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# The Effectiveness of Giving 25% Green Betel Leaf Extract Formula (*Piper Betle)* in Reducing Germ Numbers on the Emergency Room Floor of RSU "X" Ponorogo Regency

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## ABSTRACT

Hospitals are places of service that aim to achieve optimal health for the community. In addition to seeking cures, hospitals are also a source of various diseases for both patients and visitors. The disease is caused by pathogenic microorganisms that multiply in the air, water, floor, food, medical and non-medical equipment. One of the most common hospital-acquired infections in the Emergency Department (ER) is nosocomial infection. The purpose of this study is to determine the effectiveness of the use of green betel leaf extract *(Piper betel)* in reducing the number of germs on the emergency room floor at the x Hospital of Ponorogo Regency. The method used in this study is experimental, with the analysis being *Quasi-Experimental* and using *Pretest-posttest Group Design*. The percentage of effectiveness in reducing the number of germs in the 25% formula is 86.78%, the 20% formula is 85.40%, the 15% formula is 8 1.96%, and the 10% formula is 75%. There was a decrease in the number of germs on the floor of the emergency room using green betel leaf extract *(Piper Beetle)*. The effectiveness of green betel leaf extract on the floor swab test is found in the 25% formula. In addition, a long soaking method and a higher formula can be used to measure the effectiveness of green betel leaf extract as an antibacterial in reducing the number of germs on the floor.

**Keywords:** Germ Number, Emergency Installation, Green Betel Leaf Extract

## INTRODUCTION

A health development target is a healthy environment, including a hospital environment. The quality of the environment in hospitals is a problem that requires more attention because various efforts to transmit germs that cause infections can be experienced through *airborne*, droplets, or direct contact. In hospitals, there is a spread of nosocomial infections that can be experienced in several facilities in hospitals, such as operating or surgical rooms, outpatient installations, emergency rooms, and inpatient rooms. The control of these microorganisms is very important to prevent the spread of diseases and infections caused by the transmission of germ numbers that exceed quality standards. (Casandra, 2020)

The germ number is one of the indicators to measure nosocomial infections, which is commonly abbreviated as HAIs, which is an infection acquired when a patient is admitted to the hospital. Nosocomial of origin is Greece's "*nosocomial,"* which means hospital. Then, infection means contracting pests and diseases. The infection can be present at least 3 x 24 hours from the start of treatment and is not a persistent infection in previous treatment. This disease arises from various other healthcare facilities. When entering, the patient does not have

an infection or is in the incubation period. (Kemenkes RI, 2017) The cause of nosocomial infection is bacteria, fungi, or viruses. This is contagious and results in diseases with hand contact that is affected by germs, medical equipment that is less sterile, floors that are not sterile and floors that are not maintained cleanliness based on the Indonesian Minister of Health Regulation No. 2 of 2023 about the Implementation Regulation of Government Regulation No. 66 of 2014. (Ministry of Health, 2023)

The risk of nosocomial infection can increase when the patient undergoes treatment in the hospital, including being in the same room with other patients such as those aged 70 years and above, applying antibiotics for a long period of time, wearing a urinary catheter, a physical condition resulting in a continuous sleeping position, decreased physical consciousness, and the patient has a weak immune system. Examples of nosocomial infectious diseases are IADP, urinary tract infections (UTIs), pneumonia, and ILO (Seftiwan Pratami Djasfar & Pradika, 2023).

According to WHO data, there are 3-21% or an average of 9% infected with nosocomial infections, whereas at the international level, there are 9 million out of 190 million patients in hospitals. This infection causes a death rate of up to 1 million per year. In accordance with the prevalence of these infections there are more than 1.4 million or 9% of hospitalized patients around the world are nosocomial infections, findings from WHO from 55 hospitals from 14 countries that provide representation of 4 regions (Europe, Southeast Asia, the Middle East, and the Western Pacific) there are 8.7% explaining the existence of nosocomial infections and 10.0% occurring in Southeast Asia, in Europe there are 4 million – 4.5 million more patients, and ±5% of 40 million patients occur in United States per year accompanied by 1% of deaths and the burden of handling costs is up to 4.5 m in one year. The prevalence of HAI infection in developed countries is between 3.5% and 12%, and in developing countries, especially in Indonesia, there is HAIS of 9.1% through a variation of 6.1%-16% (WHO, 2021).

According to data from the Ministry of Health, HAI infections in Indonesia are up to 15.74%, exceeding the number in developed countries between 4-8-15.5%. In accordance with the results of observations made by 10 General Education Hospitals in Indonesia, a very large number was obtained, namely 6-16% of the nosocomial infection rate, where the average was 8%. Nosocomial infections that are commonly experienced are IDO, IADP, lower respiratory tract infections and UTIs (3, 2020).

Based on data from the East Java Provincial Health Office in 2014, the trend of nosocomial infections increased from 2011 to 2013, namely 306, 400, and 526 consecutive incidents. The number of germ colonies in the walls and floors of hospital rooms can provide support for biological transmission in the room, especially in the air that is easily exposed to workers and patients. This can lead to nosocomial infection or cross-contamination (East Java Health Office 2014).

Health facilities such as hospitals becoming health care facilities can cause a source of disease for the patients in it, workers and everyone who visits the hospital. The infection experienced can be transmitted and obtained from sick people, officers, visitors with career status or due to hospital conditions. In Indonesia, findings in 11 hospitals in DKI Jakarta explain that 9.8% of inpatients can be infected with nosocomial infections (Suarmayasa, 2023).

The quality of the environment in hospitals is something that must be paid attention to because the transmission of germs due to infection can spread in various ways, namely through direct contact and indirect contact. So the cause of the disease can occur through walls, air, floors and medical equipment. Microorganisms that often have the potential to cause nosocomial infections are Proteus sp., Escherichia colii, Staphylococcus aureus, Candida albicans, and Pseudomonas aeruginosa. Where the average person spends 80-95% of his activities in a room. The requirements for walls and floors in hospitals need to be cleaned,

through the level of cleanliness in the sterilization of the emergency room is 0-5 CFU/cm² (Ministry of Health, 2023).

One of the infections on the hospital floor caused by bacteria is *Staphylococcus aureus*. This bacteria can settle in humid areas, so if the floor is in a less clean condition and there is no disinfectant, the development of bacteria can develop rapidly. The large number of patients, waiters and visitors is a group of people who are the source of bacteria in the treatment room. Bacteria in a person's body can be found on the nose, skin, and mouth. Many microorganisms that are scattered on the floor and air in the treatment room are influenced by carrier factors that have a role in the distribution of microorganisms. Floors can be the highest medium of transmission, so attention needs to be paid to keep them sterile and clean. In connection with this, the floor needs to be cleaned regularly. For example, in efforts to clean the floor by utilizing disinfectants from green betel leaf extract (Casandra, 2020).

Ponorogo X General Hospital is a hospital of the NU organization, namely PCNU Ponorogo and PC X NU Ponorogo Regency. Ponorogo X Hospital is a type D hospital and a five private hospital in Ponorogo Regency. This hospital consists of ICU rooms, emergency rooms, isolation rooms and inpatient rooms. The inpatient room consists of VIP class, class I-III, PICU and NICU.

The Emergency Room (Emergency Installation) has a great opportunity for workers, visitors, non-medical workers, and patients during certain hours as a process of interaction. In accordance with the factors of maintaining space in hospitals, for example, cleanliness in the inpatient room is not the same as isolation and surgery rooms that strictly implement sterilization. The floor of the emergency room in the hospital is an outdoor medium as a container for the spread of several forms of microorganisms. (Sukmawaty et al., 2017) The visitors who came to the X Hospital in Ponorogo Regency were crowded. Those who enter the room will pass through the emergency room first so that the risk of germs is estimated to be high.

Betel leaves *(Piper beetle)* is a species in the genus *Piper* that is famous among the community because it is not only used for herbs but also has an important value in the culture or culture of the community. Traditionally, betel nut is applied as an antiseptic, anti-inflammatory, bleeding stopper, cough reliever, preventing worms, stimulating saliva, sedation, and relieving itching. Betel is usually thick in the customs of people in the East to the western tip of Indonesia. Betel is commonly used because it has a variety of functions and can be found growing in any area. In various countries in Southeast Asia to India, betel has a close relationship with people's culture. The habit of chewing betel ("betel") in Java and various regions in Indonesia, in fact, is also applied to other countries such as Cambodia, India, Thailand, Myanmar, and Malaysia. The types of betel leaves in Indonesia are green betel, red betel, and black betel (Rahmawati et al., 2020).

The advantage of green betel leaves is that they contain as much as 0.8–1.8%, including chavicol, alilpirocatechol and capitol. Other compounds are diacetate, alilpirocatechol mono, carvacrol, eugenol methyl ether, eugenol, sineol, p-cement, cadence estragol, karyophyllene, sesquiterpenes, terpenes, sesquiterpenes, tannins, phenylpropan, thiamine, carotene, nicotinic acid, riboflavin, sugar, vitamin C, amino acids and starches. Kavikol causes betel nut to have a distinctive odor and is efficacious as an antibacterial 5x stronger than immunomodulators and phenols (Arina et al., 2023).

Green betel leaves are empirically used as antiseptics, namely saponins and flavonoids. Saponin compounds can cause damage to the cytoplasmic membrane as well as the killing of microbial cells. This betel leaf can be used as a disinfectant after going through a processing process that is applied as a microorganism killer. Disinfectant liquids are generally applied as a killer of microorganisms in rooms, floors, medical, clothing equipment, and other objects. Disinfectants from betel leaf extract are very important for clinics and hospitals because they

can provide infection prevention in the clinics and hospitals they use (Dra. Hj. Darini Kurniawati, 2021).

The results of the initial observation implemented in April 2024 obtained secondary data on the number of germs in the emergency room floor of the X Hospital in Ponorogo Regency of 13 CFU/cm$^2$. The number of germs has exceeded the quality standard value based on the Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning Government Regulation No. 66 of 2014 concerning Environmental Health, which is worth 0-5 CFU/cm$^2$.

According to a study by (Owu et al., 2020), which was carried out at the Advanced Pharmacy Laboratory, Faculty of Mathematics and Natural Sciences, Sam Ratulangi University, the effectiveness of betel leaf extract (*Piper bet*el) is proven by antibacterial effectiveness tests at concentrations of 25%, 20% and 15% can provide inhibition of bacterial development *Streptococcus mutans*. In accordance with the findings, the conclusion is that betel leaf ethanol extract contains tannin compounds and is effective in killing bacteria *Streptococcus mutans* through the value of KHM (Minimum Inhibition Concentration), an antimicrobial substance that kills the development of bacteria after incubation within 24 hours, namely in a concentration of 15%.

In addition, the use of betel leaf extract by researchers (Sahani & Indrayanti, 2019) Regarding the rinsing of tableware with betel leaf extract with a concentration of 5% can provide a reduction in the number of germs in the cart meatball tableware by 42% and the rinsing of tableware through betel leaf extract has a concentration of 10% can provide a decrease in the number of germs in the cart meatball cutlery by 71%. Betel leaf extract through a concentration of 10% is considered more effective than betel leaf extract through a concentration of 5%.

Meanwhile, the results of the research by (Ekawati et al., 2021) Where that *hand sanitizer* containing betel leaf extract better as a reduction in the number of mesophyll aerobic germs in the palm of the hand compared to *hand sanitizer* that does not contain betel leaves. Average mesophilic aerobic germs in the palm of the hand that utilized *hand sanitizer* contained 25.9 betel leaf extract, and in a palm swab that applied *hand sanitizer* without betel leaf extract, there were 91.9. In accordance with the Mann-Whitney test, a sig value was obtained. 0.000 < a = 0.05, where there was a significant difference in the number of mesophyll aerobes in the palm swab and between the fingers after using *hand sanitizer*, which contains betel leaf extract, and *hand sanitizer*, which does not contain betel leaf extract.

Indicators to measure the number of germs on the hospital emergency room floor can use the swab test method. Meanwhile, efforts to reduce the number of germs are to use disinfectants, one of which is betel leaf extract, because this plant is relatively easy to obtain and lives in tropical soils in Indonesia, namely in Ponorogo Regency and the price is relatively affordable. Considering the benefits of betel leaves, among them are active compounds such as flavonoids, tannins, alkaloids, essential oils and polyphenolic compounds with the potential to reduce germ numbers.

Hospital sanitation efforts to reduce the number of germs on the floor are to wear PPE (Personal Protective Equipment) for patients or family members who enter the emergency room area. The hospital provides regulations to limit people entering the emergency room to minimize germs entering in order to maintain the cleanliness of the room to avoid the risk of exposure *to nosocomial* infections and use disinfection of floor surfaces by chemical methods such as giving disinfectant after completing actions on patients in the hospital or mopping the floor of the room in the hospital regularly for three times a day. Therefore, the researcher is interested in conducting an experiment on "The Effectiveness of Giving Green Betel Leaf Extract *(Piper Betle)* in Reducing Germ Numbers on the Emergency Room Floor of X Hospital, Ponorogo Regency."

## RESEARCH METHODS

A research design is a research design that is prepared in such a way as to provide direction for the researcher to be able to obtain answers to research questions or problems (Suggestion, 2020).

In this study, an experimental method is used, which is a study conducted by conducting a trial on the research subject, then the effect of the intervention is measured and analyzed. The analysis method of this study is *Quasi-Experimental* and uses a *Pretest-Posttest Group Design*, where two groups are selected non-randomly, then a *pretest* is carried out, which is useful to see if there is a difference between the group that is given green betel leaf extract and the group that is not given green betel leaf extract. This experimental research was carried out by administering green betel leaf extract to reduce the number of germs on the hospital floor. The following is a table of experimental research designs *for Pretest And Posttest Group Design.*

**Table 1.** Pretest And Posttest Group Design Experimental Research Design

| | Pretest | Treatment | Posttest |
|---|---|---|---|
| Experiment A | 01 | X (25) | 02 |

Information:
01 = The first measurement of the floor germ number
$X_{(25)}$ = 25% green betel leaf extract formula
02 = Second measurement on the reduction of germ rate on the floor of the emergency room

**Population and Sample**

The population is the group of subjects that become the research population. The population in this study is all floor rooms in the emergency room of the X Hospital in Ponorogo Regency. The sample is part of the population. The sample in this study is five points on the floor of the emergency room of the X Hospital in Ponorogo Regency.

The replication of the betel leaf extract formula to reduce the number of germs on the hospital floor is as follows:

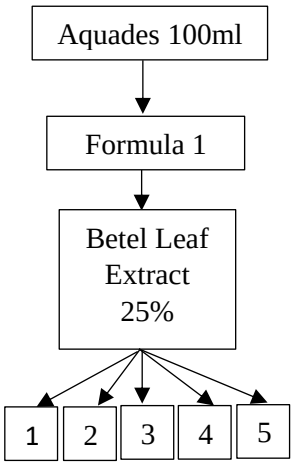


**Figure 1. Replication of Green Betel Leaf Extract Formula to Reduce Germ Rates on the Emergency Room Floor of Muslimat Hospital, Ponorogo Regency**

Information:
→ : Formula
□ : Repeat the formula at five floor points

**Research Stages**

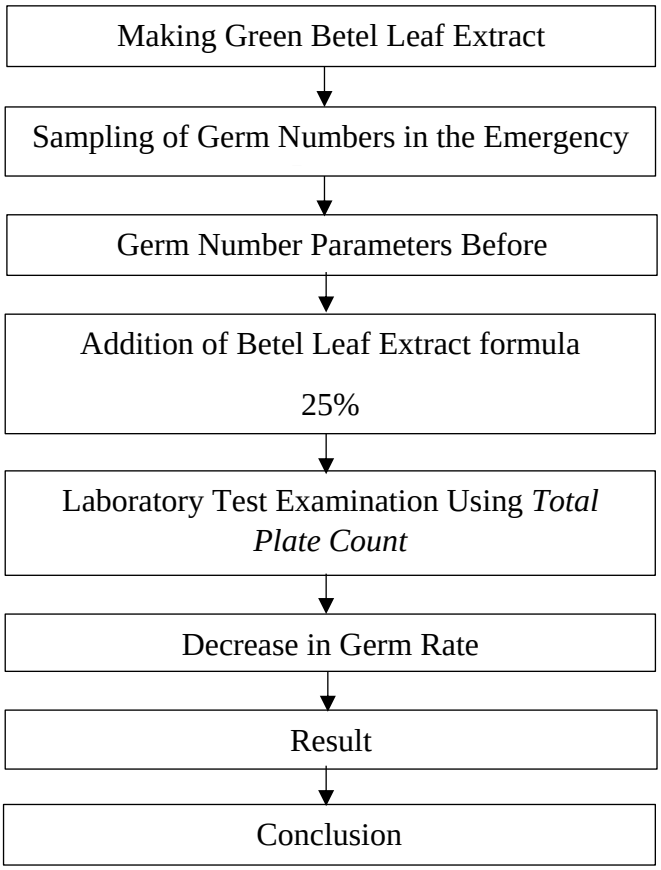


**Figure 3. Research Stages**

**Research Framework**

The framework is a research activity that will be carried out to collect data to be researched to achieve research objectives. The framework of this study is as follows:

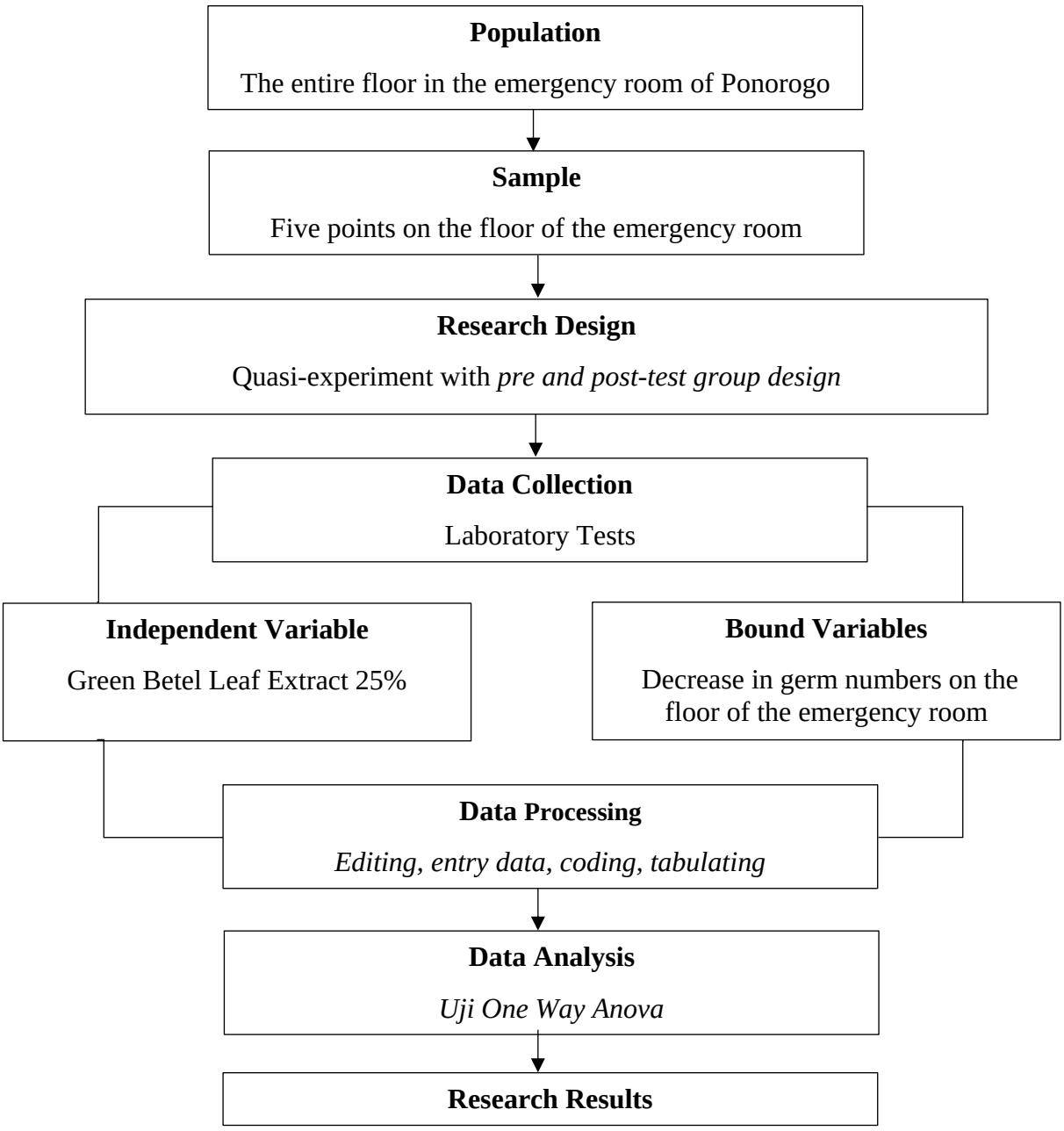


**Figure 3. Research Framework**

## RESULTS AND DISCUSSION

### Overview of Ponorogo Regency X Hospital

This research was conducted at the RSU X of Ponorogo Regency. Where the X Hospital of Ponorogo Regency is the home of one of five private hospitals engaged in health services located on Jalan Jendral Ahmad Yani Number 155, Islamic Boarding School, Surodikraman, Ponorogo District, Ponorogo Regency. Starting with the establishment of RB/BP/BKIA X in 1963, with a long journey, at that time, there was no permanent building, so several times, the location of the service address was changed, and finally, in 1986, it was able to complete the construction of the phase 1 building on Jln. Ahmad Yani 155. The status of BKIA continued until the end of 2001. Then, along with the construction of the Operating Room in 2001, BKIA X was upgraded to RSIA X "Ahmad Yani" Ponorogo. On March 31, 2002, the NU Ponorogo

X Social Welfare Foundation and its management continued the development of RSIA into a General Hospital (RSU) under the name of Ponorogo X Hospital since May 12, 2008. The progress of RSU X that has been achieved today is the result of struggle, dedication and high dedication. On the way, it is inseparable from obstacles and obstacles. RSU X is currently managed by the NU Health Service Implementation Agency (BPPK-NU) Ponorogo as a representative of the owners, namely PCNU and PC X NU Ponorogo Branch. In the future, it is hoped that it will be able to provide the greatest benefits for improving the degree of health and welfare of the community. There is a fairly rapid development at the Ponorogo X Hospital, which is required to always improve the quality of service to service users. The improvement in the quality of service expected by the community, in addition to the completeness of facilities and infrastructure owned by the Ponorogo X Hospital, is also supported by the improvement of human resources. Ponorogo X Hospital is designated as a type D class hospital in accordance with the Decree of the Ministry of the Republic of Indonesia with Number HK.03.05/1/1902/12, dated October 10, 2012, and a permanent permit to operate the hospital by the Decree of the Regent of Ponorogo No. 1376 of 2012, dated December 17, 2012.

**Results of Observation of Perturbrating Variables in the Floor Swab Test**

**Table 2.** Observation Results of Perturbrating Variables

| No. | Variable | Green Betel Leaf Extract 25% |
|---|---|---|
| **1.** | **Temperature** | 27°C |
| **2.** | **Moisture** | 62% |
| **3.** | **Lighting** | 17,1 |
| **4.** | **Number of Visitors** | 22 |
| **5.** | **Observation Time** | 09.00-11.00 WIB |

Source: Primary Data, 2024

Based on the primary data above, it can be seen that the temperature in the emergency room is 27°C, while the humidity is 62%, then the lighting measurement using *a lux meter* obtained a result of 17.1. Furthermore, the number of visitors was 22 people. The study was taken at 09.00-11.00 WIB.

**Data Analysis Results**

This research was carried out from July to August 2024, using a treatment of 25% green betel leaf extract. The examination of the number of germs on the floor of the emergency room was carried out at the Surabaya Ministry of Health Polytechnic of the Magetan Sanitation Study Program. The results of the research were processed using *SPSS 16* softwar

**Data on Reduction of Germ Rates on the Emergency Room Floor of X Hospital, Ponorogo Regency**

**Table 3.** Results of Calculation of the Effectiveness of Reducing Germ Numbers

| Sample | Formula 25% |
|---|---|
| Before treatment | 35 |
| | 35 |
| | 36 |
| | 34 |
| | 34 |
| After treatment | 4 |
| | 5 |
| | 4 |
| | 5 |
| | 5 |
| Average | 7,56 |
| Effectiveness | 86,78% |

Source: Primary data, 2024

The table above shows the results of the calculation of the effectiveness of the 25% green betel leaf extract formula. The 25% formula has an effectiveness of 86.78%. So, it can be concluded that the betel leaf extract formula is categorized as effective in reducing the number of germs on the floor of the emergency room. The formula for calculating the effectiveness value of reducing the germ rate of the green betel leaf extract formula is:

$$\text{Efficiency}=\frac{Total\ sebelum\ perlakuan-Total\ setelah\ perlakuan}{Total\ sebelum\ perlakuan}x100\%$$

**Bivariate Analysis**

Bivariate analysis is a continuation of univariate analysis. In this bivariate analysis, SPSS 16 was used with *the One Way Anova test*, which has a condition, namely normal distribution of data if p-value (≥0.05). Furthermore, the data must be homogeneous as shown by the homogeneity test that the data is said to be homogeneous if the significance value is >0.05.

**1. Normality Test Results**

**Table 4.** Normality Test Results

| **Variable** | **Sig.** |
|---|---|
| Formula extract down 25% | 0,421 |

Source: SPSS data processing, 2024

Judging from the table of normality test results above, it can be said that the four variables are normally distributed because the significance value obtained in the 25% green betel leaf extract formula is 0.421, and the data is ≥0.05.

**2. Homogeneity Test Results**

Based on the results of the variable homogeneity test with the formula of 25% green betel leaf extract, a significance value of 0.917 was obtained where the value was greater than 0.05 so that the data was said to be homogeneous or the same.

***3.*** **Uji *One Way Anova***

Based on the results of the One *Way Anova* test, the results obtained with the treatment of the 25% green betel leaf extract formula obtained a p-value of 0.000, where the value was less than 0.05. So, H0 is rejected so that there is a decrease between the variables before and after being treated.

**Discussion**

**1. Identify the presence of germs before treatment.**

Before the floor swab treatment using green betel leaf extract, an examination was carried out first by taking a sample of the floor swab through 5 points in one emergency room. From the results of the examination, the results of the laboratory for measuring the number of germs were obtained, namely the number of germs at the first point of 35 CFU/$cm^2$, the second point of 35 CFU/$cm^2$, the third point of 36 CFU/$cm^2$, the fourth point of 34 CFU/$cm^2$, and the fifth point of 34 CFU/$cm^2$.

The floor condition of the Ponorogo X General Hospital is classified as exceeding the quality standards of the Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning Government Regulation No. 66 of 2014 concerning Environmental Health. In addition, measurements were made related to disturbing variables such as temperature, humidity, lighting, and the number of visitors. Temperature measurements were obtained at 27°C. While the humidity measurement is produced by 55%, then the illumination is 21.0. Meanwhile, the number of visitors who came during the floor swab examination was 22 people.

The presence of germ numbers that exceed the quality standards of the hospital environment can cause the risk of nosocomial infections. These infections are acquired while the patient is hospitalized, not only increasing mortality, morbidity and suffering but also increasing the cost of care and medication that the individual suffers from (Seftiwan Pratami Djasfar & Pradika, 2023).

According to The quality standards of the Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning Government Regulation No. 66 of 2014 concerning Environmental Health, the number of germs on the floor of the emergency room in hospitals must not exceed 0-5 CFU/cm2. Therefore, it is necessary to increase floor cleaning using the right disinfectant in hospitals (Ministry of Health, 2023).

From the above statement, it was found that the number of germs at the Ponorogo X General Hospital has not met the environmental quality standards set by the Regulationof the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning Government Regulation No. 66 of 2014 concerning Environmental Health, so it is necessary to handle follow-up related to this matter such as cleaning the floor more optimally three times a day, Both after action for the patient and no action, using disinfectants from ingredients that are effective in killing germs, one of which is using natural ingredients from green betel leaf extract using the maceration method.

**2. Identification of the Presence of Germ Numbers After Being Given the Formula 25%**

Based on the results of the study that was carried out on the first day by taking a swab sample of germ numbers as many as 5 points between before and after being given the green betel leaf extract *formula treatment (Piper betel),* the results of the decrease were obtained after being treated. The 25% formula was carried out on the first day of the emergency room floor swab test on five points that produced germ numbers at the first point, which was 35 CFU/cm2. The second point was 35 CFU/cm2, the third point was 36 CFU/cm2, the fourth point was 34 CFU/cm2, and the fifth point was 34 CFU/cm2. As for the results of the germ number test after treatment or given betel leaf extract with a formula of 25%, namely at the first point of 4 CFU/cm2, the second point of 5 CFU/cm2, the third point of 4 CFU/cm2, the fourth point of 5 CFU/cm2, and the fifth point of 5 CFU/cm2.

Results of research that has been conducted by (Sadiah et al., 2022) explain The higher the level of betel leaf extract, the greater the decrease in the number of germs on the floor produced. In addition, green betel leaves are easy to obtain and have low toxicity, which causes the traditional plant to be used as an alternative in treating bacterial infections. The antibacterial content in betel leaves consists of Gram-positive and Gram-negative bacteria, including active compound components and their mechanisms.

The maceration method is an extraction technique using a stationary solvent or stirring several times at room temperature. This method can be done by soaking the material with occasional stirring. In general, soaking is carried out for 24 hours, then the solvent is replaced with a new solvent. Maceration can also be done by continuous stirring or kinetic maceration (Hujjatusnaini, Noor. Bunga Indah, Amelia Afitri, Ratih W, 2021).

In this study, the measurement of the disturbing variable was carried out, namely, the temperature of 27°C, while the humidity was 55%, then lighting measurements using *a lux meter* obtained a result of 2 1.0, and the number of visitors was 22 people. Meanwhile, from the results of the measurement of the disturbing variable, the number of visitors affects the swab test on the floor and the decrease in the number of germs using a simple disinfectant, green betel leaf extract, because the more people who pass around the emergency room will be higher. According to the research carried out with the maceration method, it is an alternative to reduce the number of germs on the hospital emergency room floor. In addition to betel leaf plants that are easy to obtain, the advantage of the maceration method is that it is effective for compounds that are not heat-resistant (degraded due to heat), the equipment used is relatively simple, cheap, easy to get and does not take a very long time.

**3. The Effectiveness of Green Betel Leaf Extract on Reducing Germ Numbers by the Maceration Method**

The results of the calculation of the effectiveness of reducing the germ number by giving a 25% formula treatment on the floor of the emergency room showed that the larger the green betel leaf extract formula given, the greater the decrease in the number of germs produced. The use of green betel leaf plants as a medium for making extracts as a simple disinfectant has been proven to play a good role in supporting the percentage of killing germs or bacterial activity.

In a study conducted by (Owu et al., 2020), The test results showed that the amount of green betel leaf extract was the most effective in reducing the number of germs or bacteria, which was 25% with Absorbance values before and after incubation, indicating a decrease in the number of viable bacterial cells.

According to research (Alifah et al., 2023), there is a decrease in the number of germs because betel leaf extract can inhibit bacteria because it has antibacterial active compounds contained in this plant which have antibacterial inhibitory properties such as flavonoids, tannin, alkaloids and saponins. Flavonoids are polar compounds that are generally easily soluble in polar solvents such as ethanol, methanol, butanol and acetone. Flavonoids are the largest group of phenolic compounds. Phenolic compounds have the property of effectively inhibiting the growth of viruses, bacteria and fungi. Flavonoid compounds and their derivatives have two specific physiological functions as chemicals to overcome disease attacks: antibacterial and antiviral for plants.

This shows that in the research of the maceration method in the manufacture of green betel leaf extract *(Piper betel),* the higher the formula given, the higher the decrease in the number of germs produced.

**a. Research Limitations**

This study has several limitations that may affect the results of the research, which are as follows:

1. The number of visitors passing by the emergency room at the time of floor swab sampling so that the area sampled was contaminated with bacteria in the air.

2. The durability test of green betel leaf extract has not been carried out.
3. Details of operational costs for the manufacture of green betel leaf extract have not been given.
4. The estimated time to detect germs that react to formulas applied to the floor (±5 minutes) that researchers pay little attention to can lead to the risk of being less effective in killing germs.

## CONCLUSION

The results of the study on the effectiveness of the formula for giving green betel leaf *extract (Piper betel)* in reducing the number of germs on the floor of the emergency room of X Hospital Ponorogo Regency are as follows: The number of germs on the floor of the emergency room of X Hospital Ponorogo Regency before being treated with the formula of green betel leaf extract *(Piper betel)* has not met the quality standards set by Regulation of the Minister of Health of the Republic of Indonesia No. 2 of 2023 concerning Government Regulation No. 66 of 2014 concerning Environmental Health. There was a decrease in the number of germs in the floor swab test after the treatment with the administration of green betel leaf extract *(Piper beetle)* in the formula of 25%.

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