

Healthcarepreneurship Training on Making Antibacterial Liquid Soap (Hand Soap) Made From *Hibiscus rosa sinensis* L. Extracts

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Abstract Healthcare is one of the critical elements of infection prevention and control, one of which can be done by maintaining hand hygiene. Hand washing with soap and flowing water has long been considered a parameter of personal hygiene and is a simple way to reduce the transmission of infections, especially those caused by hand contact between individuals. However, it must still be done by paying attention to the time and the correct way to wash hands according to WHO standards. At this time, various hand soap products have emerged but are not antibacterial. Antibacterial ingredients used as soap base should not contain various kinds of chemicals that are harmful to the health of its users. Therefore, the use of natural ingredients can be an alternative to substitute chemical active substances. One that has been tested for its antibacterial properties is hibiscus flower (*Hibiscus rosa sinensis* L.). This activity began with presenting the results of the screening on hand washing habits carried out 2 weeks earlier. The next activity is the introduction to making antibacterial hand soap made from hibiscus extract through material presentation and empirical evidence of the potential of hibiscus as an antibacterial, as well as videos about the importance of maintaining hand hygiene through proper hand washing regularly. The activity is expected to make the healthcare UMKM know and understand that hibiscus flowers, which are widely available around their residence, can be used as raw material for making hand soap that has been produced so far, so as to minimize the use of chemical-based antibacterials. The hand soap product produced later became a collaborative product produced by the community, and then registered a patent with the number S00202120213 on November 17th, 2021.

1. INTRODUCTION

Healthcare is one of the important elements of infection prevention and control. One of them can be done by maintaining hand hygiene from various microorganisms both resident flora, transient flora, and infectious flora. These microorganisms can be minimized in number by using antibacterial handsoap (Biswas et al., 2020; Cordita et al., 2019; Shedoeva et al., 2019; Ubheeram & Biranjia-Hurdoyal, 2017; van Seventer & Hochberg, 2017;

Weatherly & Gosse, 2017; World Health Organization, 2009; Yamlean & Lolo, 2016; Yu et al., 2018).

Handwashing with soap and water has long been considered a parameter/measure of personal hygiene. However, there is a correlation between proper handwashing and the spread of disease (Al-Snafi, 2018). Handwashing using only water is known to reduce the prevalence of bacteria, but using soap is more effective in reducing the prevalence of hand bacteria. It is preferable to use soap for handwashing in order to reduce the prevalence

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of bacteria by using antibacterial soap (Boyle et al., 2020; Nasution et al., 2019; Shedoeva et al., 2019; Yamlean & Lolo, 2016; Yu et al., 2018).

Handwashing using soap and flowing water is known as one of the simple ways to reduce the transmission of infections, especially those caused by hand contact between individuals. However, it must still be done by paying attention to the time and the correct way/ step of washing hands according to WHO standards. Some steps of hand washing in accordance with WHO standards, namely: 1) rubbing the entire surface of the hands with clean flowing water, then take enough soap and rubbing the palms in a circular direction evenly; 2) rubbing the backs of the hands alternately; 3) rubbing between the fingers alternately until clean; 4) cleaning the knuckles/ fingertips alternately in an interlocking position; 5) rubbing and rotating the thumb by grasping it with the other hand and moving in a circular direction in turn alternately; 6) place the fingertips into the center of the palm and gently rub the nails and fingertips together; 7) cleaning the wrist in turn, then rinsing with clean flowing water and drying with a disposable hand towel (Al-Snafi, 2018; Hillier, 2020; Parengkuan et al., 2020; Sari & Islamulyadin, 2017).

At this time, there are a lot of various hand soap products, but not many are antibacterial. Antibacterial ingredients used as soap base ingredients should not contain various kinds of chemicals that are harmful to the health of its users (Al-Snafi, 2018; Nazdrajic & Bratovcic, 2019; Yu et al., 2018). Making hand soap usually uses active substances as additives. One of them is triclosan, a broad-spectrum synthetic antimicrobial ingredient that is useful in several products such as hand soaps, hand sanitizer, detergents, shampoos, surgical hand scrubs, and surgical gloves (Dorotfkova et al., 2022; Verbyla et al., 2019; Wilantri & Farida, 2015; Yamlean & Lolo, 2016). However, excessive use of triclosan (>0,3%) can have several adverse effects on water quality, ecosystems, and human health (Dorotfkova et al., 2022; Verbyla et al., 2019; Yamlean & Lolo, 2016; Yu et al., 2018). Another additive in hand soap manufacturing is hydrogen peroxide. The addition is intended to remove spores, but this substance has corrosive properties that will have an adverse impact on the environment (Sari & Islamulyadin, 2017; Verbyla et al., 2019).

The development of the world of health research should bring positive changes that can be utilized and useful for humans as users. This also applies to the process of making hand hygiene products. Therefore, the use of natural ingredients can be an alternative to substitute chemical active substances. One that has been tested for its antibacterial properties is hibiscus flower (*Hibiscus rosa sinensis* L.). *Hibiscus* is proven to have antibacterial activity on several bacteria, including *Staphylococcus aureus*, *Streptococcus* sp., *Salmonella* sp., *Bacillus subtilis*, *Escherichia coli*, and *Pseudomonas aeruginosa* (Biswas et al., 2020; Cordita et al., 2019; Ubheeram & Biranjia-Hurdoyal, 2017; van Seventer & Hochberg, 2017; World Health Organization, 2009). This partly due to the flavonoid

content with its phenol group which can inhibit bacterial growth through cell membrane destruction and protein denaturation (Biswas et al., 2020; Cordita et al., 2019; World Health Organization, 2009).

The utilization of hibiscus flowers as an antibacterial ingredient in hand soap carried out in the community service activity is expected to increase the knowledge and skills of the community in Gedawang, Banyumanik, Semarang. The main goal is to prevent and control infection by maintaining hand hygiene.

2. METHOD

The introduction and training of healthcarepreneurship activities for making antibacterial hand soap made from hibiscus extract began with the presentation of the initial screening results on hand washing habits carried out 2 weeks earlier.

The introduction to making antibacterial hand soap made from hibiscus extract was carried out by providing material presentation and empirical evidence of research results on the potential of hibiscus as an antibacterial, as well as a video on the importance of maintaining hand hygiene through proper hand washing regularly.

The healthcarepreneurship training on making antibacterial hand soap made from hibiscus extract was carried out independently and in groups after 105 people were divided into 15 groups, each of which could continue to practice making hand soap independently. The hand soap that each participants have made is then put into a sterile and clean bottle.

3. RESULT AND DISCUSSION

Initial screening of 30 people in Gedawang, Banyumanik, Semarang showed that 14 people prefer to wash their hands using water only, six people wash their hands with water and soap, and ten people wash their hands with alcohol-based hand sanitizer because it is more practical and can be carried everywhere. The screening results also showed that 24 people wash their hands only when their hands look dirty and are not accustomed to washing their hands properly on a regular basis, while only 6 people are accustomed to washing their hands properly on a regular basis.

The results of the screening were presented during the introduction of hand soap making, as shown in Figure 1. In addition, photographs of the results of the study on the microscopic appearance of germs on the hands of individuals who washed their hands improperly and adequately were also displayed to provide an understanding of the importance of washing hands not only when hands look dirty, but every time before and after various activities (eating, drinking, gardening, cooking, holding pets, sneezing, coughing, and so on).

Screening results that show that there are still a high number of people who do not understand and apply proper hand washing regularly as an essential determinant to prevent transmission of infection initiate further activities that trigger the active role of the community in order to

increase human resources. One of the activities carried out is the introduction and training of healthcarepreneurship in making antibacterial hand soap made from hibiscus extract (*H. rosa sinensis* L.). The hope is that by making their own hand soap made from natural ingredients that are easily found in their environment and are antibacterial, such as hibiscus flowers, the community can be more aware and willing to apply proper hand washing regularly in their daily lives.



Figure 1 . Introduction to the manufacture of antibacterial hand soap made from hibiscus flower extract

Hand hygiene has been shown to reduce gastrointestinal infections by 31% and respiratory diseases by 21%. Hand washing should be done based on WHO standards, namely using antibacterial soap and flowing water. Hand washing using antibacterial soap has 73% better effectiveness than hand washing using hand sanitizer (63% effectiveness). The steps recommended by WHO in washing hands using soap and flowing water are as follows: 1) rubbing the entire surface of the hands with clean flowing water, then take enough soap and rubbing the palms in a circular direction evenly; 2) rubbing the backs of the hands alternately; 3) rubbing between the fingers alternately until clean; 4) cleaning the knuckles/ fingertips alternately in an interlocking position; 5) rubbing and rotating the thumb by grasping it with the other hand and moving in a circular direction in turn alternately; 6) putting the fingertips into the center of palm of the hand then rubbing the nails and fingertips gently; 7) cleaning the wrist in turn, then rinsing with clean flowing water and drying with a disposable hand towel (Al-Snafi, 2018; Parengkuan et al., 2020; Sari & Islamulyadin, 2017).

Hand hygiene itself should be an important component in preventing and controlling the spread and transmission of infectious diseases. Hand washing has been shown to be effective in removing as much as 85% of microorganisms on the hands and proper hand drying provides further reduction of transient flora. Inadequate drying after hand washing can increase the transmission of microorganisms. Although the benefits of hand hygiene are known and proven, there are still few people who wash their hands properly. Compliance in maintaining hand hygiene is mostly done by adults, female, high education level, high socioeconomic status, living in the city, and access to good water and sanitation. Compliance in maintaining hand hygiene is also not maximized in health services and has

not reduced the incidence of HAIs (Healthcare Associated Infections).

The introduction and training of making hand soap made from hibiscus flowers (*H. rosa sinensis* L.) in Gedawang, Banyumanik, Semarang is intended to make the community of healthcare UMKM know and understand that hibiscus flowers, which are widely available around their residence, can be used as raw materials for making healthcare products that have been produced so far. In addition, this activity is expected to increase and develop the use of natural ingredients with antibacterial potential to be used as raw materials for making hand soap, so as to minimize the use of chemical-based antibacterial.

Therefore, in the healthcarepreneurship training on hand soap making, although the 105 participants were divided into 15 groups, each received a kit of materials and tools to continue practicing independently with assistance from the Omah BungSep team of the Faculty of Medicine, Diponegoro University (Figure 2).



Figure 2 . Hand soap-making practice

Assistance in making antibacterial hand soap made from hibiscus extract is continuously provided to the community of UMKM activists in the healthcare sector, so that the community can make the hand soap independently. The antibacterial hand soap product made from hibiscus extract produced, then became a collaborative product produced by the community, and then registered a patent with registration number No. S00202120213 on November 17, 2021.

The antibacterial hand soap product made from hibiscus extract (*H. rosa sinensis* L.) produced from the healthcarepreneurship training was then registered for a simple patent with registration number S00202120213 on November 17, 2021. The hand soap product can be categorized as a breakthrough and new innovation in an effort to minimize the use of chemicals that are antibacterial but can have a negative impact on the health of its users (Figure 3). In addition, the use of hibiscus extract as a natural antibacterial ingredients in hand soap making is expected to reduce the risk of bacterial resistance to one of the chemical ingredients and reduce the incidence of hand and skin inflammation.

Hand soap is the most widely and frequently used product in maintaining hand hygiene. Soap is a detergent-based product derived from the esterification of fatty acids

with alkali such as NaOH or KOH and produces fatty acid salts with cleaning properties. Soap works by binding grease, dirt, soil, and various organic substances from the hands. In addition, soap also has minimal antimicrobial activity, although it can reduce some flora transients. However, hand soap cannot eliminate 100% of pathogenic bacteria as well as remove intracellular fat and damage proteins in the stratum corneum that function in the skin's defense system. This leads to increased skin sensitivity, leaving the skin dry and prone to irritation and dermatitis.



Figure 3 . Antibacterial hand soap made from hibiscus flower extract

4. CONCLUSION

The conclusions of this activity are the utilization of hibiscus extract as a natural antibacterial ingredient in hand soap making is expected to reduce the risk of bacterial resistance to one of the chemical ingredients and reduce the incidence of hand and skin inflammation; hand soap products made from hibiscus extract are a breakthrough and innovation in reducing the use of chemicals that are antibacterial but can have a negative impact on the health of its users; the introduction and training of making hand soap made from hibiscus flowers (*H. rosa sinensis* L.) aims to make the community driving UMKM in the healthcare sector know and understand that hibiscus flowers, which are widely available around their residence, can be used as raw materials for making healthcare products that have been produced so far to minimize the use of chemical-based antibacterials; and the antibacterial hand soap product made from hibiscus extract became a collaborative product produced by the community, and a simple patent was registered with Number S00202120213 on November 17, 2021.

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CONFLICT OF INTERESTS

The authors declare that there is no conflict of interest.

REFERENCES

- Al-Snafi, A. E. (2018). Chemical constituents, pharmacological effects and therapeutic importance of *Hibiscus rosa-sinensis*- A review. *IOSR J Pharm.*, 8(7), 101–119.
- Biswas, J., Paul, G. K., Jabin, T., Uddin, S., Zaman, S., & Saleh, A. (2020). Antimicrobial activity of two medicated soaps on pathogenic bacteria isolated from human skin. *Int J Biosci.*, 16(5), 293–301.
- Boyle, M. A., Kearney, A. D., Sawant, B., & Humphreys, H. (2020). Assessing the impact of handwashing soaps on the population dynamics of carbapenemase-producing and non-carbapenemase-producing enterobacteriales. *J Hosp Infect.*, 105(4), 678–681.
- Cordita, R. N., Soleha, T. U., & Mayasari, D. (2019). Perbandingan efektivitas mencuci tangan menggunakan hand sanitizer dengan sabun antiseptik pada tenaga kesehatan di Ruang ICU RSUD Dr. H. Abdul Moeloek. *J Agromedicine*, 6(1), 145–153.
- Dorotikova, K., Kamenik, J., Bogdanovicova, K., Krepelova, S., Strejcek, J., & Harustiakovska, D. (2022). Microbial contamination and occurrence of *Bacillus cereus* sensu lato, *Staphylococcus aureus*, and *Escherichia coli* on food handlers' hands in mass catering: Comparison of the glove juice and swab methods. *Food Control*, 133, 108567. <https://doi.org/10.1016/j.foodcont.2021.108567>
- Hillier, M. D. (2020). Using effective hand hygiene practice to prevent and control infection. *Nurs Stand*, 35(5), 45–50. <https://doi.org/10.7748/ns.2020.e11552>
- Nasution, T. A., Yunita, R., Pasaribu, A. P., & Ardinata, F. M. (2019). Effectiveness hand washing and hand rub method in reducing total bacteria colony from nurses in Medan. *Maced J Med Sci.*, 7(20), 3380–3383.
- Nazdrajic, S., & Bratovic, A. (2019). The role of surfactants in liquid soap and its antimicrobial properties. *Int J Adv Res.*, 7(12), 501–507.
- Parengkuan, H., Wowor, V. N. S., & Pangemanan, D. H. C. (2020). Uji daya hambat ekstrak bunga kembang sepatu (*Hibiscus rosa sinensis* L.) terhadap pertumbuhan bakteri *Streptococcus mutans*. *e-GiGi*, 8(1), 8–14. <https://doi.org/10.35790/eg.8.1.2020.27815>
- Sari, Y. E. S., & Islamulyadin, M. (2017). Efektivitas perasan daun bunga sepatu (*Hibiscus rosa sinensis* L.) terhadap pertumbuhan *Staphylococcus aureus*. *J Muhammadiyah Med Lab Technol.*, 2(1), 73–77. <https://doi.org/10.30651/jmlt.v1i1.1011>

- Shedoeva, A., Leavesley, D., Upton, Z., & Fan, C. (2019). Wound healing and the use of medicinal plants. *Evidence-Based Complement Altern Med.*, 1–30. <https://doi.org/10.1155/2019/2684108>
- Ubheeram, J., & Biranjia-Hurdoyal, S. D. (2017). Effectiveness of hand hygiene education among a random sample of women from the community. *J Prev Med Hyg.*, 58(1), 53–55.
- van Seventer, J. M., & Hochberg, N. S. (2017). Principles of infectious diseases: Transmission, diagnosis, prevention, and control. *International Encyclopedia of Public Health*. 2nd ed., 22–39. <https://doi.org/10.1016/B978-0-12-803678-5.00516-6>
- Verbyla, M. E., Pitol, A. K., Navab-Daneshmand, T., Marks, S. J., & Julian, T. R. (2019). Safely managed hygiene: A risk-based assessment of handwashing water quality. *Environ Sci Technol.*, 53(5), 2852–2861. <https://doi.org/10.1021/acs.est.8b06156>
- Weatherly, L. M., & Gosse, J. A. (2017). Triclosan exposure, transformation, and human health effects. *J Toxicol Environ Heal Part B.*, 20(8), 447–469. <https://doi.org/10.1080%2F10937404.2017.1399306>
- Wilantri, G., & Farida, H. (2015). Kolonisasi bakteri patogen potensial penyebab infeksi daerah operasi pada kulit pasien praoperatif (Studi faktor risiko usia, kebiasaan merokok, higiene personal dan lama perawatan praoperatif di RSUP Dr. Kariadi Semarang). *J Kedokt Diponegoro*, 4(4), 859–872.
- World Health Organization (WHO). (2009). *WHO guidelines on hand hygiene in health care*. World Health Organization. <https://www.who.int/publications/i/item/9789241597906>
- Yamlean, P. V. Y., & Lolo, W. A. (2016). Aktivitas antibakteri salep ekstrak daun kembang sepatu (*Hibiscus rosa sinensis* L.) terhadap luka yang terinfeksi bakteri *Staphylococcus aureus* pada kelinci (*Oryctolagus cuniculus*). *Pharmakon*, 5(4), 298–304.
- Yu, J. J., Manus, M. B., Mueller, O., Windsor, S. C., Horvath, J. E., & Nunn, C. L. (2018). Antibacterial soap use impacts skin microbial communities in rural Madagascar. *PLoS One*, 13(8), 1–14. <https://doi.org/10.1371/journal.pone.0199899>