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RESEARCH

LIPID PROFILE ANALYSIS ON REGULAR AND NON-REGULAR BLOOD DONORS

(Analisis Profil Lipid di Pendoron Darah Reguler dan Non-Reguler)

Waode Rusdiah, Rachmawati Muhiddin, Mansyur Arif

ABSTRAK

Profil lipid merupakan petunjuk untuk menilai faktor kebahayaan penyakit jantung koroner, terutama jika terdapat bukti adanya peroksidase lipid. Beberapa laporan telah mengaitkan donor darah secara reguler dengan menurunnya tolok ukur profil lipid. Donor darah secara reguler akan menurunkan kadar zat besi dan pada gilirannya akan menurunkan peroksidase lipid. Penelitian ini bertujuan mengetahui kadar profil lipid di pendonor darah reguler dan non-reguler, menggunakan pendekatan secara potong lintang dengan mengambil sampel darah di UTD Transfusi Darah Dinas Kesehatan Propinsi Sulawesi Selatan. Diperoleh sebanyak 60 sampel darah yang berasal dari donor reguler 30 orang (50,0%) dan non-reguler 30 orang (50,0%). Rentang umur 18–40 tahun 27 orang (45,0%) dan 41-60 tahun 33 orang (55,0%). Di telitian ini kelompok pendonor darah reguler rerata memiliki kolesterol total 157,93 mg/dL dan LDL 95,33 mg/dL yang lebih rendah dibandingkan dengan kelompok non-reguler dan menunjukkan perbedaan bermakna secara statistik ($p=0,001$). Kadar HDL secara bermakna lebih tinggi ($p=0,015$) di kelompok non-reguler 43,20 mg/dL dibandingkan dengan kelompok reguler 35,50 mg/dL. Kadar Trigliserida ($p=0,673$) menunjukkan tidak terdapat perbedaan bermakna antara kelompok reguler dan non-reguler. Donor secara teratur dapat memberikan perlindungan terhadap penyakit kardiovaskular seperti yang tercermin dari nilai rerata kolesterol total dan kadar LDL yang secara bermakna lebih rendah di pendonor darah reguler daripada non-reguler.

Kata kunci: Donor darah, donor darah reguler, donor darah non-reguler, profil lipid

ABSTRACT

Lipid profile is an indicator to assess risk factors for coronary heart disease, especially if there is an evidence of lipid peroxidation. Some reports have linked regular blood donor with decreasing lipid profile parameters. Donoring blood regulatory will lower iron level and in turn will reduce lipid peroxidation. This study determined the levels of lipid profile at regular and non-regular blood donors, cross-sectional study was performed on blood sample of donors in transfusion in UTD Provincial Health Office of South Sulawesi. 60 blood samples were obtained consists of 30 (50.0%) blood from regular donors and 30 (50.0%) blood from non-regular donors. Range for age 18–40 years old are 27 subject (45%) and 41-60 years old are 33 subject. In this study group of regular blood donors have an average total cholesterol 157.93 mg/dL and LDL 95.33 mg/dL lower than the non-regular group and showed statistically significant difference ($p = 0.001$). HDL levels were significantly higher ($p = 0.015$) in the group of non-regular 43.20 mg/dL compared with a regular group of 35.50 mg/dL. Triglyceride levels ($p = 0.673$) showed no significant difference between regular and non-regular group. Donor regularly may provide protection against cardiovascular disease as reflected by the average value of total cholesterol and LDL levels were significantly lower in regular blood donors than non-regular.

Key words: Blood donor, regular blood donor, non-regular blood donor, lipid profile

INTRODUCTION

Dyslipidemia is a group of heterogeneous conditions characterized by abnormal levels of one or more lipoproteins. Lipoproteins are particles in blood

containing cholesterol and other lipids. *Dyslipidemia* includes excessive *Low-Density Lipoprotein* (LDL) levels in plasma, leading to increased plasma cholesterol levels since LDL contains 70% of total plasma cholesterol. Thus, if plasma cholesterol level increases,

especially above 240 mg/dL, there will be a progressive increase in the risk of cardiovascular disease due to increased levels of LDL.¹ Cardiovascular disease is a primary cause of death in developed countries, and will be occurring in developing countries by 2020. Coronary Heart Disease (CHD) is the greatest manifestation associated with the major cause of high mortality and morbidity.²

Lipid profile, moreover, is an indicator to assess risk factors for coronary heart disease, especially if there is evidence of lipid peroxidation. Lipid fraction is a part of other risk factors (smoking, age, gender, family history, hypertension, diabetes mellitus, and increased hemostasis, and inflammatory markers such as homocysteine, fibrinogen, D-dimer and C-reactive protein). Therefore, high plasma lipid levels, especially the *Low-Density Lipoprotein* (LDL) level is a major cause of vascular damage.^{3,4}

Blood donation is an activity of giving blood or blood components from one individual (*donor*) to another individual (*recipient*).⁵ Blood donors are divided into two, namely, regular blood donor and non-regular blood donor. Healthy people can donate blood four times a year at an interval of three months regularly since the life span of erythrocytes is 120 days. Regular blood donation is expected to stimulate the formation of erythropoiesis, thus preventing the accumulation of iron in body triggering free radical formation.⁶ Another research showed that regular blood donation could decrease lipid profile parameters. Regular blood donation can also lower iron stores and then can reduce lipid peroxidase.^{7,8}

Another related research on regular blood donation every six weeks, furthermore, showed that the oxidation of *Low-Density Lipoprotein* (LDL) would be reduced, associated with the development of atherosclerosis. Similarly, some other researches indicated that high iron level may play a role in this oxidation process as the beginning of atherosclerosis formation. Another research also showed that blood donation can reduce blood viscosity and contribute to a decrease in LDL cholesterol and other lipid fractions.⁸

For those reasons, this research aimed to compare the levels of lipid profile in regular blood donors and non-regular ones. The significance of this research is to provide both scientific information about the lipid fraction of blood donors in the prevention of cardiovascular disease and as well as data that can be used as reference materials for further researches.

METHODS

This research was a cross sectional study, conducted in July 2015. Lipid levels were examined at the Laboratory of Clinical Pathology of the Dr. Wahidin Sudirohusodo Hospital in Makassar. Samples of this research were taken at the UTD (Blood Bank) of Blood Transfusion Service in South Sulawesi. The sample population of this research was all blood donors who had passed the selection criteria of blood donors set by the government regulation of the Republic of Indonesia. Consents were also taken from the donors for their willingness to participate in this study. In total, the number of samples used was 60 blood samples obtained from 60 volunteer blood donors, consisted of 30 regular and 30 non-regular blood donors. Based on Hb examination conducted quantitatively using Cupri Sulphate, donors who had a Hb of 12–18 g/dL were grouped into regular donors (donors donating blood regularly 2–4 times in the last 12 months), while donors who had never given blood donation or had given blood donation for the first time were classified as non-regular donors. Blood samples taken to test were as much as 4 mL of lipid fractions.

Test for lipid fractions in this research used serum samples from regular and non-regular donors who had been checked using ABX Pentra 400 with immunoturbidimetry method. Reference values used were total cholesterol of 200 mg/dL, HDL cholesterol more than 55 mg/dL for males, HDL cholesterol more than 65 mg/dL for females, LDL cholesterol less than 130 mg/dL and triglycerides of 200 mg/dL. Finally, the data obtained were analyzed using statistical programs by unpaired T-test and Mann-Whitney test, and then displayed in the form of tables and figures.

RESULTS AND DISCUSSION

The number of the samples in this research conducted at the UTD of Blood Transfusion Service, South Sulawesi in July 2015 was 60 blood samples derived from 30 regular blood and 30 non-regular donors aged 18–60 years old. Table 1 shows the characteristics of blood donors by age and blood donation frequency, divided by categories of regular and non-regular. The blood samples were taken mostly from the age group of 41–60 years old (55.0%) and the rest of the samples were taken from the age of 18–40 years old (45.0%). It was also known that the number

Table 1. General characteristics of blood donors

Variable	n (%)
Age (years old)	
18–40	27 (45.0)
41–60	33 (55.0)
Donors	
Regular	30 (50.0)
Non-regular	30 (50.0)

Source: Primary Data

of regular blood donors was 50.0% as much as the number of non-regular blood donors (50.0%).

Moreover, the normal distribution of the levels of lipid profile in the regular and non-regular blood donors can be seen in Table 2. The regular blood donor group had a lower total cholesterol (157.93 ± 54.37 mg/dL) and LDL (95.33 ± 36.32 mg/dL) than the non-regular blood group. However, there was a significant difference in total cholesterol and LDL values ($\rho=0.001$) between both groups. Meanwhile, HDL level was significantly higher ($\rho=0.015$) in the non-regular blood group (43.20 ± 10.58 mg/dL) compared to the regular blood group (35.50 ± 13.14 mg/dL).

This table presented the mean and standard deviation in the abnormal data distribution. It means that the mean and standard deviation could not represent the data. By using Mann-Whitney test, the *significance value* obtained was 0.673. Since the value of p was >0.05 , it could be concluded that there was no significant difference in triglyceride levels between both groups. The data can be seen in Table 3.

This research evaluated 60 subjects, consisting of 30 regular blood donors who had donated blood at least 2–4 times in the last 12 months, and 30 non-regular blood donors who had never donated blood or donated for the first time in the last 12 months. This research then found that the levels of lipid profile, total cholesterol ($\rho=0.001$) and LDL ($\rho=0.001$) in the regular were significantly lower than those in the non-regular blood donor group.

Furthermore, triglyceride levels obtained ($\rho=0.673$) indicate that there was no significant difference between the regular and the non-regular blood donor group since the lowest and highest mean values in the two groups did not differ significantly. On the other hand, the HDL level was significantly higher ($\rho=0.015$) in the non-regular blood donor group than in the regular one. Similarly, a research conducted by Uche *et al.*⁷ showed that HDL level in the control group was significantly higher than the research group ($\rho=0.016$). This is probably due to the small size of the study sample.

Table 2. Levels of lipid profile in regular and non-regular donor groups

Serum lipid	Regular	Non-regular	* ρ -value
Total Cholesterol	157.93 ± 54.37	205.76 ± 53.92	0.001
HDL	35.50 ± 13.14	43.20 ± 10.58	0.015
LDL	95.33 ± 36.32	133.83 ± 47.02	0.001

* unpaired T-test

Table 3. Analysis results of Mann-Whitney test

	N	Median (minimum-maximum)	Mean \pm SD	* ρ
Triglyceride level in regular donor group	30	132.86 (43.0–291.0)	132.86 ± 61.58	0.673
Triglyceride level in non-regular donor group	30	142.56 (28.0–392.0)	142.56 ± 86.00	

* Mann-Whitney test

In addition, based on epidemiological researches and clinical trials, *Low Density Lipoprotein* (LDL) is considered as a major risk factor for vascular disease. Meanwhile, lipid fraction considered as a protective factor is *High Density Lipoprotein* (HDL). Many researches have shown a correlation between elevated serum lipid levels with the incidence of coronary heart disease and atherosclerosis in humans. High LDL cholesterol and low HDL cholesterol are risk factors for atherosclerotic disease, while elevated HDL cholesterol and lower LDL cholesterol reduce the risk of cardiovascular disease.

Blood donation conducted on a regular basis has been identified in several researches as a group with a low risk of cardiovascular disease compared with non-regular blood donation or donation for the first time. Bharadwaj³ in his research found a normal lipid profile among voluntary blood donors from Chennai, as a result, he concluded that blood donors, overall, are protected from coronary heart disease.³

Similarly, Susic and Baumer⁴ reported that levels of cholesterol, phospholipids and esterified fatty acids were significantly lower in regular blood donors than in hospitalized myocardial infarction patients and given treatment. Meyers and colleagues⁷ also concluded that male blood donors who smoked were associated with decreased risk of cardiovascular disease, such as myocardial infarction, angina and cerebrovascular disorders.

Therefore, samples in this research were taken after blood donation in order to show that the levels of lipid profile indicated the condition of blood after donation. To obtain good results of the examination, the subjects had to be prepared first since it was necessary to remember that blood lipid levels could be affected during sampling. Under normal circumstances, triglyceride level would be increased 2 hours after a meal and will peak after 4–6 hours, then returning to the original level after 2 hours. Therefore, high triglyceride levels after fasting 12 hours indicated an abnormal condition.

Finally, the results of this research showed that the levels of lipid profiles, total cholesterol and LDL were significantly different between the regular and the non-regular blood donors. It indicated that blood donation could reduce the risk of dyslipidemia as one of the causes of cardiovascular disease.

CONCLUSION AND SUGGESTION

In conclusion, lipid levels in regular blood donors were lower than in non-regular blood donors as reflected in the total cholesterol and LDL levels in regular donors that were significantly lower than in the non-regular ones. Therefore, further research on lipid levels in regular blood donors of more than 1 year should be conducted.

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