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Impact Of Non- Surgical Periodontal Therapy On Oral Health Related Quality Of Life And Psychological Assessment In Chronic Periodontitis Patients.

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Abstract:
Background*: Chronic periodontitis is a common inflammatory condition that negatively impacts not only periodontal health but also oral health-related quality of life (OHRQoL). Beyond clinical symptoms, it affects functional, social, and psychological well-being. While non-surgical periodontal therapy (NSPT) effectively improves clinical parameters, its influence on psychosocial aspects such as anxiety and self-esteem remains insufficiently explored. Therefore, this study evaluates the impact of NSPT on OHRQoL and psychological well-being in periodontitis patients.*
Materials and Methods*: Fifty dentate adults diagnosed with chronic periodontitis were assigned to study (n=25) and control (n=25) groups. The study group received scaling and root planing (SRP) and 0.2% chlorhexidine rinses, while the control group was given oral hygiene advice. Assessments of clinical parameters (Plaque Index, Gingival Index, Probing Pocket Depth), OHIP-14, STAI, and RSES were conducted at baseline and weekly up to 4 weeks post-treatment.*
Results*: Baseline characteristics including psychological scores were similar between groups. The study group showed significant clinical improvement ($p<0.001$), alongside marked OHIP-14 score reductions at each follow-up ($p<0.001$). Anxiety scores (STAI) decreased significantly from week 1 onward ($p<0.01$), and self-esteem (RSES) improved starting week 2 ($p<0.01$) in the study group only.*
Conclusion: *Non-surgical periodontal therapy results in significant enhancements of not only clinical and oral health-related quality of life but also psychological well-being, emphasizing the need for comprehensive patient-centered care.*
Key Word: *Chronic periodontitis; Non-surgical periodontal therapy; Oral health-related quality of life (OHRQoL); Anxiety; Self-esteem.*

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I. Introduction

Oral diseases exert a profound influence on individuals' physical, psychological, and social well-being, reflecting the multidimensional nature of health as defined by the World Health Organization (WHO)[1]. Among these, chronic periodontitis represents one of the most prevalent inflammatory conditions worldwide, with global estimates suggesting that severe periodontitis affects approximately 11% of the population, ranking it as the sixth most common human disease.[2] The consequences of chronic periodontitis extend beyond clinical symptoms such as gingival inflammation, periodontal pocket formation, and tooth mobility; they include functional impairments (mastication, speech), aesthetic concerns, and social discomfort, all of which negatively influence patients' quality of life.[3,4]

While traditional periodontal research has emphasized clinical indicators such as Plaque Index (PI), Gingival Index (GI), and Probing Pocket Depth (PPD) for assessing disease burden and treatment efficacy, the contemporary approach advocates for integration of patient-centered outcomes.[5] Oral health-related quality of life (OHQoL) instruments, such as the Oral Health Impact Profile (OHIP), are particularly valuable in this context as they capture the subjective functional, psychological, and social effects of oral diseases.[6] The OHIP-14, a validated short-form version, has been extensively employed in periodontal populations across diverse cultural contexts.[7,8] However, OHQoL alone does not provide a complete picture, as psychological well-being constitutes an integral dimension of health.

Periodontal disease and its treatment may significantly affect psychological states, including anxiety and self-esteem, which are rarely investigated in periodontal trials despite their importance. Anxiety, defined as an unpleasant emotional state associated with tension and apprehension, may be situational (state anxiety) or enduring (trait anxiety). The State-Trait Anxiety Inventory (STAI), developed by Spielberger et al. in 1970, is the most widely employed self-report tool to quantify both transient and chronic aspects of anxiety.[9] Similarly, self-esteem, which reflects an individual's overall sense of self-worth and self-respect, is a core determinant of

psychological resilience and social functioning. The Rosenberg Self-Esteem Scale (RSES) remains the gold-standard tool for global self-esteem measurement.[10]

Few studies have concurrently assessed OHQoL, anxiety, and self-esteem in periodontitis patients, although literature from other medical disciplines indicates strong interrelationships between physical disease, quality of life, and psychosocial functioning.[11,12] In periodontology, limited data suggest that successful therapy may reduce psychological distress and improve self-concept.[13,14] Yet, there remains a paucity of prospective controlled studies comprehensively examining these psychosocial outcomes alongside clinical improvements following non-surgical periodontal therapy.

Therefore, the present study was designed to evaluate changes in oral health-related quality of life, anxiety, and self-esteem in patients with chronic periodontitis undergoing non-surgical periodontal therapy compared with a control group receiving only oral hygiene instruction. By integrating OHIP-14, STAI, and RSES with standard clinical measures, this investigation aims to provide a holistic understanding of periodontal treatment outcomes, with the hypothesis that effective periodontal therapy yields significant improvements across both clinical and psychosocial domains.

II. Material And Methods

This prospective, controlled, parallel-group study was carried out on patients of Department of Periodontology, Ahmedabad Dental College and Hospital, Gujarat, India, from January 2015 to June 2025. A total 50 adult subjects (both male and females) of aged ≥ 20, years were for in this study.

Study Design: Prospective controlled parallel group study

Study Location: This study was carried out in Department of Periodontology, Ahmedabad Dental College and Hospital, Gujarat, India.

Study Duration: January 2025 to June 2025.

Sample size: 50 patients.

Sample size calculation: Sample size was calculated using state test, [power analysis with α=0.05 and power=80%] to detect significant differences in OHIP-14 scores between groups.

Subjects & selection method: The study population was drawn from patients who presented to Ahmedabad Dental College and Hospital with chronic periodontitis. Participants were randomly assigned into two groups (n=25 per group) using a computer-generated randomization sequence. Allocation concealment was ensured with sequentially numbered, opaque, sealed envelopes.

Study Group: Received non-surgical periodontal therapy, including scaling and root planing (SRP) and adjunctive use of 0.2% chlorhexidine mouth rinse.

Control Group: Received only oral hygiene instructions (OHI).

Inclusion criteria:

1. Adults aged 20 years and older.
2. Presence of at least 20 natural teeth.
3. Diagnosis of chronic periodontitis, with at least four proximal sites demonstrating probing pocket depth (PPD) ≥4 mm.
4. Good general health, without systemic conditions that could influence periodontal status.

Exclusion criteria:

1. History of systemic diseases such as diabetes mellitus, cardiovascular disorders, or autoimmune diseases.
2. Use of medications known to affect periodontal health (e.g., antibiotics, corticosteroids, or immunosuppressants) within the last 3 months.
3. Presence of extensive carious lesions, ongoing orthodontic therapy, or removable prostheses.
4. Current or former smokers or individuals with alcohol dependency.
5. Pregnant or lactating women.
6. History of periodontal treatment within the last 6 months.

Procedure methodology

At Baseline after inclusion of patients as per inclusion criteria:

- Scaling and Root Planing (SRP) was performed using ultrasonic scalers and Gracey curettes in a single session.
- Patients in the study group were prescribed 0.2% chlorhexidine gluconate rinse twice daily for one week, with instructions to avoid food or drink for 30 minutes post-rinse.
- All participants (both groups) received standardized oral hygiene advice, including instructions on modified Bass toothbrushing technique and interdental cleaning.
- The control group did not undergo SRP during the study period but was provided treatment after study completion (ethical consideration).

Clinical Assessments

Clinical parameters were recorded by a calibrated examiner (intra-examiner kappa >0.85) at baseline and weekly up to 4 weeks post-intervention. The parameters measured were:

- Plaque Index (PI): Silness and Löe (1964).[15]
- Gingival Index (GI): Löe and Silness (1967).[16]
- Probing Pocket Depth (PPD): Measured at six sites per tooth using a UNC-15 periodontal probe.

Psychosocial Assessments

Psychosocial well-being was evaluated using three validated self-report questionnaires:

Oral Health Impact Profile (OHIP-14)

The OHIP-14 is a short-form quality of life instrument developed by Slade[6], consisting of 14 items across 7 domains: functional limitation, physical pain, psychological discomfort, physical disability, psychological disability, social disability, and handicap. Each item is scored on a 5-point Likert scale (0=never, 1=hardly ever, 2=occasionally, 3=fairly often, 4=very often). Total scores range from 0 to 56, with higher scores indicating worse OHQoL. The OHIP-14 has demonstrated high internal consistency (Cronbach's α >0.85) and validity in both general and periodontal populations.[7,8]

State-Trait Anxiety Inventory (STAI)

The STAI, developed by Spielberger *et al.*[9], is a 40-item instrument measuring two distinct anxiety constructs:

- State Anxiety (STAI-S): Temporary emotional responses to situational stressors.
- Trait Anxiety (STAI-T): A stable tendency to perceive situations as threatening.

Each subscale comprises 20 items, rated on a 4-point Likert scale. Scores for each subscale range from 20 to 80, with higher scores denoting greater anxiety. Reverse scoring is applied for positively worded items. The STAI demonstrates excellent reliability (Cronbach's α=0.86–0.95) and is sensitive to changes in anxiety levels following clinical interventions.[17]

Rosenberg Self-Esteem Scale (RSES)

The RSES, introduced by Rosenberg[10], is the most widely validated measure of global self-esteem. It consists of 10 items rated on a 4-point Likert scale (strongly agree=3 to strongly disagree=0). Five items are positively worded and five negatively worded (reverse-scored). Total scores range from 0 to 30, with higher scores reflecting greater self-esteem. Conventionally, scores below 15 indicate low self-esteem, 15–25 reflect normal range, and above 25 suggest high self-esteem. The RSES demonstrates robust psychometric properties, with Cronbach's α ranging between 0.77 and 0.88 across diverse populations.[18]

Follow-Up Schedule

Clinical and psychosocial assessments were performed at:

- Baseline (prior to intervention),
- 1 week, 2 weeks, 3 weeks, and 4 weeks post-intervention.

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Statistical analysis

Data analysis was performed using SPSS version 17.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (mean ± standard deviation) were computed for all variables. Independent t-tests were used for intergroup comparisons at baseline. Repeated measures ANOVA assessed within-group changes over time and

time × group interactions. Pearson's correlation coefficients evaluated associations between clinical improvements and psychosocial outcomes. A p-value <0.05 was considered statistically significant.

III. Result

Baseline Comparisons

A total of 50 participants were enrolled and equally allocated to the study (n=25) and control (n=25) groups. Baseline comparisons revealed no statistically significant differences between groups with respect to clinical parameters (PI, GI, PPD), oral health-related quality of life (OHIP-14), anxiety (STAI), or self-esteem (RSES) ($p > 0.05$) (Table 1). This confirmed that both groups were comparable at study entry.

Clinical Outcomes

Following intervention, the study group demonstrated a significant reduction in all clinical indices from week 1 onward, with progressive improvement through week 4.

- Plaque Index (PI) decreased from 2.44 ± 0.44 at baseline to 0.62 ± 0.21 at week 4 ($p < 0.001$).
- Gingival Index (GI) dropped from 2.74 ± 0.28 at baseline to 0.74 ± 0.24 at week 4 ($p < 0.001$).
- Probing Pocket Depth (PPD) reduced from 5.75 ± 0.95 mm at baseline to 3.12 ± 0.67 mm at week 4 ($p < 0.001$).

By contrast, the control group exhibited minimal to no changes across the same time points (Table 1). These findings clearly illustrate the effectiveness of SRP combined with chlorhexidine in achieving substantial clinical improvements within a short-term follow-up.

Table no 1: Baseline Clinical Parameters of Study and Control Groups.

Parameter	Study Group (n=25) Mean ± SD	Control Group (n=25) Mean ± SD	t-value	p-value
Plaque Index (PI)	2.44 ± 0.44	2.41 ± 0.38	0.24	0.80
Gingival Index (GI)	2.74 ± 0.28	2.62 ± 0.31	1.33	0.10
Probing Pocket Depth (PPD) (mm)	5.75 ± 0.95	5.73 ± 0.90	0.06	0.90

This table 1 shows comparison of clinical periodontal parameters at baseline between groups. Values are mean ± standard deviation. A non-significant difference ($p > 0.05$) indicates homogeneity of clinical status prior to intervention.

Oral Health-Related Quality of Life (OHIP-14)

The study group reported a marked decline in OHIP-14 scores immediately after therapy, indicating improved perceived oral health-related quality of life.

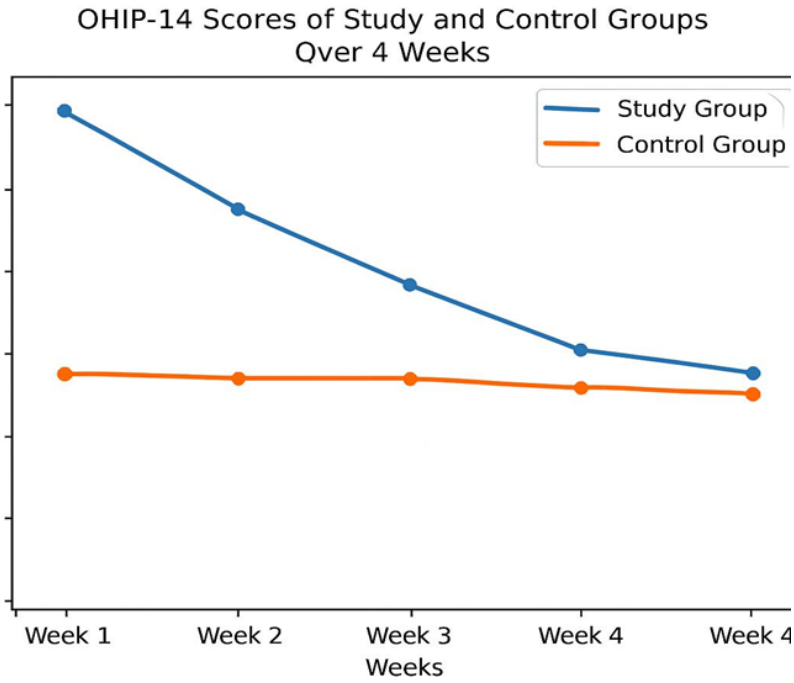
- Scores decreased from 41.08 ± 6.80 at baseline to 27.68 ± 6.93 at week 1 ($p < 0.001$).
- Progressive reductions were observed at week 2 (17.36 ± 4.99), week 3 (9.44 ± 2.32), and week 4 (5.60 ± 1.50), all statistically significant compared to both baseline and controls ($p < 0.001$). (Table 2)

In contrast, the control group's OHIP-14 scores remained virtually unchanged (42.04 ± 7.19 at baseline vs. 38.40 ± 7.27 at week 4). The time × group interaction effect was highly significant ($F=316.69$, $p < 0.001$), underscoring that improvements were attributable to active periodontal treatment rather than natural variation or repeated assessments. Figure 1 graphically demonstrates the divergence in OHIP-14 scores between groups over time.

Table no 2: OHIP-14 Scores in Study and Control Groups Over 4 Weeks.

Time Point	Study Group Mean ± SD	Control Group Mean ± SD	t-value	p-value
Baseline	41.08 ± 6.80	42.04 ± 7.19	-0.48	0.60
1 Week	27.68 ± 6.93	40.56 ± 6.89	-6.58	<0.001 *
2 Week	17.36 ± 4.99	39.72 ± 6.47	-13.67	<0.001 *
3 Week	9.44 ± 2.32	38.88 ± 7.03	-19.85	<0.001 *
4 Week	5.60 ± 1.50	38.40 ± 7.27	-22.08	<0.001 *

Table 2 shows OHIP-14 scores reflecting oral health-related quality of life. Lower scores indicate improvement (better quality of life). Significant differences from baseline between study and control groups are indicated (*p<0.001).



This line graph showing the reduction in OHIP-14 scores in the study group compared to the control group from baseline through 4 weeks.

Anxiety (STAI) Outcomes

In the study group, state-trait anxiety scores decreased significantly following therapy.

- Mean STAI scores dropped from 44 ± 8 at baseline to 37.5 ± 7 at week 1 ($p < 0.01$).
- Reductions continued through week 2 (35.8 ± 6), week 3 (33.9 ± 5), and week 4 (30.5 ± 5), with a cumulative mean reduction of ~13.5 points ($p < 0.001$).

These reductions indicate both early and sustained alleviation of anxiety following non-surgical periodontal therapy. By contrast, no statistically significant changes were observed in the control group (data not shown).

Self-Esteem (RSES) Outcomes

Improvements in self-esteem scores were observed in the study group beginning at week 2.

- RSES increased modestly at week 1 (17.5 ± 5.0 vs. baseline 18.0 ± 5.2, not significant).
- From week 2 onward, statistically significant increases were evident (19.2 ± 5.1 at week 2; 20.5 ± 5.3 at week 3; 21.4 ± 5.4 at week 4, $p < 0.01$ compared to baseline).

Overall, the study group experienced an average increase of ~3.4 points on the RSES, corresponding to a shift toward higher self-esteem. No meaningful changes occurred in the control group, indicating that periodontal therapy was the determinant factor.

Table no 3: Anxiety (STAI) and Self-Esteem (RSES) Scores Over Time (Study Group).

Week	STAI Mean ± SD	RSES Mean ± SD
0	44 ± 8	18.0 ± 5.2
1	37.5 ± 7	17.5 ± 5.0
2	35.8 ± 6	19.2 ± 5.1
3	33.9 ± 5	20.5 ± 5.3
4	30.5 ± 5	21.4 ± 5.4

This table shows mean anxiety (measured by State-Trait Anxiety Inventory, STAI) and self-esteem (measured by Rosenberg Self-Esteem Scale, RSES) scores with standard deviations at each time point across the 4-week study period in patients receiving non-surgical periodontal therapy. Lower STAI scores indicate reduced anxiety; higher RSES scores indicate increased self-esteem. Statistically significant decreases in STAI scores were observed starting at Week 1 compared to baseline ($p < 0.01$). Statistically significant increases in RSES scores were noted from Week 2 onward compared to baseline ($p < 0.01$). No significant changes were observed in the control group (data not shown).

Correlation Analysis

Correlation analysis demonstrated strong associations between clinical, psychosocial, and quality of life outcomes.

- Reductions in OHIP-14 scores were significantly correlated with improvements in clinical indices ($r=0.52–0.63$, $p < 0.01$).
- Decreases in STAI scores correlated negatively with OHIP-14 ($r=0.58$, $p < 0.01$), suggesting that reductions in anxiety were closely tied to improvements in perceived oral health.
- Increases in RSES scores correlated positively with OHIP-14 reductions ($r=0.45$, $p < 0.01$), indicating that improved oral health-related quality of life was accompanied by enhanced self-esteem (Table 4).

Table no 4: Repeated Measures ANOVA for OHIP-14 Scores.

Source	F-value	p-value
Time (within-subject)	473.34	<0.001 *
Group (between-subject)	316.69	<0.001 *
Time × Group interaction	316.69	<0.001 *

Analysis of variance evaluating changes in OHIP-14 scores over time, differences between study and control groups, and the interaction effect. Significant p-values (*) denote meaningful temporal and inter-group differences.

These results affirm a biopsychosocial interrelationship between periodontal health, anxiety reduction, and self-esteem elevation.

IV. Discussion

This prospective controlled study provides compelling evidence that non-surgical periodontal therapy exerts a significant impact not only on clinical parameters of periodontal health but also on oral health-related quality of life (OHQoL) and psychological well-being, as measured by anxiety and self-esteem scores. By incorporating validated psychometric instruments (OHIP-14, STAI, and RSES) alongside standard periodontal indices, the present investigation adopts a biopsychosocial perspective, emphasizing the multidimensional outcomes of periodontal therapy.

The significant reductions in plaque accumulation, gingival inflammation, and probing pocket depth observed in the study group corroborate existing evidence regarding the efficacy of scaling and root planing (SRP) with adjunctive chlorhexidine.[19] Previous systematic reviews and meta-analyses have consistently highlighted the effectiveness of non-surgical periodontal therapy in improving periodontal health.[20,21] The present study extends these findings by demonstrating that such clinical improvements translate into rapid and sustained enhancements in subjective health perceptions.

Improvement in OHIP-14 scores was immediate and progressive, with patients reporting substantial relief in pain, functional limitation, and psychological discomfort within the first week. This aligns with studies by Saito et al.[13], Ozcelik et al.[22] and Shah[23], who reported significant OHQoL improvements within weeks following initial therapy. Moreover, the magnitude of change in the present study (a reduction of ~35 points on OHIP-14 within 4 weeks) underscores the profound burden of periodontitis on quality of life and the extent to which effective therapy can alleviate it.

Importantly, controls receiving only oral hygiene instruction exhibited negligible changes, reinforcing that active periodontal intervention is necessary to achieve meaningful quality of life improvements. This observation supports the paradigm shift in dentistry toward patient-reported outcomes as critical indicators of therapeutic success.[5]

The present findings demonstrate a significant decline in anxiety levels as early as one week following therapy, with cumulative reductions over four weeks. This is consistent with earlier reports suggesting that dental interventions can attenuate situational anxiety by relieving pain, halitosis, and aesthetic concerns.[14,24]

The anxiety reduction observed here likely reflects both psychological relief—stemming from restored oral function and social confidence—and biological improvement, as reduced inflammatory burden diminishes systemic stress responses. Spielberger's model of anxiety[9] distinguishes between transient (state) and stable (trait) components; our data indicate that periodontal treatment effectively reduces state anxiety, though longer follow-up is needed to determine its influence on trait anxiety.

Self-esteem scores improved more gradually, reaching significance from the second week onward. This delayed response suggests that self-esteem is more resilient to change and may require tangible improvements in oral appearance, function, and social interactions to manifest. The observed increase of ~3.4 points on the RSES scale corresponds to a clinically meaningful shift in global self-worth, as corroborated by cross-cultural studies.[18]

These findings parallel those of Jowett et al.[14], who reported that periodontal therapy enhances patients' confidence and reduces social embarrassment. Improved periodontal health, particularly reduction in bleeding and halitosis, likely fosters positive self-perception, thereby elevating self-esteem.

Correlation analyses confirmed that improvements in periodontal indices were strongly associated with better OHQoL, lower anxiety, and higher self-esteem. These results reinforce the biopsychosocial model of health, wherein biological improvements directly influence psychosocial outcomes. Similar patterns have been reported in other chronic conditions such as diabetes and cardiovascular disease, where effective management improves both physiological markers and quality of life.[25,26]

The magnitude and rapidity of psychosocial improvements in the present study are noteworthy. Saito et al.[13] and Needleman et al.[27] highlighted similar quality of life gains following periodontal therapy, though without simultaneous assessment of anxiety and self-esteem. By including STAI and RSES, our study provides novel evidence that periodontal therapy benefits extend beyond functional health into broader domains of mental well-being. This positions periodontitis not merely as an oral disease but as a condition with systemic and psychosocial implications.

Several limitations warrant acknowledgment:

1. Sample size was modest (n=50), limiting statistical power for subgroup analyses (e.g., age, gender differences).
2. Follow-up duration was restricted to 4 weeks, precluding assessment of long-term psychosocial outcomes and potential relapse.
3. The study was conducted in a single-center, hospital-based setting, which may limit generalizability to broader populations.
4. The use of self-report instruments may introduce response biases, though the instruments used (OHIP-14, STAI, RSES) are validated and widely adopted.

Future research should employ larger, multicenter cohorts with longer follow-up to evaluate sustainability of psychosocial benefits and investigate additional constructs such as depression, resilience, and health locus of control.

Clinical Implications

The findings have important implications for periodontal practice:

- Non-surgical periodontal therapy should be recognized as beneficial not only for clinical outcomes but also for psychological well-being.
- Assessment tools such as STAI and RSES can be feasibly incorporated into periodontal research and practice to monitor patient-centered outcomes.
- Dentists should adopt a holistic care model, addressing both clinical disease parameters and psychosocial concerns to optimize overall health.

V. Conclusion

In summary, this study confirms that non-surgical periodontal therapy yields comprehensive benefits, significantly improving clinical parameters, oral health-related quality of life, anxiety, and self-esteem in patients with chronic periodontitis. These results advocate for integrating psychosocial assessments into routine periodontal care, reinforcing the importance of a patient-centered approach in modern dentistry.

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