Scientific Papers. Series D. Animal Science. Vol. LVI
ISSN 2285-5750; ISSN CD-ROM 2285-5769; ISSN-L 2285-5750

BLOOD GLUCOSE AND TRIGLYCERIDEPROFILE USING *ALPINIA GALANGA* (L.) / LENGKUAS JUICE

Lovita ADRIANI

Laboratory of Animal Physiology and Biochemistry, Universitas Padjadjaran,
Jln. Raya Bandung Sumedang Km. 21, Bandung, Indonesia

Corresponding author email: lovita_yoghurt@yahoo.co.id

Abstract

Alpinia galanga (L) is a tradisional medicine is also known as lengkuas in Indonesia. The World Health Organization (WHO) estimated that almost 80% of world population relies mainly on traditional medicines, mostly plant drugs in their health care. Alpinia galanga L..) /Lengkuas found all over the world. Chemical components which give the distinctive aroma is asetokskhavikol acetate. The active compounds are galangin, eugenol, kaempherol, and quercetin. These compounds can lower the blood lipid level.The objective of the study was to investigate the Profile blood glucose and triglyseride level using Alpinia galanga (L) /lengkuas Research has done at Biochemistry Laboratories, Animal Husbandry Faculty, Universitas Padjadjaran, and Biofarma Laboratory in Bandung, from October until December 2012. This research used an experimental method with a Completely Randomized Design. There were five treatments (R0 = control ration , R1= control ration + 0.01% Alpinia galanga (L), R2 = control ration + 0.02% Alpinia galanga (L) , R3= control ration + 0.03% Alpinia galanga (L), and four replications. From the statistical analysis indicated that effects of using Alpinia galanga (L) /lengkuas, has potencial effect to.decline trigliseride level i.e: R1= 21,15% , R2= 8.65%, R3= 6.73%, although the blood glucose and triglyseride level showed not significant effect (P> 0.05)

Key words: *Alpinia galanga (L), triglyseride, blood glucose, broiler.*

INTRODUCTION

Capability of broiler growth accompanied by relatively rapid high fatty. High fat content is one of the constraint in broiler chicken meat, so most people limit in taking it. Broiler chicken blood triglyceride levels according to Lovita et.al (2013) is 35.20 ± 16.45 mg / dL, while according to Freeman (1984) in Sunarto (2012) levels of broiler blood triglyceride is 27 mg / dL. The high content of cholesterol in the blood affects to high cholesterol content of broiler meat. One of the effort for lowering cholesterol and blood triglycerides broiler by giving langkuas (*Alpinia galanga* L.) juice. Data from the Central Statistics in 2011 reported that *Alpinia galanga* L. production in Indonesia reached 59,332,313 kg or 2.98 kg/m2 and in 2011 is 57,701,484 kg / year. Based on previous research, it is known that *Alpinia galanga* L. contains a variety of active ingredients such as alkaloids, saponins, flavonoids, terpenoids, atsiri oils, and quinone (Iswantini et al., 2010). Flavonoids and essential oils can inhibit the synthesis of cholesterol biosynthesis by inhibiting the enzyme 3-hydroxy-3-Metilglutaril-CoA (HMG-CoA reductase) that play a role in the synthesis of cholesterol as well as LDL receptor through SERBP so integrally suppress cholesterol synthesis and absorption. In addition, saponins and tannins also play a role in inhibiting the absorption of cholesterol by inhibiting the activity of lipase, binds cholesterol and lowers the surface tension, through the mechanism of binding of cholesterol by saponin in the lumen of the intestine that affects the metabolism of fat in the body (Malinow et al., 1981 in Morehouse et al., 1999). The role of the active compound found in lengkuas, able to reduce the cholesterol level and triglycerides in the blood Lipid are primarily triacylglycerol will hydrolyse to monoasilgliserol and fatty acids in the intestine, and then by re-esterification in the intestinal mucosa. Lipid together with protein and secreted into the lymph system and then into the bloodstream as chylomicrons, the largest plasma lipoproteins. Chylomicrons also contain other lipid-soluble nutrients. Unlike glucose and amino acids, triacylglycerol

chylomicrons are not absorbed directly by the liver. This compound is initially metabolized by tissue containing lipoprotein lipase that hydrolyze triacylglycerol, and free fatty acids, Another major source of long-chain fatty acids are synthesized from carbohydrates, in adipose tissue and liver (Murray et al,.2009).Fatty acids synthesized through a new process of lipogenesis to form triglycerides in the liver. Lipoprotein help to release these material from liver, especially the very low density lipoprotein (VLDL), and then deliver and stored in adipose tissue. The main function of triglyceride that have been stored in adipose, until use as energy in the body (Piliang, 2006). The synthesis of triglycerides, fatty acids or diestereficase combined with glycerol molecule. Triglycerides are a glyceride, the esters of glycerol and three fatty acids. Triglycerides are not cholesterol, but a fat type found in the blood as lipoprotein particles. Two acyl-CoA molecules are formed through the activation of fatty acids by acyl-CoA synthetase, binds to glycerol 3-phosphate to form phosphatidate. This takes place in two stages, which are catalyzed by glycerol-3-phosphate and 1-asilgliserol asiltransferase-3-phosphate asiltransferase. Phosphatidate changed by phosphatidate asiltransferase phosphohydrolase and diacylglycerol (DGAT) to 1,2-diacylglycerol and then into triglycerides. In mucosa intestine, monoasilgliserol asiltransferase transform into 1,2-diacylglycerol in the path monoasilgliserol. Most of the enzyme activity was found in reticulum endoplasmic, and in the mitochondria (Murray, et al. 2009). Triglycerol holds a very important role in produce energy in animals. Triglycerides are stored in cells as fat grains are almost pure and can be stored in very large amounts in adipose tissue. There is also store in fat tissues such as liver and tendons. Beside as a source of energy, triglycerides can be converted into cholesterol, phospholipids and other lipid forms when it needed (Linder, 1992). This group provides more than half of the energy needs of multiple organs, especially the liver, heart and skeletal muscle during rest (Lehninger, 1982). Glucose is very important, required to supply as energy source of the cell. Glucose is carbohydrate that is absorbed in the intestine. Glucose is the only carbohydrate found at nutritionally relevant concentrations in the blood also will form of energy currency, which can be transported in different tissues.

MATERIALS AND METHODS

In this research used 60 straight run broilers, and randomly divided into 20 unit, so each unit contain three heads. In this research,broiler was given *Alpinia galanga* juice since the fourteenth day, the content of Nutrient and metabolisable energy of the rations can be seen in Table 1.

The body weight on fourteen days broiler is + 400 grams with variations + 9%. Blood Sampling was taken on 5 weeks, at the end of the experiment. The Experiment using completely Randomied Design (CRD) which concist of four treatments, and 5 times repeated :P0 = without *Alpinia galanga* L. juice P1 = *Alpinia galanga* L. juice 0.01% from body weightP2 = *Alpinia galanga* L. juice 0.02% from body weightP3 = *Alpinia galanga* L. juice 0.03% from body weight Broilers were divided into following four groups of three animals each, and repeated five times. The treatment was continued for 5 weeks.

Document in research

Alpinia galanga

Prepare Alpinia galanga for juice

Given Alpinia galanga per oral

Body weight 5 weeks old

Take a blood from vena pectoralis

Figure 1. Document in research

Table 1. Nutrient content and Energy Metabolism of the ration

Nutrient	Content
Water (%)	Max14%
Crude Protein (%)	21.50 – 23.80
Crude Fiber (%)	Max 4%
Crude Fat (%)	Min 2.5%
Ash (%)	Max 6.5%
Calcium (%)	0.90 – 1.1%
Phosphor (%)	0.7 – 0.9%
Energy Metabolism	3025-3125 kg/kcal

RESULTS AND DISCUSSIONS

Table 2. There are the effect of sweet citrus waste flour on broiler triglyceride and blood glucose

Treatment	Triglyceride (mg/dl)	Glucose (mg/dl)
P0	20.8	244.6
P1	16.4	238.4
P2	19.0	247.6
P3	19.4	235.6

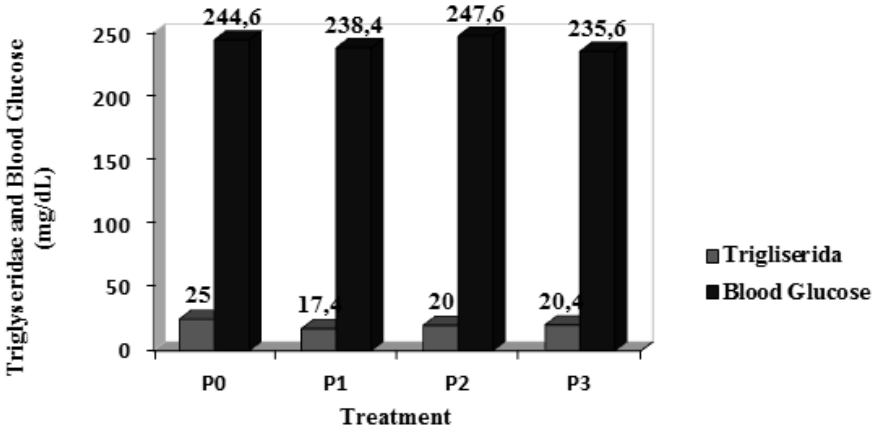

Figure 2. Effects of *Alpinia galanga* Juice on Triglyceride and Blood Glucose

Triglyceride

From Table 2, blood triglyceride levels on P0 (without lengkuas) is higher than P1, P2 and P3. According to Lovita A. et al (2013) blood triglyceride levels is 35.20 $\pm$ 16.45 mg/dL, while according to Freeman (1984) in Sunarto (2012), the content of triglyceride is 27 mg/dL Blood triglyceride levels in broiler decreased by adding lengkuas juice, because of the atsiri oil in lengkuas, inhibit the formation of triglycerides compounds of the early work of glycerol-3-phosfat derived from glycerol, dihidroxiacetone phosphate, and the NADH help to synthesize Glycerol-3-phosphate for triglycerides. In addition atsiri oil is capable of lowering the activity of Glycerol-3-Phosphate (GPDH) enzyme in the biosynthesis of triglycerides (He et al., 2009).

The active ingredient of antioxidant flavonoids is 0.21%, it will inhibit the early stages of the reaction by release 1 hydrogen atom forming and reducing associated with one free radicals, this bond will stabilize the radical peroxy that makes energy activity reduced, and finally the content of triglycerides will decline (Reynertson, 2007). Decreasing blood triglycerides also affected by saponins content for delaying the absorption of fat in the small intestine by inhibiting lipase activity, through the mechanism of binding triglyceride-and saponins in the intestinal lumen, and affect the metabolism of fat in the body (Malinow et al., 1981 in Morehouse et al., 1999).

Dalimartha, (2003) stated a nutritious kolagoga saponins that improve production and increase the secretion of bile, bile for solid particles are removed, so that the fat metabolism is able to decrease blood triglycerides. Decreasing triglyceride levels are also influenced the content of tannins in the *Alpinia galanga* L. juice, that will bind to the protein of the body and will coat the intestinal wall and digestive tract mucous layer compaction so that inhibits the absorption of dietary substances including triglycerides and cholesterol.

Low levels of blood triglycerides broiler proves that in line with provision of the liquids galangal previous research conducted Padikkala and Achuthan (1997) in mice, where the ethanol extract of in vivo galangal can effectively decrease blood triglyceride levels of serum, gave 20 mg/day/body weight (0.008%/day/body weight).

Blood Glucose

Blood glucose levels on P0 (without *Alpinia galanga* L. is almost the same with P1, P2 and P3. According to Riesenfeld et al., 1982, in Lovita A. (2013), blood glucose will circulate in the blood and will stabile in the bird, regardless of different dietary level. Much of this regulation is due to the interplay of many variety of hormones, including glucagon, pancreatic polypeptide, insulin and thyroxine. These hormones can regulate in the glucose metabolism. Usually, more than a third of glucose absorbed during a meal and is

converted to lactate in the intestinal wall, buffering the peak influx.

Glycogen synthesis. Glucose is not oxidized within minutes after a meal, it can be stored as glycogen. The major glycogen storage areas are the liver and glycolytic muscles. The muscle and liver pools are available for flight or other activities, whereas, during fasting, the liver pool is depleted prior to use of muscle glycogen. Because glycogen is very hydrated, it is a physically bulky (low kJ g^{-1}) energy storage molecule relative to triglycerides. This bulk precludes storage of large amounts and surfeit dietary carbohydrates are converted to fatty acids and stored as triglycerides. The glycogen content of the liver is usually less than 4% and is depleted within a few hours of fasting (Blem, 1990; Swain, 1992).

CONCLUSIONS

Using lengkuas (*Alpinia galanga* L.) juice, on giving 0.01% from body weight, can decrease the level of triglyceride broiler blood until 21.15% for P1, P2= 8.65%, P3 =6.73 mg/dL, although the level of blood glucose is almost the same in all treatment.

REFERENCES

Badan Pusat Statistik, 2011. Produkai Tanaman Obat-obatan. http//: Statistik Indonesia. Html (7 November 2012).

Blem C.R., 1990. Avian energy storage. In: Power, D.M. (ed.) Current Ornithology, Vol. 7. Plenum Press, New York, p. 59-113.

Dalimartha Setiawan, 2003. Atlas Tumbuhan Obat Indonesia. Jilid 3. Puspa Swara Jakarta.

Direktorat Jendral Peternakan dan Kesehatan Hewan. 2011. Statistik Peternakan dan Kesehatan Hewan. Karya Cemerlang.

Guyton, A.C. and J.E.Hall. 1996. Fisiologi Kedokteran. Jakarta : Penerbit Buku Kedokteran EGC.

Hazelwood R.L., Lorenz F.W., 1959. Effects of fasting and insulin on carbohydrate metabolism in the domestic fowl. American Journal of Physiology 197, p. 47-56.

He M. L., W. Z. Yang, J. S. You, A. V. Chaves, P.S. Mir, C. Benchaar, T. A. McAllister, 2009. Effect of Garlic Oil on Fatty Acid Accumulation and Glycerol-3-Phosphate Dehydrogenase Activity in Differentiating Adipocytes. Asian-Aust. J. Anim. Sci. 22, p. 1686-169.

Iswantini D.. Latifah K. Darusman, Dan Ana Fitriyani, 2010. Uji In Vitro Ekstrak Air dan Etanol dari Buah Asam Gelugur, Rimpang Lengkuas, dan Kencur sebagai Inhibitor Aktivitas Lipase Pankreas. Pusat Studi Biofarmaka LPPM IPB. Bogor.

Lehninger A.L., 1982.Dasar-dasar Biokimia. Jilid 2. Erlangga. Jakarta.

Linder M.C., 1992. Biokimia Nutrisi dan Metabolisme.Universitas Indonesia. Jakarta.

Lovita A., 2013. Effects Of Sweet Citrus (Citrus sinensis) Waste Flour In Rations On Broiler Tryglyceride and Blood Glucose. Fakultas peternakan. Universitas Padjadjaran. Sumedang.

Morehouse Lee A., Faan-Wen Bangerter, M.P. DeNinno, P.B. Inskeep, P.A. McCarthy, J.L. Pettini, Y.E. Savoy, E.D. Sugarman, R.W. Wilkins, T.C. Wilson, H.A. Woody, L.M. Zaccaro, C.E. Chandler, 1999. Comparison of synthetic saponin cholesterol absorption/inhibitors in rabbits: evidence for a non-stoichiometric,intestinal mechanism of action. Department of Cardiovascular and Metabolic Diseases, Pfizer Central Research, Eastern Point Road,Groton. Journal of Lipid Research.

Murray R.K., D.K Granner, D.V.W Rodwell, Alih bahasa Brahm U Pendit, 2009. Biokimia Harper Edisi 27.Buku Kedokteran EGC. Jakarta.

Padikkala J., Achuthan C.R., 1997. Hipolipidemic effect of Alpinia galanga (Rasna) andKaemferia galanga (Kachoori). Indian J of Chemical Biochemistry.

Piliang W.G., D.S. Djodjosoebagio, 2006. Fisiologi Nutrisi. Edisi ke-1. Institut Pertanian Bogor Press. Bogor.

Reynertson K.A., 2007. Phytochemical Analysis of Bioactive Constituens from Adible Myrtaceae Fruit. Disertasi. University of New York.

Riesenfeld G., Geva A., Hurwitz S., 1982. Glucose homeostatis in the chicken. Journal of Nutrition 122, p. 2261-2266.

Sunarto O., 2012. Pengaruh pemberian ransum terhadap kadar glukosa dan trigliserida plasma ayam broiler. Fakultas Peternakan Universitas Padjadjaran. Bandung.

Swaim S.D., 1992. Energy Substrate profiles during fasting in horned larks (Eremophila alpestris). Physiologycal Zoology 65, p. 568-582.