Jurnal Sains dan Kesehatan

Journal homepage: https://jsk.farmasi.unmul.ac.id

Analysis of Platelet Count on Liver Cirrhosis Patients Based on Child-Pugh Classification

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Abstrak

Sirosis hepatis menggambarkan proses patologis yang bersifat difus ditandai dengan fibrosis dan perubahan arsitektur hati normal menjadi struktur nodular yang abnormal. Sirosis hepatis dapat disebabkan oleh penyakit hati kronik akibat virus maupun non virus. Trombositopenia merupakan kelainan hematologi yang paling sering ditemui pada pasien sirosis hepatis. Tingkat keparahan dan prognosis sirosis hepatis dapat ditentukan dengan menggunakan klasifikasi Child-Pugh. Penelitian ini bertujuan untuk mengetahui perbedaan rata-rata kadar trombosit pada penderita sirosis hepatis berdasarkan klasifikasi Child-Pugh. Jenis penelitian menggunakan observasional analitik dengan desain *cross sectional*. Data diambil dari rekam medik pasien sirosis hepatis yang dirawat di RSUD Abdul Wahab Sjahranie Samarinda periode 2018-2020. Analisis statistik menggunakan uji Krsukal-Wallis. Hasil penelitian menunjukkan pasien sirosis hepatis paling banyak berada pada Child-Pugh C. Rata-rata kadar trombosit pasien sirosis hepatis dengan Child-Pugh A sebesar 73.250/µl, Child-Pugh B sebesar 126.370/µl, dan Child-Pugh C sebesar 148.375/µl. Berdasarkan uji statistik didapatkan nilai p = 0,19 (p > 0,05), sehingga tidak terdapat perbedaan rata-rata kadar trombosit di antara ketiga klasifikasi Child-Pugh.

Kata Kunci: sirosis, trombosit, Child-Pugh

Abstract

Liver cirrhosis is described as a diffused pathological process which marked with fibrosis and architectural changes of normal liver that becomes an abnormal nodular structure. Liver cirrhosis is caused by chronic liver disease of virus nor non virus. Thrombocytopenia is a hematology abnormality which frequently found on liver cirrhosis patients. Severity level and prognosis of liver cirrhosis can be determined by Child-Pugh classification. This research aims to know the difference of mean platelet count on liver cirrhosis patients based on Child-Pugh classification. It applied analytic observational method with cross-sectional design. The data was taken from medical records of patients at Abdul

Wahab Sjahranie Hospital in Samarinda of 2018-2020 period. Statistical analysis was using Kruskal-Wallis test. The results showed liver cirrhosis patients in Child-Pugh C is at most. Mean platelet count of liver cirrhosis with Child-Pugh A is 73.250/µl, Child-Pugh B is 126.370/µl, and Child-Pugh C is 148.375/ µl. Based on statistical test, the score p = 0,19 (p > 0,05), there are no differences of mean platelet count among the three Child-Pugh classifications.

Keywords: cirrhosis, platelets, Child-Pugh

Submitted: 22 Oktober 2020 **Accepted**: 20 Agustus 2021 **DOI**: https://doi.org/10.25026/jsk.v3i4.340

1 Introduction

Liver cirrhosis (LC) is a fibrotic liver disease with irreversible inflammation and develop slowly over a period of years [1]. Liver cirrhosis is described as a diffused pathological process which marked with fibrosis and architectural changes of normal liver that becomes an abnormal nodular structure [2]. Liver cirrhosis can be categorized by the size of nodul, etiology, morphology, and clinical [3].

According to World Health Organization (WHO), LC causes the most deaths in the world, covers 1,3% of it [4]. LC causes 1,2% deaths in United States [5]. Meanwhile in Indonesia itself, the number of LC disease since the year 2000-2016 was recorded 26,9 millions of patients and causing 51,1 deaths of men and 27,1 of women per 100.000 population in 2016 [6,7]. In 2010, LC was in 20 causes of deaths in the worlds and one of five causes of deaths in Indonesia [4].

Hematological abnormalities that accompany LC can be identified through laboratory examinations. Abnormalities that can be occurred such as anemia, thrombocytopenia, and neutropenia [8]. Thrombocytopenia is blood abnormalities that most frequently found on LC [9,10]. Thrombocytopenia frequently used as a marker on advanced liver disease and several research showed moderate to severe thrombocytopenia as a predictor of death [11].

Several research showed that if the level of liver disease is increasing, the platelet count would be decreasing [12,13]. On LC, the level of severity and prognosis are determined by using Child-Pugh classification such as bilirubin serum, albumin serum, ascites, hepatic encephalopathy, and PT (Prothrombin Time) or INR (International Normalized Ratio) that divide patients to Child-Pugh A, Child-Pugh B, and Child-Pugh C [14].

One of research in Padang, found the difference of mean platelet count on LC patients based of Child-Pugh classification ($p < 0,05$). The result showed platelet count of LC patients with bleeding is decreasing according to the severity level of LC disease [15]. Another research by Nwokediuko *et al* showed the significant correlation between platelet count and Child-Pugh classification ($p = 0,0001$; $y = -0,6183$) [16]. Whereas a research in Turkey categorized all of LC patients by Child-Pugh classification, each categories being compared by the mean platelet count and no significant difference was found ($p > 0,05$) [17]. This research intends to know the difference of mean platelet count on LC patients based on Child-Pugh classification.

2 Research and Methods

This research was implemented at Abdul Wahab Sjahranie Hospital in Samarinda, started on 17th of June until 3rd of July 2020, by analyzing all of medical records of LC patients in the year 2018-2020 and classified as an analytic observational research using cross-sectional design. Medical records that have been identified as LC are excluded if followed by non-liver infection disease, hematologic disorder, HIV-AIDS, and incomplete examination result. There are 71 data of medical records that are qualified for the research criteria.

Child-Pugh classification (independent variable) is classified into three Child-Pugh classifications such as A, B, and C which obtained from the result of score calculations [14]. Platelet count (dependent variable) can be

seen from medical records and cross-checked by laboratory data of Pathology Clinic. Normality test resulting the score p = 0,000 (p < 0,05), this result showed the data is distributed as not normal, so the alternative for statistical analysis is Kruskal-Wallis test. Data of this research is processed by IBM SPSS Statistics 26.

3 Results and Discussion

Table 1. Characteristics of Liver Cirrhosis Patients

Characteristics		N (71)	%
Child-Pugh	A	4	5.6
	B	27	38
	C	40	56.3
Sex	Male	58	81.7
	Female	13	18.3
Age	< 31	1	1.4
	31-40	4	5.6
	41-50	19	26.8
	51-60	29	40.8
	> 60	18	25.4
Platelet Count	Low	50	70.4
	Normal	20	28.2
	High	1	1.4

Child-Pugh classification of LC patients at Abdul Wahab Sjahranie Hospital in Samarinda, with the majority of Child-Pugh C category, consists of 40 people (56,3%). There are only 4 people (5,6%) in Child-Pugh A, and the rest of the people is in Child-Pugh B (38%). The similar result is shown by Lovena *et al*, in her research about characteristics of LC patients at Dr. M. Djamil Padang Hospital, the majority of LC patients are in Child-Pugh C with the percentage of 60,3% [18]. The research by Saksana *et al*, in line with previous research, the highest percentage was in Child-Pugh C (49,3%) [19].

Liver cirrhosis with Child-Pugh C has the worst prognosis and indicates advanced liver dysfunction [3,14]. A patient with Child-Pugh C has one year of survival rate and two years less than 50% [20]. This research showed that most of the LC patients at Abdul Wahab Sjahranie Hospital came with severe disease condition. According to Nurdjanah, patients who came to clinic are usually already at the stage of decompensate with complications [3].

There are more of male LC patients (81,7%) than female patients (18,3%) at Abdul Wahab Sjahranie Hospital in Samarinda. Another research with similar results, where as many as 78,6% of LC patients at Prof.Dr.R.D Kandou Manado Hospital are male patients [21]. In line with the result, a research by Husni *et al* has also shown that more men (94,28%) have LC disease than women (5,71%) [22].

There are some factors that presumed to be increasing the factor of LC occurrence risk on men. Based on data, the prevalence of men having hepatitis and alcohol consumption is higher than on women [23,24].

Based on age, cirrhosis patients divided into five categories of ages. Category with most frequent LC occurrence is at the age of 51-60 years old (40,8%), and category with the least LC occurrence is at the age less than 31 years old, only occurred to one person (1,4%) out of all sample patients. The result is similar with a research by Tambunan *et al* about characteristics of patients at Dr. Soedarso Pontianak Hospital, the majority of LC patients are at the age of 50-59 years old (31%) [25]. A research in Manado by Patasik *et al* also showed that the age of 50-59 years old are the most frequent occurrence of LC patients (31,4%) [26].

Liver cirrhosis is a chronic liver disease that tends to be latent and changes of pathology that occurred slow progress, so it often encountered with age. A patient with hepatitis history, changes from chronic hepatitis to LC takes time approximately 10 to 30 years, whereas compensate LC becomes decompensate takes six years. A cirrhosis patient usually would not check themselves if the symptoms are not seen yet [18].

Platelet count on LC patients in this research is in low (thrombocytopenia), normal, and high (thrombocytosis). As many as 50 out of 71 people as sample have thrombocytopenia (70,4%). There are 20 people with normal platelet count (28,2%), and the rest have thrombocytosis (1,4%). The occurrence rate of high thrombocytopenia is also shown in a research in Tasikmalaya, where 80% of LC patients have low platelet count and the rest have normal platelet count (20%) [27]. In line with this research, a research in Manado has shown 34 LC patients as samples, where most of them have thrombocytopenia (85,2%), whereas there are four patients with normal platelet

count (11,7%), and the rest have thrombocytosis (3%) [28].

Thrombocytopenia is a common occurrence on chronic liver disease, and it occurs on 76% of LC patients. This occurrence is caused by increased pooling of platelets in an enlarged spleen, secondary to portal hypertension and extensive cirrhosis [29].

Table 2. Mean Platelet Count on Liver Cirrhosis Patients Based on Child-Pugh Classifications

Child-Pugh	N (71)	%	Platelet (/µl)		
			Mean	Min	Max
A	4	5.6	73,250	42,000	152,000
B	27	38	126,370	43,000	412,000
C	40	56.3	148,375	21,000	507,000

Based on Child-Pugh classification, the mean platelet count on Child-Pugh A patients is 73.250/µl, Child-Pugh B patients is 126.370/µl, and Child-Pugh C patients is 148.375/µl. The result shows that the higher Child-Pugh classification occurs, the higher platelet count of patients as well. However, the result of research by Al Hijjah *et al* in Padang showed different results. In the research, the mean platelet count of Child-Pugh A patients is 192.181/µl, Child-Pugh B patients is 155.687/µl, and Child-Pugh C patients is 96.485/µl. This shows that Child-Pugh classification inversely proportional to platelet count [15].

According to the researcher's analysis, the difference is obtained because of maximum and minimum scores and also the number of spread of patients in each Child-Pugh classifications by the researcher and Al Hijjah. Aside of that, the amount of varying platelet count among the patients being the sample can also affect the mean platelet count between the two researchers.

Table 3. Kruskal-Wallis Test

	Child-Pugh	Mean Rank	Df	Kruskal-Wallis H	*p*
Platelet	A	17.75	2	3.326	0.19
	B	36.76			
	C	37.31			

Sig : p < 0.05

On Kruskal-Wallis test shows that the score *p* is 0,19 (score $p > 0,05$), this shows that there are no differences of mean platelet count among the three Child-Pugh classifications that the level of LC disease doesn't affect platelet count in this research.

The result of this research is in line with a research by Erdem on 201 LC patients. LC patients are categorized by Child-Pugh classifications regardless of the etiology. Research by Erdem showed that there are no significant difference between Child-Pugh classification and mean platelet count ($p > 0,05$) [17]. Research results in Bosnia also showed the similar results, there are no correlation between Child-Pugh classification and platelet count ($p > 0,05$) [30].

However, this result is contradicted with other research that showed correlations between level of LC disease and the platelet count of patients. A research implemented at the hospital in Hyderabad University, showed the differences of mean platelet count among the three Child-Pugh classifications ($p < 0,05$; Child-Pugh A vs Child-Pugh C & Child-Pugh B vs Child-Pugh C, $p < 0,05$) and the platelet count in the research inversely proportional to level of LC disease [31]. This result showed the further the course of the disease, the chances of the patients to have thrombocytopenia are increasing. In line with the research, a research by Adinolfi *et al* to see the role of liver fibrosis in causing thrombocytopenia on chronic virus hepatitis, showed higher prevalence of thrombocytopenia on patients with advanced liver fibrosis [32]. A research by Shao *et al* also showed that liver fibrosis has a negative correlation with the platelet count of patients [33].

In theory, the main cause of thrombocytopenia on LC is acceleration platelet destruction or sequestration in splenomegaly and suppressed thrombopoiesis because of reduced thrombopoietin hormone production [34]. This theory is supported by research by Osada *et al* and Shimizu *et al* [12,35]. However, another research has different results, that splenomegaly and level of thrombopoeitin hormone have no correlation with platelet count of LC patients [30,36]. This conflicting research showed factors other than splenomegaly and thrombopoeitin hormone which can affect platelet count of LC patients. According to Hayashi *et al*, bone marrow

suppression by chronic hepatitis C virus infection and anti-cancer agents, and antiviral treatment with interferon based therapy, can affect the platelet counts on patients [37].

The cause of there are no differences of mean platelet count in three Child-Pugh classifications presumed to be related to diverse etiology of the LC patients. In research by Kuo *et al*, platelet count on chronic liver disease with virus etiology and non-virus have significant differences (p < 0,05), where the mean platelet count on chronic virus infection is lower than not infected by virus was found [38]. Virus infection can causes lower platelet count because virus has a lot of different ways to decrease platelet count in body circulation [39]. Aside of that, another research with a similar opinion, that there are differences of platelet count between LC patients with non-alcoholic fatty liver disease (NAFLD) and chronic hepatitis C virus (HCV) (p < 0,05). Platelet count on LC patients with NAFLD is significantly higher than patients with chronic HCV [40].

In literature, chronic liver disease with the same etiology, caused by chronic virus infection nor non-virus, can show different platelet count. A research by Tejima *et al* in Japan, thrombocytopenia condition on HCV patients is more severe than hepatitis B virus (HBV) patients. The results indicated that HBV and HCV are on the same grade of liver stiffness and splenomegaly, there are differences of platelet count because of different kinds if infecting virus [41]. Another research about chronic liver disease caused by non-virus by Das *et al* showed significant differences of platelet count between NAFLD patients and alcoholic liver disease (ALD) patients (p < 0,05) [42]. In terms of sample variations, the number of patients with Child-Pugh A in this research are only 4 people (5,6%). The lacking number of sample on Child-Pugh is also presumed to be affecting the results.

4 Conclusions

Based on the description above, in this research is found the mean platelet count on patients with Child-Pugh A as much as 73.250/µl, Child-Pugh B as much as 126.370/µl, and Child-Pugh C as much as 148.375/µl. In this research, LC patients are in Child-Pugh C at most. There are no differences of the mean platelet count among the three Child-Pugh classifications.

In this research is also found certain limitations such as lack of Child-Pugh A variation, a lot of unrecorded complications on medical records, and laboratory examinations along with physical examination of variables used for Child-Pugh classification which were not taken on the same day, the chances of patients having worsening nor better condition caused by medical intervention in the time of treatment at the hospital that can affect the score calculation of Child-Pugh classification.

5 References

[1] Mc Cance KL, Huether SE. Pathophysiology : The Biologic Basis For Disease In Adults and Children. 7th ed. Elsevier; 2014.

[2] Kumar V, Abbas AK, Aster JC. Buku Ajar Patologi Robbins. 9th ed. Singapura: Elsevier Saunders; 2015.

[3] Nurdjanah S. Sirosis Hepatis. In: Buku Ajar Ilmu Penyakit Dalam. 6th ed. Jakarta: InternaPublishing; 2014. p. 1980–5.

[4] World Health Organization. The Global Burden of Disease 2010 [Internet]. 2010. Available from: www.who.int

[5] Wolf DC. Cirrhosis [Internet]. 2018. Available from: emedicine.medscape.com

[6] World Health Organization. Global Health Estimates 2016: Disease burden by Cause, Age, Sex, by Country and by Region, 2000-2016 [Internet]. 2018. Available from: www.who.int

[7] World Health Organization. Liver cirrhosis (15+), age-standardized death rates by country [Internet]. 2018. Available from: www.who.int

[8] Bacon BR. Cirrhosis and Its Complications. In: Harrison's Principles of Internal Medicine. 19th ed. Mc Graw Hill Education; 2015. p. 2058–67.

[9] Peck-Radosavljevic M. Thrombocytopenia in chronic liver disease. Liver Int. 2017;37(6):778–93.

[10] Sigal S, Mitchell O, Feldman D, Diakow M. The pathophysiology of thrombocytopenia in chronic liver disease. Hepatic Med Evid Res. 2016;39.

[11] Moore AH. Thrombocytopenia in Cirrhosis : A Review of Pathophysiology and Management Options. Am Assoc Study Liver Dis. 2019;14(5):183–6.

[12] Osada M, Kaneko M, Sakamoto M, Endoh M, Takigawa K, Suzuki-inoue K, et al. Causes of Thrombocytopenia in Chronic Hepatitis C Viral Infection. SAGE Journals [Internet]. 2012;18(3):272–80. Available from: https://doi.org/10.1177/1076029611429124

[13] Yoneda M, Fujii H, Sumida Y, Hyogo H, Itoh Y, Ono M, et al. Platelet count for predicting fibrosis in nonalcoholic fatty liver disease. J Gastroenterol. 2011;46(11):1300–6.
[14] Tsoris A, Marlar CA. Use Of The Child Pugh Score In Liver Disease [Internet]. StatPearls. 2019. p. 14–5. Available from: http://www.ncbi.nlm.nih.gov/pubmed/31194448
[15] Al Hijjah F, Yaswir R, Syah NA. Gambaran Jumlah Trombosit Berdasarkan Berat Ringannya Penyakit pada Pasien Sirosis Hati dengan Perdarahan di RSUP Dr. M. Djamil Padang. J Kesehat Andalas [Internet]. 2017;6(3):609–14. Available from: http://jurnal.fk.unand.ac.id
[16] Nwokediuko SC, Ibegbulam O. Quantitative Platelet Abnormalities in Patients With Hepatitis B Virus-Related Liver Disease. Elmer Press. 2009;2(6):344–9.
[17] Erdem MG, Çil EÖ, Tükek T, Helvacı ŞA. Evaluation of platelet and mean platelet volume levels in patients with liver cirrhosis. Arch Clin Exp Med. 2018;3(1):18–21.
[18] Lovena A, Miro S, Efrida E. Karakteristik Pasien Sirosis Hepatis di RSUP Dr. M. Djamil Padang. J Kesehat Andalas. 2017;6(1):5.
[19] Saksana RA, Bayupurnama P, Indrarti F, Ratnasari N, Maduseno S, Triwikatmani C, et al. Correlation between the Severity of Liver Cirrhosis (Child-Pugh Score) and QTc Interval Prolongation. Indones J Gastroenterol Hepatol Dig Endosc. 2012;13(3):157–60.
[20] D'Amico G, Garcia-Tsao G, Pagliaro L. Natural history and prognostic indicators of survival in cirrhosis: A systematic review of 118 studies. J Hepatol. 2006;44(1):217–31.
[21] Hutahaean R, Ali HR, Loho E. Hubungan Gambaran USG Pada Penderita Sirosis Hati dengan Fibrosis Skor di Bagian Radiologi RSUP Prof. Dr. R. D. Kandou Manado periode Januari 2013 – Desember 2013. J E-Clinic. 2014;2(1):1–9.
[22] Husni N, Anniwati L, Lukitasari L. Aspartate Aminotransferase to Platelet Ratio Index Profile of Cirrhotic Patients with Positive HBsAg. JUXTA J Ilm Mhs Kedokt Univ Airlangga. 2019;10(1):34.
[23] Klein SL. Sex influences immune responses to viruses, and efficacy of prophylaxis and therapeutic treatments for viral diseases. NIH Public Access. 2014;34(12):1050–9.
[24] Moinuddin A, Goel A, Saini S, Bajpai A, Misra R. Alcohol Consumption and Gender : A Critical Review. J Psychol Psychother. 2016;6(3).
[25] Tambunan A, Mulyadi Y, Kahtan MI. Characteristics of Cirrhotic Patients in Dr. Soedarso General Hospital Pontianak Periods of January 2008-December 2010. Neliti-Repositori Ilm Indones [Internet]. 2013;1–19. Available from: neliti.com
[26] Patasik YZ, Waleleng BJ, Wantania F. Profil Pasien Sirosis Hati Yang Dirawat Inap di RSUP Prof .Dr.R.D.Kandou Manado Periode Agustus 2012-Agustus 2014. J E-Clinic. 2015;3:342–7.
[27] Meri, Nurismayanti R. Gambaran Pemeriksaan Darah Rutin Terhadap Penderita Sirosis Hati. e-Jurnal STIKes Bakti Tunas Husada Tasikmalaya. 2018;1:155–9.
[28] Saragih GG, Waleleng BJ, Harlinda H. Gambaran gangguan hemostasis pada penderita sirosis hati yang dirawat di RSUP Prof.Dr.R. D.Kandou periode Agustus 2013 – Agustus 2015. J e-Clinic. 2016;4:4–9.
[29] Hancox SH, Smith BC. Liver disease as a cause of thrombocytopenia. QJM An Int J Med. 2013;(January):425–31.
[30] Djordjevic J, Svorcan P, Vrinic D, Dapcevic B. Splenomegaly and thrombocytopenia in patients with liver cirrhosis. Vojnosanit Pregl. 2010;67(2):166–9.
[31] Hassan H, Ansari AK, Memon SF. Haemostatic Abnormalities in Patients with Cirrhosis and their Relation with Severity of Liver Dysfunction as Assessed by Child Pugh Score. J Liaquat Univ Med Heal Sci. 2017;16(2):108–13.
[32] Adinolfi LE, Giordano MG, Andreana A, Tripodi MF, Utili R, Cesaro G, et al. Hepatic fibrosis plays a central role in the pathogenesis of thrombocytopenia in patients with chronic viral hepatitis. Br J Haematol. 2001;113(3):590–5.
[33] Shao L, Zhang S, Wang N, Yu W, Chen M, Xiao N, et al. Platelet indices significantly correlate with liver fibrosis in HCV-infected patients. PLoS One [Internet]. 2020;1–9. Available from: http://dx.doi.org/10.1371/journal.pone.0227544
[34] Ikura Y, Ohsawa M, Okada M, Iwai Y, Wakasa K. The Significance of Platelet Consumption in the Development of Thrombocytopenia in Patients With Cirrhosis. Am J Med Sci. 2013;346(3):199–203.
[35] Shimizu E, Murohisa G, Koide S, Yoshimi T, Nakamura H, Ohno R. Serum Thrombopoietin Levels in Patients With Chronic Hepatitis and Liver Cirrhosis. Am J Gastroenterol. 1999;94(7):2–6.
[36] Aref S, Mabed M, Selim T, Goda T, Khafagy N. Thrombopoietin (TPO) Levels in Hepatic Patients with Thrombocytopenia. Taylor Fr Heal Sci. 2004;9(5/6):351–6.
[37] Hayashi H, Beppu T, Shirabe K, Maehara Y, Baba H. Management of thrombocytopenia due to liver cirrhosis : A review. World J Gastroenterol. 2014;20(10):2595–605.
[38] Kuo YH, Kee KM, Hsu NT, Wang JH, Hsiao CC, Chen Y, et al. Using AST-platelet ratio index and

fibrosis 4 index for detecting chronic hepatitis C in a large-scale community screening. PLoS One. 2019;14(10):1–11.
[39] Assinger A. Platelets and infection - An emerging role of platelets in viral infection. Front Immunol. 2014;5:10–2.
[40] Ikarashi Y, Kodama K, Taniai M. The Clinical Difference in the Platelet Counts between Liver Cirrhosis with Nonalcoholic Fatty Liver Disease and Hepatitis C Virus. Intern Med J. 2018;57(8):1065–1070.
[41] Tejima K, Masuzaki R, Ikeda H, Yoshida H. Thrombocytopenia is more severe in patients with advanced chronic hepatitis C than B with the same grade of liver stiffness and splenomegaly. J Gastroenterol. 2010;45:876–84.
[42] Das SK, Mukherjee S, Vasudevan DM, Balakrishnan V. Comparison of haematological parameters in patients with non-alcoholic fatty liver disease and alcoholic liver disease. Singapore Med J. 2011;52(3):175–81.