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## **Does Mint have Antifungal and Antibacterial effect: An invitro study**

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**Abstract**--Introduction: Patients undergoing fixed appliance treatment have many attachments on their teeth that act as an active site as plaque retention sites for the attachment of food particles and subsequently microorganisms which later cause caries and periodontal diseases Orthodontic patients have an increase in the microorganisms because of the active sites for the plaque accumulation. Almost all conventional mouth freshners contain alcohol and fluoride, which are toxic (even lethal) if used in large amounts. This is often not the case with natural herbal mouth rinses. Mouth rinse comes into direct contact together with your mucosa and may be absorbed directly into your bloodstream. Mint which is a perennial plant has antimicrobial property and can be used as a mouth wash for these patients. Aim: To evaluate the efficacy of aqueous extracts of Mint on *Candida albicans* and *Streptococcus mutans* by evaluating their zone of inhibition. Methodology: Cell suspension with  $10^8$  cells were prepared using *Candida albicans* and *Streptococcus mutans*. Using sterile micro tip, wells were made which was about 8mm in diameter. Lawn culture was made on appropriate media. Then the prepared Aqueous extracts with different concentrations were added on to the wells and observed for zone of inhibition for *Streptococcus mutans* and for *Candida albicans*. Results: The results showed that aqueous extract of Mint had minimal inhibitory effect on *Candida albicans* and *Streptococcus mutans*.

**Keywords**---Antifungal, Antibacterial, *Candida albicans*.

## Introduction

Patients undergoing orthodontic treatment have many attachments on their teeth that act as an active site as plaque retention sites for the attachment of food particles and subsequently microorganisms which later cause caries and periodontal diseases. Also during fixed orthodontic appliance therapy, the levels of microorganisms are increased despite a pre treatment oral hygiene education and training.<sup>1,2</sup> Almost all conventional mouth fresheners contain alcohol and fluoride, which are toxic (even lethal) if used in large amounts. This is often not the case with natural herbal mouth rinses<sup>3</sup>. Mouth rinse comes into direct contact together with your mucosa and may be absorbed directly into your bloodstream. Many plants exhibit potent antimicrobial activity against various microorganisms.<sup>3</sup> The World Health Organization reported that 80% of the world's population rely chiefly on traditional medicine and a major part of the traditional therapies involve the use of plant extracts or their active constituents. Herbal therapies have limited /no side effects and act against and modulate the factors that are crucial for microbial survival or their activity.<sup>4</sup> Mint is a commonly found herb, belonging to the family Labiatae and genus *Mentha* is an important culinary plant with immense medicinal use<sup>5,6</sup>. It has many antimicrobial effect when used as a mouth rinse in the oral cavity. This study is aimed at evaluating the efficacy of aqueous extracts of Mint on *Streptococcus mutans* and *Candida albicans* by evaluation of their inhibition zones and their minimum inhibitory concentration levels.

## Materials and methods

Cell suspension with  $10^8$  cells were prepared using *Candida albicans* (Fig.1) and *Streptococcus mutans* (Fig.2). Using sterile micro tip, wells were made which was about 8mm in diameter. Lawn culture was made on appropriate media.



Fig – 1 : *Candida albicans* culture

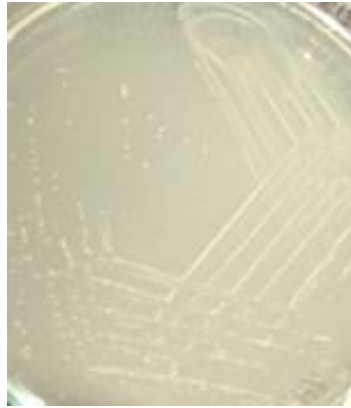


Fig – 2: Streptococcus mutans culture

### Methods of Aqueous extract preparation

Mint leaves were obtained, air dried and then powdered. Different concentration of Mint extract was prepared (i.e) 5 g in 100ml of water, 10g in 100ml of water, 15 g in 100ml of water, 20g in 100ml of water and 25 g in 100ml of water (5%,10%,15%,20%,25%), it was then individually heated at 40°C for 5-10 mins. The preparation was then incubated overnight at 37°C , filtered using sterile whattman filter paper no 1 and then re- filtered using 0.45 micrometer filter paper and stored at 4°C in separate containers (fig 3).

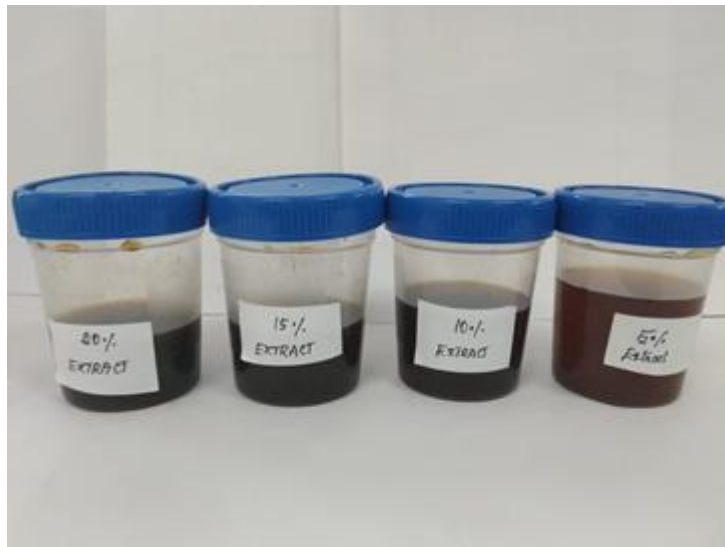


Fig – 3 : Prepared extract with distilled water

Then the prepared Aqueous extracts with different concentrations were added onto prepared culture wells of candida albicans (Fig.1) and Streptococcus mutans (Fig.2). and observed for zone of inhibition for Candida albicans and Streptococcus mutans.

## Results

### Effect of aqueous extract of Mint

*Candida albicans*: Partial zone of inhibition was present. (fig .4) (Table:1)

- 5% - No zone of partial inhibition
- 10% - 0.3mm
- 15% - 0.7mm
- 20% - 1mm



Fig – 4 : Inhibition zone with aqueous extract of Mint on *Candida albicans*

Table: 1 Effect of Aqueous extract of Mint against *Candida albicans*

Concentration of the extract	Result	Unit
5%	No inhibition zone seen	Diameter
10%	0.3mm	
15%	0.7mm	
20%	1mm	

*Streptococcus mutans*: Partial zone of inhibition was present. (fig.5) (Table:2)

- 5% - No zone of partial inhibition
- 10% - 0.5mm
- 15% - 0.8mm
- 20% - 2 mm



Fig – 4 : Inhibition zone with aqueous extract of Mint on *Streptococcus mutans*

Table: 2 Effect of Aqueous extract of Mint against Streptococcus mutans

Concentration of the extract	Result	Unit
5%	No inhibition zone seen	Diameter
10%	0.5mm	
15%	0.8mm	
20%	2 mm	

## Discussion

Unlike most commercial cosmetic and therapeutic oral rinses, natural mouth rinses typically don't contain: Alcohol Sugar, Artificial colors, Artificial sweeteners (such as saccharine) fluoride, a processed sort of fluoride which will stain teeth, Cetylpyridinium chloride (CPC), which can also cause staining, Sodium lauryl sulfate (SLS), a chemical that has been linked to varied health problems like PMS (Pre menstrual symptoms) and diminished male fertility and carcinoma.

Almost all conventional mouth fresheners contain alcohol and fluoride, which are toxic (even lethal) if used in large amounts. This is often not the case with natural herbal mouth rinses. Mouth rinse comes into direct contact together with your mucosa and may be absorbed directly into your bloodstream<sup>3</sup>.

The medicinal plants have been used for the treatment of medical ailments for a long time. Many plants have been proven to have antibacterial properties. Mint's composition (*Mentha arvensis*) is highly complex with many nutrients and biologically active substances, the amount of which may vary with different concentrations of pudina. The therapeutic properties of pudina is because of the presence of the menthol in it. It is largely used in the treatment of liver and spleen diseases. It is also used to treat asthma and jaundice.<sup>7</sup>

The other main constituents of pudina include esters - menthyl acetate (4.5 to 10%) and ketones (10-20%). The antibacterial effect of Mint is because of these constituents. The menthol in the pudina is more soluble in alcohol than in the water.<sup>5</sup>

Orthodontic patients have lots of plaque retention sites thereby increase in levels of microorganisms during active orthodontic therapy. Many studies have proven that orthodontic treatment have increased the occurrence of carious lesions. There is an increase in the level of *Streptococcus mutans* in patients treated with orthodontic appliance.<sup>1,6</sup> There is an increase in *Candida albicans* levels in orthodontic patients after the initiation of treatment<sup>2</sup>.

This study was done to find the effect of Mint against *Candida albicans* and *Streptococcus mutans*. The results showed that the aqueous extract of pudina was moderately effective against the *Candida albicans* and *Streptococcus mutans* with minimal zones of inhibition. (Table: 1 and Table:2). Additional assays are required to determine whether Mint extract is bactericidal or bacteriostatic. Also antifungal activity was dose dependent. As the concentration increased, the inhibition zone was also increased. Flavanoids and Tannis present in the extracts may be responsible for the antimicrobial activity<sup>8</sup>. Hence Mint mouthwash can be

used for the patients being treated with orthodontic appliance, who are more prone to candida infections and Dental caries progression. Owing to the already proven medicinal properties<sup>9-12</sup>, along with the anticandidal property and antibacterial property that is proved in our present study, pudina mouthrinse can be used for control of candida infections and dental caries progression that occurs during the course of the orthodontic treatment in patients with fixed and removable appliances.

### **Conclusion**

Aquaous extract of Mint causes minimum zones of inhibition on *Candida albicans* and *Streptococcus mutans*. Hence further experiments with Methanolic extracts of Mint have to be carried out to see the inhibitory effect on candida infections, so that Mint can be used successfully to reduce candida infection and Dental caries progression that might occur during the course of the orthodontic treatment. Further formulation of Mint mouthrinse and invivo studies are necessary to prove the efficacy of Mint mouthrinse in patients undergoing orthodontic treatment.

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