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# Antibacterial Test Of Avocado Leaf Ethanol Extract (Persea americana Mill) On Propionibacterium Acne

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***Abstract***

*Avocado leaves are one plant that can be used as an antibacterial. The chemical content of flavonoids, alkaloids, tannins and saponins has the potential to inhibit bacterial growth. This research aims to determine the antibacterial activity of ethanol extract of avocado leaves against Staphylococcus aureus bacteria. This research uses laboratory experiments using samples of avocado leaf extract (Persea americana Mill). With concentrations of 20%, 40%, 60% and 80% using the diffusion method. The ability of avocado leaf extract to inhibit Staphylococcus aureus bacteria can be seen from the size of the inhibition zone, namely positive by looking at the area of the inhibition zone around the disc using a caliper. This research shows that the diameter of the inhibition zone for Staphylococcus aureus at a concentration of 20% has an inhibition zone diameter of 8.71 mm, namely the medium category, a concentration of 40% has an inhibition zone diameter of 10.33 mm, namely the strong category, a concentration of 60% has an inhibition zone diameter. of 12,66 mm, namely the strong category, a concentration of 80% has an inhibitory zone diameter of 15,61 mm, namely the strong category. Based on the research results, it can be concluded that the ethanol extract of avocado leaves has activity to inhibit propionibacterium acne bacteria.*

***Keywords: Avocado Leaves, Antibacterial, Propionibacterium Acne***

## INTRODUCTION

Skin disease is one of the diseases that is often found in tropical countries like Indonesia. Skin that is not kept healthy can cause various diseases. Skin disorders often occur due to causal factors such as climate, environment, place of residence, unhealthy living habits, allergies and so on. Skin disease is a skin disorder caused by fungi, bacteria, parasites, viruses or infections which can attack the whole or certain parts of the body and can worsen the sufferer's health condition if not treated seriously (Putri et al., 2018).

Acne is a skin disease that often occurs in Indonesia, the incidence rate is around 85% and occurs at the age of 14-17 years in women and 16-19 years in men. Acne vulgaris or acne is a disease that is feared by teenagers and even young adults (Wardania, et al 2020). Propionibacterium acnes is a gram-positive bacteria that causes inflammation or swelling through its ability to break down triglycerides into free fatty acids. Acne vulgaris often becomes chronic and leaves scars or holes on the face, causing psychological disorders and lack of self-confidence (Amalia Asikin & Agus Wibowo, 2016).

Acne treatment can be done by reducing inflammation of the skin, repairing follicle abnormalities and killing bacteria. The bacterial population can be reduced by administering antibiotics, including tetracycline, erythromycin, and clindamycin. Benzoyl peroxide, azelaic acid and retinoids are also often used, but these drugs can cause unwanted effects in their use as anti-acne including irritation, while long-term use of antibiotics can not only cause resistance but also cause organ damage and immunohypersensitivity (Afifi et al., 2018).

Traditional medicine is an ingredient or concoction of ingredients derived from plants, animals, minerals, extract preparations (galenic) or mixtures of these ingredients which have been

used for generations for treatment based on experience. The use and use of traditional medicine is to maintain health as well as prevent and treat disease. Thus, the position of traditional medicine is very important in improving public health (Depkes RI, 2014).

Many plants contain chemical compounds such as flavonoids that exhibit antimicrobial properties. Several classes of chemical compounds such as flavonoids, tannins and other phenolic compounds also function as defense tools for plants to fight pathogenic microorganisms (Yuniharni et al., 2021).

One herbal ingredient that contains flavonoids is avocado leaves (Persea americana Mill). The active substances contained in avocado leaves (Persea americana Mill) are flavonoids and quercetin. Avocado leaves (Persea americana Mill) taste bitter and are effective as a diuretic and inhibit the growth of several bacteria. Apart from that, it is efficacious for curing urinary stones, high blood pressure and headaches. Tea leaves can cure nerve pain, stomach pain, swollen respiratory tract and irregular menstruation (Anggorowati et al., 2016). Avocado (Persea americana Mill) is a plant that contains antibacterial substances, especially the leaves. Avocado leaf extract is known to contain active compounds such as alkaloids, saponins and flavonoids which can inhibit the growth of several bacteria (Wijaya, 2020).

Based on the description above, the author is interested in conducting research with the title "Testing the Antibacterial Activity of Ethanol Extract of Avocado Leaves (Persea americana Mill) Against the Growth of propionibacterium acne Bacteria".

## RESEARCH METHODS

The type of research carried out is laboratory experimental. This research was carried out in the Microbiology laboratory of the Arjuna Laguboti College of Health Sciences. This research was conducted for 1 month. The sample used in this research was 3 kg of avocado leaves obtained from Matio village, Balige subdistrict, Toba Regency. The sampling method used is the Purposive Sampling method, which is a research sampling technique based on the characteristics desired by the researcher. The characteristics of avocado leaves are that the leaves are still fresh, have green skin and a hard texture (Fathnur Sani K, 2018).

## RESULTS AND DISCUSSION

This research was conducted at the Microbiology Laboratory of the Arjuna Pintubosi-Laguboti College of Health Sciences. Avocado leaves obtained from Matio District. Toba Balige is first selected and cleaned with running water then drained and chopped, then dried for 10 days. After drying, the avocado leaves are weighed and then powdered, then the resulting powder is then weighed. Then identify the simplicia content of avocado leaves using avocado leaf simplicia powder and appropriate reagents.

Avocado leaves contain alkaloid compounds, as evidenced by the yellow color, white precipitate and brown precipitate when the powder is dissolved in methanol + Dragendroff's Reagent, methanol + Mayer's Reagent, methanol + Bouchardat's Reagent. Avocado leaves contain flavonoid compounds as evidenced by the color changing to orange and a slight yellow precipitate when the avocado leaf powder is dissolved in methanol + 2 ml of concentrated HCl + 0.1 gram of Mg metal powder. Avocado leaves contain saponin compounds, as evidenced by the formation of foam when the powder is dissolved in distilled water and shaken for 15-20 seconds. Avocado leaves

contain tannin compounds, as evidenced by the color changing to dark blue when avocado leaf powder is dissolved in methanol + 3 drops of 1% FeCl3.

**Table 1 Results of Identification of Simplicia Compounds in Avocado Leaves**

| No. | Chemical Compounds | Results |
|---|---|---|
| 1. | Alkaloids | + |
| 2. | Flavonoids | + |
| 3. | Saponin | + |
| 4. | Tannin | + |

Based on research, it was found that avocado leaves contain chemical compounds, namely, alkaline, flavonoids, saponins and tannins. The identification of the chemical content of avocado leaves is in accordance with research which states that avocado leaves contain alkaloids, flavonoids, saponins and tannins. Alkaloids function to protect plants from disease, pest attacks, as development regulators, and as mineral bases to regulate ion balance in plant parts. Flavonoids in plants play a role in providing color, flavor to seeds, flowers and fruit as well as protecting plants from environmental influences, as antimicrobials and protection from exposure to UV rays. Saponins in plants have an antimicrobial effect, inhibit fungi and protect plants from insects. Tannin functions as a protector in plants when certain parts grow, as an anti-pest so as to prevent fungal attacks.

In the inhibitory power test carried out with concentrations of 20%, 40%, 60%, 80%, positive control (40% amoxicillin), negative control distilled water and 96% ethanol solvent control using the disc diffusion method, 3 repetitions each to determine the inhibitory power Each concentration of avocado leaf extract on the growth of Staphylococcus aureus bacteria shows that each concentration is able to inhibit the growth of Staphylococcus aureus bacteria.

Observations of antibacterial activity at various concentrations of avocado leaves were carried out after 1×24 hours of bacterial incubation in an incubator at 37 $^0$C. The results of the inhibition test observations after an incubation period of 1×24 hours can be seen in Figure 1.

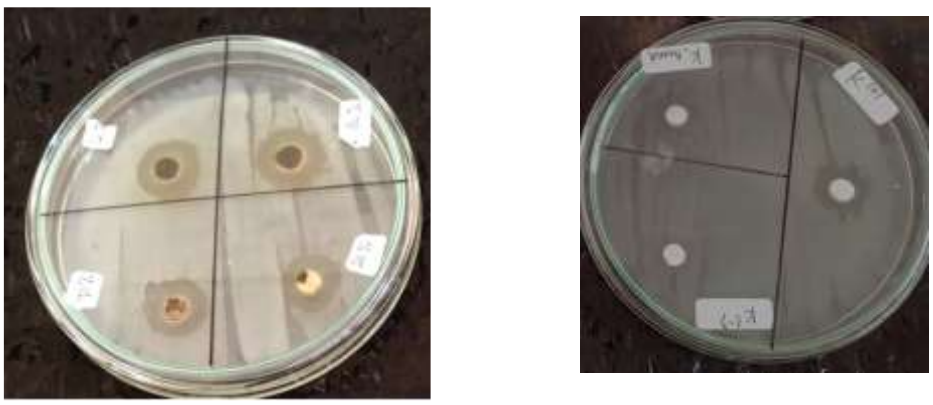

**Figure 1. Test results of the inhibitory power of avocado leaf extract on the growth of Staphylococcus aureus bacteria**

After testing the inhibitory power of avocado leaf extract with 4 different concentrations, positive control (amoxicillin), negative control, distilled water and 96% ethanol solvent control. The

following are the results of the inhibitory test of avocado leaf ethanol extract on the growth of Staphylococcus aureus bacteria:

**Table 2. Results of the inhibitory power test of avocado leaf extract on the growth of Staphylococcus aureus**

| Avocado Leaf Extract Concentration (%) | Resistance (mm) | | | | Category |
|---|---|---|---|---|---|
| | Test 1 | Test 2 | Test 3 | Average | |
| 80% | 12,8 | 13,7 | 20,35 | 15,61 | Strong |
| 60% | 11,8 | 13,05 | 12,95 | 12,66 | Strong |
| 40% | 9,75 | 10,15 | 11,1 | 10,33 | Strong |
| 20% | 9,45 | 9,55 | 7,15 | 8,71 | Currently |
| Positive control | 45,8 | - | - | 45,8 | Very Strong |
| Negative control | - | - | - | - | Weak |
| Solvent control | 4,6 | - | - | 4,6 | Weak |

Table 4.2 shows that a clear zone was formed after an incubation period of 1×24 hours at a temperature of 37 $^0$C with concentrations of 20%, 40%, 60%, 80%, positive control (clyndamicin 40%), negative control (distilled water) and control solvent (ethanol 96%). The measurement results show that a 20% concentration of avocado leaf extract has a clear zone diameter of 8.71 mm, that is, it has the ability to inhibit the growth of Staphylococcus aureus in the medium category, a 40% concentration of avocado leaf extract has a clear zone diameter of 10.33 mm, that is, it has the ability to Inhibitory power against the growth of Staphylococcus aureus is in the strong category, 60% concentration of avocado leaf extract has a clear zone diameter of 12.66 mm, that is, it has the ability to inhibit the growth of Staphylococcus aureus in the strong category, 80% concentration of avocado leaf extract has a clear zone diameter of 15.61 mm, which has the ability to inhibit the growth of Staphylococcus aureus in the strong category and the positive control (clyndamicin 40%) has a clear zone diameter of 10.2 mm, which has the ability to inhibit the growth of Staphy lococcus aureus in the strong category. The higher the concentration of avocado leaf extract, the wider the diameter of the clear zone produced, so that the greater the concentration of avocado leaf extract, the greater its ability to inhibit the growth of Staphylococcus aureus bacteria.

Research conducted by Ismiyati in 2014, suggested that avocado leaf extract with a concentration of 35% could inhibit the growth of Staphylococcus aureus which produced an inhibition zone of 9 mm (Ismiyati et al., 2014). In other research, avocado leaves were able to inhibit the growth of Escherichia coli at concentrations of 25%, 50%, 75% with growth inhibition zones of 2.5 mm, 3.5 mm, 6 mm. The higher the concentration of active substances contained in avocado leaf extract, the greater the inhibition zone formed. The greatest concentration that produces an effective inhibition zone is 75% (Rikomah et al., 2019).

Research conducted by Ramadhan (2013), regarding the resistance test of several hand sanitizers, stated that the largest diameter, namely 12 mm, was found in hand sanitizers containing alcohol with triclosan, but hand sanitizers containing alcohol alone did not form an inhibition zone (0 mm ). This is because the alcohol content alone is not effective in killing bacteria and is only short acting.

Avocado leaves can be used as a complementary therapy natural product because avocado leaves contain various ingredients including vitamin E, Vitamin B, iron, potassium, flavonoids,

quercetin, saponins and tannins which are good for health. The benefits of the ingredients contained in avocado leaves can reduce blood pressure, uric acid levels, act as an antioxidant, inhibit bacteria, and make a cream for acne. The way to process avocado leaves is by boiling them in hot or warm water to get avocado leaf extract for consumption (Meisya & Yamin, 2022).

The active compounds contained in avocado leaves have the ability to inhibit bacterial growth, namely flavonoids, tannins, alkaloids, saponins. The presence of these compounds is an important factor in their mechanism against bacteria. Flavonoids can denature bacterial cell proteins in the cell wall and damage the cell membrane irreparably. Thus, the cell wall breaks because it is unable to withstand cytoplasmic pressure (Sulaiha et al., 2022). Meanwhile, (Christanto, 2014) stated that flavonoids can denature proteins in bacterial cell membranes, then protein coagulation occurs, which results in loss of function of the bacterial cell membrane, resulting in bacterial lysis.

Tannins have antibacterial activity which is related to their ability to inactivate microbial cell adhesion as well as inactivating enzymes and disrupting protein transport in the inner layers of cells. Tannins also target polypeptides and cell walls so that cell wall formation is less than perfect. This causes bacterial cells to lyse due to osmotic and physical pressure so that bacterial cells will die (Hidayah, 2016). Saponins provide anti-microbial effects by forming polysaccharide complexes in cell walls. The interaction of saponin with the cell wall will cause damage to the cell wall and membrane and ultimately bacterilysis. The mechanism of saponin's action as an antibacterial is that it can cause leakage of proteins and enzymes from inside cells. Alkaloids have the ability to act as antibacterials and their inhibitory mechanism is by interfering with the peptidoglycan components in bacterial cells so that the cell wall layer does not form completely and causes bacterial cell death (Madduluri et al., 2013).

## CONCLUSION

Based on the research that has been carried out, it can be concluded that the ethanol extract of avocado leaves (Persea Americana Mill) has antibacterial activity against Staphylococcus aureus. The concentration of ethanol extract of avocado leaves (Persea americana Mill) which can inhibit the growth of Staphylococcus aureus bacteria is a concentration of 20% in the medium category, namely 8.71 mm, 40% in the strong category, namely 10.33 mm, 60% in the strong category, namely 12.66 mm, 80 The % strong category is 15,61 mm and in the positive control (clyndamicin concentration 40%) the very strong category is 45,8 mm.

## REFERENCES

Afifi, R., Erlin, E., & Rachmawati, J. (2018). UJI ANTI BAKTERI EKSTRAK DAUN BELIMBING WULUH (Averrhoa bilimbi L) TERHADAP ZONA HAMBAT BAKTERI JERAWAT Propionibacterium acnes SECARA IN VITRO. *Quagga : Jurnal Pendidikan Dan Biologi*, *10*(01), 10. https://doi.org/10.25134/quagga.v10i01.803

Amalia Asikin, G., & Agus Wibowo, M. (2016). Uji Aktivitas Antibakteri Ekstrak Etanol Daun Mangga Bacang (Mangifera foetida L.) terhadap Propionibacterium acnes secara in vitro. *Jurnal Cerebellum*, *2*, 434–449.

Anggorowati, D., Priandini, G., & Thufail. (2016). Potensi daun alpukat (persea americana miller) sebagai minuman teh herbal yang kaya antioksidan. *Industri Inovatif*, *6*(1), 1–7.

Christanto. (2014). *Kapita Salekta Kedokteran* (4th ed.). Media Aedculapius.

Depkes RI. (2014). *Farmakope Indonesia* (V).

Fathnur Sani K. (2018). *Metodologi Penelitian Farmasi Komunitas Dan Eksperimental* (Fathur Sani (ed.)). Deepublish.

Hidayah, N. (2016). Pemanfaatan Senyawa Metabolit Sekunder Tanaman (Tanin dan Saponin) dalam Mengurangi Emisi Metan Ternak Ruminansia. *Jurnal Sain Peternakan Indonesia*, *11*(2), 89–98. https://doi.org/10.31186/jspi.id.11.2.89-98

Ismiyati, Marlita, D., & Saidah, D. (2014). Pencemaran Udara Akibat Emisi Gas Buang. *Jurnal Manajeen Transportasi & Logistik*, *1*(3), 241–248. https://journal.itltrisakti.ac.id/index.php/jmtranslog/article/view/23/24

Madduluri, S., Babu Rao, K., & Sitaram, B. (2013). In vitro evaluation of antibacterial activity of five indigenous plants extract against five bacterial pathogens of human. *International Journal of Pharmacy and Pharmaceutical Sciences*, *5*(SUPPL.4), 679–684.

Meisya, N. M., & Yamin, Y. (2022). Pengaruh Fishbone Diagram Terhadap Kemampuan Literasi Membaca Peserta Didik di Sekolah Dasar. *Jurnal Basicedu*, *6*(5), 7950–7957. https://doi.org/10.31004/basicedu.v6i5.3690

Putri, D. D., Furqon, M. T., & Perdana, R. S. (2018). Klasifikasi Penyakit Kulit Pada Manusia Menggunakan Metode Binary Decision Tree Support Vector Machine ( BDTSVM ). *Jurnal Pengembangan Teknologi Informasi Dan Ilmu Komputer*, *2*(5), 1912–1920.

Rikomah, S. E., Andriyani, N., & Yuniarti, M. (2019). Gambaran Penggunaan Gentamisin Pasien Pediatri di Bangsal Anak Rumah Sakit Bhayangkara Bengkulu. *Jurnal Endurance*, *4*(1), 126. https://doi.org/10.22216/jen.v4i1.3211

Sulaiha, Mustikaningtyas, Widiatningrum, & Dewi. (2022). Senyawa Bioaktif Trichoderma erinaceum dan Trichoderma koningiopsis Serta Potensinya Sebagai Antibakteri. *Life Science*, *11*(2), 120–131.

Wijaya, I. (2020). Potensi Daun Alpukat Sebagai Antibakteri. *Jurnal Ilmiah Kesehatan Sandi Husada*, *12*(2), 695–701. https://doi.org/10.35816/jiskh.v12i2.381

Yuniharni, D., Marpaung, L., & Lenny, S. (2021). Uji Aktivitas Antibakteri Senyawa Flavonoid Total dan Tanin Total dari Ekstrak Daun Jambu Monyet (Anacardium occidentale. L). *Quimica: Jurnal Kimia Sains Dan Terapan* , *3*(1), 30–37. https://ejurnalunsam.id/index.php/JQ