

# A Comparative Evaluation of the Efficacy of Glycine Air Polishing following Scaling and Root Planing & Scaling and Root Planing Alone in the Treatment of Chronic Periodontitis : A Clinical Study

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## Abstract:

The purpose of this study is to evaluate the short term clinical effect of air polishing device, as well as safety and patient acceptance in subjects with pocket depth of 3-5mm. This was a randomized, split mouth clinical trial. In this study subgingival application of amino acid glycine powder at limited pressure was compared to scaling and root planing (SRP) in 10 subjects with pocket depth 3-5mm. After supra-gingival scaling, the spray was applied for 4-5 seconds in all sites in the test quadrant, whereas SRP was done in control quadrant. Sub-gingival air polishing was safe (no adverse events were noted), perceived to be more acceptable by the patients and was more time-efficient than SRP.

**Keywords :** Airpolishing Device, Aminoacid Glycine Powder, Plaque Index, Chronic Periodontitis

## Introduction

Periodontitis is defined as "an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both."<sup>1</sup> Accumulation of bacteria on tooth surfaces is the primary cause of gingivitis and periodontitis. Thus, regular mechanical removal of bacterial plaque from all non-shedding oral surfaces is considered the primary means to prevent and stop the progression of periodontal disease.<sup>2</sup>

It has been seen that in periodontal patients, frequently performed sub-gingival debridement in pockets >3mm has shown to be necessary to maintain periodontal

health.<sup>3</sup> Hand instruments or oscillating scalers may be used to reduce sub-gingival microflora; however their use is time-consuming and technically demanding, and may lead to clinically relevant root substance loss over time.<sup>4</sup> Hard tissue loss is one of the major causes of increased sensitivity in the treated teeth to evaporative, tactile, thermal or osmotic stimuli.<sup>5</sup>

The air-abrasive technology uses an abrasive powder introduced into a stream of compressed air to clean or polish the surface by removing deposits attached to it or smoothing its texture.<sup>3</sup> Plaque removal can be accomplished effectively using air-polishing devices. However, air-polishing using a slurry of water, sodium bicarbonate (NaHCO<sub>3</sub>) and pressurized air is highly abrasive to root

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cementum or dentin.<sup>6</sup> To reduce the abrasiveness and render this approach potentially suitable for removal of biofilm on root surfaces, it was suggested to replace sodium bicarbonate with a powder of amino acid glycine.<sup>7</sup>

Using pressurized air in dental procedures carries the risk of provoking emphysema. Cases of emphysema were noted after the use of high-speed dental hand pieces and air-water syringes.<sup>8</sup> However no cases of emphysema has been reported after the glycine air polishing, suggesting that this protocol allows gentle cleaning of the sulcular area with no major disruption of the gingival tissues.<sup>9</sup>

Thus, the aim of this study is to evaluate the short term clinical effect of air polishing device, safety and patient acceptance in subjects with pocket depth of 3-5mm.

#### **Materials & Method**

This was a 7 day single-centre, randomized, split-mouth clinical trial. Ten systemically healthy patients were recruited from the department of periodontics, I.T.S – C.D.S.R. Subjects who were of age 18-60 years with presence of at least one periodontal pocket of PD 3-5mm in two separate quadrants between distal aspect of central incisors and mesial of second molar with no obvious sign of persisting massive sub-gingival calculus deposits were included in the study.

Patients suffering from chronic bronchitis, asthma, major systemic illness (cardiovascular diseases), HIV, cancer and patients on anti-biotics, anti-inflammatory drugs or any medications taken within a month were also excluded as they may affect the outcome of the study. Written informed consent was obtained from each patient.

A powder of amino acid glycine, a non-toxic

soluble material with a mean grain size of 20µm was used. Air polishing device Prophy Mate® was used to allow access of the amino acid glycine powder in the sub gingival area. Prophy Mate® delivery system uses a customized handpiece to deliver amino acid glycine powder sub-gingivally under pressurized air. The abrasive particles have an access to sub-gingival tooth surfaces and have shown to be effective in removal of plaque and soft deposits.

The test procedure consisted of sub gingival treatment by inserting the tip into the pocket and applying the spray for 5 seconds. The control procedure consisted of deep scaling and root planing with Gracey curettes, without local anesthesia, for no longer than 5 minutes per site. The patients were randomly assigned to receive test treatment in one quadrant and control treatment in the other quadrant according to the availability of at least one periodontal pocket with PD 3-5mm in the area between distal aspect of central incisor and mesial aspect of second molar.

At baseline the following clinical parameters were recorded: plaque index (PI), gingival index (GI) and pocket depth (PD). This examination also included a visual examination for changes in colour and texture, signs of abrasion and visual analog scale (VAS) scoring was also done to evaluate the pain and discomfort level of the patient.

On the day of sub gingival treatment, supra gingival hard and soft deposits were removed in entire dentition. Test quadrant was treated with air polishing device (Fig. 2) and in control quadrant SRP was done (Fig. 1). Time spent in sub gingival treatment in both the quadrants was noted. Subjects were recalled after 7 days and PI, GI, PD and all adverse events were noted.



Fig. 1 (CONTROL SITE)



Fig. 2 (TEST SITE)

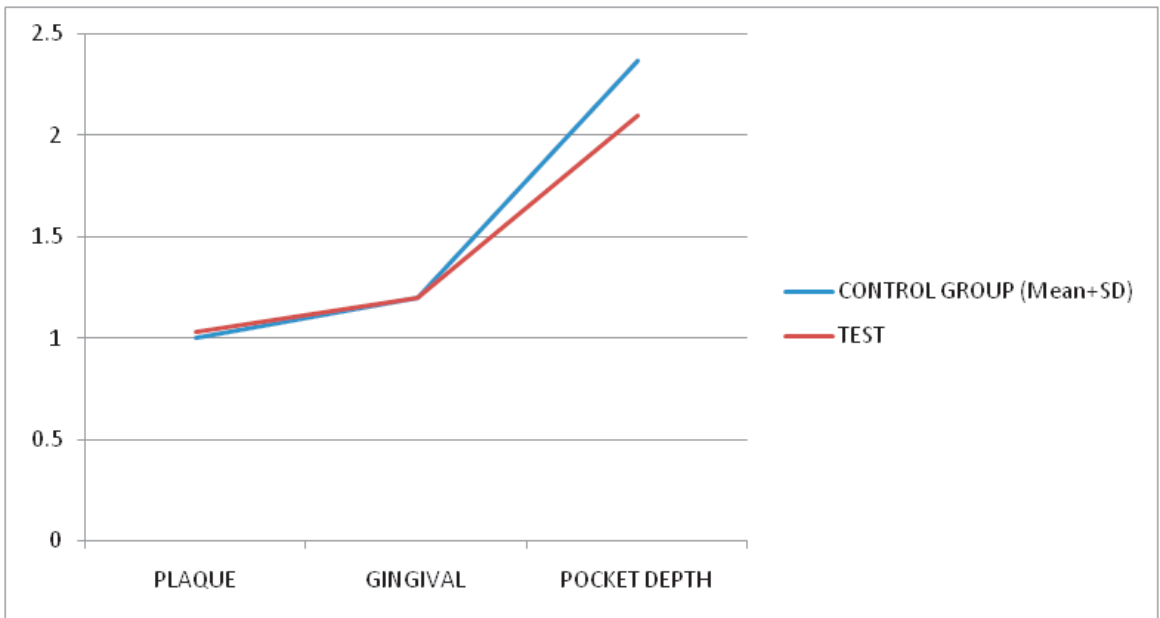


Fig. 3 Graphical representation of clinical parameters at 1 week.

**Table 1: clinical parameters (PI, GI, & PD) recorded at baseline for both the groups. No significant difference in test or control group was seen for any of the clinical variables**

PARAMETERS	CONTROL GROUP (Mean±SD)	TEST GROUP (Mean±SD)	p VALUE
PI	1.8 ± 0.48	1.8 ± 0.54	NS
GI	1.9 ± 0.27	1.9 ± 0.27	NS
PD	3.8 ± 0.47	3.8 ± 0.47	NS

**Table 2: clinical parameters (PI, GI & PD) recorded after 1 week for both groups. Both the treatment procedures significantly reduced PI, GI & PD, but when compared between the groups there was no significant reduction**

PARAMETERS	CONTROL GROUP (Mean+SD)	TEST GROUP (Mean+SD)	p VALUE
PI	1 ± 0.1	1.03 ± 0.1	NS (0.667)
GI	1.2 ± 0.35	1.2 ± 0.38	NS (0.67)
PD	2.37 ± 0.25	2.1 ± 0.1	NS (0.772)

### Results

The primary outcome measures of the study were oral tissue safety and pain/discomfort, rated by the patient on a VAS from 0 to 10. Secondary outcomes included differences between the groups for changes in pocket depth (PD), plaque index (PI) and gingival index (GI).

All 10 patients finished the study and no adverse events were noted by any subject during the study. The evaluation of pain or discomfort on a VAS from 0 to 10 immediately upon completion of treatment revealed that the patients perceived the treatment with air polishing to be significantly more comfortable than the instrumentation with cures. As expected, the mean time needed by the operator to treat one site was significantly shorter with the air-polishing device than with the cures.

### Discussion

The primary purpose of this trial was to evaluate the safety of a new method for subgingival air polishing in deep pockets. Prophy Mate® allowed access sub-gingivally. In addition, sodium bicarbonate was replaced by the amino acid glycine, a non-toxic, soluble

material with a mean grain size of 20 mm. In the past, emphysema with the use of sodium bicarbonate powder for air polishing was noted.

Previous studies indicated potential risk of soft tissue damage, sodium bicarbonate causing erosive changes in the keratin and epithelial layer. Petersilka et al,<sup>10</sup> evaluated the safety and efficacy of air polishing with glycine powder at the histologic level.

With regard to patient acceptance, the treatment with air polishing was perceived to be significantly more comfortable than SRP with curette. Treatment with the new subgingival air-polishing device was three times faster than conventional SRP<sup>11</sup>(Petersilka et al). Also in a study by Rapheal et al they used a specially designed nozzle for sub-gingival air polishing with amino acid glycine powder.<sup>2</sup> Our results are in agreement with a previous study<sup>11</sup>, in which the patients rated the mean comfort of subgingival air polishing in shallow pockets at 8.7.

### Conclusion

Subgingival air polishing with a new device was safe, because no adverse events were

noted in any of the patients, and it was perceived as being more acceptable and more time efficient than SRP.

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