

Anticariogenic Activity of Green Tea and Mint Herbal Formulation

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ABSTRACT

Aim: The aim of this study is to evaluate the anticariogenic activity of green tea and mint herbal formulation.

Introduction: Cariogenic bacteria producing or promoting the development of tooth decay leads to the breakdown of teeth. Cavities have become more common in both children and adults in recent years. Green tea leaves and mint have been used to treat numerous ailments. This study involves the preparation of green tea and mint herbal formulation. Green tea and mint are already known for its medicinal properties, of which its anticariogenic nature will be studied.

Material and method: Preparation of green tea and mint herbal formulation was followed by a test for its anticariogenic activity using agar well diffusion method.

Results: The green tea and mint herbal formulation exhibits significant anticariogenic activity.

Conclusion: From the present study, it can be concluded that green tea and mint herbal formulation have a considerably high anticariogenic activity at high concentrations. This can be used for further investigations in employing them as less biotoxic alternatives to already existing chemically synthesised anticariogenic materials.

Key words: Anticariogenic activity, Green tea, Medicinal properties, Mint

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Received: 13/09/2021

Accepted: 31/12/2021

INTRODUCTION

Recently, herbal medicine has become a popular form of health care, globally. Herbal medicine is preferred even though few contrasts exist between herbal medicines and customary pharmacological medicines [1]. Herbal formulations have been the most effective treatment for various disease conditions and many studies have proved the efficiency of herb-herb combinations [2]. By comparing single drug herbal formulations and drug combinations, the drug combination has shown a more promising effect in the treatment of disease [3,4]. This drug combination conception has been well established in many countries and shows extraordinary success [5]. Here in this study the green tea and mint were used to prepare the herbal formulation. Green tea is a non-fermented tea. Its content of certain minerals and vitamins increases the antioxidant potential of this type of tea [6]. Green tea has the promotion of oral health and other physiological functions such as anti-hypertensive effect, body weight control, antibacterial [7-9], anti-inflammatory [10-12], antioxidant [13], anti-fibrotic properties, and neuroprotective power [14]. Mint has been used as a medicinal and aromatic plant since ancient times. This plant is mainly used as a herbal agent in the treatment of

loss of appetite, bronchitis, sinusitis, common cold fever, nausea, vomiting, indigestion related problem, and it has antimicrobial, anti-inflammatory, cytotoxic activities [15]. Caries have become more prevalent worldwide both in children and adults [16]. Caries is defined as an infectious, microbiologic disease that is characterized by demineralization of the inorganic portion and the destruction of the organic substances of teeth [17]. Caries is caused by cariogenic bacteria. The cariogenic bacteria producing or promoting the development of tooth decay leads to the breakdown of teeth. [18]. Development of resistance in cariogenic bacteria against antibiotics resulted in extensive screening of natural products, particularly from plants, for anticaries activity [14]. The anticariogenic effects of green tea includes a direct bactericidal effect against *S. mutans*, *S. aureus*, *S. sobrinus*, *E. faecalis* [19,20]. and prevention of bacterial adherence to teeth. Hence inhibition of glucosyl transferase, thus limiting the biosynthesis of sticky glucan by the bacteria [21] and involved inhibition of human and bacterial amylases [22]. Mint is also able to inhibit both caries onset and caries progression in various studies by using mint in confections [23], toothpaste, chewing gums, mouth wash [24,25] etc. But in this study the combined action of green tea and mint against caries causing oral pathogens were accessed because the combination drug still has more beneficial effects than a single drug. Therefore, it would be of interest to know the anticariogenic activity of green tea and mint herbal formulation. Hence the aim of the study

was to assess the anti-cariogenic activity of green tea and mint herbal formulation. Our team has extensive knowledge and research experience that has translate into high quality publications [20, 26-44].

MATERIALS AND METHODS

Preparation of herbal formulation

Herbal formulation was prepared using the leaf of green tea and powdered leaf of mint.

To 100ml of distilled water, 1g of green tea leaf and 1g of powdered mint leaf was added and the mixture was heated for 15-20min.

The product was then filtered using Whatman's filter paper. Then the filtered 70ml of mixture was again heated and concentrated to 20ml. The colour change was observed visually, and photographs were recorded (Figure 1).

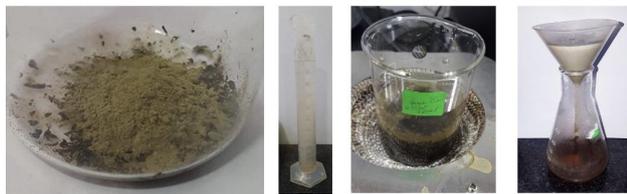


Figure 1: Preparation of herbal formulation of green tea and mint.

Determination of anticariogenic activity of green tea and mint herbal formulation

The antimicrobial activity of the prepared green tea and mint was assessed using the agar well diffusion method.

The Mueller Hinton agar plates were prepared, and each plate was swabbed with four different dental pathogens such as *S. aureus*, *E. faecalis*, *S. mutans*, *C. albicans*.

A gel puncture was used to cut four wells on each petri plates. Each well in the plate had different concentrations being 25µL, 50µL, 100µL of the herbal formulation.

The fourth well was a standard antibiotic (Amoxicillin) at a concentration of 10 µg/mL. The plates were incubated at

37°C for 24hrs and the diameter of the zone of inhibition formed around the well was measured and the mean values were recorded.



Figure 2: Antimicrobial activity of green tea and mint herbal formulation against oral pathogens.

RESULTS AND DISCUSSION

In the present study, a test for anticariogenic activity was carried out using the agar well diffusion method.

Four agar plates for identifying the inhibitory effect over *S. aureus*, *S. mutans*, *E. faecalis* and *C. albicans*, respectively, were used. Each plate had 4 wells each with different nanoparticle concentrations being 25 µL, 50 µL, and 100 µL and while the fourth was a standard (Figure 3, Table 1) shows the zone of inhibition of four oral pathogens at different concentration of herbal formulation and compared with standard antibiotic (amoxicillin), hence against *S.aureus*, the diameter of the zone of inhibition of the herbal formulation at 25 µL, 50 µL, and 100 µL is observed to be 17 mm, 24 mm, and 30 mm, respectively.

With *S. mutans*, the diameter of the zone of inhibition of the nanoparticles at 25 µL, 50 µL, and 100 µL was obtained as 10 mm, 20 mm, and 20 mm, respectively. Against *E. faecalis* the diameter of the zone of inhibition at 25 µL, 50 µL, and 100 µL was observed as 10 mm, 15 mm, and 17 mm, respectively.

Against *C albicans* the diameter of the zone of inhibition at 25 µL, 50 µL, and 100 µL was observed as 10 mm, 10 mm, and 15 mm, respectively.

Thus, maximum activity for all the three was observed at 150 µL.

Table 1: Antimicrobial activity of green tea and mint herbal formulation.

| Concentrations | 25µL | 50µL | 100µL | Standard |
|--------------------|------|------|-------|----------|
| <i>S. aureus</i> | 17 | 24 | 30 | 17 |
| <i>S. mutans</i> | 10 | 20 | 20 | 20 |
| <i>E. faecalis</i> | 10 | 15 | 17 | 10 |
| <i>C. albicans</i> | 10 | 10 | 15 | 10 |

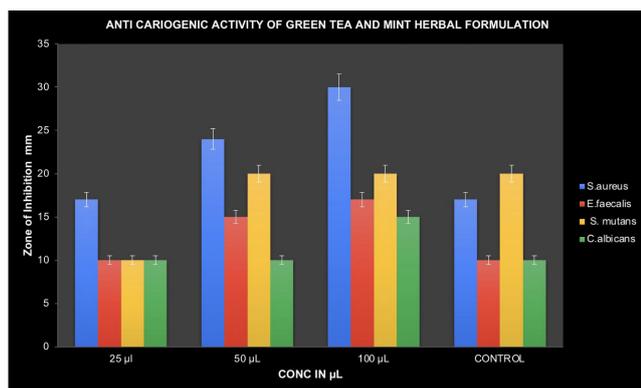


Figure 3: Anticariogenic activity of green tea and mint herbal formulation which showed that *S. aureus* was the most sensitive bacteria followed by *S. mutans*, *E. faecalis* and *C. albicans*.

CONCLUSION

From the present study, it can be concluded that herbal formulations of green tea and mint have significantly efficient anticariogenic activity at high concentrations. This can be used for further investigation in employing them as less biotoxic alternatives to already existing chemically synthesized drugs. Hence the herbal formulations of green tea and mint is expected to be used in future for the effective drug systems as well as for large scale commercial productions.

ACKNOWLEDGEMENT

The authors are thankful to saveetha dental college for providing a platform to conduct the study.

SOURCE OF FUNDING

The present project is supported by Little Holy Angels Hr Sec School, Chennai.

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