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The Existence of Bacteri Staphylococcus Aureus After Application of Allium Aativum in Hasanuddin University Hospital Makassar

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Abstract

One of the indoor biological pollution is the existence of bacteria. The existence of bacteria in the air indoor of hospital will rise nosocomial infection. One of the prevention and control ways of the bacteria is by spraying disinfectants. Generally, disinfectants use chemicals. However chemical disinfectant will result in adverse effect to both of environmental and health. So it need to find the alternative disinfectants from natural of garlic (Allium sativum). This study aimed to explore the effect of application of garlic (Allium sativum) as natural disinfectant to the existence of bacteria Staphylococcus aureus in Hasanuddin University Hospital. This research was quasi-experimental study using a pretest-posttest control group design. There were three rooms of policlinic in the University Hasanuddin Hospital, where the sampling to place. The garlic concentration was dissolved to make a concentration of 40%, 60%, 80%, of solution then used for spraying the existence of bacteria was checked the rooms before and after spraying disinfectant. The results of this study showed that application of garlic (Allium sativum) can eliminate the existence of bacteria Staphylococcus aureus. It is concluding that concentration 80% of garlic (Allium sativum) gave most influence to the elimination of bacterial death. It is recommended to the hospital to apply the use of disinfectants from elimination these natural plant.

Keywords: *Garlic, Staphylococcus aureus, Disinfectants, Hospital.*

1.0 INTRODUCTION

Bacteria found in the air in a hospital room will be a disease spread agent and result in nosocomial infection. This infection is prevalent throughout the world with the highest percentage being in poor countries and developing countries (Dacarro et al, 2003). Nosocomial infections in a hospital can occur in several ways: through air (inhalation) direct contact (through the hands of the clerk and the tools used) and wound precaution (postoperative care) (Lantang et al., 2012). This infection may be occured due to less clean hospital environment. Where the source of many germs is found in the hospital environment (Amnah et al, 2016).

Hospitals are places where sick people are treated and placed in very close proximity. At the hospital patients get therapy and care to get well. On the other hand, the hospital is not only a place to seek healing, it is also a depot for various diseases, especially diseases caused by microorganisms (Dwi, 2016). Dust in the air in hospitals or rooms of people suffering from infectious diseases consist of microorganisms such as *Tuberculosis sp*, *Streptococcus sp*, and *Staphylococcus aureus*. The bacteria can spread in the air through coughing, sneezing, talking, and laughing. These microorganisms come out of saliva and mucus fluids containing bacteria (Waluyo, 2009). Previous research conducted in South Sulawesi Indonesia (Nismawati et al, 2018) in patients at the Hasanuddin University Hospital showed that the resistance of *Staphylococcus aureus* bacteria to antibiotics cefoxitin is an important agent of nosocomial infections. Infectious diseases are still the main cause of high rates of morbidity and mortality in the world. One type of infection is a nosocomial infection, so prevention and control are needed to be done.

Disinfectant can destroy microorganisms. By using chemicals killing microorganisms (bactericide). The disinfection process alone can eliminate 60-90% of microorganisms. However, the use of chemical-based disinfectants continuously for long periods will have a negative impact on the environment. So that the alternative method is to use natural ingredients from plants, namely garlic (*Allium sativum*). Garlic (*Allium sativum*) can be used as a natural disinfectant to destroy bacterial microorganisms because in the bulbs of garlic (*Allium sativum*) contains important compounds that inhibit the growth of bacteria namely Allicin, Flavonoids (Wastiti et al, 2017).

2.0 DATA AND METHOD

2.1 *Location of Study*

The study was carried out at the University of Hasanuddin Hospital in Makassar City the rooms of outpatient unit.

2.2 *Design and Variable of Study*

The design of this study is Quasi Experimental, using a pretest-posttes control group design approach. *Staphylococcus aureus* bacteria were identified before and after the rooms treatmented.

2.3 *Population and Sample*

The population in this study were all *Staphylococcus aureus* bacteria identified in three rooms in outpatient installations in 2019. The samples in the study were accidentally drawn by members of the population, namely *Staphylococcus aureus* bacteria identified in the cup.

2.4 *Collection data*

Primary data was obtained from measurements and direct observations at the study site which consisted of identification of the presence of *Staphylococcus aureus* bacteria, which was obtained from the results of direct measurements before and after treatment garlic juice uses a cup device as a medium for bacterial growth. Examination of samples of *Staphylocoocus aureus* bacteria was carried out by expert officers at the Bacteriology Laboratory of the Faculty of Medicine UNHAS Makassar. Secondary data was obtained from the University of Hasanuddin Hospital, Makassar City, related to the number of rooms carried out by microbiology examination, and the air quality examination data of the treatment room.

2.5 *Data analysis*

The data obtained in this study are presented in the form of a distribution table to see the application of sharing the concentration of garlic juice (*Allium sativum*) to the presence of *Staphylococcus aureus* bacteria before and after spraying.

3.0 RESULTS

Table 1. The Existence of *Staphylococcus Aureus* in Air Bacteria Examination After Given Treatment with Garlic (*Allium Sativum*)

Rooms	Concentration	Existence *Staphylococcus aureus*					
		Day					
		I		II		III	
		Pre	Post	Pre	Post	Pre	Post
Room1	40%	+ Positif	+ Positif	+Positif	+Positif	+Positif	+ Positif
Room 2	60%	+ Positif	−Negatif	+Positif	−Negatif	+Positif	+ Positif
Room 3	80%	+ Positif	−Negatif	+Positif	−Negatif	+Positif	+ Positif

Source: Primary Data, 2019

Table 1. showed presence of *Staphylococcus aureus* bacteria in each concentration of garlic solution of 40%, 60%, and 80% with 3 repetitions and for 2 hours 30 minutes. It can be seen that the lowest concentration of 40% with 3 time measurements were still present the *Staphylococcus aureus.* While in the highest concentration of 80% solution. negative or no airborne bacteria *Staphylococcus aureus* in the first a second intervention. However, in the third repetition of all concentrations, *Staphylococcus aureus* were still present .

4.0 DISCUSSION

The results of examination of air germ numbers and the presence of *Staphylococcus aureus* bacteria before being given treatment showed the presence of *Staphylococcus aureus* bacteria in each room each repetition. The presence of these bacteria is influenced by the contribution of physical environmental factors.

Physical environmental factors such as temperature, humidity, and lighting that do not conform to the standards set will affect the number of colonies of germs or the number of germs in the air. Humidity is very important for the growth of microorganisms. In general, bacterial microorganisms require high humidity. Natural lighting from sunlight in addition to spreading heat rays to the earth, also emits ultraviolet light which kills microbes. Some microorganisms can also multiply on damp roofs, tiles, faucets in the bathroom or room divider (Wikansari, 2012). Then the conditions of temperature, humidity and inappropriate lighting will allow germs and bacteria to die more quickly (Jawetz, 2005).

This study *Staphylococcus aureus* were present in the room before treatment because these bacteria are normal flora in humans. According to Jawetz (2005) Colonies of *Staphylocoocus aureus* occupy the anterior part of the nose and are present in human skin. This species is pathogenic and causes a number of infections that attack healthy individuals. This is in line with the research of Wikansari (2012) who said that *Staphylocoocus aureus* bacteria can also be found in clothing, in the environment around the hospital, and can also be through air entering through the door of the room. In the concentration of 40% of garlic solution *Staphylocoocus aureus* bacteria still present. because the dosage of disinfectant was very low. The solution was not enough to elimination the bacteria. Concentration of 60% the *Staphylocoocus aureus* bacteria die. This was because an increase of the concentration of in the solution increase of killing power.

The concentration of 80%, was the strongest concentration to eliminate the *Staphylocoocus aureus* bacteria. This is in line with Musab's research (2018) on the effect of spraying sodium hypochlorite and garlic extract on alginate molds on *Staphylococcus aureus*, it was staled that the ability of disinfectants from garlic (*Allium sativum*) extract was influenced by the concentration factor or the intensity of antimokrobial substances.

On the third repetition, solution all concentration of garlic could not eliminate the *Staphylococcus aureus* bacteria. This was occured because during the treatment their workers and cleaners who were care came in and out of the room. By Indiarti (2001), contamination of airborne germs carried directly or indirectly by health workers will increase the number of bacteria in the air.

5.0 CONCLUSIONS

Based on the results of the research and discussion it can be concluded that:

1. Garlic juice (*Allium sativum*) has an effect on the effect of *Staphylococcus aureus* in three outpatient installation rooms at Hasanuddin University Hospital.
2. The concentration of garlic juice (*Allium sativum*) which had the most effect on the mortality of *Staphylococcus aureus* bacteria on the first and second repetitions was 80% with a treatment time of 2 hours 30 minutes.

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