

## “IS TOOTH POLISHING NECESSARY? : A COMPARATIVE SPLIT MOUTH CLINICAL STUDY”

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### ABSTRACT:

**Background:** Tooth polishing is done to make root surface smooth and gleam and is a part of routine oral prophylaxis. Studies have generally found air polishing to be friendly to enamel with no significant loss of tooth structure and less abrasive than any other polishing aids. Aim: The aim of this randomized split mouth clinical study was to evaluate the efficacy of air polishing during routine oral prophylaxis.

**Methods:** Fifteen patients (8 females and 7 males) within the age group of 18 to 30 years were enrolled in the study where half the mouth i.e. maxillary and mandibular right or left, were treated by only ultrasonic scaling and the contra lateral quadrants were treated with ultrasonic scaling along with Prophy-Jet polishing. Following parameters were assessed: Plaque index (PI), Simplified Oral Hygiene Index (OHI-s), Modified sulcus bleeding index (mSBI) & Lobene stain index prior to treatment, immediate post treatment, at 7<sup>th</sup> day and at 21<sup>st</sup> day post treatment.

**Results:** There was increased bleeding in Group B when compared to Group A immediate post treatment which was statistically significant with the p value <0.05. There was improvement in all the parameters when comparing baseline to immediate post treatment, at 7<sup>th</sup> day and at 21<sup>st</sup> day post treatment, but results were not significant.

**Conclusion:** Tooth polishing can be performed with both the rubber-cup or air powder polishing device; however, the rationale for selecting the air-powder polishing is for its working efficacy and effectiveness.

**Keywords:** Plaque index, polishing, air polishing, stain, abrasive



### INTRODUCTION:

Periodontal disease is a multi factorial disease in which dental plaque is the primary etiological factor in the initiation and progression of the disease. The goal of periodontal therapy is to arrest periodontal disease progression and maintaining a healthy periodontal environment.<sup>[1]</sup> The initial step of periodontal therapy is removing dental plaque and calculus from the tooth surfaces and obtaining a biologically acceptable root surface.<sup>[1]</sup> The American

Academy of Periodontology defines an oral prophylaxis as the “removal of plaque, calculus and stain from exposed and unexposed surfaces of the teeth by scaling and polishing as a preventive measure for the control of “local irritational factors”.<sup>[2]</sup> Repeated scaling can cause surface roughness or depression on the surface of tooth which makes it more favorable for plaque accumulation in a short period of time. Hence polishing of the tooth surface can

be done to smoothen the surface. Polishing is the procedure to remove any residual extrinsic stains and deposits, mostly done by using a rubber cup or bristle brush loaded with a prophylaxis paste. Abrasive water jets are the most recent air polishing devices that has emerged as an alternative to hand polishing and rubber-cup polishing.<sup>[3,4]</sup> This device uses a stream of compressed air carrying abrasive powder to polish a surface by removing deposits with greater efficiency or by smoothening its texture.<sup>[5,6]</sup> Hence this randomized split mouth study design aimed to evaluate the efficacy of tooth polishing during routine oral prophylaxis procedure.

## **MATERIALS AND METHODS:**

### **Study sample**

Fifteen patients (8 females and 7 males) within the age range of 18 to 30 years were recruited from the Outpatient Department of Periodontics and Implantology, A.M.E's Dental College and Hospital, Raichur, Karnataka, India, after obtaining ethical clearance from the ethical committee. Verbally informed and written consent was obtained from the patients prior to study.

Patients who were meeting the following criteria were included in the study:

- Systemically healthy individuals with a minimum of 20 teeth,

- At least six sites with probing depth of  $\leq 4$  mm in either quadrant and bleeding following probing,
- Subjects who had mild to moderate gingivitis,
- Subjects with plaque index (Silness and Loe) score of 0.1-1.9, and
- Gingival index (Loe and Silness) scores of 0.1 – 2.0.

The following criteria excluded the subjects from participating in the study:

- Pregnant or lactating women,
- Subjects with any systemic disease,
- Subjects allergic to abrasives,
- Subjects who were using anti-inflammatory drugs or antibiotics within three months preceding the start of the study, and
- Subjects using orthodontic and prosthetic appliances and smokers (current or former) were excluded from this study.

### **Study design**

A single blinded, clinical trial using a split mouth design was conducted where the patients were randomly assigned to two groups i.e., half the mouth were treated by only ultrasonic scaling (Group A) and the contra lateral quadrants were treated with the ultrasonic scaling along with Prophy-Jet polishing (Group B). The study was designed for 21 days and indices were

recorded at baseline, immediate post treatment, at 7<sup>th</sup> day and at 21<sup>st</sup> day post treatment.

### Procedure

A split-mouth clinical study was designed where both treatment modalities were randomly assigned to either side. All treatment procedures were performed by single examiner who knew on which side scaling was done and on which side scaling along with air polishing was done and was not involved in clinical scoring of indices [Figure 1-6]. All the Patients were instructed to follow standard oral hygiene regimen during the entire study period. All subjects were examined at baseline, immediate post treatment and at 7<sup>th</sup> day and 21<sup>st</sup> day post treatment. All teeth were scored for the plaque index (PI), Simplified Oral Hygiene Index (OHI-s), Modified sulcus bleeding index (mSBI) & Lobene stain index.

For air polishing a Prophy –jet was used with sodium hydrogen carbonate polishing powder. The tip of the Prophy-jet was kept 4–5 mm away from the tooth surface and the spray was centred on the middle third of the tooth surfaces. A constant circular motions were used by keeping in mind not to spray into the sulcus. The spray was directed at an angle of 80° away from the gingiva, for cleaning molars and premolars, and at an angle of 60° away from the gingiva for cleaning cuspids and incisors. All teeth were polished, as is routinely done during standard prophylaxis procedures.

The following clinical parameters were recorded and scored during each recall visit

in both the treatment groups: Plaque index (PI), Simplified Oral Hygiene Index (OHI-s), Modified sulcus bleeding index (mSBI) & Lobene stain index. All clinical data were collected by a second examiner who was blinded was calibrated prior to the commencement of the study until the examiner could maintain >90% agreement on repeated measures of all examination protocols. The intra- examiner agreements were evaluated by means of repeated measurements with a 7-day interval from the first examination.

### Statistical analysis

The mean value for indices used in the study were calculated for each subject and were compared for each group. Nonparametric test (Mann–Whitney test), and parametric test (unpaired t-test) were used in the study to compare different variables at each time intervals. All the data were stored in a database and were analyzed using Statistical Package for Social Sciences (SPSS) for Windows version 16 (SPSS version 16, Chicago , Illinois).

### RESULTS:

Fifteen patients (8 females and 7 males) within the age range of 18 to 30 years were enrolled in the study. The duration of study was 21 days and clinical parameters were assessed for all the patients.

Results for plaque index & OHI-s index are given in Table 1 & 3 respectively. When comparing Group A & Group B there was reduction in scores immediate post treatment, at 7 days & 21 days when

compared to baseline, but there was no significant difference between these two indices at any time interval. Table 2. shows the comparison of reduction in modified sulcus bleeding index at different time intervals. There was increased bleeding in Group B when compared to Group A immediate post treatment which was statistically significant with the p value <0.05. But at 7 days and 21 days there was reduction in bleeding in both the groups that was not significant. Table 4. shows comparison of Lobene-stain-index at different time intervals. Non-significant results were obtained when the data's were compared with baseline to immediate post treatment, 7 days & 21 days.

## DISCUSSION:

The aim of periodontal therapy is to achieve a clean & smooth tooth surface for the maintenance of a healthy dento-gingival complex,<sup>[7]</sup> which requires the removal of calculus, necrotic cementum as well as the plaque biofilm to make the tooth surface free of bacteria and their noxious products.<sup>[8]</sup>

Literature supports that air polishing has been more effective & efficient tool in stain and plaque removal, when compared to scaling and traditional polishing methods (rubber cup, prophylaxis paste). It also requires less time and causes less operator fatigue as compared to traditional polishing methods.<sup>[9,10,11]</sup>

The evidence states that supragingival scaling alone can be detrimental to the total health of an individual. There is no

additional therapeutic value of supragingival scaling along with coronal polishing.<sup>[12]</sup> As per our knowledge this is the first study to evaluate the efficacy of tooth polishing during routine oral prophylaxis.

The results in our study indicated that when comparing the effectiveness of ultrasonic scaling with polishing and ultrasonic scaling alone there was no statistically significant difference in any of these parameters i.e plaque index, OHI-s index & Lobene stain index at any point of time. There was a significant reduction in plaque index scores, OHI-s score & Lobene stain index from baseline to immediate post, at 7 days & 21 days in both the treatments groups, which are in accordance with the other studies.<sup>[13-15]</sup>

A significant increase in mSBI was seen in our study when comparing baseline to immediate post treatment score in Group B when compared to Group A which could be attributed to use of prophy-Jet polishing causing localized soft tissue trauma; however, this trauma was reversible and was not detectable after 7 & 21 days (Tables 2). This result is in accordance with the other studies.<sup>[13,14,16]</sup>

Polishing should not be considered as a routine part of the oral prophylaxis and the need for polishing should be determined by licensed dental hygienist or dentist. The practitioner should be knowledgeable enough to judge appropriately that in which patients teeth polishing should or shouldn't be done.<sup>[12]</sup> Thorough tooth brushing and flossing produced the same effect as

polishing, without damage to the tooth surface.<sup>[12]</sup>

"Polishing is a selective process and not every patient needs teeth polishing, especially on a routine basis."<sup>[17]</sup> Selective polishing is done by keeping in mind that abrasives in polishing pastes removed the fluoride-rich outer layer of enamel. This theory was based on a study according to which 4 µm of enamel tooth structure was removed during a 30-second polishing with a pumice-water slurry.<sup>[18]</sup> Selective polishing was also supported by the fact that polishing for stain removal is not considered into therapeutic procedure.<sup>[17]</sup>

After treatment by scaling, root planing and other dental hygiene care, the teeth are assessed for the presence of remaining dental stains and dental biofilm. The use of cleaning and polishing agents for stain and dental biofilm is a "selective procedure". Polishing is selective in that the teeth that need to be polished and the cleaning or polishing agent used must be selected based on the patient's individual needs ensuring the safety of their teeth and restorations.<sup>[19]</sup>

If a patient has stains and esthetic restorations, the appropriate paste should be used only on the teeth, not on the restorations. If the patient has stained teeth and no esthetic restorations, the prophylaxis polishing agent selected should be the least abrasive necessary to remove the stains. Air polishing with sodium bicarbonate is safe for tooth stain removal, provided patients meet all selection criteria. In patients with glass ionomer, porcelain,

and composite restorations, air polishing with any type of air polishing powder is highly contraindicated.<sup>[20]</sup>

## CONCLUSION:

Dental hygiene is dynamic process, with changes occurring frequently across all facets of care. Today, for all patient care decisions the evidence based decision making is the firm framework. Removal of bacterial toxins to maintain and control their periodontal health is the main aim of doing oral prophylaxis. Polishing requires knowledge of the dental restorative materials, hard dental tissues and the science of abrasion. Even though for polishing root surfaces both the rubber-cup and air polishing are used; however, the rationale for selecting the air-powder polishing is for its effectiveness and efficacy. It is highly unethical to polish teeth and restorations only with coarse grit polishing pastes. It is most important that our patients understand that cosmetic stain removal is not the main issue. Removal of bacterial toxins to maintain and control their periodontal health is why we do an oral prophylaxis. However, it is now known that even though teeth are polished, the bacteria may colonize on the tooth surface within 30 min. In studies it has been found that very minimal loss of sound enamel has been seen after air polishing; however, care should be taken when polishing at or beyond the CEJ. <sup>[21-23]</sup> Dental practitioners should follow the scientific evidence in order to provide the highest standard of dental treatment according to the patient's

need and with concern about the loss of tooth structure.

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**TABLES:**

Table 1: Comparison mean difference of plaque index <sup>a</sup> among both the groups at different time intervals.

Time intervals	Group	Mean Reduction	SD	P value
Baseline to Immediate post treatment	Group A	1.09	0.18	0.805
	Group B	1.11	0.32	
Baseline to 1 week follow up	Group A	0.67	0.32	0.463
	Group B	0.77	0.42	
Baseline to 21 days follow up	Group A	0.44	0.36	0.678
	Group B	0.50	0.45	

n= 15; <sup>a</sup> Unpaired t-test; \*Statistically significant, SD- Standard Deviation



Table 2: Comparison the mean difference of Modified sulcus bleeding index <sup>b</sup> among both the groups at different time intervals.

Time intervals	Group	Mean Reduction	SD	P value
Baseline to Immediate post treatment	Group A	0.10	0.477	0.018*
	Group B	-0.26	0.37	
Baseline to 1 week follow up	Group A	0.53	0.33	0.395
	Group B	0.41	0.37	
Baseline to 21 days follow up	Group A	0.32	0.48	0.740
	Group B	0.22	0.36	

n= 15; <sup>b</sup> Mann Whitney U-test; \*Statistically significant, SD- Standard Deviation.

Table 3: Comparison of the mean difference of OHI-s index <sup>a</sup> among both the groups at different time intervals.

Time intervals	Group	Mean Reduction	SD	P value
Baseline to Immediate post treatment	Group A	1.79	0.6	0.639
	Group B	1.67	0.7	
Baseline to 1 week follow up	Group A	1.24	0.7	0.984
	Group B	1.23	0.7	
Baseline to 21 days follow up	Group A	0.90	0.7	0.701
	Group B	0.80	0.8	

n= 15; <sup>a</sup> Unpaired t-test; \*Statistically significant, SD- Standard Deviation.

Table 4: Comparison of the mean difference of Lobene-stain-index <sup>a</sup> among both the groups at different time intervals.

Time intervals	Group	Mean Reduction	SD	P value
Baseline to Immediate post treatment	Group A	0.22	0.2	0.461
	Group B	0.29	0.2	
Baseline to 1 week follow up	Group A	0.21	0.2	0.385
	Group B	0.29	0.2	
Baseline to 21 days follow up	Group A	0.18	0.1	0.205
	Group B	0.29	0.2	

n= 15; <sup>a</sup> Unpaired t-test; \*Statistically significant, SD- Standard Deviation.



**FIGURES:**



Figure 1: Frontal view before scaling



Figure 2: Frontal view after scaling



Figure 3: Right lateral view before scaling



Figure 4: Right lateral view after scaling



Figure 5: Left lateral view before scaling



Figure 6: Left lateral view after scaling