of severity.
3. The results of the study showed that the number of platelets in pregnant women with COVID-19 by normal platelet counts was 29 cases (96.7%) in mild severity.

It is hoped that this study will help add information regarding the research on erythrocyte and platelet profiles in pregnant women in 2020, and also can be used as information regarding erythrocytes and platelet status in mothers to do antenatal care. Advised, that in studies that rely on secondary data, the completeness of patient data in the medical record is essential. As a result, it is anticipated that the hospital will be able to complete patient data that will be beneficial for future study. More samples are required for further research to ensure the validity of the findings.

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