Comparison of full-mouth and partial-mouth disinfection modalities in nonsurgical periodontal treatment for periodontitis: a randomized clinical trial in vietnam

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Abstract

Background: Periodontitis is the most common form of periodontal disease, greatly affecting the aesthetics, function as well as patient's quality of life. In the periodontal disease treatment strategy, nonsurgical treatment is considered as the initial phase for anti-infection and soft-tissue management. **Objective:** This study aims to compare the effect of two nonsurgical periodontal modalities: one-stage full-mouth and partial-mouth protocols for periodontitis. **Materials and Methods:** 60 patients with chronic periodontitis were randomly allocated to 2 groups. Group I (n = 30) was treated according to partial-mouth therapy. Group II (n = 30) was treated according to full-mouth disinfection therapy. Periodontal parameters were assessed at baseline and 1, 3, and 6 months, including plaque index, gingival index, periodontal probing depth, clinical attachment loss, and bleeding on probing. **Results:** Both two treatment modalities resulted in significant improvements in all clinical parameters over the entire duration of the study ($p < 0.05$). Full-mouth disinfection therapy showed significantly better improvements than the partial-mouth one during follow-up times ($p < 0.05$). **Conclusion:** Nonsurgical periodontal treatment has positive effects on controlling periodontitis. Full-mouth therapy shows clinical benefits over partial-mouth therapy in improving periodontal conditions.

Keywords**:** *Periodontitis, nonsurgical periodontal therapy, full-mouth therapy, partial-mouth therapy.*

1. INTRODUCTION

Periodontitis, the most frequent periodontal disease in adults, is characterized by connective tissue attachment loss and the resorption of coronal alveolar bone due to dental plaque accumulation [1]. To treat and control periodontitis, nonsurgical therapy has been considered as the priority treatment. The objective of periodontal treatment is the reduction and elimination of microbial load, and the removal of dental plaque and calculus through scaling and root planing (SRP) therapy [2]. According to partial-mouth nonsurgical therapy, SRP is performed per jaw quadrant at a 1- to 2-week interval [3]. This protocol requires at least 4 appointments, thus time-consuming for both patients and dentists. However, most bacterial species exist not only in periodontal pockets but also colonize several other oral niches and the oropharyngeal area, such as the mucosa, the tongue, the tonsils, and the saliva. They could be transmitted from one of their niches to the subgingival environment, leading to the reinfection of treated periodontal pockets. Therefore, during the time intervals of this therapy, the treated pockets may be reinfected by the untreated pockets [4]. To reduce this reinfection, Quirynen M. et al. (1995) introduced the one-stage full-mouth (OSFM) disinfection protocol that involves the use of antiseptics (Chlorhexidine). The scaling and root planing are conducted in two visits within 24 hours with the use of Chlorhexidine solution and gel. The OSFM disinfection showed a significantly higher reduction of pocket depth and fewer pathogenic organisms at one month recall, as compared to partial therapy [5]. Regardless of Chlorhexidine (CHX) use, the one-stage full-mouth scaling and root planing showed more favorable reactions in patients and clinical improvement in a long time follow-up study [6]. Moreover, several studies supported these clinical observations based on the reduction of microbiology in the OSFM group [7],[8].

In Vietnam, previously published research were conducted with partial-mouth SRP protocol in 1-2 visits or full-mouth modality without intensive disinfection [9], [10]. Moreover, the term one-stage full-mouth disinfection was not considered yet and the effects of this modality on treating Vietnamese periodontitis patients were not clarified. Therefore, the present study aims to assess and compare two nonsurgical treatment protocols: full-mouth therapy and partial-mouth one.

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Recieved: 6/2/2023; Accepted: 5/5/2023; Published: 10/6/2023

2. MATERIALS AND METHODS

Ethical approval

This study was conducted from June 2019 to June 2021 in full accordance with the Helsinki Declaration of 1975, as revised in 2000. The protocol and the informed consent form were reviewed and approved by the Institutional Ethics Committee of Hue University of Medicine and Pharmacy, Hue University, Hue, Vietnam (Number: H2019/339). Sixty participants were recruited from Hue University of Medicine and Pharmacy Hospital. It was mandatory for consent participants have to read and signed the consent form before being included in the present study.

Study population

Participants were recruited from patients who came for dental examination and were diagnosed with chronic periodontitis.

The inclusion criteria were as follows:

- ≥ 18 years of age;
- Clinical signs of mild, moderate, and severe periodontitis according to the 2014 update Classification of Periodontal Disease by the American Academy of Periodontology; [11]
- Having ≥ 20 teeth present on the dental arch;
- Commitment to participate in the study and follow-up visits.

Exclusion criteria included:

- Teeth with combined endodontic and periodontal lesions;
- Current smoking;
- Pregnancy and lactation;
- Having systemic diseases;
- Use of antibiotics or anti-inflammatory drugs within 3 months of the start of the study;
- Periodontal therapy, including nonsurgical and surgical, in the 6 months preceding the start of the study.

After obtaining informed consent, the selected subjects were randomly distributed into two nonsurgical treatment groups:

- Group I (30 patients): subjects who received the partial-mouth therapy.
- Group II (30 patients): subjects who received the full-mouth therapy.

The patients were periodontally examined before treatment (baseline) and after treatment (1-month, 3-month, and 6-month recall visits) (Figure 1).

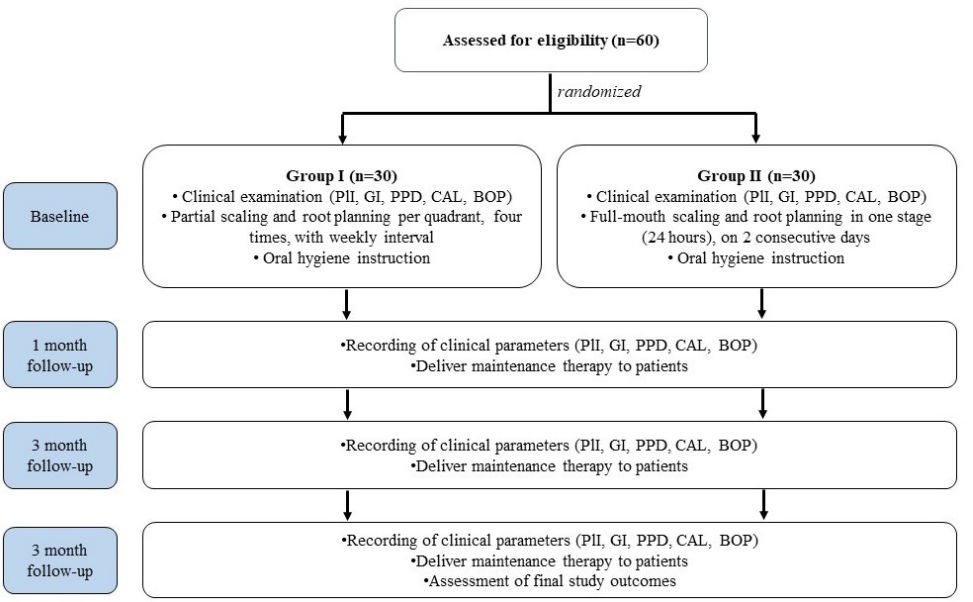

Figure 1. Schematic diagram of the study design

Nonsurgical treatment

Group I (30 patients) received partial-mouth periodontal therapy. Group II (30 patients) received full-mouth scaling and root planing. Both 2 groups received standard oral hygiene instructions at each visit.

+ ***Scaling and root planing***: The sessions of SRP were performed by the same investigator using standard periodontal curettes. The time needed per quadrant was approximately 1 hour.

- In Group I, the SRP process began in the upper right quadrant and continued clockwise, each quadrant was treated at each appointment with an interval of 1 week.

- In Group II, SRP was completed in two visits within 24 hours, starting from the lower jaw. During SRP, additional disinfection was sought by: 1) brushing the tongue dorsum (by the patient) for 60 seconds with a Chlorhexidine 1% gel; 2) rinsing twice with Chlorhexidine 0.2% solution for 1 minute (during the last 10 seconds patients had to gargle in an attempt to reach the tonsils); 3) subgingival irrigation of all the pockets 3 times within 10 minutes with a Chlorhexidine 1% gel. Additionally, the subjects of this group were instructed to rinse twice daily for 60 seconds with a 0.2% solution of Chlorhexidine for 2 months.

+ ***Oral hygiene instruction***: Patients from both groups received oral hygiene instruction at the first visit for nonsurgical treatment and other recall appointments. All patients have been instructed on toothbrushing (with the Bass technique), brushing of the tongue dorsum (twice a day), and interdental plaque control (by interdental brushes or dental floss).

Periodontal parameters assessment

At baseline, 1 month, 3 months, and 6 months after treatment, the following clinical parameters were recorded including probing pocket depth (PPD) and clinical attachment loss (CAL) at six sites per tooth. Plaque index (PII), gingival index (GI), and bleeding on probing (BOP) were recorded at four sites per tooth. Clinical parameters were carried out on a dental chair by a pre-calibrated examiner who was blinded to the study with the appropriate armamentarium.

Statistical Analysis: all data were collected in an Excel database and analyzed by SPSS version 26.0. A p-value of <0.05 was considered statistically significant.

Categorical variable like gender is expressed as proportion and compared by use of a Chi-squared test.

Quantitative variables were presented as mean ± standard deviation. The Student t-test (two-tailed, independent) was used to find the significance of study parameters on a continuous scale between two groups (intergroup analysis). The Student t-test (two-tailed, dependent) was used to find the significance of study parameters on the continuous scale within each group. The Mann-Whitney U-test was used to find the significance of nonparametric parameters probing depth between two groups and the Wilcoxon signed-rank test was used to find the significance of probing depth (nonparametric) in paired conditions.

3. RESULTS

The study consisted of 22 men and 38 women. The average age of subjects participating in the study was 55.52 ± 12.95 years. No significant differences were found between the 2 treatment groups (full-mouth therapy and partial-mouth therapy) for all participants (n=60) regarding the variables of sex, age, and periodontitis severity (p>0.05).

The clinical parameters (PII, GI, PPD, CAL, and BOP) of both groups at baseline, 1 month, 3 months, and 6 months are shown in Table 1, Figure 2, and Figure 3.

Table 1. Comparison of clinical parameters at baseline, 1st month, 3rd month, and 6th month between two groups

Clinical parameters	Group	Baseline (Mean ± SD)	1 month (Mean ± SD)	3 months (Mean ± SD)	6 months (Mean ± SD)
PII	Group I	2.26 ± 0.27	1.34 ± 0.11	1.18 ± 0.10	1.28 ± 0.15
	Group II	2.21 ± 0.35	0.49 ± 0.15	0.60 ± 0.21	0.78 ± 0.29
	p*	> 0.05	< 0.05	< 0.05	< 0.05
GI	Group I	2.02 ± 0.20	0.87 ± 0.09	0.71 ± 0.15	0.86 ± 0.21
	Group II	1.99 ± 0.33	0.27 ± 0.15	0.35 ± 0.19	0.60 ± 0.30
	p*	> 0.05	< 0.05	< 0.05	< 0.05
PPD (mm)	Group I	3.46 ± 0.78	3.08 ± 0.61	3.04 ± 0.59	3.08 ± 0.60
	Group II	3.41 ± 0.93	2.66 ± 0.52	2.59 ± 0.47	2.61 ± 0.49
	p*	> 0.05	< 0.05	< 0.05	< 0.05
CAL (mm)	Group I	3.89 ± 0.84	3.51 ± 0.69	3.47 ± 0.68	3.50 ± 0.70
	Group II	3.82 ± 1.00	3.07 ± 0.74	3.00 ± 0.72	3.01 ± 0.72
	p*	> 0.05	< 0.05	< 0.05	< 0.05

BOP (%)	Group I	79.83 ± 7.44	58.63 ± 10.53	54.30 ± 11.03	56.03 ± 14.31
	Group II	78.53 ± 10.45	45.03 ± 10.99	41.90 ± 10.30	42.97 ± 12.93
	p*	> 0.05	< 0.05	< 0.05	< 0.05

**p-value* obtained with the Mann-Whitney U-test for PPD and the independent samples t-test for the other variables for the intergroup comparison at the same time point.

PII: plaque index; GI: gingival index; PPD: probing pocket depth; CAL: clinical attachment loss; BOP: bleeding on probing; group I: partial treatment; group II: full-mouth disinfection.

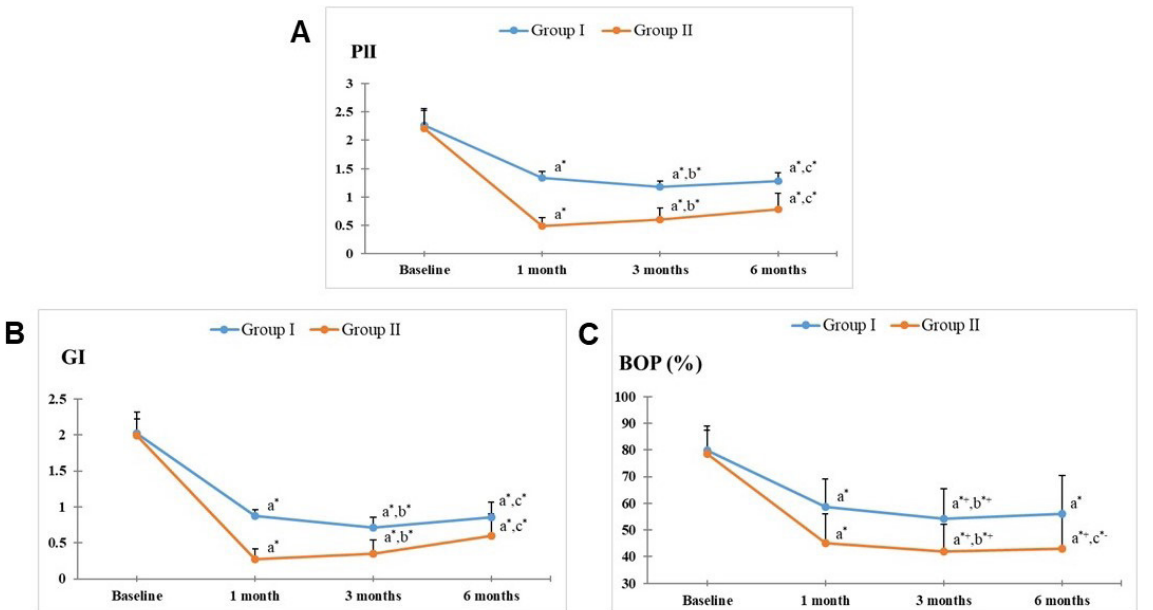

Figure 2. Changes in plaque index (PII), gingival index (GI), and bleeding on probing (BOP) in two treatment groups after 1, 3, and 6 months. *: $p<0.05$ with paired sample t-test; a: compared to baseline; b: compared to 1st month; c: compared to 3rd month.

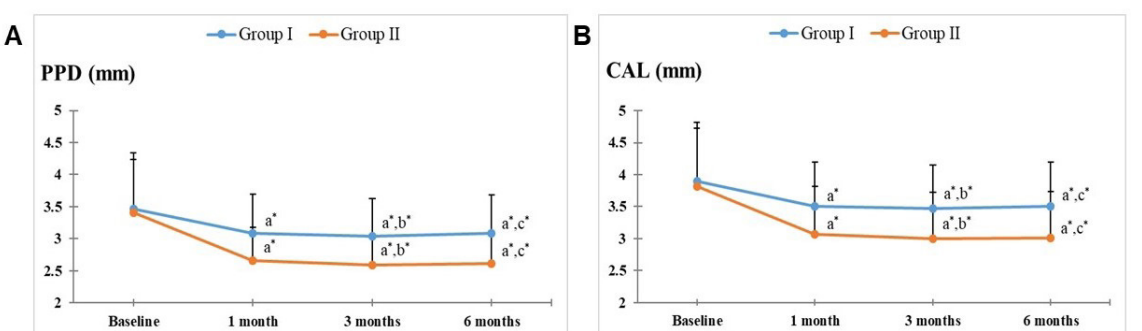

Figure 3. Changes in pocket depth (PPD) and clinical attachment loss (CAL) in 2 treatment groups after 1, 3, and 6 months. *: $p < 0.05$ with paired sample t-test; a: compared to baseline; b: compared to 1st month; c: compared to 3rd month.

At the first month follow-up, the results showed a significant reduction in all clinical parameters of both groups (p<0.05). After 3 months, all recorded indexes of Group I continued to decrease (p<0.05). However, the PII and GI indexes of Group II illustrated a slight increase again, as compared to those in 1st month (p<0.05). For the 6th-month assessment, most of the clinical parameters of both groups showed an increase in comparison with the 3rd-month records (p<0.05). Only the BOP index of Group I at this time showed insignificant change (p>0.05). Regarding the change of clinical parameters in two groups after treatment, all values at 3 assessed point times show reduction compared to baseline (Table 2).

Table 2. Reduction of clinical parameters in two groups after treatment compared to baseline

Clinical parameters	Group	1	2	3
PII	Group I	- 0.92	- 1.08	- 0.98
	Group II	- 1.72	- 1.61	- 1.43
GI	Group I	- 1.15	- 1.31	- 1.16
	Group II	- 1.72	- 1.64	- 1.39
PPD (mm)	Group I	- 0.38	- 0.42	- 0.38
	Group II	- 0.75	- 0.82	- 0.80
CAL (mm)	Group I	- 0.38	- 0.42	- 0.39
	Group II	- 0.74	- 0.81	- 0.80
BOP (%)	Group I	- 21.20	- 25.53	- 23.80
	Group II	- 33.50	- 36.63	- 35.56

$_{123}$: mean change of clinical parameters at 1st month, 3rd month, 6th month respectively, compared to baseline.

At baseline, there are no statistically considerable differences in periodontal parameters between the two groups (p > 0.05). After treatment, the clinical indexes of Group I showed higher results as compared to Group II at all recall visits (p < 0.05).

Following the AAP classification in 2014, the periodontitis severity of 60 participants showed a similar distribution of moderate and severe status at baseline, 1 and 3-month follow-up (p>0.05) (Figure 4). However, at the final assessment (6 months), the severe periodontitis percentage of Group II (60%) is lower than that of Group I (83.3%) significantly (p<0.05).

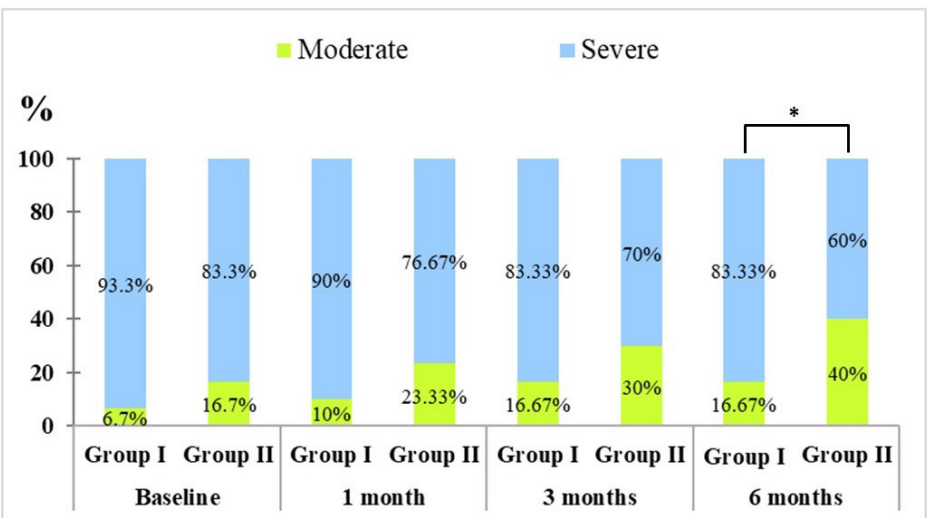

Figure 4. Distribution of periodontitis severity in two groups at baseline, 1 month, 3 months, and 6 months post-operation.* *p* < 0.05 with Chi-square test.

4. DISCUSSION

Chronic periodontitis is recognized as the most frequently occurring form of periodontitis. Its onset may be at any age but is most commonly detected in adults [1]. In the management of chronic periodontitis, nonsurgical periodontal therapy is administered to improve clinical parameters as well as control the bacterial count responsible for initiating the disease and the resultant inflammatory response [12]. Systematic reviews of nonsurgical periodontal therapy including either full-mouth or partial-mouth protocols have demonstrated that these procedures proved to be effective in reducing clinical signs and symptoms of periodontitis, such as gingival bleeding and clinical loss attachment [4],[7]. In the present study, 60 patients with periodontitis were distributed to two groups, each patient received one of two nonsurgical treatment modalities: group I was provided the partial-mouth treatment, and Group II was provided the full-mouth treatment. The efficacy of the two modalities was presented through the change of clinical parameters at 1-, 3- and 6-month follow-ups.

The obtained results showed that both groups achieved a significant reduction in PII, GI, and BOP indexes after 1 month, but a slight increase in the 6th month due to negligence in oral hygiene. At the baseline, subjects of both groups were treated and instructed on scientific oral hygiene. Further, negligence in oral hygiene caused the accumulation of bacterial plaque and food debris, thus resulting in to increase in gingivitis score. Along with the changes in PII, GI, and BOP indexes, this study also recorded a significant improvement in PPD and CAL levels, as compared to the baseline. After 6 months, PPD and CAL indices rebounded, this was consistent with the volatility of the PII, GI, and BOP indexes. Thus, the reincrease in plaque accumulation might have bad effects on deep periodontal status.

Nonsurgical periodontal treatment is effective in supporting the restoration of loss of adhesion of periodontal tissue. Noticeably, Group II showed better effects on improving all periodontal parameters at all follow-up visits, as compared to Group I ($p < 0.05$). Group II received full-mouth therapy and continued using Chlorhexidine for two months after treatment. A study by Mongardini C. et al showed a positive effect on periodontal clinical parameters in the first month for the full-mouth group [13]. Further studies also proved the better effects of OSFM disinfection in comparison with the partial-mouth modality for long-term assessments [8],[13],[14].

After follow-up for 1 month, 3 months, and 6 months, the distribution of periodontitis in the two groups changed significantly over time, especially in the 6th month for Group II ($p<0.05$). The grading of periodontitis was based on the maximum CAL level per patient according to the AAP periodontitis grading criteria [11]. This showed that patients who received full-mouth disinfection therapy had better periodontal tissue healing, epithelial re-adhesion, and decreased severity of periodontitis.

Applying a better understanding of the infectious process, full-mouth disinfection therapy could provide several benefits when compared to partial-mouth therapy: reduce the number of treatment visits for patients, more efficient use of treatment time, reduced cost of therapy, and improved clinical and microbiological results. Furthermore, if beneficial results can be maintained for more than 3 months, it may increase the time interval between maintenance visits without increasing risk to patients [15].

Chlorhexidine is known as a gold standard for antiplaque and antigingivitis, thus being suggested to bring significant clinical and microbiological benefits in full-mouth periodontal nonsurgical therapy, as depicted in previous studies [6],[7]. In this study, CHX was used in a combination of mouthwash, spray, and gel during SRP treatment and maintained at home for the next 2 months after treatment. The results showed a significant improvement in Group II in the first month. However, discontinuing CHX after 2 months of maintenance denoted an increase in PII and GI indexes in the 3rd and 6th months. This phenomenon also was recorded in other studies [6-8, 13, 14]. Therefore, the use of CHX becomes questionable as an adjunct in the full-mouth treatment for periodontitis. Even so, Chlorhexidine is still recommended to be used, especially in patients with poor oral hygiene or in cases when it is not possible to perform SRP in a short time [6].

Overall, nonsurgical periodontal therapy is an effective treatment method for patients with chronic periodontitis. Both full-mouth disinfection and partial-mouth treatment showed effective results and do not lead to any obvious discomfort for periodontitis patients. Full-mouth therapy had clinical benefits over partial-mouth modality in probing pocket depth reduction and clinical attachment level gain. Furthermore, from a practical

perspective, less time was required for the full-mouth treatment process to complete treatment. Therefore, we prefer to recommend full-mouth disinfection therapy as the first choice for the treatment of periodontitis and should be applied widely in Vietnam.

5. CONCLUSION

The findings from this study confirm that nonsurgical periodontal treatment has positive effects on controlling periodontitis. Full-mouth therapy has clinical benefits over partial-mouth modality in improving periodontal conditions.

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