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Differences in Fasting Total Cholesterol Levels in Serum and Plasma Edta Samples Using Biosystem Ba200

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ABSTRACT

Examination of total cholesterol levels in serum samples is more often used as an examination material, but serum samples often encounter difficulties due to insufficient blood volume or the condition of the serum being lysed due to poor sampling. Many studies have been conducted to look at total cholesterol levels using the anticoagulants EDTA, Sodium Citrate, and Sodium Oxalate to look at differences in total cholesterol levels, but not many studies have looked at tests of differences in total cholesterol test results during fasting with serum and EDTA. This study aims to determine differences in total cholesterol levels in the fasting state of EDTA serum and plasma samples using the BA200 biosystem. The type of research used was cross sectional, which was carried out at the Hematology Laboratory of the Palembang Muhammadiyah Institute of Health Sciences and Technology and the Palembang Health Laboratory Center. A sample of 30 people was taken purposively, female, and fasting for 10 hours. Based on the results of examining total cholesterol levels in a fasting state using the Biosystem BA200, the average result for serum samples was 4.8 mmol/L and the average for plasma samples was 4.7 mmol/L. Analysis was carried out using an independent sample T-test and the result was p = 0.00, the hypothesis was accepted. This research can conclude that there is a difference between the results of examining total cholesterol levels in fasting serum and EDTA plasma samples using the BA200 biosystem.

Keywords: Total Cholesterol, Serum, Plasma EDTA, Biosystem BA200

INTRODUCTION

Non-communicable diseases (NCDs) are diseases that are the main cause of death. In 2008 there were 57 million deaths, of which 36 million or 63% of total deaths were caused by non-communicable diseases. Cardiovascular non-communicable diseases (NCDs) (48%) include cancer, respiratory diseases, diabetes, stroke and coronary heart disease. 20 million deaths due to cardiovascular disease are caused by heart disease, especially coronary heart disease (Flora, 2017).

Cholesterol is a component of fat or lipid substances, fat is one of the nutrients that our body needs in addition to other nutrients, such as carbohydrates, protein, vitamins, and minerals. Fat is a source of energy that provides the highest calories. Total cholesterol examinations should require fasting for 10 to 12 hours because with fasting the cholesterol concentration is normal and during the examination, there are no errors during measurement due to the influence of newly consumed fat (Kurniati et al., 2023)

Total cholesterol examination can use serum and plasma samples. Serum is the part of the blood that remains after the blood clots. Serum samples are more often used as examination material, but serum samples often encounter difficulties due to insufficient blood volume or the condition of the serum being lysed due to poor sampling. Plasma samples are commonly used because they save time, namely plasma samples can be

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centrifuged directly without waiting for the sample to clot, unlike serum. This research was conducted to determine whether there were differences in the results of fasting total cholesterol levels in serum and EDTA plasma samples using the BA200 biosystem, which will later become an update in carrying out clinical laboratory examinations, especially in hematology examinations. (Gani, 2013).

MATERIALS AND METHODS

The type of research used in this research is Cross Sectional, to see the relationship by comparing differences in values or data on other variables at different times. The total cholesterol levels in the fasting state of EDTA serum and plasma samples are determined using the BA200 biosystem. This research is included in the non-probability sampling group. Data analysis was used using the paired t-test (Paired Sample T Test). The sampling technique used in this research uses a purposive sampling technique where samples were taken at the Hematology Laboratory of the Palembang Muhammadiyah Institute of Health Sciences and Technology, then an examination was carried out at the Palembang Health Laboratory Center on December 28, 2021. The respondents of this research were students of Medical Laboratory Technology, totaling 30 respondents.

RESULTS AND DISCUSSION

The data that was obtained was then analyzed using data on total cholesterol levels using EDTA serum and plasma. Data on total cholesterol levels is included in the category of good accuracy and accuracy, so the total cholesterol level data in Table 3 is then used to carry out data normality tests. The graphic results of fasting total cholesterol levels can be seen in the following figure:

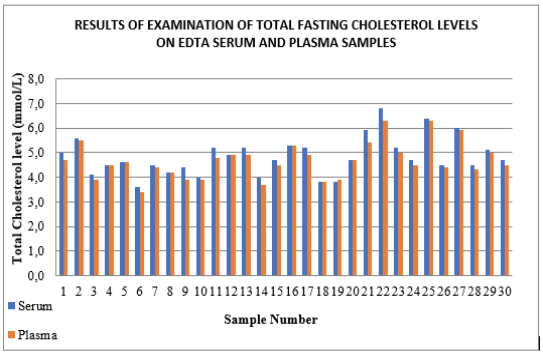

Figure 1
Fasting Total Cholesterol Level Examination Results

Based on Figure 1 above, the average value of the total serum cholesterol level examination results is 4.8 mmol/L and the average value of the EDTA plasma total cholesterol level examination is 4.7 mmol/L. To find out the average total cholesterol level results can be seen in Figure 2 as follows:

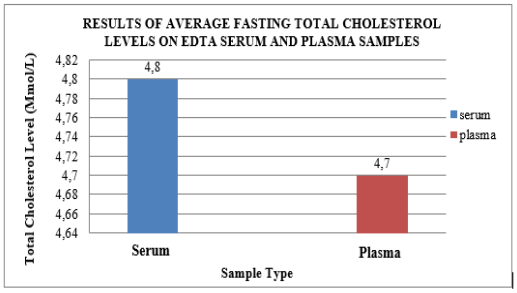

Figure 2
The Average Results Of Fasting Total Cholesterol Levels

Based on the results of examining fasting total cholesterol levels in serum and EDTA plasma samples, different results were obtained.

The data were subjected to statistical tests using the SPSS program to clarify the results by carrying out a normality test using the Shapiro-Wilk test because the amount of data was < 50. The results obtained were seen from the sig value. What is obtained, if sig. > 0.05 then the data is declared normally distributed, whereas if sig. < 0.05 then the data is declared not normally

distributed. If the results are normally distributed then proceed with the Paired Sample T Test. The results of the normality test can be seen in Table 1 as follows:

Table. 1
Normality Test

	Mean	SD	Sig
Serum	4,8367	0,76586	0,239
Plasma EDTA	4,6667	0,72270	0,213

Sumber (Widarsa et al., 2017)

Based on Table 1 above, the results obtained are that in the Shapiro-Wilk normality test, it is known that the sig value for the results of total cholesterol examination using serum obtained a value of sig = 0.239, while the results of total cholesterol examination using EDTA plasma obtained a value of sig = 0.213.

Table. 2
Paired Sample T Test

	Mean	SD	Sig. 2(Tailed)
Serum Plasma EDTA	0,17000	0,16220	0,000

Sumber (Widarsa et al., 2017)

Based on Table 2, the results obtained, namely in the Paired Sample T Test test on total cholesterol levels using serum and EDTA plasma, obtained a probability value (sig 2 tailed) p = 0.000, meaning that there is a difference in the results of the fasting total cholesterol examination on serum and EDTA plasma samples using the BA200 biosystem.

Theoretically, checking total cholesterol levels using serum is the fluid remaining after blood clots or clots. The serum obtained must meet the requirements, namely non-hemolyzed serum, clear yellow, and free from fibrinogen cells, while EDTA plasma is a mixture of blood and anticoagulants. Anticoagulants function to prevent blood clots. Serum is more often used as material for checking total cholesterol levels than plasma because plasma contains anticoagulants which can affect the specimen (Amalia & Syauqy, 2014).

Plasma has an important advantage for laboratory professionals, it does not require additional time for blood clotting, so it can reduce Turn Around Time (TAT), it is comparable to serum, 15-20%, most plasma obtained from whole blood, and has a lower risk of hemolysis and thrombolysis compared to serum. This is in accordance with research conducted by(Stefhanie Affrianti & Adelia Febriyossa, 2022).

This research is also in line with what was carried out by Fitriani Ani et al (2019) where there were differences in examinations using serum samples with an average of 321 mg/dl and plasma with an average of 320 mg/dl. Ramadhani Qurotul Aini Nur et al (2019) where there were differences in examinations using serum samples with an average of 91.8 mg/dl and plasma with an average of 97.2 mg/dl. Lestari Endang Sri et al (2018) where there were differences in examinations using serum samples with an average of 16.88 mg/dl and plasma with an average of 22.81 mg/dl. Hardiansari et al (2016) where there were differences in examination using serum samples with an average of 143.16 mg/dl and plasma with an average of 142.16 mg/dl. According to researchers, the results of research carried out examined fasting total cholesterol levels in EDTA serum and plasma samples. Where the serum samples were higher than plasma EDTA at 0.1 mmol/L, this difference was caused because there were anticoagulants in the plasma which caused a decrease in cholesterol levels (Hastuty, 2018). Then a statistical test was carried out to obtain a significant value which showed that there was a difference. In this study, it can be concluded that there is a difference in

fasting total cholesterol examination in serum and EDTA plasma samples.

CONCLUSION

Based on the results of this study, it was found that the difference in fasting total cholesterol results in serum and EDTA plasma samples was 0.1 mmol/L. Further testing is needed regarding total cholesterol examination using EDTA serum and plasma samples or other laboratory tests

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