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Characterization of Green Betel Leaf Extract (*Piper bettle L*) as Raw Material for Mouthwash Preparations

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ABSTRACT

Previous research reported that the phenol coefficient of a sample of betel leaf decoction disinfectant was only 0.3-0.5 ppm, because this compound evaporates easily with heat treatment. Therefore, in this research, a viscous extract from green betel leaves was carried out. Thus, it is necessary to characterize the condensed extract of green betel leaves from Kijang, Bintan Regency, Indonesia, which is used in the manufacture of mouthwash preparations. Based on the results of qualitative tests, the thick extract of green betel leaves contains tannins, saponins and flavonoids. Based on quantitative tests, it was found that the thick betel leaf extract contained 61.9032 ppm of antioxidants, 524.8148 ppm of flavonoids (0.53%), 219.44 ppm of tannins (0.22%), 3213.33 ppm of total phenols (3 .21%) and saponins 2542.22 ppm (2.54%) from 100 g sample. The content of these compounds can be used as part of herbal mouthwash formulas.
Keywords: green betel leaf; extract; mouthwash

INTRODUCTION

For a long time, Indonesian people have used plant parts as medicine. This is supported by high biodiversity in Indonesia. One of the plants used by Indonesian people is betel nut. Betel leaf as part of the betel plant contains essential oils, cavibetol, eugenol, safrole, hydroxy-cavicol, allylpyrocatecol-mono and allylpyrocatecol-diaacetate, antehol, cavibetolacetate, kavikol, methyl eugenol, 1,8-cineol, kadinen, kamfen, cariophyllene, limonene, pinene, carvacrol, neolignan, krotepoxide, piperbetol, piperol. Eugenol compounds are bactericidal by increasing the permeability of the bacterial membrane. The kavikol compound, apart from giving a distinctive odor to betel nut, also has 5 times the bactericidal properties of other phenolic compounds. Various studies have proven that green betel leaf extract (*Piper betle L.*) has antibacterial activity.

Green betel leaf extract as an antibacterial has been proven in Seila's research [(1)], that green betel leaf extract with ethanol solvent can inhibit the growth of Staphylococcus aureus bacteria using the disc diffusion method at the smallest concentration of green betel leaf extract, which is 106 ppm in the strong inhibition category. Angga [(2)] has also proven in his research which explains that green betel leaf extract can inhibit the growth of Streptococcus viridans bacteria using the disc diffusion method at concentrations of 20% and 30% green betel leaf extract, with an average inhibition zone of 11.67 mm and 14 mm with weak resistance category. Meanwhile at concentrations of 50% and 75% obtained an average inhibition zone of 17.67 mm and 19 mm with moderate inhibition category. At a concentration of 100%, an average inhibition zone of 21.33 mm was obtained with the category of strong inhibition.

Almasyhuri's research [(3)] showed results that in vitro betel leaf ethanol extract mouthwash was effective as an antiseptic against S. aureus bacteria. Based on the value of the phenol coefficient, mouthwash with betel leaf extract has higher antiseptic activity compared to the povidone iodine mouthwash formula circulating in the community. Hevi's research [(4)] states that the phenol coefficient of a sample of betel leaf decoction disinfectant is only 0.3-0.5 ppm. This is because phenol compounds easily evaporate with heat treatment. Therefore, in this research, a viscous extract from green betel leaves was carried out.

Based on the results of previous studies, it is necessary to characterize the condensed extract of green betel leaves from Kijang, Bintan Regency, Riau Archipelago which is used in the manufacture of mouthwash preparations.

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METHODS

The tools and materials used were green betel leaves, 70% alcohol, phytochemical test reagents, glass tools and rotary evaporators. To obtain a thick extract, there are several steps that are carried out, namely:

1. Green betel leaves as much as 3 kg washed and dried at room temperature for 1-2 days
2. Grind the dried betel leaves to obtain green betel leaf powder
3. The green betel leaf powder is then macerated for 3-5 days using 70% alcohol
4. After 5 days the maceration results are separated from the yield so that the filtrate is obtained
5. The filtrate obtained is put into the rotary evaporator to evaporate the remaining alcohol solvent so that a thick extract is obtained.
6. This thick extract will then be tested qualitatively and quantitatively for its compound content.

The green betel leaf extraction process is carried out in the Chemistry Laboratory of Universitas Negeri Padang, Indonesia.

RESULTS

Based on the results of qualitative and quantitative tests carried out on the thick extract of green betel leaves, the following information was obtained:

Table 1. Qualitative and quantitative test results of green betel leaf viscous extract

No	Test parameters	Results	Methods
1	Qualitative		
	Flavonoid	Positive (+)	Qualitative
	Saponin	Positive (+)	Qualitative
	Tannin	Positive (+)	Qualitative
2	Quantitative (in 100 g sample)		
	Saponin	2542.22 ppm (2,54%)	UV-Vis Spectrophotometer
	Total phenol	3213.33 ppm (3,21%)	UV-Vis Spectrophotometer
	Tannin	219.44 ppm (0,22%)	UV-Vis Spectrophotometer
	Flavonoid	524.82 ppm 0,53%)	UV-Vis Spectrophotometer
	Antioxidant activity	61.90 ppm	UV-Vis Spectrophotometer

DISCUSSION

Samples of fresh green betel leaves (*Piper betle L*) used in this study were taken from Kijang, Bintan Regency, Riau Archipelago. Fresh green betel leaves as much as 3 kg after drying for 1-2 days, finally become 750 grams of dried betel leaves, which are then mashed. Based on qualitative phytochemical screening, the results showed that green betel leaf extract contains several compounds.

The first compound is a flavonoid which has a benzopyron structure so that if it reacts with mineral acids, namely concentrated hydrochloric acid and a little Mg powder, it will produce colored flavilium salts [(5)]. The results obtained are brownish color indicating the presence of flavonoid compounds.

The second is saponins, which can be seen from the stable foam produced, which is caused by saponins which are compounds that have hydrophilic and hydrophobic groups. When shaken, the hydrophilic group will be associated with water while the hydrophobic group will be associated with air so as to form foam [(5)].

The third compound is tannin. The tannin test was carried out by adding 1% FeCl3 which eventually formed a blue-black, green or blue-green color and precipitate. The function of the 1% FeCl3 reagent is to form a substitution reaction by replacing the OH group in the tannins and forming a complex compound by producing a blackish blue color.

The results obtained indicated that green betel leaf extract contained tannins. The color change that occurs is thought to be due to the 1% FeCl3 solution reacting with one of the hydrosil groups present in the tannin compound [(6)]. The results of the phytochemical test of viscous green betel leaf extract were quantitatively carried out using a UV-Vis spectrophotometer, which showed the following results.

The first is saponins. The results of examination using a UV-Vis Spectrophotometer showed that the concentrated green betel leaf extract contained 2542.22 ppm saponins or the equivalent of 2.54% saponins in 100 gram sample.

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The second is phenol. From measurements using a UV-Vis spectrophotometer, it was found that the thick extract of green betel leaves contained 3213.33 ppm total phenols or the equivalent of 3.21% total phenols in 100 gram sample. This is because green betel leaves contain various kinds of phenolic derivatives, namely eugenol allypyrocatechin 26.8-42.5%, Cineol 2.4-4.8%, methyl eugenol 4.2-15.8%, Caryophyllen (Siskuiterpenes) 3-9.8%, hydroxy cavicol, kavikol 7.2-16.7%, cavibetol 2.7-6.2%, estragol, ilypyrocatekol 0-9.6%, carvacrol 2.2-5.6% [(7)]. The percentage of total phenol obtained from the condensed extract of green betel leaves is lower because there is a drying process of betel leaf samples which allows some of the phenolic compounds to evaporate due to the drying and decomposition processes.

The third is tannins. From the results of measurements using a UV-Vis Spectrophotometer it is known that the tannin content of the thick extract of green betel leaves is 219.44 ppm or (0.22%). Green betel leaves contain 4.2% essential oil, the main component of which is bethel phenol and several of its derivatives, including eugenol allypyrocatechin 26.8-42.5%, cineol 2.4-4.8%, methyl eugenol 4.2-15.8%, caryophyllen (sisquiterpenes) 3-9.8%, hydroxy kavikol, cavikol 7.2-16.7%, cavibetol 2.7-6.2%, estragol, ilypyrokatekol 0-9.6%, carvacrol 2.2-5.6%, alkaloids, flavonoids, triterpenoids or steroids, saponins, terpenes, phenylpropane, terpinen, diastase 0.8-1.8% and tannin 1-1.3% [(7)]. Tannin compounds will act as an astringent which can be used to treat diarrhea, besides that tannins can be used as a treatment for stomach and duodenal tumors, as a diuretic, anti-inflammatory, antiseptic, antioxidant and hemostatic drugs. In addition, tannins can also act as antiviral, antibacterial and antitumor [(8)].

Fourth are flavonoids. From the results of measurements using a UV-Vis Spectrophotometer, it was found that the flavonoid content of the thick extract of green betel leaves was 524.8148 ppm or (0.53%). Green betel leaves contain 4.2% essential oil, the main component of which is bethel phenol and several of its derivatives including eugenol allypyrocatechin 26.8-42.5%, cineol 2.4-4.8%, methyl eugenol 4.2-15.8%, caryophyllen (Siskuiterpen) 3-9.8%, hydroxy cavikol , cavicol 7.2-16.7%, cavibetol 2.7-6.2%, estragol, ilypyrokatekol 0-9.6%, carvacrol 2.2-5.6%, alkaloids, flavonoids, triterpenoids or steroids, saponins, terpenes, phenylpropane, terpinen, diastase 0.8-1.8% and tannins 1-1.3% [(7)]. Flavonoids include natural phenolic compounds that have potential as antioxidants and have bioactivity as drugs. These compounds can be found in stems, leaves, flowers and fruit. The benefits of flavonoids include protecting cell structures, increasing the effectiveness of vitamin C, anti-inflammation, preventing bone loss and as antibiotics [(9)]. In the human body, flavonoids function as antioxidants so they are very good for cancer prevention. Flavonoids that have antioxidant activity include flavones, flavonols, isoflavones and flavanones [(10)]. The antioxidant activity of flavonoid compounds has been studied by previous researchers. Julia [(11)] has studied 26 flavonoid-derived compounds using molecular descriptors calculated using the AM1 semi-empirical method with statistical processing using PCA and PCR.

Regarding antioxidant activity, the results of measurements using a UV-Vis Spectrophotometer showed that the anti-oxidant content of the thick extract of green betel leaves was 61.9032 ppm. Antioxidants in plants are obtained from secondary metabolites produced by plants. Secondary metabolites are compounds produced or synthesized in cells and certain taxonomic groups at certain levels of growth or stress. This compound is produced only in small quantities not continuously to defend itself from its habitat and does not play an important role in the main (primary) metabolic processes. There are several factors that affect the synthesis of secondary metabolites, one of which is a physical factor that is related to temperature, light, humidity etc [(11)]. This physical factor is closely related to the altitude of an area.

CONCLUSION

From the research conducted, it can be concluded that the thick extract of green betel leaves qualitatively contains tannins, saponins and flavonoids. Quantitatively it was obtained that the thick betel leaf extract contained 61.9032 ppm of antioxidants, 524.8148 ppm of Flavonoids or (0.53%), 219.44 ppm of tannins or (0.22%), 3213.33 ppm of total phenols or equivalent with 3.21% and 2542.22 ppm saponins or equivalent to 2.54% of 100 gram sample.

REFERENCES

1. Seila I. Efek Ekstrak Daun Sirih Hijau (*Piper betle L*) Terhadap Pertumbuhan Bakteri Staphylococcus aureus. Jakarta: Universitas Islam Negeri Syarif Hidayatullah; 2012.
2. Angga MI. Uji efektitifitas ekstrak daun sirih hijau (*Piper betle Linn*) terhadap pertumbuhan bakteri *Streptococcus viridans* dengan metode *disc diffusion.* Jakarta: Universitas Islam Negeri Syarif Hidayatullah; 2013.
3. Almasyhuri DS. Uji Aktivitas Antiseptik Ekstrak Etanol Daun Sirih (*Piper betle Linn.*) dalam Obat Kumur terhadap Staphylococcus aureus secara in Vitro. Jurnal Kefarmasian Indonesia. 2019;9(1).

4. Hevi H, et al. Uji Koefisien Fenol Dan Umur Simpan Produk Disenfektan Sirih Kalamansi (Sirkala). Laporan Penelitian. Tanjungpinang: Poltekkes Kemenkes Tanjungpinang; 2021.
5. Marliana SD, Suryanti V. Skrining Fitokimia dan Analisis Kromatografi Lapis Tipis Komponen Kimia Buah Labu Siam (*Sechium edule Jacq Swartz*.) dalam Ekstrak Etanol. 2005;3(1).
6. Kursia Set al. Uji Aktivitas Antibakteri Ekstrak Etilasetat Daun Sirih Hijau (*Piper betle L*.) terhadap bakteri *Staphylococcus epidermidis*. IJPST. 2016;3(2):1-6.
7. Rosman R, Suhirman S. Sirih tanaman obat yang perlu mendapat sentuhan tekonologi budaya. Warta Penelitian dan Pengembangan Tanaman Industri. 006;12(1):13-15.
8. Ningtyas RD. Pengembangan Sensor Berbasis Kertas (Paper Microzone Plates) untuk Penentuan Tanin pada Ekstrak Tanaman Obat. Jember: Fakultas Famasi, Universitas Jember; 2020.
9. Waji RA, Sugrani A. Makalah Kimia Organik Bahan Alam Flavonoid (Quercetin). Makassar: Universitas Hasanuddin; 2009.
10. Trilaksani W. Antioksidan: Jenis, Sumber, Mekanisme Kerja dan Peran Terhadap Kesehatan. Bogor: Institut Pertanian Bogor; 2003.
11. Julia D. Analisis hubungan kuantitatif struktur dan aktivitas antioksidan senyawa turunan flavonoid dengan deskriptor molekular hasil kalkulasi metode austin model 1 (AM1). Jurnal Kimia Mulawarman. 2008;5(2).
12. Mariska I. Metabolit Sekunder: Jalur pembentukan dan kegunaannya [Internet]. 2013 [cited 2022 Sep 25]. Available from: http://biogen.litbang.pertanian.go.id/index.php/2013/08/metabolit sekunder -jalur-pembentukan-dan-kegunaannya/ Diakses 25 September 2022.