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The Effect of Fasting Time on Triglyceride Measurement Results

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***Abstract*—Measurement of serum lipids in the Laboratory is influenced by pre-analytic, analytic and post-analytic factors. One of the pre-analytic factors is the specimen, which is related to the patient's preparation. Based on the Decree of the Minister of Health of the Republic of Indonesia Number 1792 / MENKES / SK / XII / 2010 regarding guidelines for clinical chemical examinations, patient preparation for specimen collection in basal conditions, patients must fast for 12 hours before blood is drawn. The results of a preliminary survey of 30 laboratory workers at the Hospital / Puskesmas / Clinical Laboratory found variations in information on the answer to fasting for triglyceride examination. The research method was an experimental study, respondents were given fasting for 8 hours, 10 hours and 12 hours then blood was taken and triglycerides were measured after 8 hours, 10 hours and 12 hours. The purpose of the study was to determine the effect of fasting time on triglyceride measurement results. Based on ANOVA test shows that the value of sig.0.000 <α = 0.01 means that H_0 is processed so that it can be concluded that there are differences in the effect of triglyceride values based on the time of fasting. Based on the post Hoc results The effect of fasting time of 10 hours by 12 hours is the same as the triglyceride values.**

Keywords—fasting time, triglyceride, measurement

I. INTRODUCTION

Lipids are compounds that contain carbon and hydrogen which are generally hydrophobic; insoluble in water but soluble in organic solvents. Because it is not soluble in water, lipids need a special transport mechanism to circulate in the blood. Lipids in the blood circulation are arranged into large lipoprotein particles with various apolipoprotein classes. This apolipoprotein helps lipid solubility and its transport from the gastrointestinal tract to the liver, which has specific receptors for apolipoprotein [1].

Lipoprotein in circulation consists of particles of various sizes that also contain cholesterol, triglycerides, phospholipids, and proteins in different amounts so that each lipoprotein has different density characteristics. The largest and lowest density lipoproteins are chylomicrons, followed by very low density lipoproteins (VLDL), low density lipoproteins (LDL), medium density lipoproteins (IDL), and high density lipoproteins (HDL). Most of the triglycerides in plasma are not in a fasting state contained in chylomicrons, whereas in fasting plasma samples, triglycerides are mainly found in VLDL. Most of the plasma cholesterol is contained in LDL. A small portion (15% to 25%) of cholesterol is in HDL. Cholesterol is an important constituent in the formation of cell membranes.

Cholesterol has two sources, namely food and endogenous synthesis in the body[1][2]. The most relevant measurements of serum lipids are total cholesterol, triglycerides, and cholesterol fractionation into HDL fractions by calculating LDL cholesterol fractions. Lipid measurements gained popularity among medical and non-medical staff to assess the risk of an individual contracting coronary arteries [2][3].

Measurement of serum lipids in the Laboratory is influenced by pre-analytic, analytic and post-analytic factors. One of the pre-analytic factors is the specimen, which is related to the patient's preparation. Based on the Decree of the Minister of Health of the Republic of Indonesia Number 1792 / MENKES / SK / XII / 2010 regarding guidelines for clinical chemical examinations, patient preparation for specimen collection in basal conditions, patients must fast for 8-12 hours before blood is drawn. Eating and drinking can affect the results of tests both directly and indirectly, among tests that need fasting are triglycerides, which require fasting for 12 hours, this examination is influenced by food and drink except plain water[4][5].

The results of a preliminary survey of 30 laboratory workers at the Hospital / Community Health Center / Clinical Laboratory in Ciamis District, obtained variations in information on the answer to fasting for triglyceride examination. Based on the description above, it is important to conduct research to determine the effect of fasting time on the results of triglyceride examination, so that it will be a reference for patient preparation before triglyceride examination. The research method is an experimental study, patients are given fasting for 8 hours, 10 hours and 12 hours and then blood is taken and triglyceride measurements after 8 hours, 10 hours and 12 hours. The purpose of this study was to determine the effect of fasting time on triglyceride measurement results, by referring to the 12-hour fasting time according to the reference to the Decree of the Minister of Health of the Republic of Indonesia Number

1792 / MENKES / SK / XII / 2010 regarding guidelines for clinical chemical examination, whether by fasting 8 hours or 10 hours there is a significant difference in value or not, which in turn will be material for laboratory staff regarding the correct length of fasting.

II. METHOD

The data used in this study are primary data, the method used is an experimental method, the treatment of patients with fasting time is then performed direct laboratory examinations for triglyceride parameters. Before the study, patients were asked to undergo fasting, meaning fasting here, patients do not eat and drink (may drink fresh water) starting at 21:00 to 05.00 hours (fasting 8 hours), at 05.00 the first blood collection, blood specimens were immediately processed into serum and examination for triglyceride parameters. After the first blood draw, the patient is asked to resume fasting until 07.00 (fasting time is 10 hours) then a second blood is taken, the blood specimen is directly processed into serum and an examination for triglyceride parameters is carried out. After the second blood draw, the patient is asked to resume fasting until 09.00 (fasting time is 12 hours) then a third blood is taken, the blood specimen is directly processed into serum and an examination for triglyceride parameters is carried out. The number of samples in this study were 33 people, with inclusion criteria: no smoking, no alcohol consumption, not undergoing treatment, willing to fast for up to 12 hours, willing to do blood draws 3 times. Exclusion criteria: hemolysis samples and lipemic samples.

III. RESEARCH RESULTS

Based on the results of the normality test using Kolmogorov Smirnov, the data are normally distributed, because the value of sig. 0.165> α = 0.000 so the null hypothesis is accepted. This means that data normality is met. Homogenity Test The value of sig. = 0.214 means more than α = 0.000 so that it can be concluded that the null hypothesis is accepted or the data is homogeneous.

TABLE 1. MEAN TRIGLYCERIDE BASE ON FASTING TIME

Fasting Time	Mean	Std. Deviation	N
8 hours	140,64	40,438	33
10 hours	121,58	20,092	33
12 hours	104,15	29,092	33

Based on ANOVA test shows that the value of sig.0.000 <α = 0.01 means that H_0 is processed so that it can be concluded that there are differences in the effect of triglyceride values based on the time of fasting. Since the overall ANOVA test results stated that there were differences in influence between the 3 groups on triglyceride values, the test was continued on the Post Hoc test.

Based on the post Hoc results it can be concluded that: There is no difference in the effect of the 8 hours and 10 hours fasting time on triglyceride values (seen from the value of sig. = 0.068> 0.001 meaning H_0 is accepted). The effect of fasting time 8 hours by 10 hours is the same as the triglyceride value. There is a difference in the effect of fasting time of 8 hours and 12 hours on triglyceride values (seen from the value of sig. = 0.000 <0.001 meaning H_0 is rejected). In other words, the effect of fasting time of 8 hours and 12 hours differed significantly on triglyceride values. There is no difference in the effect of fasting time of 10 hours and 12 hours on triglyceride values (seen from the value of sig. = 0.101> 0.001 means that H_0 is accepted). The effect of fasting time of 10 hours by 12 hours is the same as the triglyceride values.

IV. DISCUSSION

Triglycerides are the main form of fat stored by the body, triglycerides consist of three fatty acid molecules combined with molecules from glycerol alcohol. Triglycerides come mostly from the food we eat. The principle of examining triglycerides is that triglycerides are hydrolyzed by the lipase enzyme into glycerol and fatty acids, the glycerol that is formed is converted to glycerol-3-phosphate by the glycerol kinase enzyme. Glycerol-3-phosphate is then converted to dihydroxyacetone and hydrogen peroxide which are formed together with 4-chlorophenol by the enzyme peroxidase converted to 4- (b-benzoquinone-mono imino) -fenazone which is red [2].

The limit of plasma triglyceride reference in the fasting state is 0.3 - 1.8 mmol / l, this is a combination of exogenous and endogenous triglycerides that are being transported. Lipemia means milk-like plasma, associated with increased triglyceride content. Generally, an increase in circulating triglyceride concentrations above about 5 mmol / l causes plasma opalescence. In severe lipemia, fat content can be above about 10 mmol / l and a chylomicron-like layer of cream is present in the plasma when left in place. Diffuse opacification, without a creamy coating, indicates excess VLDL and not chylomicrons. If there is lipemia, there is often an increase in plasma cholesterol and phospholipid concentration[6].

Lipemia can be caused by excessive mobilization of triglycerides and this can occur in diabetes mellitus, liver insufficiency as well as in alcoholism, severe anemia and leukemia.

The fat in the blood is transported in the form of free fatty acids, long-term free fatty acids joining albumin, in the cell the compound is attached to a fatty acid-binding protein or protein -Z, before being metabolized the fatty acids are activated by ATP into a compound of between[7]. Fatty acids act as sources of energy formation, most of which are stored as triglyceride compounds in cells. In the form of unhydrated molecules so that the storage in cells is more concentrated, 40% of the energy used by humans is produced by fatty acids. Fatty acids are the building blocks of all lipids, so fat metabolism is also called lipid metabolism[8][9].

Physical properties of lipids; 1) insoluble in water, but soluble in one or more organic solvents such as ether,

acetone, chloroform, benzene which are often called fat solvents, 2) have a relationship with fatty acids or esters, 3) have the possibility of being used by living things. In general, lipids are poor conductors of heat, so lipids in the body have a function to prevent heat loss from the body. Lipids also have the function of protecting certain body organs from damage due to collisions or shocks. Lipids are also a food ingredient that contains vitamins A, D, E and K[7][9].

Triglycerides are the main lipids in the diet. Triglycerides provide good taste and are a concentrated source of energy: 3 kJ (9 kcal) per gram of fat. Dietary fats contain unsaturated fatty acids (some of which are essential, especially linoleic acid, because they cannot be synthesized in the body) and saturated fatty acids. Generally, the proportion of unsaturated fatty acids to polyunsaturated ones is higher in animal fats than in plant fats. The content of saturated fat in a higher proportion (and unsaturated fatty acids in a low proportion) is a suspected factor in the etiology of atheroma[6][8].

Lipids in the blood circulation are arranged into large lipoprotein particles with various apolipoprotein classes. This apolipoprotein helps lipid solubility and its transport from the gastrointestinal tract to the liver, which has specific receptors for apolipoprotein[7][8].

Lipoprotein in circulation consists of particles of various sizes that also contain cholesterol, triglycerides, phospholipids, and proteins in different amounts so that each lipoprotein has different density characteristics. The largest and lowest density lipoproteins are chylomicrons, followed by very low density lipoproteins (VLDL), low density lipoproteins (LDL), medium density lipoproteins (IDL), and high density lipoproteins (HDL). Most of the triglycerides in plasma are not in a fasting state contained in chylomicrons, whereas in fasting plasma samples, triglycerides are mainly found in VLDL. Most of the plasma cholesterol is contained in LDL. A small portion (15% to 25%) of cholesterol is in HDL. Cholesterol is an important constituent in the formation of cell membranes. Cholesterol has two sources, namely food and endogenous synthesis in the body[6][7][8]. The most relevant measurements of serum lipids are total cholesterol, triglycerides, and cholesterol fractionation into HDL fractions by calculating LDL cholesterol fractions. Lipid measurements gained popularity among medical and non-med staff.

V. CONCLUSION

Referring to the Decree of the Minister of Health of the Republic of Indonesia Number 1792 / MENKES / SK / XII / 2010 regarding guidelines for clinical chemical examinations that the duration of fasting for triglycerides is 12 hours and based on research results between 10 and 12 hours, the length of time for fasting for triglyceride examination is 10-12 hours.

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