

PEMANFAATAN EKSTRAK ETANOL DAUN SOSOR BEBEK DALAM SEDIAAN PASTA GIGI

THE APPLICATION OF ETHANOL EXTRACT OF SOSOR BEBEK (*Bryophyllum pinnatum* Lam. Oken) IN A TOOTHPASTE

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ABSTRAK

Daun sosor bebek merupakan salah satu tanaman yang dapat dimanfaatkan oleh masyarakat sebagai obat tradisional, karena memiliki khasiat sebagai antipiretik, diuretik, insektisida dan antibakteri. Tujuan penelitian ini untuk melihat aktivitas antibakteri sediaan pasta gigi ekstrak etanol 96% daun sosor bebek terhadap pertumbuhan bakteri *Streptococcus mutans*. Pembuatan ekstrak dilakukan dengan metode maserasi menggunakan pelarut etanol 96%. Dilanjutkan pembuatan sediaan pasta gigi ekstrak daun sosor bebek pada konsentrasi ekstrak 0%, 5%, 10%, 20% dan dilakukan evaluasi fisik serta uji aktivitas antibakteri dengan metode dilusi. Data yang didapat dianalisis secara statistik dengan uji *one way* ANOVA yang dilanjutkan dengan uji Tukey. Hasil penelitian menunjukkan, bahwa pada konsentrasi ekstrak 5% memiliki rata-rata koloni sebesar 84, ekstrak 10%; 69,67, ekstrak 20%; 44,33, plasebo 366 dan pasta gigi pembeding 43,33. Ekstrak etanol 96% daun sosor bebek sebesar 10% dan 20% dalam sediaan pasta gigi dapat menghambat pertumbuhan koloni *S.mutans* sebaik produk komersial.

Kata kunci: daun sosor bebek, *Streptococcus mutan*, pasta gigi, sifat fisik, aktifitas antimikroba

ABSTRACT

Sosor bebek leaves is a natural material that known having an antibacterial activity on Streptococcus mutans. The aim of this research was to determine antibacterial activity of ethanol extract of sosor bebek leaves in toothpaste formulation on Streptococcus mutans. The extracts were made by maceration method using ethanol 96%. Followed by produce the toothpaste of sosor bebek leaves extract at concentration of 0% (placebo), 5%, 10%, 20% and then evaluations on physical characteristics and antibacterial activity test by dilution method. The data obtained were analyzed statistically by one way ANOVA test followed by Tukey's test. The results shows that the average of the colony were 366; 84; 69.67; and 44.3; respectively. While comparative toothpaste (commercial) produce an average colony of 43.33. It can be conclude that 10% and

20% of ethanol extract of sosor bebek leaves in the toothpaste inhibited the growth of *S. mutans* that same with the commercial product.

Keywords: *Sosor bebek leaves, Streptococcus mutans, Toothpaste, physical characteristic, antimicrobial activity*

INTRODUCTION

The leaves of sosor bebek (*Bryophyllum pinnatum* Lam Oken) have been empirically believed as an antipyretic, diuretic, insecticidal and antibacterial (Latief, 2012). Oktoria (2010) has conducted a research that at 5% of ethanol extract 96% of sosor bebek leaves had minimum inhibitory concentration (MIC) as the antibacterial to *Streptococcus mutans* causes of dental caries. This bacteria has some properties such as cariogenic, asidogenic, asiduric and can convert sugars to acid through carbohydrate fermentation (Widasany, 2011). In the presence of high acid concentration resulted in demineralization of enamel and dental caries (Jawetz *et al.*, 2007).

To improve the utilization of this natural material in assisting caries prevention is made in the dentifrice preparations. Elfiyani (2015) has reported that the dentifrice preparation of ethanol extract 96% of sosor bebek leaves with 2% of xanthan gum as binder indicated a good physical stability of toothpaste. Based on the background, in this research will be tested antibacterial activity of toothpaste preparation of ethanol extract 96% of sosor bebek leaves to *Streptococcus mutans* bacteria. This study aims to determine the antibacterial activity of ethanol extract 96% of sosor bebek leaves in toothpaste formulation on *Streptococcus mutans*.

RESEARCH METHODS

Materials

Sosor bebek leaves (*Bryophyllum pinnatum* Lam Oken) is obtained from Indonesian Spices and Medicinal Plant Research Institute (Balitro) Bogor Agriculture Department. *Streptococcus mutans*, Nutrient broth (NB) and Nutrient agar (NA) were obtained from the Indonesia University of Parasitology Department, Mustika Ratu betel herbal toothpaste as a comparison. Xanthan gum (Danisco-France), sodium lauryl

sulphate, calcium carbonate, glycerin, sodium saccharin, candy oil, methyl paraben, propyl paraben and aquadest.

Research path

1. Preparation of sosor bebek leaves extract and Phytochemical identification (Depkes RI, 2008).

Twelve Kg of sosor bebek leaves are separated by dirt or other ingredients such as roots and stems, then washed and rinsed with running water to remove impurities, drained, then sliced the sosor bebek leaves with a thickness of 2-3 mm. The simplicia powder of ± 6922.1 g are macerated with 96% ethanol for 3 days, then filtered and re-macerated until there is no active substance in the powder of simplicia. The maserate is concentrated with a vacuum rotary evaporator at 50°C, then dried in an oven with a temperature of 50°C to obtain a viscous extract. The identification of viscous extract includes flavonoid test, tannin and saponin.

2. Preparation of toothpastes

This study was conducted using 3 toothpastes formulas of ethanol 96% extract of sosor bebek leaves in various concentration and 1 formula of toothpaste base (placebo), can be seen in Table I.

Table I. Toothpaste formulas of ethanol 96% extract of sosor bebek leaves

	Formulas (%)			
	Placebo	F1	F2	F3
Viscous extract of sosor bebek leaves	0	5	10	20
Xanthan gum	2.0	2.0	2.0	2.0
Calcium Carbonat	45.0	45.0	45.0	45.0
Glycerin	25.0	25.0	25.0	25.0
Sodium lauryl sulfate	2	2	2	2
Sodium saccharin	0.2	0.2	0.2	0.2
Methyl paraben	0.18	0.18	0.18	0.18
Propyl paraben	0.02	0.02	0.02	0.02
Peppermint oil	0.4	0.4	0.4	0.4
Aquadest	d 100	ad 100	ad 100	ad 100

Xanthan gum is dispersed with a partial of glycerin (M1). Propyl paraben and methyl paraben are dissolved with a partial of glycerin (M2). Sodium saccharin is diluted with aquadest (M3). The extract of sosor bebek leaves is mixed with a partial

glycerin (M4). Then M1, M2, M3 and M4 are mixed and homogenized using a mixer. After that the calcium carbonate is mixed into the mixture gradually while stirring until homogeneous (Mixed mass). Sodium lauryl sulfate is dispersed with the remaining of glycerin, then mixed into the mixed mass slowly, stirring until homogeneous. Furthermore, peppermint oil is added to the mixture, stir until homogeneous.

3. Evaluate the physical properties and antibacterial activity of toothpaste

The evaluation includes organoleptic, homogeneity, rheology, pH value, phase separation test with freeze thaw and centrifugation. The test of antibacterial activity was performed using the dilution method. Tubes 1, toothpaste as much as 1 gram diluted in 9 mL of sterile aquades. Tube 2, 0.8 mL of medium NB plus 0.1 mL of tube 1, and 0.1 mL of bacterial suspension; previously compared to turbidity with solution of Mc Farland 0.5; and incubated at 37 ° C for 24 hours. A total of 0.1 mL of tube 2 was piped and inserted into a NA medium, then flattened by using drugalsky and incubated at 37° C for 24 hours. To find out the number of colonies that grow on solid media, colonies were calculated using colony counter and number of colony compared with placebo and commercial toothpaste (comparator) (Harmita and Radji, 2008; Atikah, 2013).

Data analysis

The antibacterial activity test data were analyzed statistically, using one way ANOVA with 95% significance level (α 0.05).

RESULTS AND DISCUSSION

The extract of sosor bebek leaves was produced at 242.6 g. Characteristics of extracts were viscous liquid, blackish brown, typical smell, sour taste, pH value 5.7; and loss on drying 23.14%. The results of phytochemical identification showed that the extract contained flavonoids, tannins, and saponins.

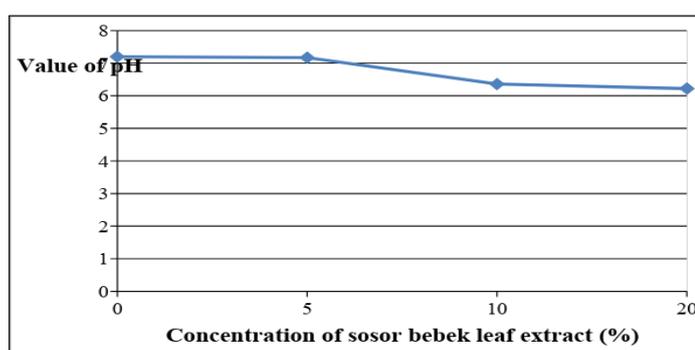
The results of organoleptic test and homogeneity of toothpaste sosor bebek leaves extract can be seen in Table II.

Table II. Organoleptic and homogeneity of toothpaste sosor bebek leaves extract

Concentration of extract	Organoleptic and homogeneity			
	Texture	Flavor	Color	Homogeneity
0%	Slightly viscous	Mint	White	Homogeneous
5%	Viscous	Mint	Light green	Homogeneous
10%	Slightly stiff	Mint	Dark green	Homogeneous
20%	Stiff	Mint	Green brown	Homogeneous

The result of phase separation test with freeze thaw method showed four dentifrice preparations did not occur separation in each cycle. Similar results were also obtained from the centrifugation method at 3750 rpm for 1 hour that all formulas did not undergo phase separation, due to the large number of bonds between the solid phase and the dispersion phase so it can withstand from the shaking of the device. This shows that all dentifrice preparations with various concentrations of the extract are stable both in storage at cold and hot temperatures and are stable against the presence of centrifugal force.

The four dentifrice preparations have different pH values, ie, the higher concentration of sosor bebek leaves extract indicates acidic pH value (Figure 1). This is because the pH value of the extract was acid, ie 5.70. However, with the results of the pH value of the four dentifrice preparations have met the toothpaste quality requirement, ie 4.5-10.5 (SNI, 1995).

**Figure 1.** The pH value of the toothpaste of sosor bebek leaves extract

Increased concentration of sosor bebek leaves extract can increase the viscosity value of dentifrice preparation (Figure 2). This shows the effect of extract form, in this study was using extracts that have loss on drying at 23.14%. The loss of drying value of

the extract used is the same as the water content. According Saifudin (2011) thick extract has a water content of 5-30%. Based on the range of water content, the extract was included in the form of viscous extract.

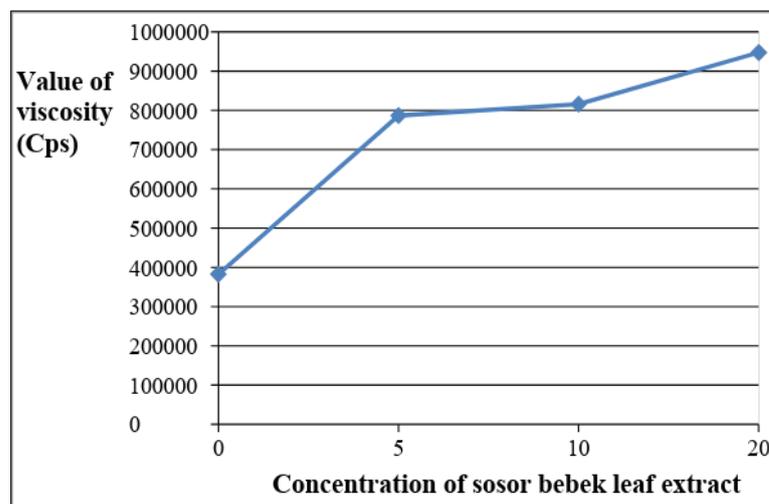


Figure 2. Viscosity value of toothpaste sosor bebek leaves extract

According to research Putri (2014) in evaluating kale extract obtained viscosity of 13000 cps with loss on drying at 29.44%. Based on the loss on drying data, the result of sosor bebek leaves extract was smaller than the kale extract (Putri, 2014) hence can be estimated that sosor bebek leaves extract had a viscosity value greater than 13000 cps.

The rheology of toothpaste showed that all formulas had plastic thixotropic flow properties (Fig. 3). The thixotropic flow properties are obtained because the down-curve is on the left of the up-curve, it shows smaller shear stresses on the down curve than the up curve. While it was said a plastic properties because the rheogram does not look through the origin but intersect the axis of the shear stress if the linear part of the curve is extrapolated to the axis at a certain point known as the yield value. Yield value indicates the presence of particles that have to be first broken down before the preparation can flow (Agoes, 2012).

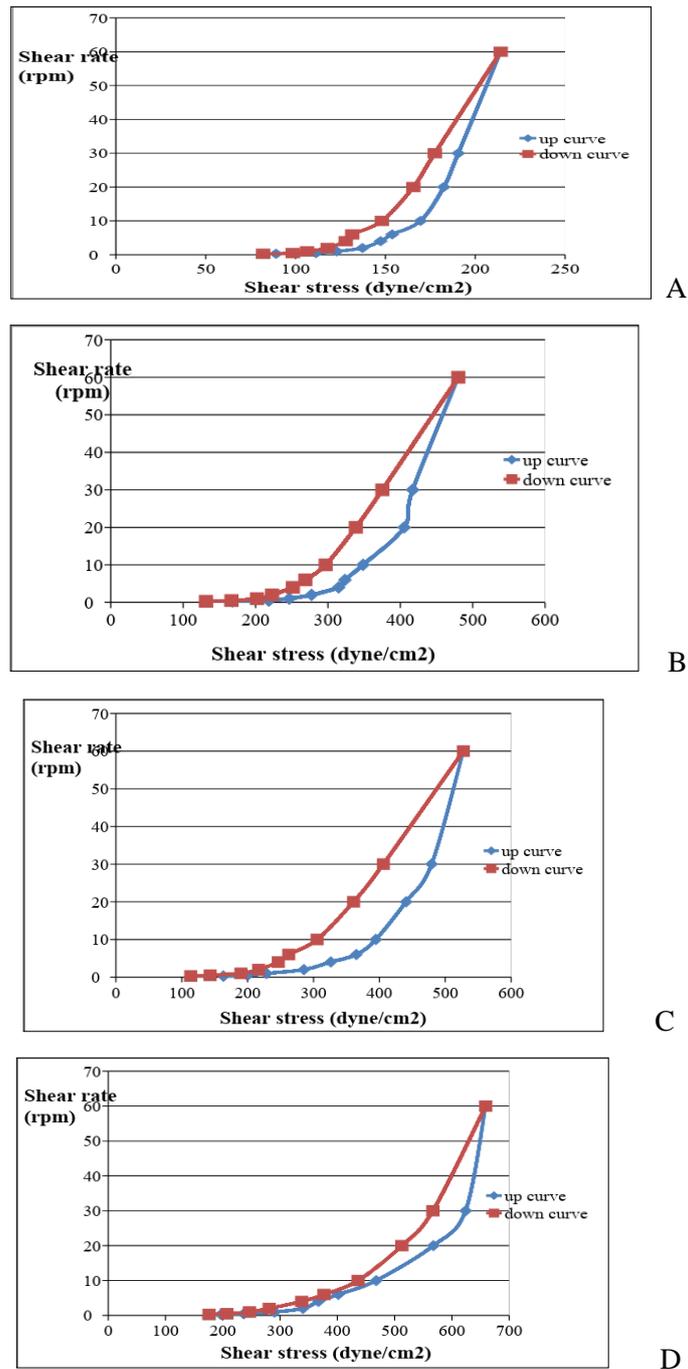


Figure 3. Rheogram of toothpaste : (A) placebo, (B) F1, (C) F2, and (D) F3

Can be seen in Figure 4 shows that there is a decrease in the number of colonies that grow with increasing concentration of sosor bebek leaves extract. This indicated the presence of inhibition of growth of *S.mutans* colonies due to flavonoid compounds contained in the leaves of sosor bebek (Nuria *et al.*, 2010).

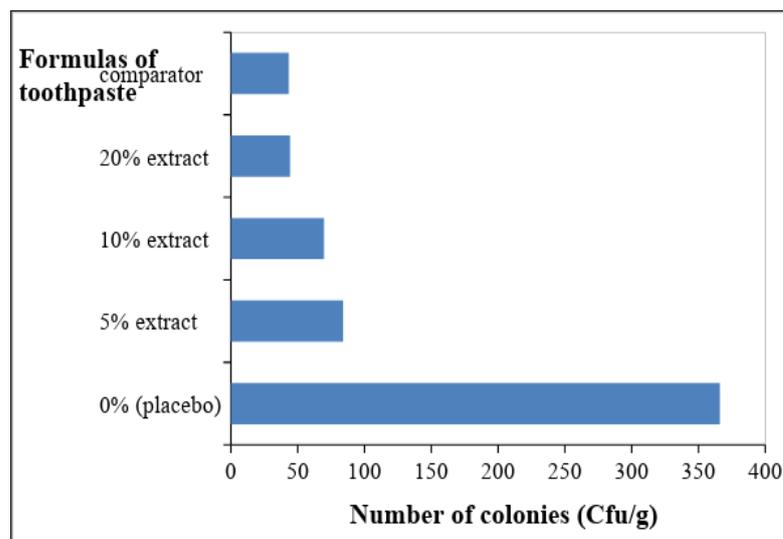


Figure 4. The average number of *S.mutans* colonies on 10^{-2} dilution

The antibacterial activity test results were statistically analyzed using one way ANOVA showing the sig value. $0.00 < 0.05$. This shows the significant influence of the use of sosor bebek leaves extract on the number of *S.mutans* colonies. While on Tukey HSD test result stated that toothpaste at 10% and 20% of sosor bebek leaves extract had the same effect with comparator toothpaste.

CONCLUSION

The results of this study showed that ethanol extract of sosor bebek leaves at concentrations of 10% and 20% has the same ability as a comparative toothpaste in inhibiting the growth of *S.mutans* bacteria.

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