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Use of Sweet Mango Leaves (Mangifera indica) To Reduce Germs Colonies on Cutlery

The Utilization of Harum Manis Mango Leaves (Mangifera indica) to Reduce Total Plate Count of Microbes on Utensils

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Abstract
According to WHO, the global death rate due to diarrhea in 2002 was 1.8 million people. Global morbidity rates due to PBM (Community Based Diseases) are very difficult to estimate. Apart from diarrhea, there are more than 250 types of diseases caused by consuming unsafe food. This study aims to determine the difference in average germ numbers before and after using soap made from mango leaf powder. This research is an experimental study with a pre-post design to determine the ability of dishwashing soap made from sweet fragrant mango leaves to reduce germ colonies. The population and sample in this study were cutlery in the form of spoons, glasses and plates, each consisting of 5 samples. Examination of the samples was carried out before and after using dish soap. Data is collected from an observation sheet which contains the number of germ colonies in each sample examined. Data were analyzed using the paired t test. This research was conducted at the Microbiology Laboratory of the Integrated Health Polytechnic Laboratory of the Ministry of Health in Ternate. The results showed that the average germ number in the pre-test was 2454.44 ± 668.70, while in the post-test the average germ number was 1178.67 ± 249.61. The P value = 0.012 (< 0.05) indicates that there is a significant difference in the average number of germs before and after using soap made from mango leaf powder. The conclusion is that using soap made from mango leaf powder can significantly reduce the number of germs on the hands. This shows the potential of soap as an effective alternative in maintaining cleanliness and reducing the risk of spreading disease through hand contact.

Keywords: Germs Colonies, Mango Leaves, Cutlery

Introduction

One environmental health effort is to sanitize food and drinks to prevent contamination from the growth of germs and additional ingredients in food that come from the process of handling food served by traders, so that it does not become a chain of disease transmission. and health problems. Apart from that, strict monitoring of the food ingredients used is also important to ensure that no dangerous or unfit for consumption ingredients enter the food. This can be done through checking the quality and safety of food ingredients before they are used in the food handling process. Additionally, implementing proper storage and handling practices is critical in preventing contamination and ensuring food freshness. This includes maintaining appropriate temperatures, separating raw and cooked foods, and cleaning food preparation areas regularly to minimize the risk of cross-contamination.

Factors that need to be considered in food processing are the quality of the equipment used to process food ingredients, as well as those used to serve them to consumers (Samosir, 2011). Apart from that, another factor that needs to be considered is the cleanliness and sanitation of equipment. Equipment that is dirty or not kept clean can cause contamination and endanger consumer health. In addition to equipment quality and cleanliness, proper training and adherence to food safety protocols by food processing staff is also critical. This ensures that the handling and processing of food ingredients is carried out hygienically,

minimizing the risk of contamination and ensuring consumer safety. Apart from that, it is also important to pay attention to the correct storage of food ingredients. Food that is stored properly can avoid bacterial growth and maintain its quality. Apart from that, the use of fresh and quality ingredients can also increase the safety of food served to consumers.

According to WHO, the global death rate due to diarrhea in 2002 was 1.8 million people. Global morbidity rates due to PBM (Community Based Diseases) are very difficult to estimate. Apart from diarrhea, there are more than 250 types of diseases caused by consuming unsafe food (Samosir, 2011). Some diseases caused by unsafe food include food poisoning, parasitic infections, and foodborne illnesses. These ailments can range from mild discomfort to severe illness and can have long-term health consequences. It is important to prioritize food safety measures and educate the public on proper food handling and preparation techniques to reduce the burden of these diseases globally. These efforts may involve improving cleanliness and sanitation throughout the food supply chain, strict monitoring of food production and distribution, and promotion of compliance with food safety guidelines. In addition, there is also a need for an effective disease monitoring system to detect and control outbreaks

Based on a report from the National Food and Drug Supervisory Agency (BPOM), poisoning cases in 2010 caused by food were ranked fifth with a total of 592 cases. Food poisoning cases that occurred in Jakarta among elementary school children in 2010 were 13.5%. These figures show that cases of food poisoning among elementary school children in Jakarta in 2010 were quite significant. This requires more serious efforts in monitoring and improving the cleanliness of the food consumed by children. Food poisoning can have a serious impact on children's health and well-being, leading to hospitalization and even death. Therefore, it is vital for the authorities to implement stricter regulations and ensure that food safety standards are strictly adhered to to protect the health of young students in Jakarta.

Surveillance data for Extraordinary Events of Food Poisoning in 2010 contained 163 incidents and based on the type of food it is known that snack foods contributed 13.5% of poisoning cases (Jilfer et al, 2013). This suggests that snacks were an important factor in the outbreak of food poisoning in 2010. It is important to further investigate the specific types of snacks involved to identify potential sources of contamination and prevent similar incidents in the future. In this study, it was not explained in detail the types of snacks that caused food poisoning. Therefore, further research needs to be carried out to identify certain types of snacks that contribute to these poisoning cases. The results of this research can be used as a basis for taking appropriate preventive measures to reduce

Methods

This research is an experimental study with a pre-post design to determine the ability of dishwashing soap made from sweet fragrant mango leaves to reduce germ colonies. The population and sample in this study were cutlery in the form of spoons, glasses and plates, each consisting of 5 samples. Examination of the samples was carried out before and after using dish soap. Data is collected from an observation sheet which contains the number of germ colonies in each sample examined. Data were analyzed using the paired t test. This research was conducted at the Microbiology Laboratory of the Integrated Health Polytechnic Laboratory of the Ministry of Health in Ternate.

Results

The eating utensils examined in this study were plates, spoons and glasses. Each of the samples examined was 5. Samples were examined before and after treatment. The treatment in this research was the use of dishwashing soap made from mango leaves.

Table 1. Number of Pre-Test Germ Colonies

Sample	Germ colonies in Pre-Test							
	Dilution						Σ	
	1	x10	2	x100	3	x1000		
Plate 1	10	100	4	400	2	2000	2500	833.33
Plate 2	21	210	10	1000	0	0	1210	403.33
Plate 3	11	110	5	500	2	2000	2610	870.00
Plate 4	2	20	3	300	2	2000	2320	773.33
Plate 5	13	130	8	800	31	31000	31930	10643.33
Spoon 1	4	40	3	300	7	7000	7340	2446.67
Spoon 2	35	350	5	500	12	12000	12850	4283.33
Spoon 3	6	60	1	100	8	8000	8160	2720.00
Spoon 4	52	520	11	1100	2	2000	3620	1206.67
Spoon 5	2	20	3	300	14	14000	14320	4773.33
Glass 1	11	110	5	500	4	4000	4610	1536.67
Glass 2	2	20	2	200	3	3000	3220	1073.33
Glass 3	70	700	10	1000	4	4000	5700	1900.00
Glass 4	133	1330	2	200	4	4000	5530	1843.33
Glass 5	3	30	5	500	4	4000	4530	1510.00

Table 1 shows that of the 15 samples examined,

Table 2. Number of Post-Test Germ Colonies

Sample	Germ colonies on Post-Test							
	Dilution							
	1	x10	2	x100	3	x1000		
Plate 1	5	50	3	300	1	1000	1350	450.00
Plate 2	4	40	2	200	1	1000	1240	413.33
Plate 3	12	120	7	700	2	2000	2820	940.00
Plate 4	8	80	3	300	0	0	380	126.67
Plate 5	0	0	7	700	6	6000	6700	2233.33
Spoon 1	11	110	8	800	1	1000	1910	636.67
Spoon 2	2	20	2	200	1	1000	1220	406.67
Spoon 3	3	30	3	300	2	2000	2330	776.67
Spoon 4	0	0	0	0	3	3000	3000	1000.00
Spoon 5	0	0	2	200	8	8000	8200	2733.33
Glass 1	5	50	1	100	1	1000	1150	383.33
Glass 2	1	10	5	500	10	10000	10510	3503.33
Glass 3	5	50	4	400	4	4000	4450	1483.33
Glass 4	8	80	2	200	4	4000	4280	1426.67
Glass 5	10	100	4	400	3	3000	3500	1166.67

Table 3. Average Results of Inspection of Cutlery with Soap Based on Mango Leaf Powder

	Average	Standard Error (SE)	P value
PreTest	2454.44	668.70	0.012
PostTest	1178.67	249.61	

From the table it can be seen that the average germ number in the pre-test was 2454.44 ± 668.70, while in the post-test the average germ number was 1178.67 ± 249.61. The P value = 0.012 (< 0.05) indicates that there is a significant difference in the average number of germs before and after using soap made from mango leaf powder.

Discussion

The discussion aims to answer the problem formulation and research questions, interpret the findings obtained and use these results to solve the problem, show differences and similarities with previous research and possible intervention efforts to overcome these problems. The discussion contains a discussion that connects and compares the research results with theories/concepts/findings from other research results that are either in line or not in line with the research results. If any, potential research limitations are also mentioned in the discussion. This section is typed in single space with Calibri11pt font.

The germ number or total plate number is a number that shows the presence of pathogenic or non-pathogenic microorganisms according to visual observation or with a magnifying glass on the planting medium being examined, then calculated based on the base plate for the standard test for bacteria (Maurer 1973 in Prastiwi 2004) or the number of bacteria in one milli liter or one gram or cm2 swab of the sample tool being examined. The germ number is a calculation of the number of bacteria based on the assumption that each living bacterial cell in suspension will grow into a colony after being incubated in a suitable culture medium and environment.

The results of other research show that the number of germs on cutlery at the Sambang Lihum Mental Hospital exceeds the standard/does not meet the requirements (TMS), except for washing method A, all of which meet the requirements, namely below 100 colonies/cm2 of the utensil surface. The conclusion of this research is that there are significant differences in the three washing methods as shown by a p value of 0.027 (Ananda Brilian Rizky, 2017). This research is a quantitative study with a cross sectional design, which aims to determine the relationship between personal hygiene and cutlery washing techniques on the number of germs on cutlery used by food traders at Angso Duo Market, Jambi City, quota sampling technique of 30 food traders and data. tested using the chi-square test. The results of the analysis showed that there was no relationship between cutlery washing techniques and personal hygiene on the number of germs on cutlery used by food traders at Angso Duo Market, Jambi City with a p-value of 1,000

This research is in line with research conducted (Pohan, 2009) that research on Pecel Lele cutlery in Tambakbayan Babarsari Sleman showed that the number of germs produced was 2,973 colonies/cm2 of the surface of the utensil, this was due to the technique of washing cutlery first cleaning from food residue. then rinse it so that the entire surface of the equipment is perfect, then wash it using soap and rinse it with water while rubbing it with your hands so it doesn't feel soapy anymore. This washing does not use running water, only uses two small tubs. This is because there is no direct water source available and water is taken from water sources far from the place of sale so that they use clean water more efficiently (Pohan, 2009).

Another research conducted by Andriyani (2009) who examined the effect of detergent solution and chlorine solution on the process of washing cutlery using the three compartment sink method on reducing the number of germs on cutlery at PKU Muhhamadiyah Hospital, Surakarta, stated that there was a decrease in the number of germs on utensils. eating after washing when compared with the number of germs on eating utensils before washing with a p-value of 0.0019

According to the Directorate General of PPM and PL (2004), factors that influence bacterial growth include temperature. If the temperature is below their normal growth, they will not grow but will not necessarily die. If the temperature increases to a suitable temperature, they grow again. On the other hand, if bacteria are heated above their preferred temperature then over a long period of time, they will die. Time, in

a suitable environment and temperature, bacteria divide every 20 to 30 minutes. Under the conditions they like, in 9 hours one bacterium has grown to 2,000,000 cells and to one billion in 12 hours. Acidity (pH), at a pH equal to or higher than 4.5 is a type of food that has low acidity, at this pH there are many spores and microbes that grow. At a pH of 4.0-4.5 it is called acidic food and at a pH below 4.0 it is called high acidic food. At these two pH levels, there are usually no more spores or microbes growing (FG Winarno, 2007). Light: Bacteria usually grow in the dark, although this is not a necessity. But ultraviolet light can kill bacteria and this can be used for sterilization procedures.

Washing technique is a factor that influences the number of bacteria or microorganisms on cutlery. Wrong washing techniques can increase the risk of food being contaminated by bacteria or microorganisms. The consequences if consumers do not have sufficient immune system can cause poisoning. Equipment that comes in direct contact with food ready to be served after washing must not contain germ numbers or 0 colonies/cm^2. The correct technique for washing dishes according to the Ministry of Health (2009), goes through several stages, namely separating dirt or food waste from cutlery, soaking, washing, rinsing with clean, running water, soaking in chlorine water, draining, soaking in hot water 82-100 ^oC , and drying. The correct washing technique will provide healthy and safe washing results. One effort to reduce germ colonies on food utensils is to improve washing techniques, including the use of anti-bacterial soap.

Based on the research results, it is known that there is a difference in the number of germs before and after using soap made from mango leaf powder.

Research conducted by Ningsih (2017) shows that there are chemical compounds in mangoes that produce an inhibitory zone for fungal growth. The results of this research are in line with research by Rijayanti (2014) that ethanol extract of mango leaves has antibacterial activity against Staphylococcus aureus bacteria. The secondary metabolite content contained in the ethanol extract of mango leaves is flavonoids, tannins, saponins, alkaloids and steroids.

According to Nuria, et al. 2009, the mechanism of action of flavonoids in inhibiting cell membrane function is to form complex compounds with extracellular and dissolved proteins so that they can damage bacterial cell membranes, followed by the release of intracellular compounds. Other research states that the mechanism of flavonoids inhibits cell membrane function by disrupting cell membrane permeability and inhibiting the binding of enzymes such as ATPase and phospholipase. The antibacterial mechanism of flavonoids inhibiting nucleic acid synthesis is the A and B rings which play an important role in the interchelation or hydrogen bonding process by accumulating nucleic acid bases which inhibit the formation of DNA and RNA. The location of the hydroxyl group at position 2',4' or 2',6' dihydroxylation on ring B and 5,7 dihydroxylation on ring A plays an important role in the antibacterial activity of flavonoids. Flavonoids cause damage to the permeability of bacterial cell walls, microsomes and lysosomes as a result of the interaction between flavonoids and bacterial DNA (Cushnie, TPTim.2005)

Madduluri (2013) stated that the mechanism of action of saponins as antibacterial is that they can cause leakage of proteins and enzymes from inside cells. Saponin can be anti-bacterial because its surface active substance is similar to detergent, as a result saponin will reduce the surface tension of bacterial cell walls and damage membrane permeability. Damage to the cell membrane greatly disrupts the survival of bacteria. (Harborne, JB 2006)

According to Nuria, et al (2009), the antibacterial mechanism of action of tannins has antibacterial power by precipitating protein. The antibacterial effect of tannins is through reactions with cell membranes, inactivation of enzymes and inactivation of the function of genetic material. The mechanism of action of tannin as an antibacterial is to inhibit the enzyme reverse transcriptase and DNA topoisomerase so that bacterial cells cannot form. Tannins also target cell wall polypeptides so that cell wall formation is less than perfect. This causes bacterial cells to lyse due to osmotic and physical pressure so that the bacterial cells will die. (Sari, FP and SM Sari. 2011).

Based on research conducted by Darsana (2012), the mechanism of action of alkaloids as antibacterials is by disrupting the components that make up the peptidoglycan in bacterial cells, so that the cell wall layer does not form completely and causes cell death. Another antibacterial mechanism of alkaloids is that the alkaloid component is known to act as a DNA interchelator and inhibits the topoisomerase enzyme in bacterial cells.

Conclusion

There is a difference in the number of germs before and after using dishwashing soap made from mango leaf powder. The average number of germs in the Pre Test was 2454.44 ± 668.70 while in the Post Test the average number of germs was 1178.67 ± 249.61. The results of the research show that using dishwashing soap made from mango leaf powder can significantly reduce the number of germs. The significant difference in germ numbers between the Pre Test and Post Test shows the effectiveness of soap in cleaning and removing germs on kitchen utensils. These findings show that dishwashing soap made from mango leaf powder could be the right choice for maintaining cleanliness in the kitchen. Additionally, the reduction in germ counts highlights the potential antimicrobial properties of mango leaf powder, making it a promising natural alternative to conventional dishwashing soap.

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