THE EFFECT OF MECHANICAL NONSURGICAL PERIODONTAL THERAPY IN CHRONIC PERIODONTITIS: A CLINICAL STUDY
Maya S Indurkar, Pallavi S. Bhailume

ABSTRACT
Background: Nonsurgical periodontal therapy encompasses mechanical therapy; chemotherapeutics as an adjunct to mechanical therapy, full mouth disinfection, and more recently laser therapy. Mechanical nonsurgical periodontal therapy is directed towards the removal of the microbial biofilm from the root surfaces of periodontally diseased teeth by scaling and root planning. It is the first recommended approach to the control of periodontal infections. Aims and Objectives: To evaluate the clinical effects of mechanical nonsurgical periodontal therapy in 170 subjects with chronic periodontitis over a period of six weeks. Materials and Method: 170 subjects coming to the outpatient department of periodontology for the treatment of chronic periodontitis were selected for the study. Plaque index (Turesky-Gilmore Glickman Modification of the Quigley-Hein 1962), gingival index (Loe and Silness, 1963), probing pocket depth and CAL were evaluated at baseline and six weeks after mechanical periodontal therapy. Results: There was a decrease in scores of clinical parameters Plaque index, gingival index, probing pocket depth and gain in CAL at six weeks after mechanical periodontal therapy. Conclusions: Mechanical nonsurgical periodontal therapy induces favorable changes in the periodontal tissues, as expressed by a reduction of plaque index, gingival index, probing pocket depth, and gain in clinical attachment level.

Keywords: Periodontitis; Mechanical Therapy; Nonsurgical Therapy;

Introduction
The term periodontal disease in its strict sense refers to both gingivitis and periodontitis. Gingivitis is an inflammatory condition of the soft tissue surrounding the teeth (the gingiva) and is a direct immune response to the dental microbial plaque building up on teeth. Periodontitis involves the destruction of the supporting structures of the teeth including the periodontal ligament, bone, and soft tissues. The basic approach to periodontal infections has always been and remains the removal of supra- and subgingival bacterial deposits by scaling and root planning. Although mechanical nonsurgical periodontal therapy has evolved over the years, it is still considered to be the gold standard to which other treatment methods are compared.

The aim of Nonsurgical periodontal therapy is to eliminate both living bacteria in the microbial biofilm and calcified biofilm microorganisms, i.e. dental calculus, from the root surface and from the subgingival area without the surgical reflection of the soft tissues surrounding the teeth. As a consequence, the host tissues can better cope with the remaining microorganisms, reducing the inflammatory changes of the soft tissues and producing a varying degree of closure of the subgingival pocket. Numerous studies have supported the contention that root planning can reduce probing depths, gain clinical attachment and inhibit disease progression. A number of treatment options are available for the treatment of periodontal disease ranging from the traditional non-surgical periodontal therapy (mechanical hand instrumentation, ultrasonic debridement, supragingival irrigation, subgingival irrigation, local drug delivery, systemic antibiotic therapy and host modulation therapy) to recent surgical treatment modalities utilizing grafts, membranes, growth factors along with flap and various other tissue engineered products and techniques. These therapies can be continued with antibiotics and host modulation therapy. Despite various treatment options discussed above, nonsurgical periodontal therapy still remains the mainstay of the periodontal treatment regimens. Also, nonsurgical treatment is indispensable for many periodontitis patients, especially for those with systemic diseases, such as heart disease and diabetes, who may not be suitable for periodontal surgery. Thus, the present study is plan to measure the effect of nonsurgical mechanical periodontal therapy in chronic periodontitis.

Materials and Method
The present study was conducted in the Department of Periodontology, Govt. Dental College and Hospital, Aurangabad, Maharashtra. 170 subjects of chronic periodontitis were selected for the study.

Inclusion criteria includes, a) patients having mild to severe periodontitis, b) subjects 18 years to 65 years of age, c) presence of at least 16 teeth in the oral cavity, d) the good general health of the patient, e) subjects willing to participate in the study.

Exclusion criteria includes, a) subjects having undergone any periodontal treatment in past six months, b) subjects under a long-term anti-bacterial or analgesic medication, c) pregnant females, d) medically compromised subjects, in whom periodontal treatment was contraindicated, e) non compliant subjects.

Pre-operative assessment: Plaque score was recorded using the Plaque Index by (Turesky-Gilmore Glickman Modification Of The Quigley-Hein 1962) at two designated sites i.e. facial and lingual. Gingival inflammation was recorded using Gingival Index (Loe and Silness, 1963) at the four designated sites i.e. mesiofacial, mid-facial, disto-facial and lingual. Pocket depth was noted using University of North Carolina 15 periodontal probe on mesiofacial, mid-facial, disto-facial and lingual surfaces rounding off to the nearest higher millimeter. Clinical at-
Attachment levels were noted at the four designated sites to the nearest highest millimeter, by calculating the distance from free gingival margin (FGM) to the base of the pocket.

All the subjects underwent thorough supra and subgingival scaling after measurement of clinical parameters with hand and ultrasonic scalers. The subjects received oral hygiene instructions including tooth brushing technique and interdental cleaning aids according to the individual needs. Patients were recalled at six weeks after Phase-1 periodontal therapy. All the clinical parameters were re-evaluated at six weeks follow-up.

**Results**

In statistical analysis, the value of continuous variables was expressed as mean ±SD (standard deviation). The significance of the difference in mean values of continuous variables before and after phase-1 periodontal therapy was estimated by student’s t – test (paired samples T-test and one sample T-test).

A two-tailed p-value of <0.05 was taken as statistically significant. There was a decrease in scores of clinical parameters after follow-up compared to baseline.

The mean plaque index at the baseline was 2.807 ± 0.4667 mm and at the follow-up of phase-1 periodontal therapy was 1.716 ± 0.4753 mm (Table-1) with a reduction in plaque index (Mean ± SD) 1.091 ±0.5330 mm. The difference in means of plaque index at baseline and at the 6 weeks follow-up was statistically highly significant.

The mean gingival index at the baseline was 2.362 ±0.6529 mm and at 6 weeks follow-up of phase-1 periodontal therapy after 6 weeks was 1.204 ± 0.6759 mm (Table-2) with a reduction in the gingival index (Mean ± SD) 1.1580 ±0.6250 mm. The difference in means of gingival index at baseline and at the six weeks follow-up was statistically highly significant.

### Table 1. Showing the results of Phase-1 periodontal therapy on Plaque index in chronic periodontitis.

<table>
<thead>
<tr>
<th></th>
<th>Plaque Index score at baseline (Mean ± SD)</th>
<th>Plaque index score at follow-up after 6 weeks (Mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plaque Index</td>
<td>2.807 ± 0.4667</td>
<td>1.716 ± 0.4753</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

### Table 2. Showing the results of Phase-1 periodontal therapy on the Gingival index in chronic periodontitis.

<table>
<thead>
<tr>
<th></th>
<th>Gingival Index score at baseline (Mean ± SD)</th>
<th>Gingival index score at followup after 6 weeks (Mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gingival Index</td>
<td>2.362 ±0.6529</td>
<td>1.204 ± 0.6759</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

### Table 3. Showing the results of Phase-1 periodontal therapy on pocket depth in chronic periodontitis.

<table>
<thead>
<tr>
<th></th>
<th>Periodontal Pocket Depth (PPD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PPD score at baseline (Mean ± SD)</td>
<td>3.443 ± 0.9324</td>
<td></td>
</tr>
<tr>
<td>PPD score at follow-up (Mean ± SD)</td>
<td>2.423 ± 0.7817</td>
<td></td>
</tr>
<tr>
<td>PPD reduction (Mean ± SD)</td>
<td>2.423 ± 0.7817</td>
<td>&lt; 0.0001</td>
</tr>
</tbody>
</table>

### Table 4. Showing the results of Phase-1 periodontal therapy on CAL in chronic periodontitis.

<table>
<thead>
<tr>
<th></th>
<th>Clinical Attachment Level (CAL)</th>
<th>Gain in CAL (Mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAL score at baseline (Mean ± SD)</td>
<td>3.754 ± 1.084</td>
<td>1.024 ±0.4882</td>
<td>&lt; 0.0001</td>
</tr>
<tr>
<td>CAL score at followup (Mean ± SD)</td>
<td>2.730 ± 0.9270</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 5. Showing the results of Phase-1 periodontal therapy on CAL in male and female.

<table>
<thead>
<tr>
<th></th>
<th>Clinical Attachment level CAL in relation to Gender</th>
<th>Gain in CAL (Mean ± SD)</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>CAL score at baseline (Mean ± SD)</td>
<td>CAL score at baseline (Mean ± SD)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>3.717 ±1.127</td>
<td>2.688 ± 0.9229</td>
<td>1.029 ±0.4990</td>
</tr>
<tr>
<td>Female</td>
<td>3.789 ±1.047</td>
<td>2.769 ± 0.9343</td>
<td>1.020± 0.4808</td>
</tr>
</tbody>
</table>
The effect of mechanical nonsurgical periodontal therapy in chronic periodontitis: a clinical study

### Clinical Attachment level CAL in relation to Age group

<table>
<thead>
<tr>
<th>Age</th>
<th>CAL score at baseline (Mean ± SD)</th>
<th>CAL score at baseline (Mean ± SD)</th>
<th>Gain in CAL (Mean ± SD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30 years</td>
<td>3.851 ± 0.8990</td>
<td>2.704 ± 0.7321</td>
<td>1.148 ± 0.4963</td>
</tr>
<tr>
<td>31-45 Years</td>
<td>4.046 ± 1.016</td>
<td>2.920 ± 0.8572</td>
<td>1.126 ± 0.5530</td>
</tr>
<tr>
<td>&gt; 45 years</td>
<td>4.130 ± 1.189</td>
<td>3.101 ± 1.035</td>
<td>1.030 ± 0.4932</td>
</tr>
</tbody>
</table>

Table 6. Showing the results of Phase-1 periodontal therapy on CAL in different age groups

The mean probing pocket depth at the baseline was 3.443 ± 0.9324 mm and at 6 weeks follow-up of phase-1 periodontal therapy was 2.423 ± 0.7817 mm (Table–3) with a mean reduction of pocket depth 1.020 ± 0.5126 mm. The difference in means of PPD at baseline and at the 6 week follow-up was statistically highly significant.

The mean CAL at the baseline was 3.754 ± 1.084 mm and at 6 weeks follow-up of phase-1 periodontal therapy was 2.730 ± 0.9270 mm with a gain in CAL (Mean ± SD) 1.024 ± 0.4882 mm (Table–4). The difference in means of CAL at baseline and at the 6 weeks follow-up was statistically highly significant.

The mean CAL score at baseline was higher in male patients as compared to female patients as shown in table no. 5. But there was no statistically significant difference gain in CAL level after six weeks follow-up by unpaired t-test (p=0.07).

Subjects were divided into 3 groups according to age i.e less than 30 years, 31-45 years and more than 45 years. At baseline, CAL was maximum in the 3rd age group > 45 years, but maximum gain in CAL level was seen in the 1st age of group < 30 years as shown in Table 6.

**Discussion**

Although there have been tremendous advances in the understanding of the events leading to periodontal breakdown and of the effects of periodontal treatment in the past few decades, the concept and understanding of subgingival plaque elimination and oral hygiene performed by the patient as being the essential elements of a successful periodontal treatment approach date back more than a century. In 1886, Black stated that the most important measure in the treatment of calcific inflammation of the periodontal membrane and gums is the removal of the concretions from the teeth, and the next most important, instilling in the mind of the patient an active determination to keep their teeth clean in the future. In the present study, the mean plaque index decreased from 2.807 ± 0.4667 mm at baseline to 1.716 ± 0.4753 mm at 6 weeks follow-up with a reduction in plaque index (Mean ± SD) 1.091 ± 0.5330 mm. According to Cugini MA et al, plaque index (%) was decreased from baseline 73 ± 80% to 12 month follow-up 66 ± 72 %of scaling and root planning.

In many clinical studies on the effects of nonsurgical or surgical periodontal therapy, bleeding after probing was used as an indicator of residual disease activity. Several investigators have demonstrated that sites in which bleeding after probing occurred repeatedly at successive observations during the periodontal supportive therapy, had a higher probability of showing periodontal breakdown as evidenced by loss of clinical periodontal attachment. In the present study, the mean gingival index at the baseline was 2.362 ± 0.6529 mm and at 6 weeks follow-up of phase-1 periodontal therapy was 1.204 ± 0.6759 mm (Table–2) with a reduction in the gingival index (Mean ± SD) 1.1580 ± 0.6250 mm. Ashu Bhardwaj et al has evaluated the effectiveness of mechanical non-surgical therapy in subjects with moderate to severe gingivitis and periodontitis over a period of eight weeks and found the mean gingival index at the baseline was 2.15 ± 0.131 mm and after 8 weeks of phase-1 periodontal therapy was 1.12 ± 0.087 mm with reduction in gingival index (Mean ± SD) 1.03 ± 0.044 mm. Thus, nonsurgical periodontal therapy leads to a reduction of the periodontal inflammation as evidenced by a reduction in bleeding tendency.

The surface area of the gingiva where bacteria can invade/diffuse the tissues is larger if the probing depth is greater. So by a reduction in pocket depth, we can achieve periodontal health. In the present study, the mean probing pocket depth at the baseline was 3.443 ± 0.9324 mm and at 6 weeks follow-up of phase-1 periodontal therapy was 2.423 ± 0.7817 mm with a mean reduction of pocket depth 1.020 ± 0.5126 mm (Table–3) indicating that non-surgical therapy provides an indispensable tool for pocket depth reduction. Also this probing pocket depth reduction is beneficial since it results in an environment that is less favorable for the establishment of anaerobic periodontopathic microorganisms leading the periodontal tissues towards health. Cugini MA et al has evaluated the effect of scaling and root planing on the clinical and microbiological parameters of periodontal diseases: 12-month results and found mean probing pocket depth decreased from 3.2 ± 0.3 at baseline to 2.9 ± 0.3 at 12 months of scaling and root planing. John F. Cercek et al has compared relative effects of plaque control and instrumentation on the clinical parameters of human periodontal disease and found after 25 weeks of instrumentation, there was further and more pronounced improvement in probing pocket depths.

The effect of scaling and root planing on clinical attachment levels has generally been related to initial probing depths. In the present study, the mean CAL at the base line was 3.754...
± 1.084 mm and at 6 weeks follow-up of phase-1 periodontal therapy was 2.730 ± 0.9270 mm with a gain in CAL (Mean ± SD) 1.024 ± 0.4882 mm (Table–4). Ashu Bhardwaj et al. has evaluated the effectiveness of mechanical non-surgical therapy in subjects with moderate to severe gingivitis and periodontitis over a period of 8 weeks and found the mean CAL at the baseline was 4.555±1.461mm and after eight weeks of phase-1 periodontal therapy was 4.302±1.726mm. Philiostrom et al has compared surgical and nonsurgical treatment (modified Widman flap) in periodontal disease over a period of 6 1/2 years and found greater gain in attachment level with scaling and root planning5.

Conclusion

It can be concluded from this clinical study that mechanical nonsurgical periodontal therapy induces favorable changes in the periodontal tissues, as expressed by a reduction of plaque index, gingival index, probing pocket depth, and gain in clinical attachment level.

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