



A STUDY OF EFFECT OF OIL PULLING ON ORAL MICROBIAL FLORA IN ORTHODONTIC TREATMENT PATIENTS: A RANDOMIZED CLINICAL TRIAL

Dentistry

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ABSTRACT

Background: Oil pulling, a traditional Ayurvedic practice, involves swishing oil in the mouth to remove bacteria and toxins. This study evaluates the effectiveness of oil pulling in reducing microbial counts, specifically *Streptococcus mutans* and *Lactobacilli*, in patients undergoing fixed orthodontic therapy. **Aim:** The study aims to determine if oil pulling can be efficient for maintaining oral hygiene during orthodontic treatment. **Methods:** This investigation was conducted at the institutional level. The patients were divided into two groups - Group 1 – Oil Pulling Group, Group 2 – Control group. The patients in group 1 were instructed to use the oil pulling once daily before brushing their teeth for 21 days. The patients group 2 were instructed to follow routine oral hygiene instructions after brushing their teeth. Sampling for both the groups was done at three different time points namely - T0: on the day of bonding Orthodontic brackets, T1: 14 days after T0, T2: 21 days after T0. Stimulated saliva samples were collected from all patients by asking them to rinse with normal saline. The saliva samples were then submitted for microbiological assessment. **Results:** Growth of micro-organisms was observed in both control and oil pulling groups in blood agar. The control group showed increased colonies in blood agar from T0 to T2, while the oil pulling group showed decreased colonies in blood agar from T0 to T2. **Conclusions:** Oil pulling, an Ayurvedic technique, is a viable alternative to chlorhexidine mouthwash for orthodontic patients due to its long-term effectiveness in controlling oral microbiota and better patient compliance.

KEYWORDS

Oil Pulling, Blood agar, S mutans, Lactobacilli

INTRODUCTION

There are billions of microorganisms in the oral cavity. On the surfaces of the teeth, several of these micro-organism's aid in the formation and progression of plaque and calculus. This may also result in gingivitis and periodontitis that damage the tooth's supporting tissues, as well as dental caries which compromise structural integrity of the teeth. Dental biofilm, a collection of about 1000 different bacteria species encased in polysaccharide material, forms through an ordered series of processes, namely - Composition of colonizing species, the bulk fluid that serves as a medium for transport of substances in the biofilm community, nature of the surface to which the biofilm adheres.¹

Oral cavity is divided into 5 major niches which allow bacterial adhesion namely supragingival area (hard surfaces), intra-oral area, dorsum of tongue, tonsils, gingiva²

In fixed orthodontic therapy, orthodontic brackets are bonded to the teeth along with other components, such as springs and elastomeric chain, may be utilized for a period of 1.5 to 2 years. It can lead to qualitative and quantitative changes in the oral microflora. Plaque forms on the cervical surface of the brackets near the leveling arch, and its accumulation is made difficult by the patient's difficulty in cleaning these areas.³

The enamel surface adjacent to these appliances undergoes decalcification in patients who neglect proper oral hygiene. This process results in the formation of white spot lesions (WSLs). The term "white spot lesion" was coined by Fejerskov et al. as "the first visible sign of a caries lesion on enamel." These incipient lesions are typically found on the buccal surfaces of teeth, as observed by Øgaard et al. in 1988.⁴

Patients are advised to practice good oral hygiene during the course of the treatment. These practices include brushing twice daily using a normal or an orthodontic brush, use of interdental brushes, flossing, rinsing after meals using oral mouthwashes. The oral mouthwashes prescribed can be chemical or herbal.

The most commonly prescribed mouthwash is chlorhexidine 0.2 CHX mouthwash which is prescribed for 2-4 weeks.⁷ Prolonged use of CHX can cause some side effects, such as staining, which may also affect composite restorations and cause discoloration on dorsal surface of tongue. Hence the patient is advised not to use of CHX mouthwash for

a minimum of 30 mins after brushing.⁵

Taking into consideration the disadvantages due to the use of CHX mouthwash, the use of herbal mouthwashes and traditional methods for maintaining oral hygiene in orthodontic patients should be studied. One such traditional method is known as oil pulling. Oil pulling, a traditional practice in ancient India, has been mentioned in Ayurvedic texts like the 'Charak Samhita' and the 'Sushruta Samhita' as 'Kavala Graha' or 'Kavala Gandoosha'. 'Kavala Graha' employs lesser quantities of oil, allowing for gargling. In this study, 'Kavala Graha' is followed.⁶

In the present study a commercially available oil pulling formulation is being used. In-vitro evaluation was done by assessing the microbiological count at various time intervals across the study.

Hence, in this study the effectiveness of the oil pulling formulation as a good anti-microbial agent will be studied and accordingly can be prescribed as an adjunct to other routine oral hygiene procedures.

MATERIALS AND METHODS

Study Design: A study was conducted using oil pulling mouthwash in patients undergoing fixed orthodontic therapy.

Sample Size: Calculated using the "comparing two means" formula. A total sample size of 40 is derived, assigning 20 patients to each group. The patients were divided into two groups randomly using chit method of randomization.⁷

Inclusion And Exclusion Criteria

Inclusion Criteria:

- Individuals undergoing orthodontic therapy.
- Cases with full dentition present till second molar
- Age: 15-25 years
- Both males and females included
- Patients willing to participate in the study

Exclusion Criteria:

- Use of antimicrobials and mouthwash in the past three months
- Presence of any other removable prosthesis
- Patients with poor periodontal conditions and systemic disorders
- Patients not willing to participate in the study

Statistical Analysis

Intragroup comparison and Pairwise Multiple Intragroup comparison of colonies amongst different agars between different time intervals was performed using Repeated measures ANOVA evaluated mean differences between predicted and actual values for each parameter.

- Ap-value <0.05 considered statistically significant.
- SPSS v21.0 used for all analyses.

Methodology

1. All the subjects were instructed to rinse their mouths vigorously with 5 ml normal saline for 1 minute. These saliva samples were collected in sterile containers.
2. After collection the samples were submitted for microbiological assessment of total colony forming units at baseline.
3. The saliva samples were cultured in blood agar plates for total colony forming units.
4. Patients in oil pulling group were given instructions to perform oil pulling in the morning, before brushing for 21 days, 5 ml of oil on an empty stomach in the morning before brushing.
5. Saliva samples were collected at first interval (T_1 - 14) days and submitted for microbiological assessment.
6. Saliva samples were collected at the second interval (T_2 - 21 days) and submitted for microbiological assessment.
7. Data obtained for bacteria count was statistically analyzed and was used for verification of hypothesis
8. Interpretation and presentation of results

RESULTS:

Growth of micro-organisms was observed in both control and oil pulling groups in blood agar culture medium at all the three intervals. In the control group, the total number of CFUs increased over the three intervals in blood agar culture medium. In the oil pulling group, the total number of CFUs decreased over the three intervals in blood agar culture medium.

DISCUSSION

In addition to improving a person's dentofacial complex, orthodontic therapy has a direct effect on their general oral health. Crowding, spacing, and deep bite are examples of occlusion deviations that produce plaque retention regions, making it more difficult to practice proper dental hygiene. These problems are addressed by orthodontic treatment, but rigorous adherence to the best oral hygiene practices is essential. When oral hygiene is neglected during treatment, plaque can build up on the appliance, resulting in dental caries and periodontal issues.

In order to maintain proper oral hygiene during orthodontic treatment, in addition to routine oral hygiene procedures (OHP), mouthwashes can be prescribed to the patients. Chlorhexidine 0.2% is the most commonly prescribed chemical mouthwash which has its fair share of disadvantages – inability of long-term usage being the major disadvantage.

Hence, in the current study, we evaluated the effects of a commercially available oil pulling formulation on the oral microflora of patients undergoing orthodontic treatment. In-vitro evaluation was done by assessing the microbiological count at various time intervals across the study. The oil pulling formulation consisted of sesame oil as the major component. Sesame oil has long been known to be the recommended oil for oil pulling procedures. A substance with antifungal qualities called chlorosessamone is found in sesame oil, which is extracted from the root of the sesame plant (*Sesamum indicum*).

Balenseifen et al. conducted a study to evaluate the changes in dental plaque in orthodontic patients. They collected plaque samples before and after banding procedures. The pH of the plaque decreased by 0.4 pH units after banding, falling from pH 6.8 to 6.4.⁸

In the present study the microbiological assessment of the patients in control group showed that the total number of Colony Forming Units (CFUs) in the culture plates increased over time from baseline to 21 days in blood agar culture plates. The statistical analysis conducted showed statistically high significant differences ($p < 0.01$) between all the time intervals for blood agar plates indicating significant and constant rise in the number of total CFU from baseline to 21 days. These findings were in agreement with the study conducted by Liu J, Bian Z in their study which concluded that total CFUs increased significantly after the bonding of fixed orthodontic appliance.⁹

Various studies conducted by Amith HV, Asokan S, T. Durai Anand, D

Sarvanan have showed that the practice of oil pulling is highly effective in reduction of total bacterial colonies in the oral cavity.^{10,11,12,13} In our study, we have evaluated the effectiveness of commercially available oil pulling formulation in patients undergoing orthodontic treatment.

In the present study, the patients in the oil pulling group were asked to use oil pulling formulation for 21 days in the morning before brushing their teeth. The microbiological assessment showed that the oil pulling formulation in addition to other oral hygiene practices is effective in restricting the growth of oral microflora. There was a reduction of total CFUs in blood agar from baseline to 21 days. The statistical analysis conducted shows statistically high significant differences for blood agar plates between baseline(T_0) and 14 days(T_1) indicating that oil pulling is effective in reducing total CFU in the initial days of orthodontic treatment. Furthermore, there was a gradual decrease in total CFU up to 21 days for blood agar plates.

Limitations: In this study, the microbiological evaluation was done to assess the effectiveness of oil pulling. In addition to microbiological evaluation, clinical parameters should be assessed to determine the clinical significance of oil pulling. Long-term effects of oil pulling with large sample size should be studied.

CONCLUSION

- The start of orthodontic treatment introduces many new appliances and components which bring about a change in the environment of the oral cavity by changing the microflora.
- Because of the presence of these appliances, maintaining oral hygiene becomes difficult leading to an increase in the microbial population which can lead to unwanted consequences like accumulation of plaque deposits, staining of teeth, appearance of white spot lesions, gingivitis.
- Toothbrushing alone is not adequate to maintain oral hygiene. Adjunctive measures such as mouthwashes – herbal and chemical, flossing, interdental brushes, fluoride mouthrinses should also be used effectively maintain oral hygiene.
- Chlorhexidine mouthwash 0.2% is the most commonly prescribed chemical mouthwash for orthodontic patients. Its usage has certain disadvantages – unsuitable for long term use being more relevant to orthodontic patients owing to the long duration of the treatment.
- Oil pulling technique is an age-old ayurvedic technique that is being rediscovered in the recent years and extensively studied to assess its effectiveness in maintaining oral hygiene.
- The data obtained from this study proves the fact that the commercially available oil pulling formulation can be a viable alternative for chlorhexidine mouthwash as it can be used on long term basis. It is also effective in controlling the oral microbiota as the treatment progresses.

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