History of Medicine, 2025, 11(1): 289-297
DOI: 10.48047/HM. V11.I1.2025.289-297

COMPARATIVE EVALUATION OF THE CLINICAL EFFICACY OF LOCALLY DELIVERED CURCUMIN AND MELATONIN GEL AS AN ADJUNCT TO SCALING & ROOT PLANNING IN CHRONIC PERIODONTITIS - A CLINICAL STUDY

Dr. Shruti Gupta[1], Dr. Sachin Kumar[2], Dr. Sushovan Chakraborty[3], Dr. Anishka Dhanai[4], Dr. Janardhana Amarnath B.J.[5], Dr. Jyothi S.G.[6]

1. Reader, Department of Periodontology, Rama Dental College, Hospital & and; Research Centre, Mandhana, Kanpur (UP)- 209217, Email address: shrutz26@gmail.com, Mobile no: 9936497542.
2. Post graduate student, Department of Periodontology, Rama Dental College, Hospital & Research Centre, Mandhana, Kanpur (UP)- 209217, Email address: kumarsachin8311@gmail.com, Mobile no: 7665029531.
3. Post graduate student, Department of Periodontology, Rama Dental College, Hospital & Research Centre, Mandhana, Kanpur (UP)- 209217, Email address: drsushovanchakraborty@yahoo.com, Mobile no: 9706560638.
4. Senior lecturer Department of Periodontology, Rama Dental College, Hospital & Research Centre, Mandhana, Kanpur (UP)- 209217, Email address: anishkadhanai@gmail.com, Mobile no: 8303079715.
5. HOD and Professor, Department of Periodontology, Rama Dental College, Hospital & Research Centre, Mandhana, Kanpur (UP)- 209217, Email address: j26236940@gmail.com, Mobile no: 8791079004.
6. Reader, Department of Periodontology, Rama Dental College, Hospital & Research Centre, Mandhana, Kanpur (UP)- 209217, Email address drjyothiperiosg1981@rediffmail.com, Mobile 9319784290.

Corresponding author details: Dr.Shruti Gupta Reader, Department of Periodontology, Rama Dental College, Hospital & and; Research Centre, Mandhana, Kanpur (UP)- 209217, Email address: shrutz26@gmail.com, Mobile no: 9936497542.

History of Medicine, 2025, 11(1): 289-297
DOI: 10.48047/HM. V11.I1.2025.289-297

Abstract

Background: Chronic periodontitis is an infectious disease resulting in inflammation within the supporting tissues of the teeth, progressive attachment loss, bone loss, characterized by periodontal pocket formation and or recession of the gingiva. Curcumin and melatonin, known for their anti-inflammatory and antioxidant properties, may improve SRP outcomes.

Aim: To evaluate and compare the clinical efficacy of locally delivered curcumin and melatonin gel as an adjunct to scaling & root planing in chronic periodontitis subjects.

Materials & Methods: In this split-mouth study, a total of 22 subjects with chronic periodontitis was included. Group II received SRP + Intra-pocket application of Curcumin, Group III received SRP + Melatonin gel, and Group I received only SRP. Periodontal parameters were assessed at baseline, 4^{th} week, and 8^{th} week on all sites.

Result: At 8 weeks, melatonin Group III and curcumin group II, both showed a significant reduction, mean PPD (1.63 ± 0.40 & 1.45 ± 0.42) and CAL (1.68 ± 0.45 & 1.40 ± 0.43) in compared to control Group I.

Conclusion: Subgingival application of curcumin and melatonin gels may be used as adjuncts to scaling and root planing in chronic periodontitis subjects.

Keywords: Chronic Periodontitis; local drug delivery: curcumin; melatonin.

Introduction: Chronic periodontitis is a common inflammatory disease affecting the supporting structures of the teeth, characterized by progressive attachment and alveolar bone loss, periodontal pocket formation, and gingival recession (1). Among available treatment approaches, Scaling and Root Planing (SRP) remains the gold standard in non-surgical periodontal therapy. It involves the mechanical removal of supra- and subgingival plaque and calculus, promoting a return to periodontal health (2).

Although systemic antibiotics have been used to enhance periodontal therapy outcomes, their limitations—such as systemic toxicity, antibiotic resistance, and the need for higher doses to achieve therapeutic levels in gingival crevicular fluid—have led to the growing interest in localized drug delivery (LDD) systems (3). The concept of LDD in periodontal pockets was first

introduced by Dr. Max Goodson in 1979 at the Forsyth Dental Center (4), offering the advantage of site-specific delivery of therapeutic agents with minimal systemic side effects.

Natural compounds with anti-inflammatory and antioxidant properties, such as curcumin—a bioactive component derived from *Curcuma longa* (turmeric)—have demonstrated promising results in periodontal therapy. Curcumin is known for its antimicrobial, anti-inflammatory, and antioxidant effects, making it a valuable adjunct in periodontal treatment (5,6). Similarly, melatonin, a hormone synthesized from tryptophan, exhibits potent antioxidant, anti-inflammatory, and immunomodulatory effects and has also shown therapeutic potential in periodontal disease management (7,8).

Although several studies have evaluated the efficacy of melatonin as an oral supplement or topical application in periodontal therapy, there is limited clinical evidence assessing its use as a locally delivered drug in periodontal pockets (9). To our knowledge, this is the first clinical study that directly compares the effects of locally delivered 10 mg curcumin gel (Curenext) and 2% melatonin gel as adjuncts to SRP in the treatment of chronic periodontitis.

Aim: The aim of this clinical study was to compare and evaluate the clinical efficacy of subgingivally delivered 2% curcumin gel and melatonin gel as adjuncts to Scaling and Root Planing (SRP) in the treatment of chronic periodontitis.

Methodology: This longitudinal, randomized clinical study was conducted in the Department of Periodontology at Rama Dental College, Kanpur. A total of 22 systemically healthy subjects (≥35 years of age) diagnosed with chronic periodontitis, characterized by clinical attachment loss (CAL) of ≥3 mm, were enrolled in the study. Ethical approval was obtained from the Institutional Ethical Committee prior to the commencement of the study.

Inclusion and Exclusion Criteria

Inclusion criteria comprised both male and female patients diagnosed with chronic periodontitis with no systemic diseases influencing periodontal health and who had not received any periodontal therapy in the past six months. Exclusion criteria included patients with systemic illnesses, those who had received antibiotics or anti-inflammatory medications in the past three months, individuals with known hypersensitivity to curcumin or melatonin, and subjects with a history of periodontal surgery in the previous year.

Sample Distribution

A total of 66 periodontal sites from 22 subjects (3 sites per subject) were randomly allocated into three groups using a coin toss method:

Group I (Control Group): Received SRP alone.

Group II (Test Site 1): Received SRP followed by the subgingival application of 2% curcumin gel.

Group III (Test Site 2): Received SRP followed by the subgingival application of 2% melatonin gel.

All clinical parameters—Plaque Index (PI) (4), Sulcular Bleeding Index (SBI) (5), Gingival Index (GI) (6), Probing Pocket Depth (PPD), and Clinical Attachment Level (CAL)—were assessed at baseline, 4 weeks, and 8 weeks post-treatment to evaluate the clinical outcomes.

Formulation of 2% Melatonin Gel

The melatonin gel was formulated by dissolving 1.5 g of pure melatonin (AM Group Pharmaceuticals) in 30 mL of distilled water. To this solution, 1 g of carboxymethyl cellulose dissolved in 50 mL of distilled water was added. The mixture was stirred until a gel-like consistency was achieved. The prepared 2% melatonin gel was stored in sterile glass containers and refrigerated until use (10,11).

Treatment Protocol

This was designed as a split-mouth clinical trial. After initial clinical examination and baseline measurement of periodontal parameters (PI, GI, PPD, CAL), subjects underwent the following treatment protocols:

Scaling and Root Planing (SRP):

Full-mouth SRP was performed using both ultrasonic scalers and hand instruments to thoroughly debride the subgingival and supragingival areas, which remains the cornerstone of non-surgical periodontal therapy.

Control Group (SRP Only):

Periodontal sites assigned to the control group received only SRP without any adjunctive gel.

Test Site 1 (SRP + Curcumin Gel):

After SRP, 10mg curcumin gel (Curenext®) was delivered subgingivally at selected sites using a blunt cannula, ensuring adequate placement within the periodontal pockets. Curcumin, derived from Curcuma longa, has demonstrated anti-inflammatory, antioxidant, and antimicrobial properties, making it a promising adjunct in periodontal therapy.

Test Site 2 (SRP + Melatonin Gel):

In this group, melatonin gel was similarly applied subgingivally after SRP using a blunt cannula. Melatonin, a hormone derived from tryptophan, is known for its strong antioxidant, immunomodulatory, and anti-inflammatory effects, which support periodontal regeneration (12,13).

Post-operative Care and Evaluation

All patients were provided with post-treatment instructions and were advised to maintain optimal oral hygiene throughout the study duration. Re-evaluation of all clinical parameters was carried out at 4- and 8-weeks post-treatment to assess the comparative effectiveness of curcumin and melatonin gels as local drug delivery agents adjunctive to SRP.

Figure 1: Armamentarium

Results: The study evaluated clinical parameters—**Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), and Clinical Attachment Level (CAL)**—across three groups: Control (SRP only), Test 1 (SRP + Curcumin), and Test 2 (SRP + Melatonin) at baseline, 4 weeks, and 8 weeks. PI values were comparable at baseline across all groups ($p > 0.05$). At 4 weeks, both Test groups showed significant reductions in PI compared to Control ($p < 0.05$). At 8 weeks, Test 2 (Melatonin) showed the greatest reduction (1.10 ± 0.18), followed by Test 1

(1.20 ± 0.20), with Control at 1.60 ± 0.25 ($p < 0.01$). Baseline GI values showed no significant intergroup differences ($p > 0.05$). At 4 and 8 weeks, both Test groups exhibited significant improvement, with Test 2 demonstrating the lowest GI at 8 weeks (1.30 ± 0.20), followed by Test 1 (1.35 ± 0.24) compared to Control (1.65 ± 0.28) ($p < 0.05$).(table 1)

All groups showed similar PPD at baseline ($p > 0.05$). Both Test groups showed significantly greater reductions in PPD at 4 and 8 weeks. At 8 weeks, Test 2 showed the greatest improvement (4.10 ± 0.30), followed by Test 1 (4.20 ± 0.32) and Control (4.85 ± 0.38) ($p < 0.01$). Initial CAL values were similar across all groups ($p > 0.05$). At both follow-ups, Test groups demonstrated significantly greater attachment gain. At 8 weeks, Test 2 showed the most improvement (4.50 ± 0.30), followed by Test 1 (4.75 ± 0.35), and Control (5.30 ± 0.40) ($p < 0.01$). (table 1)

Table 1: Intergroup Comparison of Clinical Parameters Among Control Group, Test Group I and Test Group II

Clinical Parameter	Time Interval	Control (SRP) (Mean ± SD)	Test 1 (SRP + Curcumin) (Mean ± SD)	Test 2 (SRP + Melatonin) (Mean ± SD)	p-value
Plaque Index (PI)	Baseline	2.15 ± 0.32	2.12 ± 0.29	2.10 ± 0.30	>0.05
	4 Weeks	1.85 ± 0.28	1.52 ± 0.24	1.48 ± 0.22	<0.05
	8 Weeks	1.60 ± 0.25	1.20 ± 0.20	1.10 ± 0.18	<0.01
Gingival Index (GI)	Baseline	2.20 ± 0.36	2.18 ± 0.34	2.19 ± 0.35	>0.05
	4 Weeks	1.90 ± 0.30	1.55 ± 0.28	1.40 ± 0.25	<0.05
	8 Weeks	1.65 ± 0.28	1.30 ± 0.22	1.15 ± 0.20	<0.01
Probing Pocket Depth (PPD) (mm)	Baseline	5.80 ± 0.50	5.75 ± 0.48	5.78 ± 0.49	>0.05
	4 Weeks	5.20 ± 0.42	4.80 ± 0.38	4.70 ± 0.35	<0.05
	8 Weeks	4.85 ± 0.38	4.30 ± 0.32	4.15 ± 0.30	<0.01
Clinical Attachment Level (CAL) (mm)	Baseline	6.20 ± 0.55	6.15 ± 0.53	6.18 ± 0.54	>0.05
	4 Weeks	5.70 ± 0.48	5.25 ± 0.42	5.10 ± 0.38	<0.05
	8 Weeks	5.30 ± 0.40	4.75 ± 0.35	4.50 ± 0.30	<0.01

Discussion: This study aimed to evaluate and compare the clinical efficacy of locally delivered curcumin and melatonin gels as adjuncts to scaling and root planing (SRP) in the non-surgical management of chronic periodontitis. The results clearly demonstrated that both curcumin and melatonin, when applied subgingivally following SRP, significantly enhanced clinical outcomes compared to SRP alone.

At baseline, there were no statistically significant differences in clinical parameters—Plaque Index (PI), Gingival Index (GI), Probing Pocket Depth (PPD), and Clinical Attachment Level (CAL)—among the three groups, confirming proper randomization and comparability. By the 4th and 8th weeks, both test groups showed statistically significant improvements in all parameters, with reductions in PI, GI, and PPD, along with gains in CAL, compared to the control group receiving only SRP.

Curcumin, derived from *Curcuma longa*, is known for its well-documented anti-inflammatory and antioxidant effects. In this study, curcumin gel significantly reduced plaque accumulation and gingival inflammation, supporting findings from previous research that reported curcumin's efficacy in periodontal therapy due to its ability to suppress inflammatory mediators and inhibit microbial growth (12,13).

Melatonin, a pineal gland hormone with strong antioxidant and immunomodulatory properties, demonstrated superior clinical results compared to curcumin in all measured parameters. By the 8th week, the melatonin group exhibited the greatest reduction in PPD and the most substantial gain in CAL, underscoring its potential regenerative role in periodontal therapy. These results align with the findings of Cutando et al., who emphasized melatonin’s ability to modulate oxidative stress and promote periodontal healing (14). Furthermore, Rodriguez et al. reported that melatonin aids in bone regeneration and tissue repair, which may explain its enhanced efficacy in our study (15).

Although the results are promising, this study has limitations. The small sample size and relatively short follow-up period restrict the broader applicability of the findings. Additionally, patient compliance and individual variations in oral hygiene maintenance may have influenced outcomes. Future research should involve larger sample sizes and extended observation periods to confirm the therapeutic potential of curcumin and melatonin as adjuncts to non-surgical periodontal therapy.

Conclusion: The present study concludes that both 2% curcumin gel and 2% melatonin gel, when locally delivered as adjuncts to scaling and root planing, significantly improve clinical outcomes in the treatment of chronic periodontitis. While curcumin effectively reduces inflammation and plaque levels, melatonin demonstrated superior performance in enhancing clinical attachment and reducing pocket depth. These findings support the incorporation of natural agents such as curcumin and melatonin in periodontal therapy. However, further long-

term studies with larger populations are necessary to validate these results and explore their full potential in clinical practice.

References:

1. Kinane DF, Stathopoulou PG, Papapanou PN. Periodontal diseases. Nat Rev Dis Primers. 2017;3:17038.
2. Cobb CM. Clinical significance of non-surgical periodontal therapy: an evidence-based perspective of scaling and root planing. J Clin Periodontol. 2002;29 Suppl 2:6–16.
3. Slots J. Low-cost periodontal therapy. Periodontol 2000. 2012;60(1):110–37.
4. Goodson JM, Cugini MA, Kent RL, et al. Multicenter evaluation of tetracycline fiber therapy: II. Clinical response. J Periodontol. 1991;62(3):185–8.
5. Gupta SC, Patchva S, Aggarwal BB. Therapeutic roles of curcumin: lessons learned from clinical trials. AAPS J. 2013;15(1):195–218.
6. Mali AM, Behal R, Gilda SS. Comparative evaluation of 1% curcumin and 0.2% chlorhexidine gel as local drug delivery agents in the treatment of chronic periodontitis: a clinical and microbiological study. J Contemp Dent Pract. 2012;13(3):371–7.
7. Srinath R, Acharya AB, Thakur SL. Melatonin in periodontal health and disease. J Indian Soc Periodontol. 2010;14(2):72–6.
8. Cutando A, López-Valverde A, Arias-Santiago S, et al. Role of melatonin in periodontal diseases. J Periodontal Res. 2012;47(4):433–41.
9. Guney M, Iraz M, Sogut S. Protective effect of melatonin on alveolar bone resorption after experimental periodontitis in rats. J Periodontol. 2003;74(2):144–51.
10. Katyal D, Subramanian AK. The Effect of Topical Melatonin Gel on the Oral Health and Salivary Nickel and Chromium Content of Orthodontic Patients: An In Vivo Study World J Dent 2023; 14(4):326-330.
11. Srinath R, Acharya AB, Thakur SL. Melatonin in periodontal health and disease. J Indian Soc Periodontol. 2010;14(2):72–76
12. Gupta SC, Patchva S, Aggarwal BB. Therapeutic roles of curcumin: lessons learned from clinical trials. AAPS J. 2013;15(1):195–218.

13. Mali AM, Behal R, Gilda SS. Comparative evaluation of 1% curcumin and 0.2% chlorhexidine gel as local drug delivery agents in the treatment of chronic periodontitis: a clinical and microbiological study. J Contemp Dent Pract. 2012;13(3):371–377.
14. Cutando A, López-Valverde A, Arias-Santiago S, et al. Role of melatonin in periodontal diseases. J Periodontal Res. 2012;47(4):433–441
15. Rodriguez AB, Marchena AM, Nogales G, et al. Melatonin: a potential “molecule of hope” in the treatment of chronic periodontitis. J Periodontol. 2017;88(12):1119–1126.