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The Use Of Kaffir Lime Peel Filtrate (*Citrus Hystrix*) In Reducing The Number Of Cutlery Germs

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ABSTRAK

Judul : Penggunaan Filtrat Kulit Jeruk Purut (Citrus Hystrix) Dalam Menurunkan Jumlah Kuman Alat Makan

Latar Belakang: Kulit jeruk purut memiliki kandungan utama yang terdiri dari flavonoid, saponin, alkaloid, naringin, dan hesperidin sebagai antibakteri dan antioksidan sehingga dapat menurunkan jumlah kuman pada peralatan makan.
Metode: Penelitian ini bertujuan untuk mengetahui penggunaan kulit jeruk purut dalam menurunkan angka kuman pada peralatan makan. Jenis penelitian eksperimen ini menggunakan desain post-test-only control group design. Objek penelitian menggunakan sendok stainless dengan populasi 96 buah. Variasi konsentrasi kulit jeruk purut adalah 20%, 50%, dan 80%. Analisis data menggunakan uji Kruskal - Wallis untuk mengetahui ada tidaknya perbedaan yang bermakna secara statistik antara dua kelompok atau lebih dan uji Mann-Whitney untuk mengetahui perbandingan yang bermakna antara dua populasi yang berbeda terhadap variabel bebas.
Hasil : Hasil penelitian menunjukkan rata-rata jumlah kuman kontrol adalah 909,1 koloni/cm2 dan konsentrasi larutan kulit jeruk purut 20% ,50%, dan 80% yaitu 398,1 koloni/cm2, 8,3 koloni/cm2, dan 35,0 koloni./cm2. Hasil yang paling signifikan dalam menurunkan jumlah kuman pada peralatan makan adalah pada konsentrasi 50% (Pvalue=0,004). PH larutan kulit jeruk antara 4-5, dan suhu larutan kulit jeruk 28ºC.
Kesimpulan: Penelitian ini menyimpulkan bahwa kulit jeruk purut dapat menurunkan jumlah kuman pada peralatan makan. Disarankan untuk menambah variasi waktu perendaman dengan larutan perasan kulit jeruk purut sehingga diharapkan dapat menurunkan jumlah kuman pada peralatan makan sesuai ketentuan Menteri Kesehatan.

Kata Kunci: Kulit jeruk purut, Peralatan Makan, Jumlah Kuman

ABSTRACT

Title: The Use Of Kaffir Lime Peel Filtrate (Citrus Hystrix) In Reducing The Number Of Cutlery Germs

Background: *Kaffir lime peel consist primarily of flavonoids, saponins, alkaloids, naringin, and hesperidin as antibacterial and antioxidant so that it can reduce the number of germs on cutleries*
Method: *This study aimed to identify the use of kaffir lime peel in reducing the number of germs on cutlery. This type of experimental research uses a post-test-only control group design. The object of the study was a stainless spoon with a population of 96 pieces. Variations in the concentration of kaffir lime peel from 20%, 50%, to 80%. Data analysis used the Kruskal - Wallis test to determine whether there were statistically significant differences between two or more groups and the Mann-Whitney test to determine the significant comparison of two different populations on the independent variables.*
Result *: The results showed that the average number of germs in control was 909.1 colonies/cm2 and the concentrations of kaffir lime peel solution were 20% ,50%, and 80% with the number of 398.1 colonies/cm2, 8.3 colonies/cm2, and 35.0 colonies/cm2. The most significant result in reducing the number of germs on cutlery was a concentration of 50% (Pvalue=0.004). The pH of the lime peel solution was in the range of 4-5, and the temperature was 28ºC.*

***Conclusion**: This study concludes that kaffir lime peel has the potential to reduce the number of germs on cutlery. It is recommended that the immersion time is increased with a solution of kaffir lime peel juice so that it is expected to reduce the number of germs on cutlery by the requirements of the Minister of Health.*

Keywords**: **Kaffir lime peel, Cutlery, Germ Number

INTRODUCTION

Foodborne illness can be affected by a number of factors, including food processing habits, improper storage and serving, washing, and equipment maintenance.[1,2] According to World Health Organization (WHO) data for 2019, 70% of the 1.5 billion diseases are transmitted through food and water. Foodborne illness and waterborne diarrhea kill an estimated 2 million people annually. For example, in the United States, there are an estimated 48 million cases of food poisoning annually. The results of monitoring extraordinary events of food poisoning cases in Indonesia in 2019, there were approximately 20 million cases of food poisoning annually based on the causes of poisoning, the most common sources animals and food and beverages. It is found that the highest cases of food and beverange poisoning in West Java with 1290 cases and followed by East Java with 761 cases.[3]

One aspect that greatly affected the quality of food and beverages is the cleanliness of cutlery which plays a crucial role in the growth and reproduction of germs, poisoning, and the propagation of disease; as a result, it is necessary to maintain the level of food hygiene so that disease-carrying bacteria and other substances do not contaminate it. The number of colonies on the tableware surface should be zero and should not contain Escherichia coli and other germs for tableware requirements, [4,5] so it is necessary to prevent it by carrying out a disinfection process to reduce the number of germs on cutlery.

There is an influential factor that affects the number of bacteria and microorganisms on cutlery that is its washing procedure. The disinfection must not be overlooked ,it is a vital procedure to reduce the number of cutlery germs. Disinfectants are generally made of synthetic materials.[6–89,10] Previous research used the natural ingredient starfruit for disinfection. The results of the examination of the number of germs that experienced the most significant decrease in the number germs, namely the number of germs in the sample before treatment, amounted to 3985 colonies/cm2 after soaking for 3 minutes in the star fruit solution the number of germs reduced into 720 colonies/cm^2.[11]

This research is one of the media innovations to aims at achieving health within the daily environment of the society.Therefore another natural disinfectant alternative that can use is kaffir lime fruit. Kaffir lime (Citrus hystrix) contains alkaloids, saponins, flavonoids, tannins, steroids, essential oils, and secondary metabolite compounds formed from non-essential glucose derivatives during aging or injury, and contain saponins and flavonoids.[6,12–14]

The main flavonoids and saponins in kaffir lime are naringin and hesperidin, which are found in its peel and pulp, kaffir lime is therefore pharmacologically effective as an antiseptic and contains a very high antioxidant. Kaffir lime leaves have a broad-spectrum antibacterial activity that can inhibit the growth of *S. aureus* and *E. Coli*. [2,4,15,16] Based on the literature review in this study, it can be identified the suitability the content of kaffir lime peel to reduce the number of germs on cutlery and is expected to reduce the high number of cases of food and drink-borne diseases due to improper washing of cutlery. Based on the above context, the researchers finally decided to examine the use of kaffir lime peel filtrate (Citrus hystrix) in reducing the number of cutlery germs.

MATERIAL AND METHODS

Research Design and Sample Processing

This study used pure experimentation with Posttest Only Control Group Design. The treatment focused on the use of kaffir lime peel filtrate as a disinfectant to determine the decrease in the number of germs on cutlery. This research was conducted in April - May 2022 at the Airlangga University Nutrition Laboratory. The treatment was carried out by soaking cutlery in kaffir lime peel filtrate with concentrations of 20%, 50%, and 80% for 3 minutes with a solution temperature control of 28°C and pH of 4 - 7. This treatment was repeated for six times. The treatment was carried out by swabbing the tablespoon's entire inner and outer surfaces three times. Bacterial culture with pour plate method using PCA media, incubated 2 x 24 hours at 37°C, reporting with colony/cm^2 units concerning SNI 2332.3: 2015.

Dilution of Kaffir Lime Peel Filtrate

Squeeeze kaffir lime peel until it produces 100% kaffir lime juice without dilution. The liquid was filtered using sterile gauze. Adjust kaffir lime peel juice with concentration of 20% (1:4) consisting 200 ml of lime peel juice and 800 ml of distilled water, 50% concentration (1:1) with 500 ml of kaffir lime peel juice, and 500 ml of

distilled water, 80% concentration (4:1) consist of 800 ml of kaffir lime peel juice and 200 ml of clean filtered water.

Data Analysis

Distribution of research data using the normality test by Shapiro Wilk and, the homogeneity test by Levene. Data analysis with the Kruskal Wallis test to determine whether there is a difference in the average of the independent variable concentration of 20%, 50%, and 80%. Furthermore Mann Whitney further tests the significant average comparison between control with 20%, 50%, and 80% concentration.

RESULT AND DISCUSSION

Table 1 shows a tendency to decrease the number of germs from a concentration by 20% to 80% compared to the control. The number of germs on the cutlery must be 0 colonies/cm2 until the examination of the number of germs carried out still exceeds the threshold value. The average number of germs on the control cutlery was 909.1 colonies/cm2. The average number of germs after the disinfection process with concentration of 20% was 398.1 colonies/cm^2, 50% was 8.3 colonies/cm^2, and 80% was 35 colonies/cm^2 (figure 1).

Table 1 Germ Count from theTable Spoon After Treatment

Replication	Total Plate Numbers (Colonies/cm^2)			
	Control	**20%**	**50%**	**80%**
1	945	160	5	5
2	745	155	10	15
3	985	290	5	15
4	855	355	15	10
5	995	675	5	85
6	930	755	10	80
Average	909,1	398,1	8,3	35

Figure 1 The Number Of Germs On Cutlery

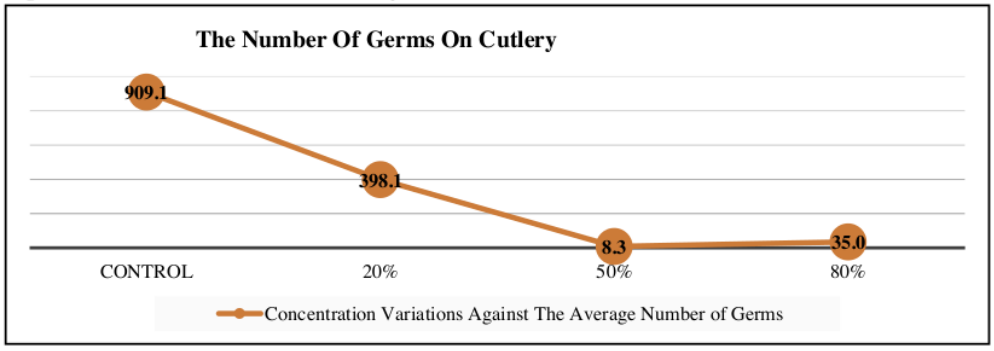

Figure 1 shows the average number of germs after beng soaked in the kaffir lime peel juice solution at concentrations of 20%, 50%, and 80% compared to the control; the reduction in germ numbers is quite substantial.

Table 2 Significant difference in germ count reduction between the control group and treatment group

	Concentration	n	Mean	CI 95%	
				Min	Max
ALT	control	6	21.33	343.73	677.94
	20%	6	15.67	222.90	557.10
	50%	6	4.75	196.23	530.44
	80%	6	8.25	707.06	1041.27

Kruskal Wallis = 0.000 *Significa (p ≤ 0,05).
Mann Whitney / *Post hoc LSD : control vs 20% : P = 0.006 ; control vs 50% : P = 0.002; control vs 80% : P = 0.004 ; 20% vs 50% : P = 0.004 ; 20% vs 80% : P = 0.004 ; 50% vs 80% : P = 0.008.

Table 2 shows that there are significant differences between control and treatment. The results of the Kruskal Wallis test from variations in the concentration of kaffir lime peel filtrate showed a substantial difference in the decrease in the number of germs (P = 0.000). The results of the statistical test showed that there was a significant difference decrease in the number of germ between the control concentration of 0% and 20% (P=0.006), between the control concentration and 50% (P=0.002); the control concentration and 80% (P=0.004); the concentration of 20% and 50%; the concentration of 20% and 80% (P=0.004); as well the concentrations of 50% and 80% (P=0.00). The most significant result in reducing the number of germs was between the control concentration and the 50% concentration (P=0.002).

Cutlery is crucial and affects the quality of food, where food scraps often stick to the cutlery used especially for greasy foods. If the cutlery is contaminated by microorganisms and used for food processing, it may spoil the processed food ingredients. One way to reduce the number of germs/microorganisms is through disinfection [4,6,17,18]. Natural disinfectants agent commonly used are aloe vera, star fruit (Averrhoa bilimbi), lime (Citrus aurantifolia), and kaffir lime (Citrus Hystrix). This study uses kaffir lime peel as a disinfectant which contains flavonoids, carotenoids, glycosides, saponins, coumarins, citric acid, limonoids, amino acids, bergamottin, oxypeucedanin, minerals, and essential oils [2,4,6,17–19]. The main flavonoids as antibacterial, and saponins as antifungal and antibacterial in kaffir lime peel which can affect the number of cutlery germs.[20]

In this study, the number of germs after soaking for 3 minutes in a solution of kaffir lime peel showed that different concentration affected e number of germs. The lowest average number of germs was at concentrations of 50% and 80%. The low concentration can only inhibit microbial proliferation. The disinfectant's contact time with the object to be disinfected resulted in an increase in temperature to increase the disinfectant capacity so that the disinfectant effect against microorganisms is bactericidal [11,13,21]. The concentration of 80%, there was an increase in germs from the previous repetition due to taking swabs on cutlery.Kaffir lime peel filtrate can reduce the germ number on cutlery this is evidenced by the suitability of literature studies and the results of research where the high flavonoid and saponin content as antibacterial and antioxidant high saponin content effectively reduces the germ number of cutlery where this saponin is like soap so that it can give a flat effect on cutlery. [4,16,20,22–24] Flavonoids as antibacterial that inhibit the function of the cytoplasmic membrane, while saponins as antibacterial with a mechanism that damages the permeability of the cell wall so that it way lead cell death [2,6,25]. From the results of measuring the pH and temperature of the solution, it can be concluded that the higher the concentration of kaffir lime peel, the lower the pH value, which means acidic.

The content of kaffir lime peel is influenced by tannin compounds which are classified as flavonoid compounds, where the physical properties of tannin compounds if dissolved in water, will form colloids that produce acidic and astringent properties [4,21] It is known that microorganisms have different responses to pH and temperature[19]. Microorganisms grow at temperatures around 30ºC. The growth of microorganisms is slow as the temperature rises, and above the maximum temperature, the growth rate of microorganisms decreases rapidly with increasing temperature. [17] Environmental factors affect the growth of microorganisms especially the temperature. therefore the temperature must be controlled to prevent contamination of the cutlery to be used.

CONCLUSION

Kaffir lime peel can potentially be a disinfectant on cutlery to reduce germ numbers. The kaffir lime peel filtrate can reduce the number of germs on cutlery. The average number of germs at concentrations of 20%, 50%, and 80% are 398.1 colonies/cm^2, 8.3 colonies/cm^2, and 35.0 colonies/cm^2. The pH of the kaffir lime peel filtrate solution and the temperature of the filtrate solution were 4-5 and 28ºC. The 50% kaffir lime peel filtrate concentration significantly reduced the number of germs on cutlery, with the lowest average germ number of 8.3 colonies/cm^2.

REFERENCE

1. Zakaria ZF, Wong XC, Lai WH, Hon YK, Tiong LL, Sapian RA, et al. Incidence of Food Poisoning Outbreaks in Pahang, Malaysia, for Six-Year, from 2013 to 2018. Pertanika J Trop Agric Sci. 2022;45(3).
2. Bakar Babu, Osman Chep, Razak Wanrwana. Antibacterial Activity Of Kaffir Lime Leaves (Citrus Hystrix) On Selected Foodborne Pathogens. Malaysian Appl Biol. 2021;50(1):217–9.
3. BPOM. Risk-Based Drug and Food Control System in 2019. J Chem Inf Model. 2019;53(9):1689–99.
4. Tunjung WAS, Liana D, Hidayati L. Antibacterial Activity and Composition of Crude Extracts of Kaffir Lime (Citrus hystrix DC.) Leaves and Callus: Antibacterial Activity of Kaffir Lime Leaves and Callus. Proc Pakistan Acad Sci B Life Environ Sci. 2018;55(2):45–53.
5. Ncube F, Kanda A, Chijokwe M, Mabaya G, Nyamugure T. Food safety knowledge, attitudes and practices of restaurant food handlers in a lower-middle-income country. Food Sci Nutr. 2020;8(3):1677–87.

6. Sreepian A, Sreepian PM, Chanthong C, Mingkhwancheep T, Prathit P. Antibacterial activity of essential oil extracted from Citrus hystrix (kaffir lime) peels: an in vitro study. Trop Biomed. 2019;36(2):531–41.
7. Budiarti LY, Yasmina A, Nurikwan PW, Prayudi MOS, Firisa MR, Kangsudarmanto Y. Antibacterial activity of infused peel of kaffir lime, manurun banana, and pineapple against the number of Staphylococcus aureus and Escherichia coli colonies. In: IOP Conference Series: Earth and Environmental Science. IOP Publishing; 2022. p. 12034.
8. Usfar AA, Iswarawanti DN, Davelyna D, Dillon D. Food and personal hygiene perceptions and practices among caregivers whose children have diarrhea: a qualitative study of urban mothers in Tangerang, Indonesia. J Nutr Educ Behav. 2018;42(1):33–40.
9. Sumantri D, Maulida C. Inhibition effect of hydrocolloid irreversible alginate on soaking spray using aloe vera juice. Intisari Sains Medis. 2018;9(3).
10. Edis Z, Bloukh SH. Facile synthesis of antimicrobial aloe vera-"smart" triiodide-PVP biomaterials. Biomimetics. 2020;5(3):45.
11. Septiani NW. Capability of Starfruit (Averrhoa Vilimbi) at in Decreasing the Amount of Germs at the Cutlery. 2017;6:5–9.
12. Yin S, Li L, Su L, Li H, Zhao Y, Wu Y, et al. Synthesis and in vitro synergistic antifungal activity of analogues of Panax stipulcanatus saponin against fluconazole-resistant Candida albicans. Carbohydr Res. 2022;517:108575.
13. Jamaluddin N, Pulungan MH, Warsito. Activity Test of Kaffir Lime (Citrus hystrix DC) Essential Oil Against Klebsiella pneumoniae ATCC. J Teknol dan Manaj Agroindustri. 2017;6(2):61–6.
14. Srifuengfung S, Bunyapraphatsara N, Satitpatipan V, Tribuddharat C, Junyaprasert VB, Tungrugsasut W, et al. Antibacterial oral sprays from kaffir lime (Citrus hystrix DC.) fruit peel oil and leaf oil and their activities against respiratory tract pathogens. J Tradit Complement Med. 2020;10(6):594–8.
15. Pohan DJ, Djojosaputro M. Antibacterial Effectiveness Of Extracts Of Lime (Citrus Aurantifolia Swingle) And Kaffir Lime (Citrus Hystrix Dc) Leaves Against Escherichia Coli. 2021;5(6):29–36.
16. Utami S, Larasati R, Hidayati S, Sugito BH. The Effectiveness of Involvement Test of kaffir lime (Citrus hystrix) Fruit Extract on the Growth of Streptococcus Mutans Bacteria (in vitro). In: International Conference on Dental and Oral Health. 2022. p. 64–71.
17. Budiarto R, Poerwanto R, Santosa E, Efendi D, Agusta A. Preliminary study on antioxidant and antibacterial activity of kaffir lime (Citrus hystrix DC) leaf essential oil. Appl Res Sci Technol. 2021;1(2):58–65.
18. Chanthaphon S, Chanthachum S, Hongpattarakere T. Antimicrobial activities of essential oils and crude extracts from tropical Citrus spp. against food-related microorganisms. Songklanakarin J Sci Technol. 2019;30.
19. Kooltheat N, Kamuthachad L, Anthapanya M, Samakchan N, Sranujit RP, Potup P, et al. Kaffir lime leaves extract inhibits biofilm formation by Streptococcus mutans. Nutrition. 2016;32(4):486–90.
20. Gunawan AT, Widiyanto T, Dewi IK, Putriyantari W. The Sanitation Aspects Impact To The Number Of Germs On Spoons Used By Street Vendors. Int J Heal Educ Soc. 2021;4(12):13–22.
21. Wijaya YA, Widyadinata D, Irawaty W, Ayucitra A. Fractionation of phenolic compounds from kaffir lime (Citrus hystrix) peel extract and evaluation of antioxidant activity. Reaktor. 2017;17(3):111–7.
22. Tunjung WAS, Fatonah V, Christy GP, Triono S, Hidayati L, Priyanto D, et al. Effect of Growth Factor in Callus Induction and Bioactive Compounds in Seed Explant of Kaffir Lime (Citrus hystrix DC.). Indones J Pharm. 2020;31(2):61–8.
23. Iskandar I, Horiza H, Yuhesti M. Reducing the Number of Germs on Hands Using Disinfectants Combination of Betal Leaves and Kalamansi Orange. Eksakta Berk Ilm Bid MIPA (E-ISSN 2549-7464). 2021;22(4):294–301.
24. Tunjung WAS, Fatonah V, Christy GP, Triono S, Hidayati L. Effect of growth factor in callus induction and bioactive compounds in seed explant of kaffir lime (Citrus hystrix DC.). Indones J Pharm. 2020;31(2):61.
25. Chowdhury A, Alam MA, Rahman MS, Hossain MA, Rashid MA. Antimicrobial, antioxidant and cytotoxic activities of Citrus hystrix DC. fruits. Dhaka Univ J Pharm Sci. 2018;8(2):177–80.
26. Lee JH, Jeon JK, Kim SG, Kim SH, Chun T, Imm J. Comparative analyses of total phenols, flavonoids, saponins and antioxidant activity in yellow soy beans and mung beans. Int J Food Sci Technol. 2011;46(12):2513–9.

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