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The Influence of Thrombocytopenia in Covid-19 Patients on Dengue Hemorrhagic Fever Cases

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ABSTRACT

The increasing cases of Dengue Hemorrhagic Fever in all regions of Indonesia are a disease transmitted through a vector amid the ongoing COVID-19 Pandemic, which can seriously threaten public health. This study aims to analyze the relationship between thrombocytopenia in patients with COVID-19 and cases of dengue hemorrhagic fever. This research was conducted from February to March 2022. The tools used in this study were the Abbot Cell-Dyn Ruby Hematology Autoanalyzer and questionnaires as well as PCR secondary data. Anas used Pearson's Correlation Test statistic and used a cross-sectional study design with 389 respondents who came to check blood at the laboratory. Based on the data obtained, 128 respondents had thrombocytopenia (32.9%) diagnosed with Dengue Hemorrhagic Fever, and as many as 70 out of 128 respondents had been exposed to COVID-19 (54.7%). The analysis results show a relationship between the influence of thrombocytopenia in patients with COVID-19 and cases of Dengue Hemorrhagic Fever. It is necessary to improve anamnesis in patients suspected of Dengue Hemorrhagic Fever, it is hoped that they will carry out investigations related to previous exposure to COVID-19, so that they can provide, fast, precise and accurate treatment and treatment.

INTRODUCTION

Coronavirus disease (SARS-CoV-2), also known as COVID-19, is a global health issue of international concern, with confirmed cases in several regions or countries. WHO has declared COVID-19 as a global pandemic case (Yusuf et. al., 2021). COVID-19 is a highly contagious ARI (Acute Respiratory Infection) and is also easy to transmit, where the causative agent of the disease is Novel CoV. It has an incubation period of between 2 days to 2 weeks or 14 days, and transmission is through droplet transmission or saliva splashing and close person-to-person contact (within 1 meter). The transmission also occurs when a person touches an infected surface, object, or pet and then performs touching actions to the mouth, around the nose, or eyes (Kolifarhood et. al., 2020). Reported cases of COVID-19 range from cases with mild to severe manifestations of clinical symptoms and can even cause death.

The most common signs of COVID-19 are fever, cough, shortness of breath, pneumonia, and other respiratory disorders. The diagnosis of COVID-19 is confirmed by RT-PCR (Reverse Transcription-Polymerase Chain Reaction) method testing with specimens from nasopharyngeal swabs and identification of lesions on radiographs or chest X-rays. COVID-19 has no specific treatment such as antibiotic and antiviral therapy. Other than that, other supportive measures may be recommended (Adhikari et. al., 2020).

Dengue Hemorrhagic Fever caused by dengue virus (DENV), is considered a vector-borne disease transmitted through the bite of female Aedes aegypti mosquitoes. Symptoms of dengue virus infection in Dengue Hemorrhagic Fever patients are almost the same as other dengue fever symptoms, sometimes severe flu-like symptoms such as chills and high fever, which lasts 2 to 7 days, dengue infection can be fatal in some patients when the disease stage has become severe sometimes biphasic. In cases of Dengue Fever there can be bleeding characterized by petechiae, positive tourniquet test, purpura, ecchymosis, and hematemesis or melena and can result in shock. Laboratory results in Dengue Fever cases have thrombocytopenia (≤ 150,000 cells per mm3), which is

caused by plasma leakage due to increased vascular permeability, namely an increase in hematocrit levels by 5% to 10% (Wilder-Smith et. al., 2019). Diagnosis of Dengue Hemorrhagic Fever patients clinically is acute hyperthermia, hepatomegaly, and Dengue Shock Syndrome, with confirmation of laboratory results as supporting data (Tosepu et. al., 2020; Cardona-Ospina et. al., 2021). So based on the background description above, the purpose of this study is to determine whether there is an influence of thrombocytopenia in Covid-19 patients on Dengue Hemorrhagic Fever cases.

METHOD

The analytic cross-sectional method with a retrospective approach was the method used in the study. The data used were secondary data from patients who came to the Tanjung Priok District Health Center Laboratory with a history of fever. The study was conducted at the sub-district health center by examining the total platelet count in whole blood which was carried out at the sub-district health center laboratory. Samples taken in the study were all patients who came to the laboratory who were diagnosed with DENGUE HEMORRHAGIC FEVER according to WHO criteria 1997 and conducted laboratory examinations, namely platelet counts during the period February - March 2022 (Ajlan et. al., 2019). Based on WHO 2011 criteria that symptoms of dengue fever in patients will experience high fever accompanied by signs or symptoms such as muscle pain, myalgia, petechiae, epistaxis, bleeding gums, hematemesis, and melena. Leukopenia can be defined as a leukocyte count <5000/µl, platelet cell count <100,000/µl, and an increase in hematocrit (Hct) by 5% to 10% (Kalayanarooj et. al., 2011; Guzman et. al., 2004).

The study variables include the examination of platelet counts obtained in the thrombocytopenia category, namely <100,000/µl with normal values. Platelet counts of 150,000 - 450,000/µl in patients who come to the laboratory, who have been diagnosed with Dengue Hemorrhagic Fever and have been exposed to COVID-19 in the previous year, and who have not been exposed by interviewing the patient about whether they have been exposed to COVID-19.

The tools used were Autoanalyzer Hematology Cell Dyn for platelet count examination, and collecting secondary data on COVID-19 cases for the period March 2020 - March 2022. Secondary data were obtained from the surveillance section at the Public health center, as well as conducting interviews with patients with thrombocytopenia. The SPSS 18 for windows program was used by researchers in data processing and data analysis. The Pearson Correlation Test was used by researchers to determine whether there is a relationship between platelet counts in patients with COVID-19 and the incidence of Dengue Hemorrhagic Fever.

RESULTS AND DISCUSSION

Based on the number of patients who came to the public health center laboratory, there were 389 with symptoms of fever fluctuating between 2 to 5 days, bringing laboratory referrals for complete blood tests and laboratory examination results, 128 patients had thrombocytopenia (platelets <100,000/µl), which means around 32.9% were diagnosed with Dengue Fever and of the 128 patients who had been exposed to COVID-19, 70 patients, which means around 54.7% were exposed to COVID-19. A total of 261 patients obtained laboratory results with normal platelet counts (platelets > 150,000/µl) whereas other infections can cause fever. Graph Dengue Hemorrhagic Fever patients (decreased platelets < 100,000/µl) exposed to COVID-19 :

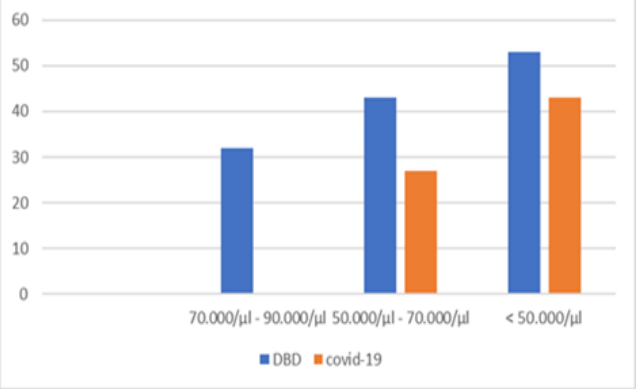

Figure 1.
Dengue Hemorrhagic Fever patients exposed to Covid-19

From Figure 1, it was found that patients diagnosed with Dengue Fever who had been exposed to COVID-19 and experienced thrombocytopenia (platelets between 100,000/µl to 150,000/µl) obtained laboratory results with platelet counts below 70,000/µl.

Based on the results of statistical calculations obtained X2count > X2, then H0 is rejected, which means there is an influence of thrombocytopenia. This means that there is an influence of thrombocytopenia of COVID-19 patients on Dengue Fever cases.

Table 1.
Results from SPSS

Chi-Square Tests

	Value	df	Asymptotic Significance (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	15.659[a]	1	.000		
Continuity Correction[b]	14.802	1	.000		
Likelihood Ratio	15.539	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	15.619	1	.000		
N of Valid Cases	389				

a. 0 cells (0.0%) have expected count less than 5. The minimum expected count is 51.99.
b. Computed only for a 2x2 table

Based on table 1, it is known that the pearson chi-square statistical test is 15.659 and the result of X2 count is 14.802 (X2 Correction Continuity due to N > 40) while X2 table 2x2 is 3.841, indicating a relationship between thrombocytopenia in patients with COVID- 19 and Dengue Fever Cases.

Dengue virus is the cause of Dengue Fever and Corona Virus is the cause of acute respiratory syndrome, better known as COVID-19. Both diseases have clinical symptoms that may be associated with certain comorbidities and share some clinical characteristics (Omame et. al., 2021). Clinical similarities between COVID-19 and Dengue Hemorrhagic Fever include fever, headache, and cough with thrombocytopenia and leukopenia (Adhikari et. al., 2020; Kalayanarooj et. al., 2011).

COVID-19 is a new virus and there is still stigma and fear that you will contract this virus. Patients tend to falsify their medical history, often leading to misdiagnosis. In addition, asymptomatic patients continue their activities and do not know that they can spread the virus.

The transmission of Dengue Fever is through the bite of an Aedes aegypti female mosquito that has been infected by the dengue virus, while the transmission of COVID-19 is through droplet transmission and close person-to-person contact (within 1 meter). Transmission also occurs when a person touches an infected surface, object, or pet and then touches the surface of their mouth, around their nose, or their eyes (Kolifarhood et. al., 2020).

Based on WHO in 2011, the symptoms of Dengue Fever in patients will experience high fever accompanied by signs or symptoms such as muscle pain, myalgia, petechiae, epistaxis, bleeding gums, hematemesis, and melena. Leukopenia can be defined as leukocyte count <5 x 103/µl, platelet count <150 x 103/µl, and hematocrit (Hct) increased by 5% to 10% (Kalayanarooj et. al., 2011; Guzman et. al., 2004).

Patients with Covid-19 also experience symptoms similar to Dengue Hemorrhagic Fever and also experience thrombocytopenia, although the platelet levels do not drop significantly because in the case of Covid-19 the platelet count drops in the range of 125 x 103/µl to 140 x 103/µl, and the number of leukocytes < 5 x 103/µl.

The most common signs of COVID-19 patients are Fever, Malaise, Dry Cough, and Dyspnea which develop gradually. Some patients have mild symptoms at the beginning of the disease such as high fever which may not occur. Rare symptoms are abdominal pain, headache and palpitations, and chest pain. Changes in Hematologic changes are common in COVID-19 patients, including decreased lymphocyte and platelet counts but normal white blood cell counts (Xu et. al., 2020; Bhattacharjee and Banerjee, 2020).

In a retrospective study of COVID-19 patients, they had lymphopenia of about 82.1%, thrombocytopenia of about 36.2%, and leukopenia of about 33.7% when hospitalized. Patients who have severe symptoms will show significant abnormalities compared to patients who are not severe (Lippi et. al., 2020; Chang et. al., 2020).

Critically ill COVID-19 patients who receive treatment initially show an increase in platelet count and then a very dynamic decrease, and the platelet/lymphocyte ratio has prognostic value in determining the severity of COVID-19 disease (Qu et. al., 2020).

There are many case reports of COVID-19 patients experiencing severe thrombocytopenia, especially those related to peripheral damage, drugs such as remdesivir and tocilizumab, or co-infection with other viruses (Adarsh et. al., 2021). Dengue is a mosquito-borne viral disease that is endemic in many countries. Two cases of severe thrombocytopenia in COVID-19 were reported due to co-infection with dengue hemorrhagic fever (Varghese and Kumaran, 2020), Thrombocytopenia in Dengue Hemorrhagic Fever can resolve on its own.

COVID-19 and dengue hemorrhagic fever have similar laboratory characteristics. Lymphopenia, leukopenia, thrombocytopenia, and elevated transaminase levels (Halsey et. al., 2012). Coagulopathic inflammatory response is an indicator of Dengue Fever and COVID-19. including blood clotting parameters and inflammatory biomarkers D-dimer, prothrombin time (PTT), partial thromboplastin time, fibrinogen, C-reactive protein, and ferritin were not analyzed (Gupta et. al., 2020; Chen et. al., 2020).

Based on data that COVID-19 patients who experience thrombocytopenia and are declared cured of COVID-19, then experience the same symptoms and patients diagnosed with Dengue Fever will experience a significant decrease in platelet count.

Based on this case, the author hypothesizes that there is an association between thrombocytopenia in Covid-19 patients with a significant decrease in platelet levels in dengue fever cases. So that every history of action against suspected Dengue Fever patients is expected to be carried out epidemiological investigations related to previous exposure to COVID-19 so as to provide fast, precise and accurate handling and treatment. The possibility of this link still needs further study, such as conducting further research and conducting more accurate and specific supporting examinations.

CONCLUSIONS AND RECOMMENDATION

Based on this case, the author hypothesizes that there is an association between thrombocytopenia in Covid-19 patients with a significant decrease in platelet levels in dengue fever cases. So that every history of action against suspected Dengue Fever patients is expected to be carried out epidemiological investigations related to previous exposure to COVID-19 so as to provide fast, precise and accurate handling and treatment. The possibility of this link still needs further study, such as conducting further research and conducting more accurate and specific supporting examinations..

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Conflict of Interest statement

Penulis yang namanya tercantum tepat di bawah ini menyatakan bahwa tidak memiliki afiliasi atau keterlibatan dengan pihak luar manapun dan tulisan ini murni dari sumber yang dicantumkan di daftar pustaka serta tidak mengandung plagarisme dari jurnal artikel manapun. Sumber tulisan telah dicantumkan seluruhnya di daftar pustaka.

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