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Analysis of SGPT and SGOT Levels in Free-Range Chickens Given Starfruit Leaf Extract

(Analisis Nilai SGPT dan SGOT pada Ayam Kampung yang Diberi Ekstrak Daun Belimbing Wuluh)

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ABSTRAK

Tujuan dari penelitian ini adalah untuk menentukan kadar enzim *Serum Glutamic Oxaloacetic Transaminase* (SGOT) dan *Serum Glutamic Pyruvate Transaminase* (SGPT) pada ayam kampung yang diberi ekstrak daun belimbing wuluh (*Averrhoa bilimbi L.*). Ekstrak daun belimbing wuluh mengandung metabolit sekunder seperti tanin, saponin, dan flavonoid, yang semuanya memiliki potensi untuk berfungsi sebagai antibakteri alami dan imunostimulan pada unggas. Studi ini menggunakan Rancangan Acak Lengkap (RAL) dengan lima kelompok perlakuan: tiga kelompok ayam yang diberikan ekstrak daun belimbing wuluh dengan dosis 0,25 mL, 0,30 mL, dan 0,35 mL per ekor per hari, dan dua kelompok kontrol (positif untuk antibiotik oksitetrasiklin dan negatif untuk air). Sampel darah diambil setelah periode perlakuan, dan kadar SGOT serta SGPT diukur di laboratorium. Hasil penelitian menunjukkan bahwa pemberian ekstrak daun belimbing tidak memiliki efek signifikan terhadap kadar SGPT ayam kampung (P>0,05). Namun, kadar SGOT bervariasi antar kelompok, dengan nilai tertinggi pada kontrol negatif. Ini menunjukkan bahwa ekstrak daun belimbing tidak bersifat hepatotoksik dan dapat digunakan sebagai alternatif antibiotik alami. Temuan ini mendukung penggunaan ekstrak daun belimbing wuluh dalam pakan ayam kampung sebagai cara untuk mengurangi ketergantungan pada antibiotik sintetis tanpa berdampak negatif pada fungsi hati.

Kata Kunci : ayam kampung; daun belimbing wuluh; hepatoksisitas; SGOT; SGPT

INTRODUCTION

Indonesia is a tropical nation that is abundant in flora, fauna, and biodiversity. The starfruit tree is one of the thriving plants in Indonesia, as evidenced by the profusion of flora diversity. The starfruit tree or Belimbing wuluh is occasionally cultivated or develops in the wild due to its numerous advantages. In addition to its potential as a natural acidic Flavors enhancer in food, it can also be used as an alternative medicinal ingredient for a variety of conditions, such as diabetes, diarrhoea, high blood pressure, and

cough (Hidjrawan, 2020). The utilization of starfruit leaves as traditional medicine is advantageous for the mitigation of synthetic antibiotics, which have adverse effects on village poultry, including the development of resistance and residues for consumers (Moenek *et al*., 2023).

The extract of Belimbing wuluh fruit and leaves possesses antibacterial, antimicrobial, antifertility, and antidiabetic properties, as per (Kumar et al., 2013). Secondary metabolite compounds, including tannins, saponins, and flavonoids, are present in the leaves of the bilimbi (Herlina *et al*, 2023). The tannin extract from belimbing wuluh leaves is effective against the bacteria *Escherichia coli* (*E. coli*), *Staphylococcus aureus*, *Pseudomonas fluorescens*, and *Micrococcus luteus* (Hayati *et al*, 2010). Toxicity testing is one of the safety tests that must be conducted on the leaves of belimbing wuluh (*Averrhoa bilimbi L.*) in order to support their use as traditional medicine. Toxicity is the capacity of a chemical substance to inflict harm on an organism, whether through its use or presence in the environment. The toxicity of a substance can be ascertained by examining the effects of exposure to the substance on organisms (Farisi *et al*., 2015).

Free-range Chickens are the most commonly cultivated livestock in Indonesia, as their chicks are readily available and highly adaptable to a variety of feed and climatic conditions (Wahyono *et al*, 2024). Currently, there is a growing trend of intensive cultivation of Freerange Chickens, particularly in the vicinity of large cities, with the objective of producing Freerange Chickens as either broilers or layers. In intensive poultry farming, livestock are susceptible to environmental factors that may induce stress or infections. Consequently, it is imperative to pursue the use of traditional medicinal plant materials, as it will result in cost savings and an increase in livestock productivity (Suprijatna, *et al*, 2018). Disease prevention efforts are mandatory for producers, as livestock health is one of the factors that influence productivity (Wahyono *et al*., 2024).

Farmers usually prioritize the safety of poultry from disease outbreaks over the consideration of antibiotic drug residues in chickens, as per (Mardiana et al., 2025). Due to the administration of feed additives, antibiotics, or growth-promoting hormones to animals, residues may be present. The presence of residues in animal-derived food results in economic losses in the form of product rejections, particularly when these products are exported to countries that are consistent and serious about instituting food safety

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systems. The use of antibiotics that does not comply with administration guidelines or the use of antibiotics as treatment in a manner that is not in accordance with instructions, such as failing to observe the withdrawal period prior to slaughtering the animal, will result in the drug remaining in the tissues or organs, which will subsequently accumulate at varying concentrations under the term "residues." Field observations suggest that the use of antibiotics by broiler and layer poultry farmers is often excessive and inappropriate, as they fail to adhere to proper usage guidelines (Sutiningsih *et al.*, 2023).

The liver is a critical organ that is responsible for the primary function of detoxifying substances that enter the body and the metabolism process. A substantial number of xenobiotic compounds (substances that are toxic within the organism's body) have the potential to induce liver damage (hepatotoxicity) during the metabolic process (Prasesti *et al.*, 2023). Fatigue can impede liver performance due to the liver's detoxification processes and elevated metabolic rate. Liver dysfunction can be the consequence of the continuous detoxification of contaminants, which can lead to impaired liver function. The elevated levels of serum glutamate oxaloacetate transaminase (SGOT) and serum glutamate pyruvate transaminase (SGPT) are indicative of liver function disorders. Given this, it is imperative that village poultry maintain optimal performance and have a healthy liver in order to generate high-quality products. If the antibiotic residues in the food that is intended for public consumption exceed the permissible limit, they may induce allergic reactions, disrupt the microflora of the digestive tract, cause nervous system disorders, and even result in resistance in humans who consume it (Agustin, 2017).

Almost all feed manufacturers formulated poultry feed with antibiotics as additives, which inhibits the development of pathogenic bacteria, improves the immunization process through vaccination, and promotes the health of chickens. Bacterial resistance will be influenced by the continuous use of antibiotics, which will remain in livestock products as antibiotic residues. Consequently, it is imperative to identify alternatives to antibiotics, including the utilization of medicinal plants, such as bilimbi leaves (*Averrhoa bilimbi* L.) (Wahyono *et al.*, 2024). Consequently, additional testing is required to evaluate the toxicity of the belimbing wuluh leaf extract as a chemical-free herbal antibiotic in village poultry administered in vivo to guarantee its safety for use.

MATERIALS AND METHODS

The extraction process is referenced in (Sihombing & Rachmawati, 2015). The Belimbing Wuluh leaf samples are air-dried and shielded from direct sunshine. This is executed to maintain the physical characteristics and chemical composition of the starfruit leaves. The desiccated belimbing wuluh leaves are subsequently pulverized into a fine powder, measured at 500 grams, and deposited in a sealed glass container, followed by maceration with 2500 mL of water (1:5 ratio). The container was thereafter wrapped with aluminium foil and stored for seven days (114 hours). The maceration results were filtered via filter paper to acquire the filtrate. The filtrate was isolated from the solvent with a rotary evaporator until a viscous extract was achieved (Harborne, 1987). The extracted substance was prepared as a stock solution at a concentration of 100%, subsequently diluted to yield solutions with concentrations of 25%, 30%, and 35%. The allocation of these values is founded on prior research indicating that the maximum inhibitory efficacy of starfruit leaf extract against *E. coli* bacteria was observed at a concentration of 30%.

Classification of Treatment for Group and Test Animals. This research employs a fully randomized factorial design comprising 5 treatment groups and 5 replications. Each treatment group has five Free-range Chickens reared under identical conditions. The community hens were randomly allocated within the coop to ensure an equitable distribution among all groups. The five therapy groups mentioned are: Group 1 received 0.25 mL of starfruit leaf extract each animal daily. Group 2 received 0.3 mL of starfruit leaf extract each animal daily. Group 3 received 0.35 mL of starfruit leaf extract per animal daily. Group 4, the Positive Control, utilized the synthetic antibiotic Oxytetracycline. Group 5 Negative Control employs water. The cage utilized in this investigation is a platform structure elevated 1.5 meters above the ground, partitioned into 25 pieces, each measuring 60 x 60 x 60 cm. Each part comprises one village chicken and is furnished with a feeding area and a watering area. The community chickens underwent adaptation for a duration of seven days. Once the chickens have acclimated, they are provided with feed and drinking water as customary. Each treatment group received a daily administration of starfruit leaf extract via syringe, according to the designated volume for that group.

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Blood has been collected using a sterile 3 mL syringe and transferred into a tube containing an anticoagulant. A single syringe is utilized for each animal, and the SGOT and SGPT levels are analyzed at the Politani Animal Health Laboratory. The acquired data quantitatively contains the amounts of Serum Glutamic Oxaloacetic Transaminase (SGOT) and Serum Glutamic Pyruvate Transaminase (SGPT) from the serum of village chicken blood. The data was subsequently examined using ANOVA, followed by Duncan's test, to ascertain the variations in SGOT and SGPT levels in the serum of village hens across each treatment group.

RESULTS AND DISCUSSION

Table 1 presents the outcomes of the quantitative analysis of Serum Glutamic Pyruvate Transaminase (SGPT) levels derived from the serum of broiler chicken blood, utilizing the Duncan test. The findings demonstrate that the administration of starfruit extract to village hens did not significantly affect serum glutamic pyruvic transaminase (SGPT) levels ($P>0.05$). The data in Table 1 clearly indicates that, according to the Duncan test, groups 1, 2, and 3 exhibit means and standard deviations ranging from 0.2 to 0.9, thereby exceeding 0.05.

SGPT is an enzyme that is specific to and predominantly found in the liver, as it is synthesized within hepatic cells. SGPT, or Alanine Aminotransferase, serves as a crucial biomarker for identifying liver injury. Liver impairment may lead to elevated SGPT levels (Hidayat, 2013). The research findings indicate that the average SGPT levels in the treatment groups (Groups 1-3) are lower than those in the normal group (Group 4). This suggests that the livers of the treated hens did not undergo disruptions or damage from the injection of starfruit extract.

Table 1. Results of Duncan's test on SGPT levels in rural hens following the administration of starfruit leaf extract

Group	Mean ± standard deviation
1	0,91460 ± 0,427383
2	0,81340 ± 0,221102
3	0,77300 ±.0,54366
4	0,97975 ± 0,318084
5	0,88467 ± 0,514215

Table 2 presents the SGOT levels of Free-range Chickens administered starfruit extract. This study's results indicate variations in SGOT levels between the treatment and control groups. The peak SGOT level of 222.6980 was observed in group 5, designated as the negative control (water control), followed by groups 2 and 3 with levels of 204.4420 and 192.9200, respectively. Conversely, the minimum level of 161.4140 was seen in treatment group 1, which received a daily dosage of 0.25mL of belimbing wuluh leaf extract.

In addition to SGPT, SGOT is an enzyme present in the liver, although at lower concentrations than SGPT. This enzyme is present not solely in liver cells but also in several organs, including the heart, kidneys, and brain (Purwaningsih *et al.*, 2015). Consequently, SGOT level assessment cannot serve as the principal indicator of liver abnormalities or damage (Ballo *et al.*, 2022). The statistical analysis results indicate that the medication did not significantly affect SGPT and SGOT levels. This suggests that the specified starfruit leaf extract is devoid of hazardous compounds that would necessitate liver detoxification. The ingestion of starfruit leaf extract at concentrations up to 0.35% did not adversely affect liver cells, specifically regarding cellular damage, and does not result in elevated SGOT levels. The liver is responsible for energy storage, protein and bile acid synthesis, regulation of cholesterol metabolism, and detoxification of poisons and medications entering the body.

Table 2. Results of Duncan's test for SGOT levels in local chickens

	Group	N	Subset			
			1	2	3	4
Duncan[a,b]	Group 1	5	161.4140[a]			
	Group 4	5		190.6780[b]		
	Group 3	5		192.9200[b]		
	Group 2	5			204.4420[c]	
	Group 5	5				222.6980[d]
	Sig.		1.000	.494	1.000	1.000

[a,b,c,d]Different superscripts on different columns indicate differences (P<0,05)

This study's results demonstrate that the active chemicals in starfruit leaf extract (tannins, saponins, flavonoids, and other substances) do not elevate SGPT and SGOT levels. The lack of a substantial effect of the medication on the measured parameters can be attributed to the fact that the primary source of the SGOT enzyme is the liver, whereas the SGPT enzyme is mostly located in tissues such as the heart, skeletal muscles, kidneys, and brain. The

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assessment of SGOT serves as a more sensitive predictor of liver function abnormalities than SGPT, while elevated levels of both enzymes signify liver function disorders (Amir & Amir, 2015). Liver dysfunction results from hepatocyte injury. Moreover, the impairment of hepatocyte cells results in alterations to transport function and membrane permeability, facilitating the exodus of SGOT and SGPT enzymes from the cytoplasm into the bloodstream (Wardani *et al.*, 2016).

CONCLUSION

The oral administration of starfruit extract to Free-range Chickens does not significantly affect the SGPT and SGOT levels, indicating no notable impact on the liver function alterations in the examined Free-range Chickens.

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