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BIOPROSPECTING FOR ANTI-STREPTOCOCCUS MUTANS: THE ACTIVITY OF *SESBANIA GRANDIFL*ORA LEAVES EXTRACT COMPARABLE TO AZITHROMYCIN

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ABSTRACT

To look for an herbal substance that can prevent the plaque-producing bacteria Streptococcus mutans. Methods: Using hydro alcohol, *Sesbania grandifl*ora leaves and *Costus speciosus* rhizomes were extracted (70:30). They were then tested in vitro on Mueller-Hinton media against Streptococcus mutans at a concentration of 10% (w/v). As a positive control, azithromycin (20 mg disc) was used. Results: With inhibited zone widths of 17.5 and 13.5 mm, respectively, *Sesbania grandifl*ora (S. grandiflora) leaves and *Costus speciosus* rhizome extracts demonstrated the most effective activity of the examined samples. S. grandiflora's activity (diameter = 18.0 mm) was comparable to that of azithromycin. The flower of the *S. grandiflora* plant holds promise for use as an anti-plaque toothpaste and mouthwash solution active ingredient

Keywords: Azithromycin, *Sesbania grandiflora*, *Coctus speciosus*, *Streptococcus mutans.*

INTRODUCTION

Nowadays, tooth decay is a dental health issue in both industrialised and developing nations [1-3]. Plaques, a biofilm material created by a variety of bacterial species, are known as the primary plaque producers. These include Lactobacillus sp. [4], *Streptococcus viridans* [5], and Streptococcus mutans (S. mutans) [6,7]. People in the community are instructed to clean their teeth or use mouthwash on a regular basis to stop plaque from forming. A strong active component is necessary for the creation of antibacterial toothpaste or mouthwash. However, more enduring food traces after brushing have been the most complicated part of present dental caries as a result of rapid food consumption as well as multiple meals provided in the communities [8].

Therefore, daily toothpaste or mouthwash solution should contain inhibitors of plaque-causing microorganisms as well as an effective plaque removal [9–11]. Finding a potential antibacterial component is starting to get our attention.

A strong component of toothpaste that inhibits germs could be found in plant-derived materials. Customers are more likely to embrace it over a synthetic alternative because of how well it represents a "natural" lifestyle and a particular safety concern.

Therefore, *Sesbania grandifl*ora (S. grandiflora) and the rhizome of *Costus speciosus* were searched for anti-plaque generating bacteria. S. mutans was chosen as the target model since it has been noted as one of the leading plaque makers.

MATERIALS AND METHODS

Collection of plant materials

Sample Preparation

Within a 24-hour period, the dried powder of *Sesbania grandifl*ora and *Costus speciosus* was twice macerated with hydro alcohol (70:30%). To create a dried extract, the obtained extract was evaporated at a lower pressure. In each disc, the sample was dissolved in 10% dimethyl sulfoxide (DMSO). The positive control was azithromycin (20 mg/disc), while the solvent control was a test disc with only 10 mL of DMSO.

Anti-Bacterial Test

S. mutans was raised on brain heart infusion medium while being shaken at 37°C for 18–24 hours. To 1 mL of suspension, 100 mL of brain-heart infusion medium was added. To get the suspension's concentration to 108 CFU/mL, saline solution was added. 200 mL of the culture was spread out on solid Mueller-Hinton media in a Petri dish at 37 °C for the bioassay. The disc was taken out and put in a biosafety cabinet after 24 hours. For a second 24-hour incubation, five discs containing tested samples, a positive control, and solvent were placed on the media.

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The millimeter value for the inhibitory zone was used here (mm).

RESULTS

The most effective samples were discovered to be rhizome and leaf extracts from *S. grandiflora* and C. specious, respectively. While DMSO did not exhibit any inhibition effects, they had inhibition diameters of 17.57 mm and 14.05 mm, respectively (positive control erythromycin = 17.0 mm).

Table 1:

Species	Part used	Inhibition in diameter (mm)		
		Sample 1	Sample 2	Average
S. grandiflora	Leaves	17.3	17.85	17.57
Costus speciosus	Rhizome	13.5	14.6	14.05
Azithromycin		18	16	17
DMSO		0	0	0

Table 2:

Sample	Concentration (%)	Diameter of inhibition		Average
		1	2	
Costus speciosus	10 5 2.5	13.5 5 3.5	14 5.5 4	13.75 5.25 3.75
S. grandiflora	10 5 2.5	17 5 3	18 5 4	17.5 5 3.5
Azithromycin (15mcg)		16	18	17
DMSO	-	0.0	0.0	0.0

DISCUSSION

Evidently, *S. grandiflora* is a viable contender for an ingredient in toothpaste and mouthwash. Along with its robust activity, it also stands out for having a high extraction yield (55.75%). *S. grandiflora* will therefore be particularly advantageous for raw material bulk in the industrial processes from an economic standpoint. To the best of our knowledge, there aren't many studies on the pharmacological research or chemical components of *S. grandiflora* leaves. Flavonoid rutin and other polyphenols in it may be the active ingredients to suppress some pathogenic microorganisms, according to China et al. [12]. Ascites carcinoma was inhibited by its protein fractions [13] and leukemic cells were subjected to apoptosis and autophagy [14, 15]. This could pave the way for further research into this plant material. This leaf was only used in Indonesia as part of a traditional salad with other boiled vegetables. As a result, the research can be broadened to include functional food ingredients as well as food preservatives against bacteria and fungi. Antibiotic resistance is currently growing into a real issue in clinics in some developing nations. As a result, this extract can be studied for synergism mode in conjunction with particular antibiotic classes. Evidently, extraction optimization needs to be done as well to improve the greater extraction yield for the plant's industrial raw material needs. Based on pharmacological and financial considerations, *S. grandiflora* ought to be a prospective choice for an active ingredient in antibacterial toothpaste or mouthwash solutions.

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