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Brief Article

Activity antibacterial from honey kelulut (*Trigona sp.*) against bacteria *Staphylococcus epidermidis*

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Abstract

Honey kelulut is derived from the kelulut bee (*Trigona sp.*), which is native to Kalimantan and belongs to the Trigona genus of stingless bees. The honey produced by the Trigona genus has a well-documented antibacterial property. Study objective accomplished. This text discusses the potent antibacterial action of kelulut honey. The antibacterial testing method employed is the well diffusion method, utilizing the bacterium *Staphylococcus epidermidis* as the test organism. An antibacterial test was conducted by measuring the diameter of the zone of inhibition against bacteria. The results were obtained from concentrations of 40%, 60%, 80%, and 100%. Then the resistance diameter was measured for each concentration. The most optimal outcomes were achieved in the antibacterial test using honey kelulut. The honey kelulut with an 80% concentration exhibited a medium resistance level of 10.2 mm, while the 100% concentration demonstrated a strong resistance level of 13.7 mm.

Keywords: Honey kelulut, antibacterial, *Staphylococcus epidermidis*, inhibition

1. INTRODUCTION

Honey kelulut (*Trigona sp.*) belongs to the genus Trigona and is categorized as a type of bee. The bee genus Trigona is one of the genera that lacks a stinging ability [1]. Physically, bees of the genus Trigona typically have a length ranging from 3 to 8 mm and possess three pairs of segmented legs. On the hind legs, there are specialized structures called thorns that aid in the movement of pollen from one flower to another. The wings of the Trigona bee

are proportionally longer than its body. The head segment of the insect has a pair of antennae, large eyes, and a long mouth muzzle that facilitates the process of sucking honey [2]. Honey kelulut possesses a tangy flavor and fragrance. The sour flavor of honey kelulut is likely due to the presence of a significant amount of water, which leads to a fermentation process [2]. The water content of honey can also be influenced by storing it in open pot-shaped cells that come into direct contact with air [3].

The bacteria in question are anaerobic facultative and non-motile organisms that belong to the genus Staphylococcus, which is classified as a group of gram-positive bacteria. *Staphylococcus epidermis* is a bacterium that resides on the surface of the skin and mucous membranes of humans [4]. If not identified at an early stage, these extremely harmful chemical compounds continuously target the body's proteins, carb, lipids, and DNA, causing catastrophic harm [5].

2. MATERIALS AND METHODS

2.1. Material

The honey bees of the kelulut species were sourced from Balikpapan City, located in East Kalimantan. The bees were treated with a solution containing 0.9% sodium chloride (NaCl) and Aquades (purified water). They were then cultured on Nutrient Agar together with the bacteria *Staphylococcus epidermidis*.

2.2. Instrument

Autoclave, laminar airflow, backup wells, micrometer screw, micropipette, glass object, range caliper, Erlenmeyer flask, reaction tube, osteotomy needles, and Petri dishes.

2.3. Method

2.3.1. Manufacturing Suspension Bacteria *Staphylococcus epidermidis*

Add 10 ml of 0.9% NaCl to the existing bacterial medium in a reaction tube, then homogenize. Extract 2.5 ml from a homogeneous solution and transfer it to a separate tube for different reactions. Next, add 7.5 ml of a 0.9% NaCl solution and mix thoroughly.

2.3.2. Testing Activity Antibacterial Honey Flushing in Bacteria *Staphylococcus epidermidis*

Prepared a solution by dissolving honey in distilled water at concentrations of 40%, 60%, 80%, and 100%. Obtain a 25 µL sample of a Staphylococcus epidermidis bacterial solution that has been contaminated. Then evenly distribute on top of the petri dish. Subsequently. Add 15 ml of liquid medium and homogenize. Repeat the technique three times and wait until the media solidifies. After the media solidifies, a hole is constructed to accommodate the desired amount of treatment. This includes control experiments using distilled water and a test solution of honey in distilled water with concentrations of 40%, 60%, 80%, and 100%. A backup well is used for this purpose. For the control negative, distilled water was used. As for the test control, honey was used in concentrations of 40%, 60%, 80%, and 100%.

3. RESULT AND DISCUSSION

The antibacterial testing procedure involved using a 25 µL suspension of *S. epidermidis* bacteria, which was applied using a dropper. Afterwards, the bacteria were put onto separate spoits containing Nutrient Agar media. The mixture was then homogenized and left to solidify. By utilizing a backup welling technique, the medium is punctured into as many as 5 pieces. Each hole is then filled with a controlled negative form solvent, which consists of distilled water and different concentrations of kelulut honey solution (40%, 60%, 80%, and 100%).

After being incubated for 24 hours, the diameter of the colored zone was measured by moving a ruler both horizontally and vertically. Then, the diameter of the inhibition zone was determined by subtracting the diameter of the well and taking the average. The identified results calculate the power resistance zone in the specified category. The antibacterial power parameters of the inhibition zone can be observed. After measuring the diameter of the inhibition zone for *Staphylococcus epidermidis* bacteria, the following results were obtained: the average diameter for a solution with a 40% concentration is 6.0 mm, with a moderate inhibitory power. The average diameter for a solution with a 60% concentration is 9.0 mm, also with a moderate inhibitory power. The average diameter for a solution with an 80% concentration is 10.2 mm, and for a 100% concentration it is 13.7 mm. Solutions with concentrations of 80% and 100% exhibit a strong inhibitory power (Table 1). These findings are reported [6].

Tabel 1. Inhibition Zone Diameter Honey Kelulut *for Staphylococcus epidermidis* bacteria

Treatment	Inhibition Zone Diameter (mm)			Average (mm)
	R1	R2	R3	
Control negative	0.0	0.0	0.0	0.0
40%	7.0	5.0	6.0	6.0
60%	10.5	9.0	7.5	9.0
80%	11.5	8.5	10.5	10.2
100%	14.0	12.5	14.5	13.7

The pH value of kelulut honey is evaluated to be acidic, which is one of the reasons why it possesses potent antibacterial properties. Honey has the ability to affect the antibacterial properties of substances by altering their pH levels and acidity [7,8,9]. The pH of the kelulut honey sample used in the tests is being determined. This equates to a range of 3.24 to 3.31. The pH of kelulut honey is low.The qualities of honey kelulut are typically accompanied by a sour flavor [2]. The honey produced by kelulut bees has been found to contain secondary metabolites in the form of saponins, phenols, and flavonoids [3].

4. CONCLUSION

Honey kelulut demonstrated moderate inhibition against Staphylococcus epidermidis at doses of 40% and 60% in the power zone category. The average inhibition zone was 6.0 mm and 9.0 mm, respectively. The honey kelulut samples with concentrations of 80% and 100% fall into the category of average strong inhibition. They exhibit an average zone of inhibition measuring 10.2 and 13.7 mm, respectively. If the acidity level of honey exceeds the predetermined parameter, the storage temperature will be affected. This is because at higher room temperatures, the humidity level is higher, which makes honey more prone to absorbing water, and a high water content makes fermentation more likely to occur [8] Manage or regulate negativity The power zone is not displayed.

AUTHOR CONTRIBUTION

Conceptualization, Laode Rijai and Hifdzur Rashif Rija'i : methodology, Aulia Sita;

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