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EFFECT OF CHARCOAL MOUTHWASH AS AN IRRIGANT IN PERIODONTITIS PATIENTS - A PILOT STUDY

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ABSTRACT

Introduction

Periodontitis is one of the most common diseases of the oral cavity and it is prevalent in all age groups. Plaque is responsible for the development of periodontal diseases. Chemotherapeutic agents such as essential oils, chlorhexidine and triclosan play a significant role in preventing periodontal diseases and also help in improving the oral hygiene of the individuals. The adjunctive effect of subgingival irrigation was found to provide added clinical benefits when compared to scaling and root planing (SRP) alone. Therefore, in this study, the antibacterial effect of charcoal mouthwash as an irrigant after SRP has been investigated.

Materials and methods

This pilot study recruited 6 subjects who were divided into two groups, Group A (3 – experimental) and Group B (3 – control) based on inclusion and exclusion criteria. In the experimental group, charcoal mouthwash was used as an irrigant after SRP and chlorhexidine mouthwash was used as irrigant after SRP in the control group. Plaque samples were collected before SRP. Following SRP, the respective irrigants were used in both the groups,

and plaque samples were collected again. The total colony forming units were assessed by inoculating nutrient agar by the pour plate method.

Results

Charcoal mouthwash as an irrigant did not have better results than chlorhexidine mouthwash with regard to mean colony forming units.

Conclusion

The antibacterial effect of charcoal mouthwash was not shown to be as effective as chlorhexidine mouthwash in periodontitis patients.

Keywords: Charcoal mouthwash, mouthwash, irrigant, colony forming units, chlorhexidine mouthwash

INTRODUCTION

Gingivitis and periodontitis are the most prevalent oral diseases, equally affecting all age and gender groups. **[1]**. Plaque accumulation is one of the major predisposing factors for development of periodontal diseases. Regular mechanical plaque control measures such as toothbrushing and usage of interdental aids can prevent gingival inflammation. But mechanical methods of plaque control require proper technique and dexterity, hence chemical plaque control agents were introduced as adjuncts **[2]**. These chemotherapeutic agents such as essential oils, chlorhexidine and triclosan play a significant role in preventing periodontal diseases and also help in improving the oral hygiene of the individuals **[3, 4]**.

Mouth rinses are considered as a home care measure for oral hygiene maintenance. They can alter both the quantity and quality of the plaque formed. Chlorhexidine is regarded as the gold standard among all mouth rinses. The efficacy of Chlorhexidine to inhibit plaque formation and reduce gingival inflammation is well documented. It has both antibacterial and antiplaque effects. But it has some adverse effects like tooth staining, unpleasant and altered taste sensation, and increased calculus formation **[5, 6]**. So an alternative for Chlorhexidine mouthrinse is required.

In earlier days, materials like chewing stick, baking soda, alum, charcoal, and other unorthodox agents were used for teeth cleaning, especially in the rural areas of many developing countries **[7, 8]**. In the modern times, new variants of tooth brushes incorporating charcoal, has been introduced in the market in South East Asian countries like Indonesia, Malaysia and Singapore **[9]**. As per our knowledge, the effect of Charcoal mouthwash as an irrigant has not been previously studied. So the aim of this study was to assess the

effect of Charcoal mouthwash as an irrigant after scaling and root planing compared to Chlorhexidine mouthwash in periodontitis patients.

MATERIALS AND METHODS

Patients diagnosed with moderate to severe periodontitis were selected for the study according to AAP classification 1999 and were divided into Group A (3 - experimental) and Group B (3 - control) based on the inclusion and exclusion criteria. A total of 6 patients participated in the current study. Patients with a history of systemic illness like diabetes mellitus, HIV and hepatitis infections, immunological disorders, history of allergic reactions to any medicines (suspected or known), with habit of tobacco smoking or alcoholism, immunocompromised state, and pregnant or lactating females were excluded.

The plaque samples were collected in an eppendorf containing BHI broth. Charcoal mouthwash **(Figure 1)** was used as an irrigant after scaling and root planing in patients belonging to Group A, whereas patients belonging to Group B were given chlorhexidine mouthwash (0.2%). After using it as an irrigant, plaque samples were collected again. 10 microlitres of the broth was taken and was inoculated into a sterile plate containing nutrient agar, the total colony-forming units (CFUs) present in the plaque samples were determined **(Figure 2, 3)**.

The plate was then incubated at 37°C for around 12 hours. Microorganisms were cultivated on the surface of the medium. Each colony is represented as a "CFU". Each colony (both large and small) was counted carefully and total CFUs were calculated.

RESULTS

Table 1 shows a comparison of CFU count per ml of the two groups pre and post irrigation. Paired t test was performed to compare the CFUs between the two groups before and after irrigation. The statistical analysis was done using SPSS version 20.0. In group A, the mean number of colonies declined from 154 x 10^3 to 103 x 10^3 with a difference of 51 x 10^3 ($p > 0.05$) and in group B (control), the mean number of colonies declined from 488 x 10^3 to 204 x 10^3 with a difference of 284 x 10^3 ($p > 0.05$). Though the difference was not statistically significant in the experimental group, the mean difference in the colony forming units was much better than in the control group.

Table 1: Colony forming units of group A and B, before and after irrigation

PRE (test) (CFU/ml)	POST (test) (CFU/ml)	PRE (control) (CFU/ml)	POST (control) (CFU/ml)	P value
240 x 10^3	120 x 10^3	552 x 10^3	240 x 10^3	P > 0.05
100 x 10^3	180 x 10^3	504 x 10^3	204 x 10^3	
120 x 10^3	10 x 10^3	408 x 10^3	168 x 10^3	

Figure 1: Activated charcoal mouthwash

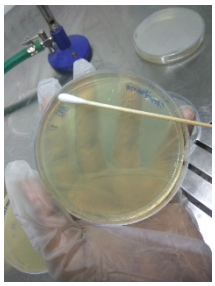

Figure 2: Agar plate inoculation

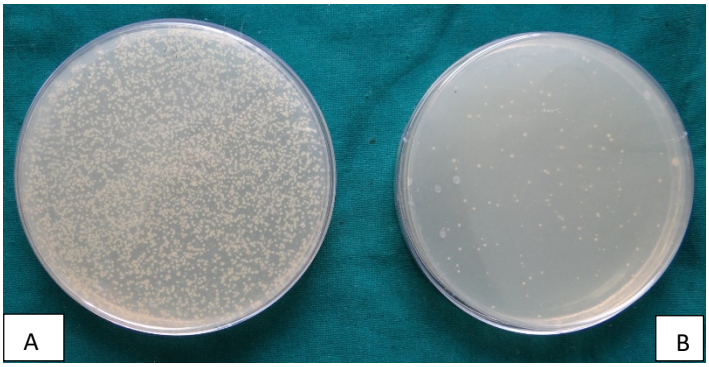

Figure 3: Colony Forming Units- Charcoal mouthwash (A- pre; B- post)

DISCUSSION

In this study, the adjunctive use of charcoal mouthwash as an irrigant after SRP was compared with chlorhexidine mouthwash as an irrigant. The total numbers of participants were divided equally into both the groups. SRP combined with subgingival irrigants are beneficial for the treatment of periodontitis. According to a systematic review by Nagarakanti *et al*., the adjunctive effect of subgingival irrigation was found to provide added clinical benefits when compared to SRP alone **[10]**.

The antibacterial properties of charcoal have been revealed in some laboratory experiments. Study done by Ravasi *et al*. in wastewater showed that powdered activated carbon reduced antibiotic-resistant microfora with 99.7% efficiency **[11, 12]**. Since there are not many studies which have evaluated the

antibacterial effect of charcoal mouthwash as an irrigant, this study has been compared to other products that have utilised charcoal such as toothpaste and toothbrush.

Previous studies have found that charcoal containing toothpastes show anti gingivitis effects **[12, 13]**. This study was done to assess the effect of charcoal mouthwash as an irrigant in periodontitis patients. The results of this pilot study suggested that charcoal mouthwash when used as an irrigant after scaling does not have statistically significant antimicrobial activity when compared to Chlorhexidine in patients with chronic periodontitis. However, there were no adverse effects seen in any of the subjects involved in the study.

The results of the present study were contradictory to that reported by Thamke *et al* **[14]**, where charcoal and non-charcoal toothbrush was compared for bacterial contamination after 7 days of use and the results were in favour of toothbrush with charcoal bristles which showed lower CFU counts in agar plates compared to non-charcoal toothbrush. The antibacterial efficacy of charcoal tooth bristles was manifested in the 10 mm of the zone of inhibition.

Evidence shows the clinical benefits of charcoal toothbrush, however the effects of charcoal mouthwash used as irrigant as an adjunct has not been assessed considerably in the past. The negative result of the present study could be that the irrigant should have been used more number of times and secondly, the sample size of the study was small. Therefore the actual potential of the mouthwash could not be assessed due to these reasons.

CONCLUSION

The antibacterial effect of charcoal was found to be less effective than chlorhexidine. Increasing the number of times of application of irrigant could show the actual potential of the charcoal mouthwash.

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