

**ANTICARIOGENIC AND ANTIOXIDANT ACTIVITY OF *PIPER LONGUM* AND *STEVIA* FORMULATION****Vikraman K S**

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Corresponding author:**T. Lakshmi,****ABSTRACT:****AIM:**

To study the anticariogenic and antioxidant activity of *piper longum* and *stevia* formulation.

INTRODUCTION:

Pharmacological activities of plants and plant derived drugs necessitates for the search of new and useful drugs globally. Long pepper (*Piper longum*), sometimes called Indian long pepper is a flowering vine in the family *Piperaceae*, cultivated for its fruit, which is usually dried and used a spice and a seasoning. *Piper longum* has various pharmacological activities such as stomachic, aphrodisiac, thermogenic, carminative, expectorant, digestive, emollient, anti-giardiasis, anti-amoebic and antiseptic activity, and used to treat respiratory tract infection, chronic gut related pain, gonorrhoea, menstrual pain, tuberculosis, and arthritic conditions. Stevia is a natural non-caloric sweetener, with more sweetness than sucrose, without adverse effects. Stevia improves the antioxidative defence in adipose tissue and vascular wall and prevents the development of atherosclerotic plaque

MATERIAL AND METHODS:

Piper longum and *Stevia* were dried and made into a powder. 2.5g of *Piper longum* and *Stevia* were collected and dissolved in 100ml distilled water. And were boiled for 30-40 min at 50 degrees Celsius. The solution was filtered by using Whatman no. 1 filter paper and evaluated for anticariogenic and antioxidant activity.

RESULTS AND DISCUSSION:

The different concentration of *Piper longum* and *Stevia* formulation showed dose dependent antimicrobial activity and antioxidant activity against the tested microorganisms that includes *Streptococcus mutans*, *Staphylococcus aureus*, *Enterococcus faecalis* and *Candida albicans*.

CONCLUSION:

The present study showed that piper longum and stevia formulation has proven to be a better choice against oral bacteria *Streptococcus mutans* and *Enterococcus faecalis*. Hence, this extract may be utilized for the control of such infection.

KEYWORDS: *Piper longum*, *Stevia*, antioxidant, anticariogenic.

INTRODUCTION:

Pharmacological activities of plants and plant derived drugs necessitates for the search of new and useful drugs globally. Fifty percent of the estimated 250,000 plant species found on earth come from tropical forests(1). India is the largest producer of medicinal herbs. India has 15,000-18,000 species of flowering plants, 2500 algae, 23000 fungi and 1600 types of microorganisms. These values have shown a vast and tremendous biodiversity potential in India, which can be utilized in the drug industry (2). Species of the genus *Piper* are among the important medicinal plants employed in various systems of medicine.(3)

The fruits of piper consists of minute fruit similar to size of poppy seeds, these fruits contain alkaloid *pipeline* whis is noted for its pungency effect(4).*Piper longum* were used as main spicy mixes during medieval now it was rarely used in European countries but it is still been used by Asian population as in pickles(5). times *Piper longum* L., *Piper nigrum* L. and *Piper galeatum* L. (Piperaceae), commonly known as “long pepper”, “black pepper” and “helmet pepper” respectively, are distributed in the tropical and subtropical regions of the world, throughout the Indian subcontinent, Sri Lanka, Middle Eastern countries and the Americas(6).

The oldest reference of *Piper longum* comes from Indian text books of ayurveda. It has given detailed information about its medicinal and its dietary uses(7).*Piper longum* has various pharmacological activities such as stomachic, aphrodisiac, thermogenic, carminative, expectorant, digestive, emollient, anti-giardiasis, anti-amoebic and antiseptic activity(8)(9).And it is also used as remedy for treating respiratory tract infection, chronic gut related pain, gonorrhoea, menstrual pain, tuberculosis, and arthritic conditions(10).

Stevia rebaudiana Bertoni is a natural non-caloric sweetener, with more sweetness than sucrose, without adverse effects, which has demonstrated to have multiple benefits to the systemic health and recently to the oral health(11). *Stevia* improves the antioxidative defence in adipose tissue and vascular wall and prevents the development of atherosclerotic plaque(12)(13). *Stevia* extracts, in water, methanol, ethanol, hexane and ethyl acetate show antibacterial activity of *Stevia* against *Streptococcus mutans* and *Lactobacillus acidophilus*(14). Our team has extensive knowledge and research experience that has translated into high quality publications(15–25)(26)(27)(28)(29–33). Furthermore this study highlights the formulation of both *piper longum* and *stevia* and its anti-cariogenic and antioxidant properties.

MATERIALS AND METHODS:

PREPARATION OF PLANT EXTRACT:

Piper longum and *stevia* were dried and made into a powder. 2.5g of *Piper longum* and *Stevia* were collected and dissolved in distilled water. And were boiled for 30-40 min at 50 degrees Celsius. The solution was filtered by using Whatman no. 1 filter paper. The filtered extract was collected and stored in 4 degrees Celsius.

ANTIBACTERIAL ACTIVITY:

Antibacterial activity of respective nanoparticles against the strain *staphylococcus aureus*, *Streptococcus mutans*, *Enterococcus faecalis*. MHA agar was utilized for this activity to determine the zone of inhibition. Muller Hinton agar was prepared and sterilized for 45 minutes at 120lbs. Media poured into the sterilized plates and let them stabilize for solidification. The wells were cut using the well cutter and the test organisms were swabbed. The nanoparticles with different concentrations were loaded and the plates were incubated for 24 hours at 37 ° C. After the incubation time the zone of inhibition was measured.

ANTIFUNGAL ACTIVITY:

Candida albicans is used as test pathogens by agar well diffusion assay. Sabouraud's Dextrose Agar is used to prepare the medium. The prepared and sterilized medium was swabbed with test organisms and nanoparticles with different concentration were added to the wells. The plates were incubated at 28° C for 48-72hours. After the incubation time the zone of inhibition was measured.

ANTIOXIDANT ACTIVITY:

DPPH assay was used to test the antioxidant activity of herbal formulations. Diverse concentrations of herbal formulation of *piper longum* and *stevia* formulation was mixed with 1 ml of 0.1 mM DPPH in methanol and 450 µl of 50mM Tris HCl buffer (pH 7.4) and incubated for 30 minutes. Later, the reduction in the quantity of DPPH free radicals was assessed dependent on the absorbance at 517 nm. BHT was employed as control. The percentage of inhibition was determined from the following equation,

% inhibition = $\frac{\text{Absorbance of control} - \text{Absorbance of test sample}}{\text{Absorbance of control}} \times 100$

RESULTS AND DISCUSSION:

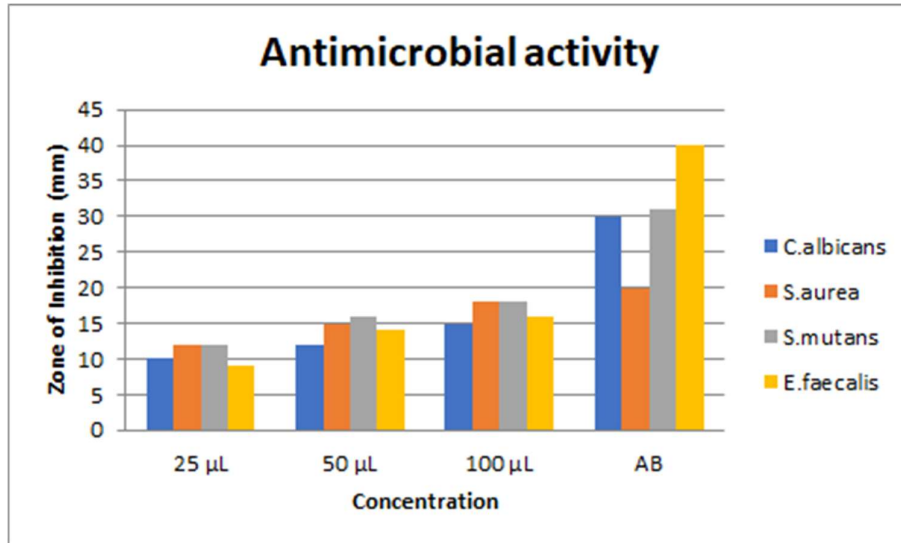


FIGURE 1: Bar Graph showing antimicrobial activity of *Piper longum* and *Stevia* formulation, where in blue color denotes *Candida albicans*, orange colour denotes *Staphylococcus aureus*, grey colour denotes *Streptococcus Mutans* and yellow colour denotes enterococcus faecalis. X-Axis represents the concentration in µL and Y-Axis represents the zone of inhibition in mm. Maximum zone of inhibition was seen against *Streptococcus mutans* (17 mm) and *Staphylococcus aureus* (17 mm).

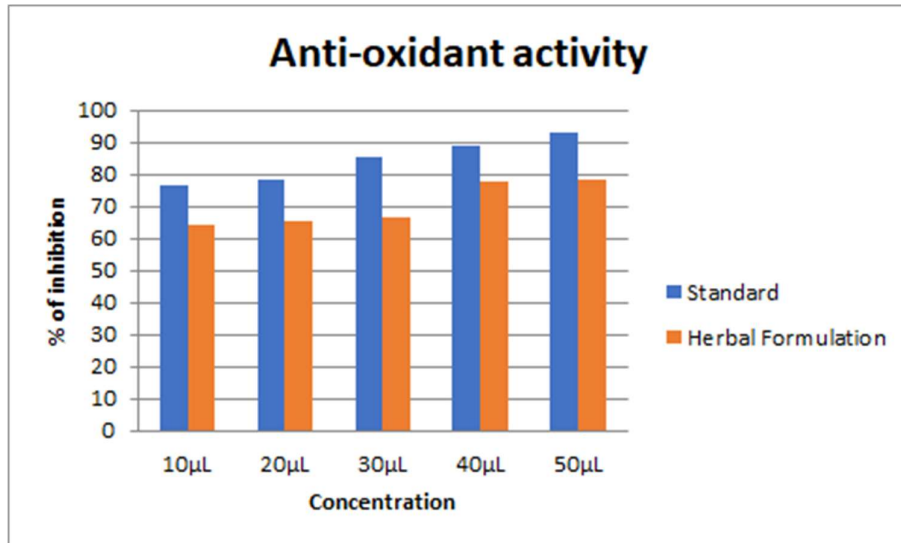


FIGURE 2: Bar graph showing antioxidant activity of *Piper longum* and *Stevia* formulation axis denotes the diverse concentration and Y axis denotes the percentage of zone of inhibition, blue colour represents the standard (ascorbic acid) and orange colour represents the herbal formulation of *Piper longum* and *Stevia* formulation.

ANTIMICROBIAL ACTIVITY:

In this study figure 1 shows than increase in concentration of herbal formulation of *Piper longum* and *Stevia*, increases the zone of inhibition, when the concentration is 25 μ L *S.aureus* and *S.mutans* shown a higher zone of inhibition. When the concentration is 50 μ L *S.aureus* and *S.mutans* shown a higher zone of inhibition. When the concentration is 100 μ L *S.aureus* and *S.mutans* shown a higher zone of inhibition, but in antibiotics *E.faecalis* and *S.mutans* shown a higher zone of inhibition(34)(35).On other similar study the solvents with their increasing order of polarity were used for the extraction(36). Twenty seven extracts of different solvent showed activity against *P.aeruginosa* and twenty two extracts showed activity *E.coli* and eighteen extracts showed activity against an *A.niger* (37).

ANTIOXIDANT ACTIVITY:

In this study figure 2 shows an activity of herbal formulation of *Piper longum* and *Stevia*. The percentage of inhibition is less than standard but it showed spontaneous increase with increase in concentrations. The higher reducing potency of the antioxidants was present in the leaves and fruit of *Piper nigrum* and *Piper longum* exhibiting their antioxidant properties(38)(39). The ability of the plant extracts of *Piper nigrum* and *Piper longum* against lipid peroxidation was revealed through the efficiency of inhibiting the radicals at a percentage of 58.33, 77.77, 66.66 and 22.22, respectively.(40).

CONCLUSION:

The present study showed that piper longum and stevia formulation has proven to be a better choice against oral bacteria *Streptococcus mutans* and *Enterococcus faecalis*. Hence, this extract may be utilized for the control of such infection. In future this extract can be used to treat numerous diseases.

CONFLICT OF INTEREST: NIL

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