

# The Effectiveness of Polishing after Oral Prophylaxis Using Ultrasonic Scaler Unit on Plaque Accumulation on the Tooth Surface – A Split Mouth Study

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**Abstract:** Aim: To determine the effectiveness of polishing after oral prophylaxis on patients by evaluating the plaque index on third and seventh day after oral prophylaxis. Background: Dental plaque is a film of mucus and bacteria deposited on the teeth that encourages the development of dental caries. Oral prophylaxis is done to remove the accumulated plaque and debris on the tooth surface. Ultrasonic oral prophylaxis leaves a rough tooth surface which encourages bacteria accumulation and increase incidence of dental plaque. It is always recommended to polish the tooth surface after it has been cleared of plaque / calculus through manual / sonic / ultrasonic scaling. Materials and Methods: A total of 25 patients were involved in this split mouth study. Plaque index of patients was recorded prior to the treatment using a disclosing solution and then oral prophylaxis is done using ultrasonic scaler. Polishing of tooth surface is done using rubber cup and polishing paste only on one side of upper and lower arch. Patient is recalled on third and seventh day following oral prophylaxis and plaque index is recorded. Reason: A comparative study to determine the effectiveness of polishing after oral prophylaxis. Result: The results showed that unpolished surfaces exhibited higher mean percentages of visible plaque in the 7<sup>th</sup> day. Dental polishing after ultrasonic scaling contributed to reducing plaque formation. Conclusion: Polishing exerts an inhibitory effect on plaque formation.

**Keywords:** Oral Prophylaxis, Plaque

## 1. Introduction

### Description of the condition

Periodontal (gum) disease' is a broad term that encompasses a cluster of diseases that result in inflammatory responses and chronic destruction of the tissues that surround and support the teeth, namely the gingiva, periodontal ligament, cementum and alveolar bone which is called periodontium. Dental plaque is the principal aetiological factor in the pathogenesis of periodontal disease. Apart from dental plaque certain modifying factor like environmental, systemic disease, depleted nutrition also plays a cumulative role in plaque accumulation. The host response, the modifying effect of various risk factors and the bacterial attack from dental plaque can account for a variety of disease patterns, both between different individuals and between different sites in the mouth within the same individual. Gingivitis is a reversible disease and can be defined as the presence of gingival inflammation (where the gum can appear reddened and swollen and may bleed easily) without loss of connective tissue attachment. Gingivitis is a precursor to periodontitis in some individuals - that is, gingivitis does not inevitably progress to periodontitis. Periodontitis can be defined as the presence of gingival inflammation at sites where there has been a pathological loss of attachment (AAP 2003). This loss of attachment contributes to pocket formation and the denuded cementum may become contaminated by microorganisms and their products. Scaling and polishing of the teeth by a dentist or a dental care professional (DCP) (dental therapist or dental hygienist) is a nonsurgical intervention that is intended to supplement (and is not a substitute for) the patient's home-care plaque control. Scaling is the removal of plaque, mineralised plaque

deposits (also referred to as calculus or tartar), debris and staining from the crown and root surfaces of the teeth. Specially designed sharp dental instruments ('hand scalers') or ultrasonic scalers can be used to perform the scaling procedure. Repeated scaling can surface roughness or depression on the surface of tooth which makes 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 mechanical removal of any residual extrinsic stains and deposits, typically undertaken by using a rubber cup or bristle brush loaded with a prophylaxis paste. Hence this randomized split mouth study has been conducted to find out the efficacy of polishing prior to scaling on the tooth surface on the accumulation of dental plaque.

## 2. Aim of the Study

The aim of the study is find out the efficacy of polishing prior to scaling of the tooth surface on the accumulation of dental plaque on the 3<sup>rd</sup> and 7<sup>th</sup> day.

## 3. Material and Method

### Types of participants

Healthy dentate adults. We include participants who had mild to moderate gingivitis at baseline. We excluded trials where participants were described as having severe periodontal disease.

### Method

The study was designed as a split-mouth randomised clinical trial. Plaque index of patients was recorded prior to the

treatment using a disclosing solution. Twenty-five patients were submitted to supragingival scaling on the upper and lower arch using ultrasonic scaler. Subsequently, lower arch were selected to be polished with a rubber cup and pumice. Third and seventh days following treatment, evaluation of the visible plaque index on tooth surfaces is recorded.

Twenty-five patients were randomly selected with gingival index is less than 2 and subjected to supragingival scaling on the upper and lower arch using piezoelectric ultrasonic scaler which is set at RPM. The time limit for scaling is 30 minutes. The gingival index and plaque index is recorded before scaling is done.

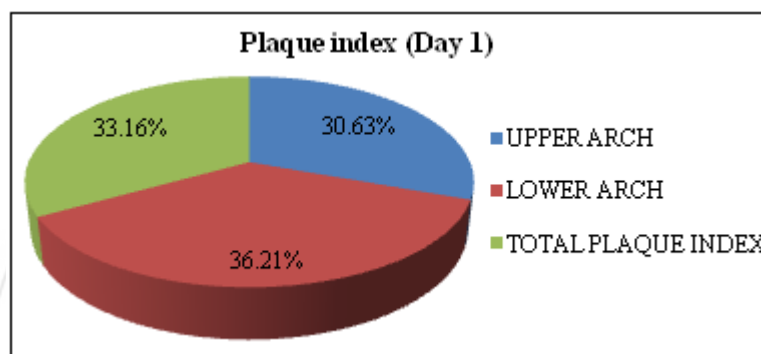
Inclusion criteria based on mild to moderate gingivitis with gingival index less than 2 and age of the patient <20. Exclusion criteria were of chronic inflammatory periodontal disease and a 3–5 mm pocket, a clinical attachment loss of 8

to 12 mm, bone loss, any systemic diseases, any usage of antibiotics or systemic drugs.

Subsequently, lower arch were selected to be polished with a rubber cup and polishing paste. Low speed micromotor connected to the contra angle hand piece where the rubber cup is attached. Polishing paste is used along with the rubber cup to polish the lower arch alone.

#### 4. Results

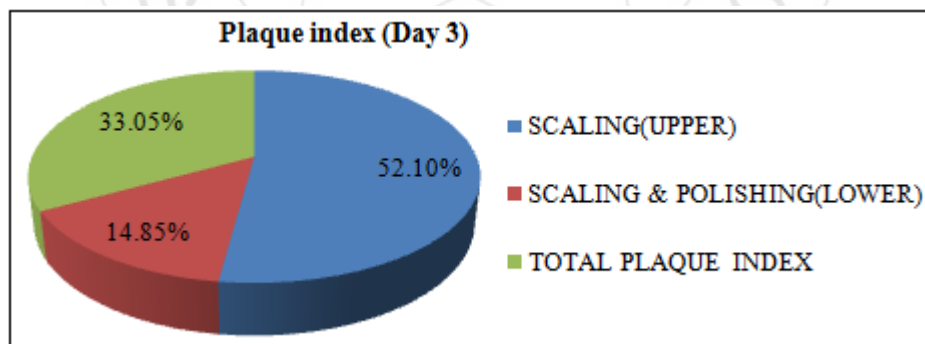
Figure 1 shows the mean results of total plaque index accumulation in day 1 before ultrasonic scaling and polishing. It can be seen that the mean pre-treatment total plaque index before scaling is 33.16%. For upper arch alone the plaque index before scaling is approximately 30.63%. While for lower arch the plaque index before scaling and polishing is approximately about 36.21.



**Figure 1**

Figure 2 shows the mean results of plaque index accumulation on 3<sup>rd</sup> day after ultrasonic scaling and polishing. It can be seen that the mean total plaque index after ultrasonic scaling and polishing is 33.05%. It can be

seen that the plaque index after ultrasonic scaling and without polishing on the upper arch alone shows 52.10%. While for the lower arch alone the plaque index after ultrasonic scaling and polishing is approximately 14.85%.



**Figure 2**

Figure 3 shows the mean results of plaque index accumulation on 7<sup>th</sup> day after ultrasonic scaling and polishing. It can be seen that the mean total plaque index after ultrasonic scaling and polishing is 33.40%. It can be seen that the plaque index after ultrasonic scaling and

without polishing on the upper arch alone shows 56.96%. While for the lower arch alone the plaque index after ultrasonic scaling and polishing is approximately 9.64%.

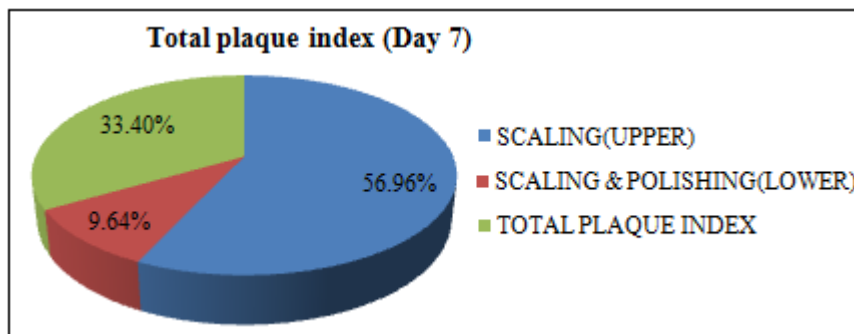


Figure 3

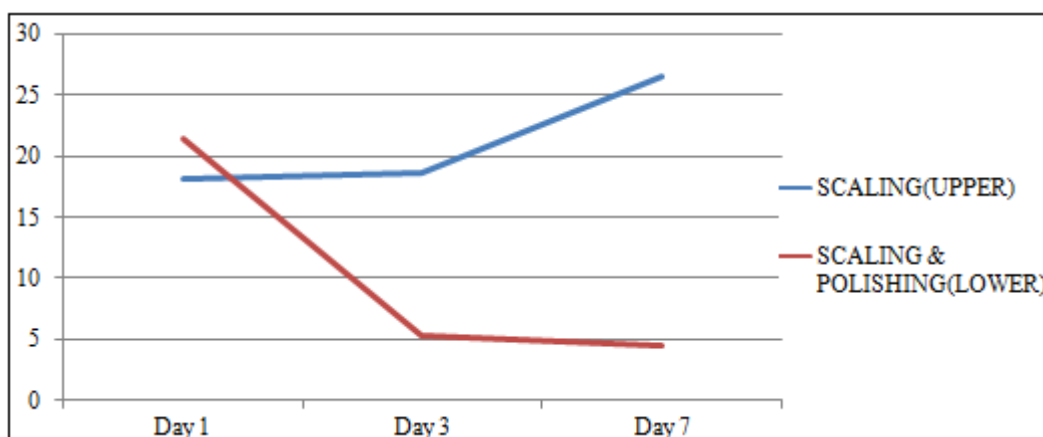


Figure 4

## 5. Discussion

According to the present study, the percentage of plaque index on lower arch shows significant decrease between 1<sup>st</sup>, 3<sup>rd</sup> and 7<sup>th</sup> day where ultrasonic scaling and polishing done. While the percentage of plaque index on upper arch shows significant increase between 1<sup>st</sup>, 3<sup>rd</sup> and 7<sup>th</sup> day where only ultrasonic scaling done. So, the results showed that unpolished surfaces exhibited higher mean percentages of visible plaque on 3<sup>rd</sup> and 7<sup>th</sup> day. The removal of plaque from tooth surfaces is an essential part of periodontal therapy. However, cleaning procedures may lead to a number of unintended side effects. For example, increasing the surface roughness of dental hard tissues and restorative materials by scaling instrumentation has a considerable impact on promoting plaque formation, thereby increasing the risk for both caries and periodontal inflammation. Sonic and ultrasonic scaling techniques are widely used in periodontal prophylaxis. The vibration of sonic scaler inserts ranges between 3,000 and 8,000 cycles per second, while the vibration of ultrasonic scaler inserts operate between 18,000 and 45,000 cycles per second. Studies have confirmed that both techniques appear to attain similar results as hand instruments for removing plaque, calculus and endotoxin. Although differences in ultrasonic power devices seem not to influence clinical results of periodontal treatment, the increase in roughness could directly influence the accumulation of dental biofilm over exposed root surfaces. The cleaning procedures, however, may increase surface roughness, which will influence bacterial colonization and increase the rate of plaque formation. Ultrasonic scaling are also subjected to vary depending on operator, power setting, tip to surface angle, sharpness of the working edge, instrumentation time after placement of the restoration,

which may require further long-term studies for different time periods. Ultrasonic scaling is essential part of periodontal therapy that includes elimination of plaque, calculus, and bacterial endotoxins from the tooth and exposed root surfaces. Studies have demonstrated that the most important prerequisite for healing after periodontal treatment is a root surface free of plaque and calculus. Mierau<sup>25</sup> (1984) and Quirynen and Bollen<sup>27</sup> (1995) have clarified that supragingival rough surfaces subsequent to professional instrumentation can promote plaque formation and contribute to bacterial adhesion. Supragingival surface roughness and surface irregularities increase the surface area, promote bacterial colonization, plaque formation and thereby can compromise daily plaque removal. These cleaning procedures may lead to a number of unintended side effects most commonly increase in the surface roughness of dental hard tissues and restorative materials. This kind of surface irregularities increases the available surface area 2 to 3 times, which provides the niche to attach and grow to the microorganisms leading to quicker plaque accumulation and more difficult plaque removal. Eid *et al.* have mentioned that bacterial adhesion is directly proportional to surface roughness of the restorations. Ikeda *et al.*, also stated that surface roughness has a positive influence on *S. mutans* biofilm adherence. The American Academy of Periodontology defines tooth polishing (*in relation to oral prophylaxis*) as “the removal of plaque, calculus and stains from the exposed and unexposed surfaces of the teeth by scaling and polishing as a preventive measure for the control of local irritational factors”. A study on the effects of polishing on the enamel surface of the teeth, conducted at the University of San Paulo, School of Dentistry, demonstrated the need for eliminating rough surfaces on the teeth, which create a risk for increased

accumulated of biofilm, calculus, and exogenous stain. A 2007 study published in the "Journal of the American Dental Association" found that when teeth are polished with a combination of acid and pumice, the difference in appearance was visible in every case. So, not only does polishing with pumice remove plaque and bacteria, but it can also polish out stains that occur when your teeth react with the foods you eat and the beverages you drink.

## 6. Conclusion

The results showed that unpolished surfaces exhibited higher mean percentages of visible plaque in the 7th day. Significant differences were observed between unpolished and polished sites related to plaque formation. Dental polishing after ultrasonic scaling contributed to reducing plaque formation. Within the limitations of this study, ultrasonic instrumentation has caused significant changes in the surface roughness of teeth. So it is concluded that Polishing exerts an inhibitory effect on plaque formation.

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