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ANALYSIS OF RED BLOOD CELL DISTRIBUTION WIDTH VALUE TOWARDS FIBROTIC STAGE IN CHRONIC HEPATITIS B

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ABSTRACT

Chronic hepatitis-B is a liver disease caused by hepatitis B virus infection lasting for more than 6 months since the first appearance of signs and symptoms. Red Blood Cell Distribution Width (RDW) is more related to an inflammation process compared to the fibrotic stage. Increase in RDW value results from an increase in erythrocyte destruction or ineffective erythrocyte production caused by the inflammation process. The inflammation can suppress erythrocyte maturation and enable new reticulocytes to be released into blood circulation. Liver inflammation is the characteristic of chronic hepatitis B virus infection. This study aimed to know the RDW value towards the fibrotic stage in chronic hepatitis B patients. This study was a retrospective study conducted in the Dr. Wahidin Sudirohusodo Hospital Makassar. The data were taken from medical records of chronic hepatitis B patients in January 2015-July 2016. The research subjects were chronic hepatitis B patients who underwent routine blood examination for the first time when the patients had just hospitalized. The investigation was continued with Fibroscan examination in Gastroenterohepatology Department of the Dr. Wahidin Sudirohusodo General Hospital. Statistical analysis was analyzed with Kruskal-Wallis test using SPSS ver. 22. One hundred data of chronic hepatitis B patient consisted of 27 patients without fibrosis, 16 with moderate fibrosis and 11 with severe fibrosis were obtained in this study. Kruskal-Wallis test results showed no significant difference between RDW value with a fibrotic stage in chronic hepatitis B patient ($p = 0.255$). This study results showed no significant difference between RDW value and fibrotic stage in chronic hepatitis B patients. Red blood cell distribution width value cannot be used as a predictor of liver fibrosis. It is suggested to conduct further studies using larger sample size and more equally distributed sample based on fibrotic stage.

Key words: RDW, fibrotic stage, chronic hepatitis B

INTRODUCTION

Chronic hepatitis B is a liver disease caused by hepatitis B virus lasts for more than six months since the first appearance of signs and symptoms. Hepatitis B virus belongs to Hepadnaviridae which is a double-stranded (ds) DNA virus. This virus can be transmitted through infected blood, semen, and other body fluids.^{1,2}

Hepatitis B is one of the leading health issues in the world generally and in Indonesia especially. The prevalence of this disease in the world is very variable, about 240 million people have been infected by hepatitis B virus chronically, 75% of those infected people live in Asia.³ The hepatitis B infected patients in Indonesia is estimated to be about 4.0-20.3% of the healthy population. The highest prevalence was reported to be found in Makasar (7.1%).^{3,4}

Chronic hepatitis is a liver inflammation disease that involves progressive destruction process and regeneration of liver parenchyma which ends in

fibrosis and cirrhosis. The fibrotic stage can be a predictor of mortality level related to chronic liver disease complications. Fibroscan is a noninvasive method to detect liver fibrotic stage. The sensitivity and specificity of this method are 100% and 73.9%, respectively.^{5,6}

Red blood cell distribution width is a measure of erythrocyte variation in circulation. It is a routine hematology parameter. This parameter plays a role in complete blood examination in which it can represent microscopic examination to determine the degree of anisocytosis. Red blood cell distribution width value may increase when the erythrocyte destructions increase or the erythrocyte production occurs ineffectively.⁷

Lou *et al.*, Huang *et al.*, and Karagoz *et al.* studies found the RDW value in hepatitis-B patients was significantly higher compared to healthy people. They also found that an increase in RDW value was proportional to disease severity that the rise in RDW value can be used as an independent factor to predict the liver fibrosis. Xu *et al.* in 2015 stated that

RDW could predict liver fibrosis and inflammation in hepatitis B patients.⁸⁻¹¹

Red blood cell distribution width value data in chronic hepatitis B patients in Indonesia, especially in Makassar had not been studied yet. The researchers were interested in studying about RDW value in chronic hepatitis B patients in the Dr. Wahidin Sudirohusodo Hospital Makassar.

This study aimed to know the RDW value towards the fibrotic stage in chronic hepatitis B patients.

METHODS

This study was a retrospective study conducted by taking secondary data from chronic hepatitis B patients from the Medical Records Installation of the Dr. Wahidin Sudirohusodo Hospital, Makassar from January 2015- December 2016. The study population was medical records of chronic hepatitis B patients in the Dr. Wahidin Sudirohusodo Hospital. Inclusion criteria were patients diagnosed with chronic hepatitis by internist based on anamnesis, physical examination and also laboratory examination. The exclusion criteria were incomplete medical record, a patient with any following coexistence disease such as malignancy including liver cancer, hematological disease, e.g. iron deficiency anemia and cardiovascular disease, e.g. stroke.

This study's data were analyzed statistically using SPSS ver. 22. The Kruskal-Wallis test, a comparative test analysis to investigated numeric data for two or more study groups that were not equally distributed,

was used. The result of the study was considered statistically significant if the p-value < 0.05.

RESULT AND DISCUSSION

The result of the study conducted in the Dr. Wahidin Sudirohusodo Makassar by taking the medical recordin January 2015-December 2016 obtained 100 medical records of chronic hepatitis B patients.

Most of the participants were male with the proportion of 56% (n=56) and the other was female with a percentage of 44% (n= 44). Most of the participants were 30-49 years old. National data reported the sex ratio of the hepatitis B patient between male and female was 2.1:1 with the mean age of 44 years old. This result was likely related to the productive age. In productive age, people tend to be exposed to chronic liver disease risk factors such as hepatitis virus which is the most common cause of chronic liver disease. Forty-six percent of the subjects were found in the moderate stage of liver fibrosis (Table 1).^{12,13}

The Kruskal-Wallis test showed no significant difference between RDW value with a fibrotic stage in chronic hepatitis B patients (p = 0.255) (Table 2). The result of this study was not consistent with the research conducted by Yufeng *et al.*, Huang *et al.*, Karagoz *et al.*, that reported that the RDW value was higher in hepatitis B patients compared to that of healthy people. The increase in RDW value was proportional with the disease severity that this

Table 1. Characteristics of chronic hepatitis B subject

Characteristics		Number (n = 100)	Percentage (%)
Sex	Male	56	56
	Female	44	44
Age	20-29	18	18
	30-39	26	26
	40-49	24	24
	50-59	21	21
	60-69	9	9
	70-79	2	2
Fibrotic stage	Normal	27	27
	Mild	46	46
	Moderate	15	15
	Severe	12	12
RDW (%)	Normal (10.0 -15.0 %)	82	82
	Abnormal (>15.1 %)	18	18

Source: *Medical Record Data

Table 2. Comparison of RDW value based on the fibrotic stage

		n	RDW Median (max - min)	p-value
Fibrotic stage	Normal	27	13.5 (11.4 – 15.9)	0.255
	Mild	46	12.7 (11.1 – 18.2)	
	Moderate	16	14.2 (11.5 – 20.6)	
	Severe	11	12.6 (12.0 – 14.4)	

Note: * Kruskal-Wallis test. Data was presented in median (minimum-maximum)

parameter can be used as an independent predictor in liver fibrosis. This study was different from the previous research in terms of using healthy people as a control. The previous study used healthy people as a control so the RDW value of chronic hepatitis B patients could be differentiated from healthy control while our study did not involve healthy control. The increase in RDW value by 1 % had independent risk to increase in inflammation by 14.6% so that RDW value more related to inflammation process compared to fibrotic stage.^{8,11}

Several mechanisms can explain the relationship of liver disease related to hepatitis B with RDW value i.e.: Inflammation processes can suppress erythrocyte maturation and enable bigger new reticulocytes to be released in to blood stream that result in RDW value increase; Inflammation can relate to progression of liver fibrosis and cirrhosis; Increase in RDW value caused by endothelial dysfunction. This study has some limitations, i.e. first, data were taken retrospectively, and the sample size was relatively small hence needing further studies with more significant sample size to confirm the relationship of RDW value and chronic hepatitis B condition. Second, the RDW value was not observed sequentially, so do not know precisely whether the RDW value increases gradually when the patient's condition progressively worsened.^{9,10}

CONCLUSION AND SUGGESTION

This study results showed no significant difference in RDW value toward the fibrotic stage in chronic hepatitis B patients, so this value cannot be used as a predictor of liver fibrosis. It is suggested to conduct further studies in chronic hepatitis B with more significant sample size and more equally distributed sample based on fibrotic stage.

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