

Test Effectiveness Antimicrobial Extract Etanol Leaves Melinjo (*Gnetum Gnemon L.*) On Growth Of Bacteria *Propionibacterium Acnes*

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ABSTRACT-Background: *Propionibacterium acnes* includes gram-positive bacteria in the form of stems and normal skin flora that play a role in the occurrence of inflammation in acne. The prevalence of *acne* ranges from 47-90% during adolescence. African, American and Hispanic women have a prevalence of 37% and 32% while Asian women are 30%, Caucasian 24%, and India 23%. Leaves melinjo contain flavonoid compounds that function as antioxidants that will interfere with the metabolic functions of microorganisms such as bacteria. **Purpose:** This study aims to determine the effectiveness of melinjo leaf extract (*Gnetum gnemon L*) on the growth of bacteria *Propionibacterium acnes*, using design *Descriptive*. Data analysis using univariate analysis to know effectivity of leaf extract of melinjo to the growth of bacterium *Propionibacterium acnes*. **Method:** This study used melinjo leaf extract which was generated using 96% ethanol solvent. **Results:** The study showed that concentrations that could inhibit the growth of bacteria *Propionibacterium acnes* were at concentrations of 2.5%, 5%, 7.5%, and 10%. Inhibition zone diameter at 2.5% concentration of 6.13 mm, 5% concentration of 6.68 mm, 7.5% concentration of 7.92 mm and 10% concentration of 10.94 mm. It means the higher concentration of melinjo leaf extract hence the higher the resistance of bacteria *Propionibacterium acnes*. **Conclusion:** Further research is expected to carry out further tests with other concentrations and solvent extracts other than 96% ethanol or bacteria other than *Propionibacterium acnes*. **Keywords:** *Propionibacterium acnes*, Leaf melinjo, Flavonoids.

I. INTRODUCTION

Acne is often regarded as physiologically-appearing skin disorder. It generally occurs at the age of about 14-17 years in women, 16-19 years in men. Acne will disappear by itself at the age of about 20-30 years. However, sometimes especially in women, acne persists until the age of 30 years more. Acne forms like small boils containing fatty things that sometimes turn to hard like a candle [1].

The prevalence of *acne* or acne on adolescence is quite high, ranging from 47-90% during adolescence. African, American, and Hispanics had a high prevalence of *acne* racial women, 37% and 32%, while Asian racial women 30%, Caucasian 24%, and India 23%. In Asian races, inflammatory lesions are more frequent than comedonal lesions, i.e., 20% inflammatory lesions and 10% comedonal lesions. However, in the Caucasian race, *acne* is comedonal more common than *acne* inflammation, ie 14% *acne* comedonal, and 10% *acne* inflammation [4]. Acne or *acne*

vulgaris in the form of inflammatory abnormalities in the layer pilosebaceous accompanied by clogging and accumulation of keratin materials one of which is caused by the bacteria *Propionibacterium acne* [5].

Propionibacterium acnes includes gram-positive bacteria in the form of stems and normal skin flora that play a role in the occurrence of its Inflammation in acne. The role of *Propionibacterium acnes* in the pathogenesis of *acne* breaks down triglycerides, one of the components of sebum. Triglycerides turn into free fatty acids (FFAs). FFA triggers colonization of *Propionibacterium acnes*; the colonization causes inflammation. Besides, antibodies against cell wall antigens *Propionibacterium acnes* can enhance the inflammatory response through complement activation [4].

acne treatment is done by improving follicle abnormalities, decreasing sebum production, decreasing the number of colonies *Propionibacterium acne* can be derived by providing an antibacterial agent such as erythromycin, clindamycin, and tetracycline. Increased use of antibiotics spur increased bacterial resistance to these antibiotics. To prevent the occurrence of bacterial resistance to antibiotics should be developed research in the discovery of new drugs derived from nature [5].

One of the plants in Indonesia is often used as a natural treatment of melinjo. Melinjo (*Gnetum gnemon L.*) Comes from the tropics, the community generally utilizes as ingredients processing of melinjo and vegetable chips. Melinjo is often used to treat various types of diseases such as painful urination, dog bites, eye diseases, anemia, and malnutrition. Melinjo contains active compounds such as alkaloids, flavonoids, steroids, and tannins. Chemical compounds such as flavonoids and tannins have an antibacterial effect[

7]. Based on the above background, the authors are interested in researching the antimicrobial effectivity test of ethanol extract of leaf melinjo (*Gnetum gnemon L.*) At various concentrations of

2.5%, 5%, 7.5%, and 10% to inhibit the growth of *Propionibacterium acnes*.

II. RESEARCH OBJECTIVES

Examine the effectiveness of antimicrobial substances contained in the leaf extract of melinjo on the growth of *Propionibacterium acnes*.

III. RESEARCH METHOD

This research use design *descriptive* that is by doing effectivity test of a leaf of melinjo with the variation of concentration 2,5%, 5%, 7,5% and 10% to growth of bacteria *Propionibacterium acne* which then studied the effect of the treatment. Integrated Laboratory Poltekkes Kemenkes Bengkulu in December 2017- May 2018. Samples used are old leaves melinjo with current physical condition.

IV. RESEARCH PROCEDURES

Melinjo Leaf Extraction by Maseration Method

The dried melinjo leaves are mashed using a blender to a powder, then weighed as much as 300 grams, inserted into the container and then macerated with 96% ethanol of 1000 mL and stirred with a stir bar and then let stand for three days. A filter filtered the extract, obtained filtrate I, collected in a bottle and one dregs plus ethanol 96% 1000 mL again, stirred with a stir bar and set aside for three nights. After that, the extract is filtered with filter paper to obtain filtrate II. Furthermore, the same process carried out until the obtained filtrate III. All filtrate obtained from the maceration process I, II, III were combined, filtered, and concentrated with a *vacuum rotary evaporator* at a temperature of 40⁰C to obtain a viscous extract [5].

Table 4.1 Result of Inhibition Zone of Melinjo Leaf Extract

Konsentrasi	Diameter Zona Hambat (mm)				Rata-rata	Kekuatan	Efektifitas (%)
	1	2	3	4			
2,5%	6,1	6,15	6,2	6,1	6,13	Sedang	30,42%
5%	7,2	6,2	7,25	6,1	6,68	Sedang	33,15%
7,5%	8,15	8,15	8,3	7,1	7,92	Sedang	39,30%
10%	10,2	12,15	11,2	10,22	10,94	Kuat	54,29%
Kontrol positif	21,1	20,2	19,2	20,1	20,15	Sangat kuat	100%
Kontrol negatif	0	0	0	0	0	Tidak ada	0%

The results of antimicrobial effectivity test of leaf extract of melinjo proved to inhibit the growth of *Propionibacterium acne* bacteria with the formation of a clear zone around the disc. The cleared zone formed is a zone of inhibition for bacterial growth. This occurs because of the effectiveness of antimicrobials on the leaves of melinjo, At a concentration of 2.5% the average

inhibit zone formed is 6.13 mm, the concentration of 5% is 6.68 mm, the concentration of 7.5% is 7.92 mm concentration of 10% is 10.94 mm, positive control 20.15 mm and negative control 0 mm. According to David and Stout the rate of inhibition of bacterial growth if the inhibitory zone is 5 mm or less, the inhibition rate is categorized as weak, 5-10 mm is categorized, 10-20 mm is strongly categorized, and 20 mm or more is very strong.

VI. DISCUSSION

Results of drag zone contained in ethanol extract of leaf melinjo that is with the formation of clear zone on bacteria growth medium *Propionibacterium acnes* at treatment of extract concentration from 2,5%, 5%, 7,5%, and 10% resulted in inhibition zone average 6 , 13 mm, 6.68 mm, 7.92 mm, and 10.94 mm.

According to David Stout, the concentration of extracts 2.5%, 5%, and 7.5% into the category of moderate with the percentage of effectiveness of inhibitory power of bacteria that is 30.42%, 33.15%, and 39.30%, the concentration of extract 10% ethanol into strong category with the percentage of the effectiveness of the inhibitory power of bacteria that is 54.29%. The higher the concentration of the ethanol extract of melinjo leaves the larger the inhibit zone diameter [5].

Kining conducted previous studies in 2015 on the antibacterial activity of leaf melinjo (*Gnetum gnemon L.*) To bacteria, *Pseudomonas aeruginosa* showed an inhibitory zone of 11 mm. It indicates that the drag zone formed in this study is smaller than that of previous studies [7].

This research was also conducted by (Taroreh, Rumampuk, and Siagian, 2016), about melinjo leaf extract (*Gnetum gnemon L.*) On the growth of bacteria *Streptococcus mutans*. At a concentration of 100% Zone of inhibition of melinjo leaf extract has an antibacterial effect on *Streptococcus mutans* of 10.6 mm with a resistance zone response in the moderate category when compared to amoxic antibiotic [7].

Folifenol compounds are flavonoids and tannins. Extracellular Flavonoid compound is a compound that has a very high potential as an antioxidant and has bioactivity as a drug. Flavonoids will interfere with the metabolic functions of microorganisms such as bacteria. Flavonoids will form complexes with extracellular proteins thereby destroying bacterial cell membranes. The mechanism of action will mendenatuasi protein cell bacteria and damage the cell membranes without being restored [3].

Tannins have phenol compounds that have hydroxyl groups in them, the mechanisms in which bacteria are deactivated by utilizing polarity differences between lipids and hydroxyl groups. If the bacterial cells contain more lipid, then it takes a high concentration to make the bacteria lisis [2].

Saponin belongs to antibacterial compounds because it can suppress the growth of bacteria. Saponin will bind to lipopolysaccharides on the cell wall of bacteria, resulting in increased permeability of the cell wall and decrease the surface tension of the cell wall so that when the interaction occurs the cell wall will rupture or lysis and make antibacterial substances will enter the cells quickly and will disrupt bacterial metabolism death [6]

The steroid is a triterpenoid compound that alleged mechanism of action was inhibiting bacteria by destroying cell membrane so that leakage occurs. Alkaloids can also cause bacterial cells to be susceptible to lysis, which is thought to have a working mechanism by disrupting the constituent components of the cell wall so that the cell wall is not entirely formed [7]

VII. CONCLUSION

Based on the research of effectivity of leaf extract of melinjo (*Gnetum gnemon L*) inhibition zone, *Propionibacterium acne* it can be concluded that there is inhibition power of leaf extract of melinjo with higher concentration then increase antimicrobial effectivity to bacteria *Propionibacterium acnes*.

VIII. SUGGESTIONS

For the Society, this research can be suggested for people to be able to use the leaves of melinjo as a traditional medicinal plant because the leaf extract of melinjo has effectiveness in inhibiting the growth of bacteria *Propionibacterium acne*.

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