

**ANTIMICROBIAL POTENTIAL OF GARLIC FRESH (*Allium sativum L.*)  
AND LAKOR ONION (*Allium ascalonicum L.*) ON THE GROWTH OF *Staphylococcus aureus***

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**ABSTRACT**

Garlic (*Allium sativum L.*) and shallot Lakor (*Allium ascalonicum L.*) local products are plants that are used as spices for various dishes and can be used as herbal medicine. For natural use, safe and easy to consume which can be seen through its potential as herbal medicine, a study was carried out to test the antimicrobial potential of garlic (*Allium sativum L.*) and Lakor shallot (*Allium ascalonicum L.*) juice on the growth of bacteria (*Staphylococcus aureus*). Lakor garlic and shallots are grated, the results of grated Lakor garlic and shallots are squeezed to produce 100% pure onion bulb juice. Lakor garlic and shallot juice was diluted with concentrations of 25%, 35%, 45%, 55%, 65%, 75%, 85% and 95%, respectively. Antimicrobial activity was tested by the diffusion method using a disk to measure the diameter of the clear zone. The results showed that garlic (*Allium sativum L.*) was able to inhibit the growth of *Staphylococcus aureus* which could be demonstrated by the clear zone diameter of 16.3 mm at a concentration of 35% and at a concentration of 65% the diameter of the clear zone exceeded the clear zone of the amoxycillin antibiotic. Lakor red onion (*Allium ascalonicum L.*) showed antimicrobial potential but was unable to damage the bacterial cell wall as indicated by the diameter of the clear zone of 7.7 mm at a concentration of 95%. There is potential for both onion bulbs but have different antimicrobial properties against the growth of *Staphylococcus aureus*.

**Keywords:** *garlic, lakor red onion, staphylococcus aureus, antimicrobial*

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**INTRODUCTION**

Infectious diseases are caused by bacteria, one of which is *Staphylococcus aureus* which lives in the pores of the skin and parts of the body that secrete mucus so that when a wound or skin tissue is injured the chance for this bacteria to infect is greater, because the place where these bacteria live is close to the skin. *Staphylococcus aureus* is a facultative anaerobic gram-positive bacterium that has a coccus (spherical) form, produces enterotoxins and is commonly found in air, dust, sewage, water, milk, food or cutlery on environmental surfaces (Wertheim. H.F. 2004). These bacteria are also often found in the pores and surfaces of the skin, sweat glands and intestinal tract (Brooks. G.F et al, 2007).

Garlic (*Allium sativum L.*) is a long-lived, acrid herb. This plant originates from Southern Europe, then it is planted everywhere, including in Indonesia, especially for its tubers which are widely used in spices for various dishes. This plant belongs to the Liliales nation and the Liliaceae tribe, one of the tribes of the Liliales nation which has members that can produce medicinal ingredients or medicines (Tjitraoepomo. G. 2005). Garlic was used as a medicinal ingredient such as wound medicine from the Middle ages until the Second World War, during the war it was used by medical personnel to treat injured soldiers (Amagase. H. et al, 2001). Garlic has clinical potential from previous large studies that have been conducted that garlic has the effect of reducing heart disease, reducing the risk of cancer, antimicrobial and antioxidant (Kemper. K.J. 2005). The compound that has the most active role as an antimicrobial in garlic is allicin (allyl 2-propenethiosulphinate) and its derivatives (diallyl thiosulfinate and diallyl disulfide). These substances will not appear if garlic is not crushed or chopped, so when cut or crushed it will damage the garlic cells so that it releases the allinase enzyme which is capable of converting alliin to allicin (Amagase. H. et al, 2001).

Lakor shallots are one of the riches of the Southwest Maluku region. Lakor red onion (*Allium ascalonicum* L.) is a type of community need, both used for spices or staple food ingredients and also for its nutritional content. Shallots are widely used as a staple ingredient in cooking, because of their distinctive taste and aroma characteristics. Lakor shallots (*Allium ascalonicum* L.) when viewed physiologically are not much different from shallots that we usually find in the market, but what distinguishes them is that Lakor shallots have characteristics in terms of taste and aroma, a spicier taste and a more fragrant aroma which makes people not interested in shallots which are not their product according to empirical data obtained according to Muhlisah (2000), Shallots contain allicin and essential oil compounds which are bactericidal and fungicidal. The active ingredients of essential oils consist of cycloalliin, methylalliin, kaempferol, quercetin and phloroglucin. Red onion is also a close relative of garlic which also has allicin which can be used as a bactericidal and fungicide. To date, research on the antimicrobial potential of Lakor shallots has never been carried out. based on previous studies on common shallots and some empirical data on Lakor shallots which became the basis for using local products to see antimicrobial potential. This study aims to see the antimicrobial potential of garlic (*Allium sativum* L.) and lakor shallot (*Allium ascalonicum* L.) juice on the growth of *Staphylococcus aureus* bacteria.

## **METHOD**

### **Tools and materials**

The tools used were erlenmeyer, glass beaker, hot plate, magnetic stirrer, petridish, autoclave, 37°C shaker incubator, oven, bunsen, analytical balance, tweezers/scissors, cloth filter, knife, grater, test tube rack and test tube, 37°C incubator, loop needle, stir bar, spreader bar, vortex, ruler, spatula, tip, micropipette, spectrophotometer, diluent bottle and camera. The materials used were pure culture isolates collected from the Microbiology Laboratory, Faculty of Mathematics and Natural Sciences, Pattimura University. (*Staphylococcus aureus*), *Allium ascalonicum*, *Allium sativum* taken from several supermarkets or markets in Ambon, Brain Heart Infusion-Broth media (BHIB), Mueller Hinton Agar (MHA) media, distilled water, Spirtus, Amoxycillin AML25 antibiotic disks, blank disks, cotton, NaCl, 70% alcohol and 95%, BaCl<sub>2</sub>, H<sub>2</sub>SO<sub>4</sub>, Mc Farland 0.5 and bacto agar.

### **Procedure**

This research was carried out in several stages, namely taking samples of Lakor garlic and shallots, making media, sample preparation, the process of making Lakor garlic and shallot juice. Sampling of garlic from the market Ambon mardika and samples of Lakor garlic and shallots through a research agency and a letter to the Regent. Making 1.3 grams and 13.7 grams of BHIB and MHA media. Sample preparation of *Staphylococcus aureus* bacteria was taken from pure isolates at the Microbiology Laboratory, Pattimura University, cultured in MHA media for 24 hours at 37°C, taken from MHA media as much as 1 ose was put into BHIB media, incubated in a shaker at 122 rpm for 24 hours at 37°C, took 3 µL and homogenized, compared to turbidity with standard 0.5 McFarland standard solution equivalent with  $1 \times 10^6$ . The process of making Lakor garlic and shallot juice. Lakor garlic and shallots are washed, weighed as much as 500 grams each, grated and squeezed through a sterile cloth filter to produce pure onion bulb juice with a concentration of 100%.

### **Evaluation of antimicrobial**

The antimicrobial potency test was obtained by diluting each of eight concentrations of lakor garlic and shallot juice, namely concentrations of 25%, 35%, 45%, 55%, 65%, 75%, 85% and 95%. Several blank discs were taken and dripped with eight concentrations of each onion bulb with three repetitions. Compared with the negative control of distilled water and the positive control of amoxycillin antibiotics. Comparing the turbidity of NaCl 0.1 with Mc Farland's standard 0.5. Spread the *Staphylococcus aureus* bacteria with a spreading rod over the MHA medium. Place the test disk into the MHA medium and incubate it for 10 hours at 37°C.

## **DISCUSSION RESULT**

The results obtained from the antimicrobial potency test of garlic (*Allium sativum* L.) and lakor shallot (*Allium alasonicum* L.) on the growth of *Staphylococcus aureus* bacteria with respective concentrations of 25%, 35%, 45%, 55%, 65%, 75%, 85% and 95% can be shown through the histogram below:

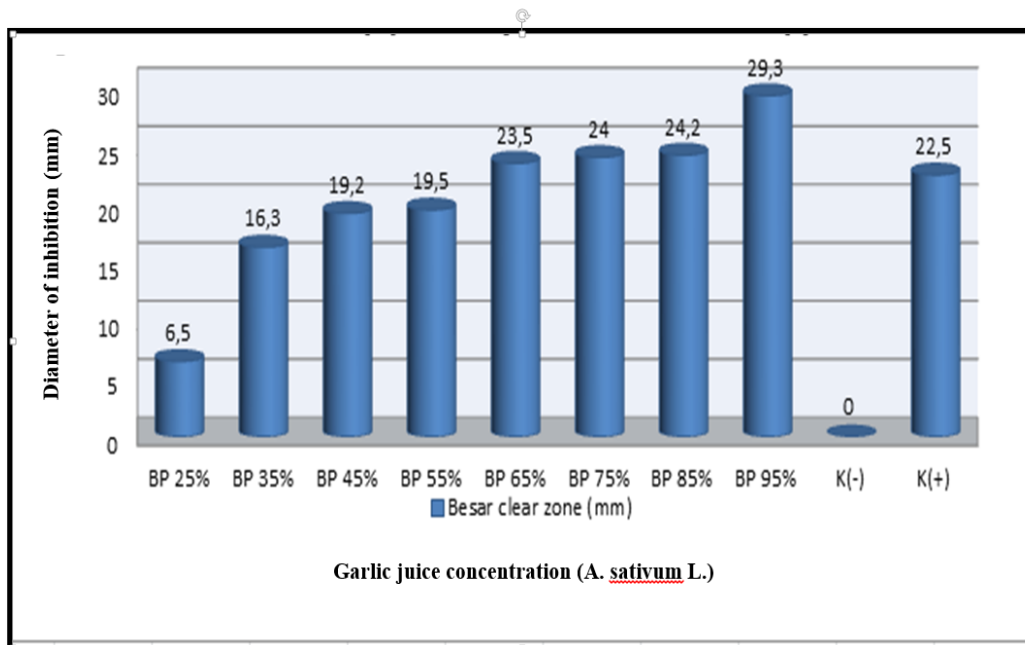


Figure 1(a). Histogram of the diameter of the inhibition zone (mm) with control (+) Amoxycillin and control (-) in garlic juice (A.sativum L.) with concentrations of 25%, 35%, 45%, 55%, 65%, 75%, 85% and 95% had a larger inhibition zone that was larger than the positive control

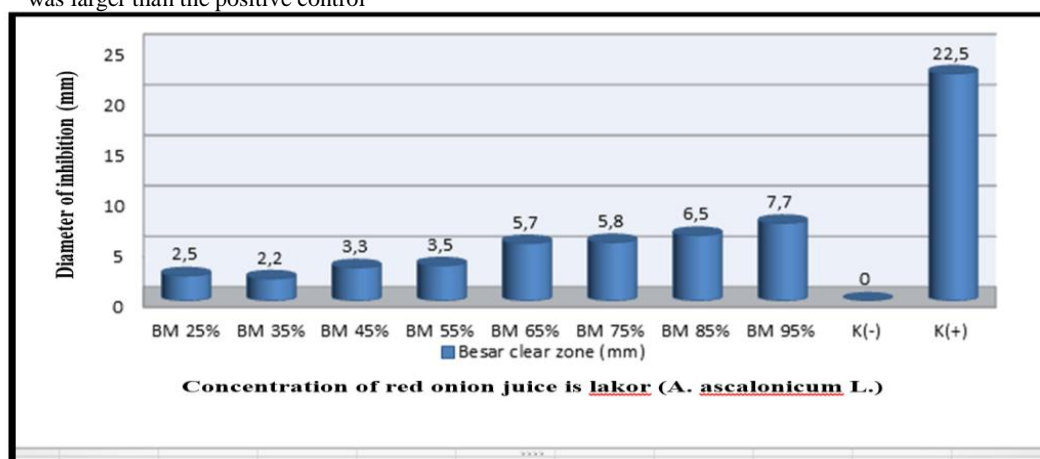


Figure 1(b). Histogram of the diameter of the inhibition zone (mm) with control (+) Amoxycillin and control (-) in lakor onion juice (A.ascalonicum L.) with concentrations of 25%, 35%, 45%, 55%, 65%, 75%, 85% and 95% had inhibition zones that were getting bigger but not bigger than the positive control.

The results of this study indicate that garlic juice (*Allium sativum* L.) indicated in the histogram in Figure 1(a) contains antimicrobials that can inhibit the growth of *Staphylococcus aureus*. The greater the concentration given, the greater the clear zone produced from garlic (*Allium sativum* L.). In garlic juice (*Allium sativum* L.) with the lowest concentration used in this study, namely 25%, the diameter of the clear zone formed around the disk was 6.5 mm. It can also be seen that starting from a concentration of 35%, it was able to inhibit properly. At a concentration of 65%, a larger inhibition zone was obtained compared to the positive control of the amoxycillin antibiotic. This shows that the antimicrobial ability of garlic juice is greater than the antibiotic amoxycillin.

The results of the research on the inhibition test of lakor shallot extract (*A. Ascalonicum* L.) which is morphologically specific to lakor shallot (*A.ascalonicum* L.) originating from Lakor Island, Southwest Maluku for the growth of *Staphylococcus aureus*, the lowest concentration used in this study is the same as garlic, namely 25% but has a different antimicrobial ability than garlic (*Allium sativum* L.) can be seen in the histogram in Figure 1(b). The diameter of the inhibition zone produced depends on the greater the

concentration, the greater the antimicrobial power produced. The inhibition of Lakor shallot extract (*A. Ascalonicum* L.) on the growth of *Staphylococcus aureus* showed that Lakor shallot extract was not able to inhibit the growth of *Staphylococcus aureus*. It can be seen in the histogram of figure 1(b) that the largest concentration of 95% had a clear zone formed of 7.7 mm smaller than the clear zone formed from the positive control of the antibiotic amoxycillin, which shows that Lakor shallot has the potential to inhibit but not be able to damage the cell wall of *Staphylococcus aureus* bacteria. Based on the phytochemical analysis according to research [8] it can be seen that the inhibiting or antimicrobial potential of shallots actually exists. In fact, research on Lakor shallots (*A.ascalonicum* L.) proved not because these shallots have a spicier and hotter characteristic which was the initial suspicion of being able to inhibit *S.aureus* bacteria but because Lakor shallots also contain the same organsulfur as ordinary shallots which provide potential antimicrobial effects, but are unable to damage the cell walls of *Staphylococcus aureus* bacteria.

## CONCLUSION

Potency antimicrobial of garlic juice (*Allium sativum* L.) and lakor shallot (*Allium ascalonicum* L.) in several controlled concentrations that have been tested and compared with the positive control of amoxycillin antibiotic and negative control of distilled water on the growth of *Staphylococcus aureus* bacteria. It can be concluded that: Garlic juice (*Allium sativum* L.) and Lakor shallot (*Allium originicum* L.) have antimicrobial potential against the growth of *Staphylococcus aureus* bacteria. 35% was good at inhibiting but when compared to the positive control of antibiotics, garlic at a concentration of 65% had an inhibitory potential that exceeded the antibiotic amoxycillin, while red onions failed at all concentrations not being able to inhibit the growth of *Staphylococcus aureus* bacteria properly.

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