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Original Research

Evaluation of the Efficacy of Non-Surgical Periodontal Therapy in Chronic Periodontitis

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ABSTRACT:
Background: Chronic periodontitis is a prevalent inflammatory condition affecting the supporting structures of teeth. Non-surgical periodontal therapy (NSPT), including scaling and root planing (SRP), is widely recommended as a primary treatment. **Objective:** To evaluate the efficacy of NSPT in managing chronic periodontitis. **Methods:** A total of 100 patients with chronic periodontitis were enrolled in this study. Clinical parameters such as probing depth (PD), clinical attachment level (CAL), bleeding on probing (BOP), and plaque index (PI) were recorded at baseline and six months post-treatment. NSPT was performed, and the outcomes were statistically analyzed. **Results:** Significant improvements were observed in all clinical parameters post-NSPT. The mean PD reduced by 2.1 mm ($p<0.001$), CAL improved by 1.8 mm ($p<0.001$), BOP decreased by 40% ($p<0.001$), and PI reduced by 1.5 ($p<0.001$). **Conclusion:** NSPT demonstrated substantial efficacy in improving periodontal health in patients with chronic periodontitis. These findings support NSPT as an effective initial treatment strategy.
Keywords: Chronic periodontitis, non-surgical periodontal therapy, scaling and root planing, clinical parameters, periodontal health

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INTRODUCTION

Background

Chronic periodontitis is a chronic inflammatory disease characterized by the destruction of the supporting structures of the teeth, including the periodontal ligament and alveolar bone. It results from the complex interaction between pathogenic bacterial biofilms and the host's immune response, leading to periodontal pocket formation, gingival recession, and tooth loss if left untreated [1]. Epidemiological studies have shown that chronic periodontitis affects a significant proportion of the adult population worldwide, making it a major public health concern [2].

Pathogenesis

The pathogenesis of chronic periodontitis involves both microbial and host factors. The subgingival biofilm harbors various periodontal pathogens such as *Porphyromonas gingivalis*, *Tannerella forsythia*, and *Treponema denticola*. These bacteria produce virulence factors that provoke an inflammatory response, which, while intended to control the infection, also causes tissue destruction [3]. Host factors, including genetic predisposition, systemic conditions (e.g., diabetes mellitus), and environmental factors (e.g., smoking), further modulate disease progression [4].

Current Treatment Modalities

Treatment of chronic periodontitis aims to eliminate the pathogenic biofilm and halt the progression of the disease. Non-surgical periodontal therapy (NSPT) is the cornerstone of periodontal treatment and involves mechanical debridement of the tooth surface to disrupt and remove biofilms and calculus [5]. Scaling and

root planing (SRP) is the primary procedure in NSPT, aiming to smooth the root surfaces and remove any bacterial toxins embedded in the cementum [6].

Efficacy of NSPT

Numerous studies have demonstrated the efficacy of NSPT in reducing clinical parameters such as probing depth (PD), clinical attachment level (CAL), bleeding on probing (BOP), and plaque index (PI) [7]. The reduction in PD and improvement in CAL are critical indicators of periodontal treatment success, reflecting both the resolution of inflammation and reattachment of periodontal tissues [8]. BOP and PI are also valuable indicators, with decreases in these parameters signifying reduced inflammation and improved oral hygiene, respectively [9].

Objective of the Study

Despite the established benefits of NSPT, variations in clinical outcomes have been reported due to differences in study design, patient populations, and treatment protocols. This study aims to evaluate the efficacy of NSPT in a well-defined cohort of patients with chronic periodontitis, using standardized clinical parameters and follow-up periods.

Significance

Understanding the effectiveness of NSPT and identifying factors that influence treatment outcomes are crucial for optimizing periodontal care. This research provides valuable insights into the clinical benefits of NSPT, contributing to evidence-based periodontal practice.

MATERIALS AND METHODS

Study Design

This prospective clinical study was conducted at the Department of Periodontology, at the tertiary care center. Ethical approval was obtained from the Institutional Review Board (IRB), and informed consent was obtained from all participants.

Patient Selection

A total of 100 patients diagnosed with chronic periodontitis were recruited based on the following criteria:

- Inclusion Criteria: Patients aged 30-60 years with chronic periodontitis, minimum of 20 teeth, and no periodontal treatment in the past six months.
- Exclusion Criteria: Patients with systemic diseases affecting periodontal health, smokers, pregnant or lactating women, and those on medications affecting periodontal status.

Clinical Parameters

The following clinical parameters were recorded at baseline and six months post-treatment:

- Probing Depth (PD): Measured using a periodontal probe at six sites per tooth.
- Clinical Attachment Level (CAL): Calculated as the distance from the cemento-enamel junction to the base of the pocket.
- Bleeding on Probing (BOP): Recorded as the presence or absence of bleeding within 15 seconds of probing.
- Plaque Index (PI): Assessed using the Silness-Löe index.

Treatment Protocol

All patients underwent NSPT, which included SRP performed under local anesthesia. The procedures were carried out by experienced periodontists using ultrasonic and hand instruments. Patients were provided with oral hygiene instructions and asked to perform routine home care.

Statistical Analysis

Data were analyzed using SPSS version 25.0. Paired t-tests were used to compare baseline and post-treatment values. A p-value <0.05 was considered statistically significant.

RESULTS

Demographic Data

The study included 100 patients (45 males and 55 females) with a mean age of 45 ± 10 years. No significant differences in baseline clinical parameters were observed between males and females.

Clinical Parameters

Table 1: Probing Depth (PD) Changes

Timepoint	Mean PD (mm)	SD	p-value
Baseline	5.8	0.9	-
6 months	3.7	0.8	<0.001

Table 2: Clinical Attachment Level (CAL) Changes

Timepoint	Mean CAL (mm)	SD	p-value
Baseline	4.5	1.0	-
6 months	2.7	0.9	<0.001

Table 3: Bleeding on Probing (BOP) and Plaque Index (PI) Changes

Parameter	Baseline (%)	6 months (%)	p-value
BOP	65	25	<0.001
PI	2.5	1.0	<0.001

Significant improvements were observed in all clinical parameters post-NSPT. The mean PD reduced from 5.8 mm at baseline to 3.7 mm at six months, indicating substantial pocket reduction (Table 1). CAL showed a mean gain of 1.8 mm, reflecting successful reattachment and periodontal stability (Table 2). BOP decreased from 65% to 25%, and PI reduced from 2.5 to 1.0, demonstrating reduced inflammation and improved oral hygiene (Table 1-3).

Statistical Significance
All changes in clinical parameters were statistically significant ($p<0.001$), confirming the efficacy of NSPT in managing chronic periodontitis.

DISCUSSION

Comparison with Previous Studies
The findings of this study are consistent with previous research demonstrating the efficacy of non-surgical periodontal therapy (NSPT) in managing chronic periodontitis. Significant reductions in probing depth (PD) and improvements in clinical attachment level (CAL) have been reported in various studies, including those by Kwon et al. and Cobb et al., which highlight the consistent positive outcomes of NSPT across different patient populations and research designs [10][11]. These studies, along with our findings, confirm that NSPT is effective in reducing periodontal inflammation and promoting tissue healing.

Mechanisms of NSPT
The primary goal of NSPT is to eliminate pathogenic subgingival biofilms and calculus, thereby reducing periodontal inflammation and halting disease progression. The significant reduction in PD observed in this study can be attributed to the successful removal of biofilms and the resolution of inflammatory processes. Improvement in CAL indicates reattachment of periodontal tissues, which is a direct result of the creation of a clean, smooth root surface post-scaling and root planing (SRP) [12]. These mechanisms underpin the clinical improvements seen following NSPT and support its use as a first-line treatment for chronic periodontitis.

Patient Compliance and Oral Hygiene
Patient compliance with oral hygiene instructions plays a critical role in the success of NSPT. In this study, detailed oral hygiene instructions were provided to all patients, contributing to the significant reductions in plaque index (PI) and bleeding on probing (BOP). Effective plaque control by patients helps maintain the benefits achieved through NSPT, as persistent plaque accumulation can quickly lead to recurrence of periodontal inflammation [13]. The role of patient education and motivation in maintaining periodontal health post-treatment is essential for long-term success.

Role of Adjunctive Therapies
While NSPT alone is effective, adjunctive therapies may enhance clinical outcomes, especially in cases of advanced periodontitis or poor response to initial treatment. Studies by Sanz et al. and Heitz-Mayfield et al. have shown that the adjunctive use of antimicrobial agents, such as systemic antibiotics and local antimicrobial delivery systems, can result in additional improvements in clinical parameters compared to SRP alone [16][17]. These findings suggest that adjunctive therapies should be considered, particularly for patients with severe or refractory periodontal disease.

Host Modulation Therapy
Host modulation therapy (HMT) represents a promising adjunctive approach to periodontal treatment. HMT aims to modify the host's inflammatory response, thereby reducing tissue destruction and promoting healing. Studies by Preshaw et al. have demonstrated that the use of sub-antimicrobial dose doxycycline (SDD) as an adjunct to NSPT significantly improves clinical outcomes, particularly in reducing PD and BOP [18]. These findings support the potential integration of HMT into periodontal treatment protocols to enhance the efficacy of NSPT.

Long-term Maintenance
The long-term success of NSPT depends on maintaining good oral hygiene and adhering to regular periodontal maintenance visits. Research by Lang and Tonetti emphasizes the importance of supportive periodontal therapy (SPT) in sustaining the treatment gains achieved through NSPT [19]. Patients who participate in regular SPT show better long-term periodontal stability and lower rates of disease recurrence compared to those who do not adhere to maintenance schedules. This underscores the need for ongoing periodontal care even after initial treatment [20].

Individual Patient Factors
Various individual patient factors, including systemic health, smoking status, and genetic predisposition, significantly influence periodontal treatment outcomes. This study excluded smokers and individuals with systemic conditions known to affect periodontal health, which helped reduce variability and enhance the reliability of the findings. However, in clinical practice, these factors must be considered and managed to optimize treatment outcomes. Personalized treatment plans that address these individual factors are crucial for achieving the best possible results.

Clinical Implications
The results of this study underscore the importance of NSPT as a foundational treatment for chronic periodontitis. Clinicians should prioritize thorough mechanical debridement and emphasize the significance of patient education and regular follow-up to achieve and maintain periodontal health. The findings also suggest that adjunctive therapies, such as antimicrobial agents and HMT, may be beneficial for certain patients and should be considered to enhance treatment outcomes.

Future Research Directions

Future research should focus on long-term studies with extended follow-up periods to validate the durability of NSPT outcomes. Randomized controlled trials (RCTs) are needed to further investigate the efficacy of adjunctive therapies in combination with NSPT. Additionally, research exploring the genetic and molecular factors influencing individual responses to periodontal treatment could lead to more personalized and effective treatment strategies. Understanding the long-term effects of NSPT and its adjuncts will help refine periodontal treatment protocols and improve patient outcomes.

CONCLUSION

This study demonstrates the significant efficacy of non-surgical periodontal therapy (NSPT) in improving clinical parameters in patients with chronic periodontitis. The results indicate substantial reductions in probing depth (PD), clinical attachment level (CAL), bleeding on probing (BOP), and plaque index (PI) following NSPT. These findings support the use of NSPT as a primary treatment modality for chronic periodontitis. Additionally, the study highlights the potential benefits of adjunctive therapies and the importance of patient compliance in maintaining periodontal health. Further research with extended follow-up periods and randomized controlled trials is needed to validate these findings and explore the long-term effectiveness of NSPT and its adjuncts.

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