

Literature Review: Hand sanitizer formulation from extract and essential oil of betel leaf (*Piper betle* Linn.) As well as antibacterial activity test

1st Weri veranita
Pharmacy Departemen, Faculty of health science
Duta Bangsa University
Surakarta, Indonesia
weri_veranita@gmail.com

3rd Danang Raharjo
Pharmacy Departemen Faculty of health science
Duta Bangsa University
Surakarta, Indonesia
danang_raharjo@udb.ac.id

2nd Kusumaningtyas Siwi Artini
Pharmacy Departemen Faculty of health science
Duta Bangsa University
Surakarta, Indonesia
kusumaningtyas@udb.ac.id

4th Ferry Effebdi
Pharmacy study program
STTIF
Bogor, Indonesia
ferryeffendi79@gmail.com

Abstract—The pandemic encourages us to look for various ways to overcome it, from various sides, including physical mobility management, vaccine development, to drug discovery. Indonesia has long recognized and used medicinal plants as an effort to overcome health efforts. *Piper betle* Linn or betel is a plant known to have antiseptic properties. Traditional use is usually by boiling the betel leaf. Utilization of stew and betel leaf extract as natural antibacterial agents has advantages. This is because these plants have natural compounds that are safer than the use of drugs that contain synthetic ingredients. Research reveals that betel leaf with an extract content of more than 15% is equivalent to alcohol and ethanol content. Research and utilization of betel leaf as an antiseptic and hand sanitizer products have been done a lot, one of which is by using extracts and essential oils from betel leaves. The aim of this study was to compare the antibacterial activity of the betel leaf hand sanitizer formulation using extracts and essential oils against the tested bacteria. This research is a literature review. Information on the hand sanitizer formulation of *Piper betle* Linn betel leaf was collected from online databases such as Pub Med, Direct Scient, and Google Scholar.

Keywords— hand sanitizer, natural antibacterial, *Piper betle* Linn

I. INTRODUCTION

During the Covid-19 pandemic, maintaining cleanliness and health is something that must be done. Using hand sanitizer, the use of hand sanitizers can be an alternative to easily clean hands. The liquid from alcohol-based hand sanitizers is not able to reduce bacteria on the hands. In human hands there are 98% of germs or bacteria that stick to it, such as *Staphylococcus aureus*, *E.colli*, *Salmonella* and *Shigella*. When in direct contact with food items without hands with soap it will be contaminated by these bacteria. Hand sanitizer is often used in everyday life, especially when doing activities outside the home. The ideal hand sanitizer must have microbial lethal properties, active against the vegetative phase of bacteria, molds and yeasts. *Piper betle* Linn or betel is a plant known to have antiseptic properties. Traditional usage is usually by boiling the betel leaf then boiled water is used to rinse or clean other parts of the body, or crushed betel leaf and then placed on the wound (Mardisiswojo, 1985, Anonymous, 1981). It is known that the content of betel leaf is an essential oil consisting of hydroxy kavikol, cavibetol, estargiol, eugenol, metileugenol,

carvacrol, terpenes, sesquiterpenes, phenylpropane and tannins (Anonymous, 1980).

Various metabolites are found in betel essential oils such as chavibetol, chavicol, hydroxychavicol, eugenol, caryophyllene, cadinene, allyl catechol, p-cymene, terpinene, eucalyptol, sesquiterpenes, cadinene, caryophyllene, sitosterol, β -sitosterol and γ -sitosterol (Srinivasan et al., 2016; Syahidah et al., 2017). Some of the metabolites of betel essential oil that are reported to have antibacterial properties are chavicol, allylpyrocatechol (Murata et al., 2009; Islam et al., 2020). Betel leaf essential oil can be formulated into antiseptic preparations and has shown good antibacterial activity (Triastuti, et al., 2011; Bhattacharya et al., 2016; Basak & Guha, 2017). Currently, there are several studies conducted to make betel-based hand sanitizer preparations both from betel leaf extract and betel leaf essential oil. This study aims to compare the effectiveness of hand sanitizers formulated using betel leaf extract and betel leaf oil against these bacteria using the literature review method.

II. RESEARCH METHOD

This type of research in this study is non-experimental research. The method used in writing this journal uses a literature review approach. Literature study itself is a data collection activity both library data and documentation (Nursalam, 2016). Information about testing in this study can be obtained from research journals obtained from Pub Med, Direct Scient, and Google Scholar. The main focus of this review literature is the formulation of handsanitizer and antiseptic gel preparations from betel leaf extract and essential oil. Search results through reviews A total of 20 journals were identified and eligibility criteria were carried out. After that, 10 journals were filtered, then excluded studies were carried out and 8 journals were carried out, after that excluded studies were again based on inclusion criteria so that the total number of articles that met the requirements for review was 5 journals.

Data analysis

Analysis of the data in this study is a number of journal writing that will be literature review starting from the most relevant, relevant, and quite relevant the year of writing for this research was in the span of the year of writing (2014-

2020. Read the abstract completely and thoroughly each journal to evaluate whether the problem discussed is in accordance with what is going to be solved in a journal

III. RESULTS AND DISCUSSION

Research on betel essential oil the 3% active ingredient, the method used in the extraction of essential oils, is using QC. The results show the diameter of the strong inhibition against the gram-positive *S. aureus* bacteria where the 10-20mm inhibition range falls into the strong category. Whereas in the study (Gita Mentari 2015) the betel essential oil formulation gave an antibacterial effect at a concentration of 10% against the gram-negative test bacteria *E. coli* with a diameter also entered into strong inhibitory power with a diameter of 17mm. In the 3% concentration study, the optimum formulation of bacterial inhibition was 11.32 mm (Haryati, 2020), According to research (Angnes 2016) 12% betel extract after being formulated into a handsanitizer preparation provides a very strong inhibitory power. In the study (Hapsari 2018), the extract concentration of 10% was able to reduce the germ rate by 77.92%; a concentration of 20% of 86.13%; and a 30% concentration of 93.94%. In other studies (Fathoni 2019), The handsanitizer formulation with a concentration of 12% betel leaf extract showed a very strong inhibitory diameter. In general, this hand sanitizer gel product can be said to be more effective in killing *S. aureus* bacteria compared to commercial handsanitizer products.

The increase in the concentration added has an effect on the increase in the inhibition of the antibacterial test on the preparation, the higher the concentration of extract and essential oil of betel leaf, the greater the inhibition of the results. In the betel essential oil preparation formulation the concentration used tends to be smaller than the betel leaf extract, this may be due to the small yield of betel leaf essential oil so that the number of samples obtained is also small. Like other oils, most essential oils are insoluble. Color changes are seen in green betel leaf essential oil, this occurs because there is exposure to air in the green betel leaf essential oil used. Essential oils are unstable against environmental influences, both the influence of oxygen, air, sunlight, and heat because they consist of various kinds of constituent components. In testing the viscosity of the

essential oil handsanitizer gel formulation of betel leaf was only stable for 30 days.

IV. CONCLUSION

Based on the results of the review literature, it can be found that betel leaf extract and betel leaf essential oil provide almost the same antibacterial inhibitory power which is in the strong and very strong category against *S. aureus* and *e.coli* test bacteria. while the product stability in betel extract preparation gives better results than when it was formulated. the peculiarity of the betel leaf aroma that is increasingly pungent with an increase in the concentration of the extract. So it is necessary to add another aroma so that it can compete with commercial products

REFERENCES

- [1] Hapsari, dkk, Manfaat Ekstrak Daun Sirih (*Piper Betle* Linn) Sebagai Hand Sanitizer Untuk Menurunkan Angka Kuman Tangan., 2019, Poltekkes Kemenkes Yogyakarta,
- [2] Mentari, Pengaruh Karbopol 940 dan
- [3] Sorbitol Dalam Formulasi Gel Hand Sanitizer. Minyak Daun daun sirih hijau dan uji aktivitas antibakteri, 2015, sanata dharma Yogyakarta. Skripsi
- [4] Angnes Y, Pengaruh Karbopol 940 dan gliserin dalam Formulasi gel Hand Sanitizer. Minyak Daun daun sirih hijau dan uji aktivitas antibakteri, 2016, sanata dharma Yogyakarta. Skripsi
- [5] Fathoni Dk, Efektivitas Ekstrak Daun Sirih Sebagai Bahan Aktif Antibakteri Dalam Gel Hand Sanitizer Non-Alkohol, 2019, Universitas Sebelas Maret, Artikel
- [6] Haryanti.,S, dkk, Optimasi Waktu Maserasi Dan Konsentrasi Ekstrak Daun Sirih Hijau (*Piper Betle* Linn) Dalam Pembuatan Gel Antiseptik Kulit, 2020, Teknik Kimia, Universitas Jayabaya Jakarta
- [7] Nursalam. 2016. Metodologi Penelitian Ilmu Keperawatan Pendekatan Praktis Edisi.4. Jakarta : Salemba Medika.
- [8] Sari, R., Isadiartuti, D., 2006. Studi efektivitas sediaan gel antiseptik tangan ekstrak daun sirih (*Piper betle* Linn.) Antiseptic activity evaluation of piper leave from *Piper betle* Linn extract in hand gel antiseptic preparation. Retno Sari Majalah Farmasi Indonesia 17, 165.
- [9] Murata, K., Nakao, K., Hirata, N., Namba, K., Nomi, T., Kitamura, Y., Moriyama, K., Shintani, T., Iinuma, M., Matsuda, H., 2009. Hydroxychavicol: A potent xanthine oxidase inhibitor obtained from the leaves of betel, *Piper betle*. Journal of Natural Medicines 63,355–359.
- [10] Islam, M.A., Ryu, K.Y., Khan, N., Song, O.Y., Jeong, J.Y., Son, J.H., Jamila, N., Kim, K.S., 2020. Determination of the Volatile Compounds in Five Varieties of *Piper betle* L. from Bangladesh Using Simultaneous Distillation Extraction and Gas Chromatography/Mass Spectrometry (SDE-GC/MS). Analytical Letters 0, 1–18.
- [11] Mardiswojo, S. and Harsono R., 1985, Cabe Puyang Warisan Nenek Moyang, PN. Balai Pustaka, 189- 190, 215