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Comparative effect of with and without application of curcumin gel as a periodontal dressing following periodontal flap surgery in chronic periodontitis patients - A clinico-microbiological study

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Abstract

Objectives: This study aimed to evaluate the effect of curcumin gel as a periodontal dressing on tissue response, early wound healing, pain perception, and microbial load following periodontal flap surgery in patients with chronic periodontitis.

Materials and Methods: Fifteen patients diagnosed with chronic periodontitis were enrolled in this randomized clinical study. Surgical sites were divided into control sites (without dressing) and test sites (curcumin gel applied twice daily for one week). Clinical parameters assessed included tissue edema, tissue colour, early wound healing index (EHI), and pain using the modified visual analog scale (VAS). Microbial load was evaluated through colony-forming units (CFU) from suture samples cultured on blood agar and MacConkey agar. **Results:** Tissue colour showed significant improvement in the test group compared to control ($p=0.019$), while wound healing trends favored curcumin but were not statistically significant ($p=0.072$). Pain scores were significantly reduced in the test group ($p<0.001$), with lower analgesic consumption. Microbiological analysis revealed significantly fewer CFUs in the curcumin group compared to control ($p=0.007$).

Conclusion: Curcumin gel demonstrated favorable effects on postoperative tissue response, pain reduction, and microbial control, suggesting its potential as a safe

and effective alternative to conventional periodontal dressings.

Keywords: Periodontitis, Periodontal Dressings, Curcumin, Wound Healing.

Introduction

Chronic periodontitis is defined as an inflammatory disease of supporting periodontal tissues of teeth caused by group of specific microorganisms, resulting in progressive destruction of periodontal ligament and alveolar bone with either pocket formation, recession or both.[1] During periodontal destruction, there is a complex interplay of this plaque biofilm with host immune-inflammatory reaction and hence there occurs an imbalance between bacteria and the host's defence ability. This imbalance causes injury to tissue manifested as periodontitis.[2]The treatment of periodontitis includes both non-surgical and surgical methods aimed at eliminating the periodontal pockets and regenerating the lost periodontium[3,4].

It is of utmost importance that following any periodontal surgery, the wound should be protected from mechanical trauma, and the surgical site should be stable to encourage the healing process as well as the comfort of the patient. This is enabled by the use of periodontal dressing. Recently, the use of periodontal dressing following periodontal surgical procedures has become questionable. A number of clinical trials have proposed that the use of periodontal dressing has many drawbacks like plaque retentive properties which allow food debris, local irritants to seep under the dressing and add to the inflammatory burden of the surgical site which causes inflammation, irritates the healing tissues, pain, discomfort, difficulty in eating and also it is unesthetic[5-7]. This has led interest to consider other alternatives as periodontal dressing such as tissue conditioners, fibrin glue, Barricaid VLC (Visible Light Cure) which also has many disadvantages. Recently, Curcumin is being investigated as a Periodontal Dressing. It is a naturally occurring chemical compound found in the spice turmeric. It is used commonly as a topical application possessing wound healing properties. Hence, introduced for the treatment of gingival and periodontal diseases.

Turmeric is a rhizome of Curcuma longa, a member of the ginger family; it is a yellow, water-soluble pigment derived from perennials belonging to the Zingiberaceae family.[8] The primary active constituent of turmeric and the one responsible for its vibrant yellow color is "curcumin" first identified in 1910 by Lampe and Milobedzka.[9]

Curcumin exhibits anti-inflammatory, antioxidant, anticarcinogenic, antiviral, antihyperlipidemic, antitumor, antimicrobial, wound healing, and gastroprotective activities. Curcumin modulates the inflammatory response by down-regulating the activity of cyclooxygenase-2, lipoxygenase, and inducible nitric oxide synthase enzymes and inhibits the production of the inflammatory cytokines.[9] The potent anti-inflammatory actions of curcumin are attributed to several mechanisms and to its multiple molecular targets. First, it suppresses the activation of the transcription factor NF-κB, which is a key signalling molecule in the elaboration of the inflammatory response as well as in cell proliferation, oncogenesis and cell transformation. [10] Secondly, curcumin downregulates the expression of cyclo-oxygenase-2 (COX-2), an enzyme that catalyzes the synthesis of prostaglandins (PGs) and is linked to most forms of inflammation, including periodontitis.[11]

Curcumin has been reported to possess antibacterial[12] and antifungal properties[13]. Its activity ranges from bacteriostatic to bactericidal for several pathogenic Gram-positive bacteria such as Staphylococcus aureus, as well as Gram-negative bacteria, including Pseudomonas

aeruginosa, Klebsiella pneumoniae as well as different fungal species (Candida albicans and Paracoccidioides brasiliensis. Additionally, curcumin appears to possess inhibitory action on the planktonic growth of several periodontal pathogens, including Aggregatibacter actinomycetemcomitans, F. nucleatum and P. gingivalis. Curcumin significantly reduced the metabolic activity of multiple bacterial species in the biofilm, including periodontal pathogens.

Considering the disadvantages of periodontal dressing and considerable healing potentials of curcumin, the purpose of this study was to compare the effect of curcumin gel may be better in terms of tissue response, pain, and wound healing in the early stages and can be an alternative to periodontal dressing in patients diagnosed with chronic periodontitis.

Therefore, the study aims to compare the effect of curcumin gel as a periodontal dressing in tissue response, early wound healing and pain assessment following periodontal flap surgery in the treatment of chronic periodontitis (CP) and to evaluate in terms of added microbial load.

Methodology

The present clinical study was conducted in the Department of Periodontology, Chhattisgarh Dental College & Research Institute, Rajnandgaon, following approval from the Institutional Ethical Committee. A structured proforma was used to record demographic details, complete case history, clinical examination, periodontal indices, and written informed consent of each participant. Patients were informed in detail about the surgical procedure, possible risks, benefits, and postoperative care, and only those who signed the informed consent were enrolled in the study.

Patients with moderate to severe chronic periodontitis, exhibiting probing pocket depths ≥5 mm and requiring flap surgery in at least two quadrants, were included. Only individuals with no periodontal therapy in the preceding six months, acceptable oral hygiene, and willingness to provide informed consent were enrolled. Patients with a history of systemic antibiotic use in the past six months, use of antimicrobial mouth rinses within two months, pregnancy or lactation, endo-periodontal lesions, systemic contraindications, smoking, or alcohol consumption were excluded.

All patients underwent Phase I periodontal therapy, including scaling and root planing, followed by oral hygiene instructions. After 2–3 weeks, re-evaluation was done, and only patients with a plaque index ≤1 were considered for surgery.

Following Phase I therapy, flap surgery was performed under local anesthesia with standard asepsis. After sulcular incisions, mucoperiosteal flaps were reflected, debridement and root planing were completed, and flaps were sutured with 4-0 silk. Control sites received no dressing, whereas test sites were treated with curcumin gel applied twice daily for one week. Standard postoperative instructions and analgesics were provided.

Postoperatively, all patients were prescribed analgesics (Zerodol SP, every 8 hours for 24 hours and subsequently as needed for one week) and instructed to record daily pain intensity and analgesic intake using the Modified Visual Analog Scale (VAS). Standard postoperative instructions, including maintenance of oral hygiene and dietary precautions, were provided. Patients were recalled after one week for suture removal, clinical evaluation, and collection of suture samples for microbiological analysis. At the recall visit, surgical sites were gently cleansed with 0.2% chlorhexidine, oral hygiene was reinforced, and further mechanical plaque control was advised when necessary.

Clinical evaluation included tissue edema, tissue colour, and early wound healing using the Early Healing Index

(EHI). Postoperative pain was assessed using the Modified Visual Analog Scale (VAS), while microbial load was determined from colony-forming units (CFU) cultured from suture samples.

Suture samples from operated sites were aseptically collected and transferred to sterile containers. Samples were cultured on blood agar and MacConkey agar plates and incubated at 37 °C. Colony-forming units (CFU) were assessed at 12–48 hours. Gram staining was performed to determine bacterial morphology.

Results

A total of 15 patients with chronic periodontitis were enrolled, comprising 10 males (66.7%) and 5 females (33.3%), with the majority belonging to the 31–40 years age group (46.7%).

When clinical parameters were compared between the control (without gel) and test (with curcumin gel) groups, tissue edema scores were slightly lower in the test group (1.06 ± 0.35) compared to the control (1.13 ± 0.35), though not statistically significant (p=0.559). Tissue colour improved significantly in the test group (1.13 ± 0.35) compared to the control (1.53 ± 0.51) (p=0.019). Wound healing assessed by the Early Healing Index demonstrated better outcomes in the test group (1.00 ± 0.00) than the control (1.20 ± 0.41), though the difference was not statistically significant (p=0.072).

Pain assessment using the Modified Visual Analog Scale (VAS) showed a highly significant reduction in postoperative pain in the test group (0.20 ± 0.56) compared to the control (1.46 ± 0.63) (p=0.001). Analgesic consumption was also lower in the curcumin group.

Microbiological analysis revealed that mean colony-forming unit (CFU) counts were significantly lower in the test group (69.93 ± 4.92 $\times 10^5$ CFU/ml) compared to the control group (74.66 ± 3.90 $\times 10^5$ CFU/ml), with a statistically significant difference (p=0.007).

The study found that the use of curcumin gel as a periodontal dressing resulted in improved tissue response, better early wound healing trends, significantly reduced pain, and lower microbial load compared to sites without dressing

Table 1: Age group distribution

Parameters		No of Patients	Percentage
Age	21-30 Years	5	33.3%
	31-40 Years	7	46.7%
	41-50 Years	2	13.3%
	51-60 Years	1	6.7%
Gender	Male	10	66.7%
	Female	5	33.3%

Table 2: Comparison between Control Site (without gel) and Test Site (with Gel) in relation to Tissue edema

Index	Group A	Group B	Mean Difference	t value	P value
Tissue Edema	1.13±0.35	1.06±0.35	0.07±0.11	0.59	0.559#
Tissue Color	1.53±0.51	1.13±0.35	0.40±0.16	2.48	0.019*
Early Healing Index	1.20±0.41	1.00±0.00	0.40±0.16	1.87	0.072#
Pain (Modified VAS)	1.46±0.63	0.20±0.56	1.26±0.22	5.76	0.001*

Table 3: Comparison between Control Site (without gel) and Test Site (with Gel) in relation to CFU count (values are in CFU/ml x 10^5 count)

Group	colony count (Mean±SD)	Mean Difference	t Value	P value
Group A (Control: Without Gel)	74.66±3.90	4.73 ± 1.62	t=2.919	p = 0.007*
Group B (Test: With Gel)	69.93±4.92			

Discussion

The primary aim of periodontal therapy is reduction of microbial load to improve clinical outcomes. Periodontal dressings have been traditionally employed to minimize postoperative pain, hemorrhage, and infection, and to promote healing.[14] However, studies have reported drawbacks such as plaque accumulation beneath dressings[6,7] and adverse reactions related to eugenol-containing packs[15]. Earlier investigations have shown inconsistent results regarding pain and healing with or without dressings, with some reporting little or no benefit, while others noted increased discomfort[7,14].

Curcumin, a bioactive component of turmeric, has gained attention due to its anti-inflammatory, antimicrobial, and wound healing properties[15]. It modulates inflammatory mediators, inhibits cytokine production, and promotes collagen deposition, angiogenesis, and fibroblast proliferation[15,16]. Several studies have compared curcumin with chlorhexidine and reported significant improvements in clinical parameters, reduced postoperative inflammation, and enhanced wound healing in animal and human models [17-19].

In our study, tissue edema was lower and tissue colour normalized faster in the curcumin group, with statistically significant improvement in gingival colour (p=0.019). These findings support earlier reports by Meghana et al.[20]. Wound healing assessed using the Early Healing Index also showed better outcomes with curcumin, though not statistically significant (p=0.072), corroborating results from previous clinical and experimental studies [20-22].

Pain assessment revealed a highly significant reduction in postoperative pain (p<0.001) and fewer analgesics consumed in the curcumin group, in agreement with earlier work[20-22]. This can be attributed to curcumin's aspirin-like inhibition of prostaglandin E2 and thromboxane synthesis without affecting prostacyclin[23].

Curcumin's antimicrobial effects have also been demonstrated against periodontal pathogens such as A. actinomycetemcomitans, F. nucleatum, and P. gingivalis as well as Streptococcus mutans and S. pyogenes. Its mechanisms include inhibition of bacterial cell division and membrane permeabilization[13]. Prior clinical studies comparing curcumin with chlorhexidine have shown significant reductions in microbial load[24,25]. Similarly, Shah et al.[14] reported increased microbial colonization under periodontal packs.

In the present study, microbial analysis revealed significantly fewer CFUs in the curcumin group than the control (p=0.007), confirming its antimicrobial potential when used as a periodontal dressing. To our knowledge, this is the first study evaluating topical curcumin gel as a dressing after periodontal flap surgery, and the results demonstrate its effectiveness in improving tissue response, wound healing, pain control, and microbial reduction.

The present study has certain limitations that must be considered while interpreting the results. First, the relatively small sample size and short follow-up period may limit the generalizability of the findings; larger studies with longer observation periods are required to validate these outcomes. Second, pain assessment was based on subjective patient-reported scores, which may introduce variability and reduce reproducibility of the data. Finally, the microbiological evaluation was limited to quantification of colony-forming units without identification of specific periodontal pathogens; future studies should employ detailed microbial analyses to better elucidate the antimicrobial efficacy of curcumin.

Conclusion

The present study concluded that curcumin gel applied topically as a periodontal dressing after flap surgery is effective in reducing the tissue edema, normalizing the tissue color, effective in enhancing the wound healing,

effective in reducing the pain perception and also significantly reducing the microbial loads in chronic periodontitis patients. The study also shown that topical application of curcumin can be used as a safe alternative when the patient is not willing for periodontal dressing.

References

1. Armitage GC. Development of a classification system for periodontal diseases and conditions. An Periodontal, 1999; 4: 1-6.
2. Kornman, Kenneth S., 2008. Mapping the pathogenesis of periodontitis: a new look. J. Periodontol. 79 (8s), 1560–1568.
3. Ramamurthy JA, Mg V. Comparison of effect of hiora mouthwash versus chlorhexidine mouthwash in gingivitis patients: a clinical trial. Asian J. Pharm. Clin. Res. 2018;11(7):84.
4. Ravi S, Malaiappan S, Varghese S, Jayakumar ND, Prakasam G. Additive Effect of Plasma Rich in Growth Factors With Guided Tissue Regeneration in Treatment of Intrabony Defects in Patients With Chronic Periodontitis: A Split-Mouth Randomized Controlled Clinical Trial. J Periodontol. 2017 Sep;88(9):839-845.
5. Jones TM, Cassingham RJ. Comparison of healing following periodontal surgery with and without dressings in humans. J. Periodontol.. 1979 Aug 1;50(8):387-93.
6. Heaney TG, Appleton J. The effect of periodontal dressings on the healthy periodontium. J. Clin. Periodontol. 1976 Mar;3(1):66-76.
7. Newman PS, Addy M. Comparison of hypertonic saline and chlorhexidine mouthrinses after the inverse bevel flap procedure. J Periodontol. 1982 May;53(5):315-8.
8. Nagpal, M.; Sood, S. Role of curcumin in systemic and oral health: An overview. J. Nat. Sci. Biol. Med. 2013, 4, 3–7.
9. Jurenka JS. Anti-inflammatory properties of curcumin, a major constituent of Curcuma longa: A review of preclinical and clinical research. Altern Med Rev 2009; 14:141-53.
10. Giuliani C, Napolitano G, Bucci I, Montani V and Monaco F. [NF-κB transcription factor: role in the pathogenesis of inflammatory, autoimmune, and neoplastic diseases and therapy implications]. Clinical Therapeutics 2001; 152:249-253.
11. Hong J, Bose M, Ju J, et al. Modulation of arachidonic acid metabolism by curcumin and related beta-diketone derivatives: Effects on cytosolic phospho-lipase A(2), cyclooxygenases and 5-lipoxygenase. Carcinogenesis 2004; 25:1671-1679.
12. Shahi K, Shukla AC, Bajaj AK, et al. Broad spectrum herbal therapy against superficial fungal infections. Skin Pharmacology and Applied Skin Physiology 2000; 13:60-64.
13. Packiavathy IA, Priya S, Pandian SK and Ravi AV. Inhibition of biofilm development of uropathogens by curcumin – An anti-quorum sensing agent from Curcuma longa. Food Chemistry 2014: 148:453-460.
14. Shah M A, Shah B K, Dave D H, Shah S S. Comparative evaluation of microbial colony counts on sutures with and without use of periodontal pack: a split mouth, randomized controlled study. J Integr Health Sci 2013; 1:90-4.
15. Jaswal R, Dhawan S, Grover V, Malhotra R. Comparative evaluation of single application of 2% whole turmeric gel versus 1% chlorhexidine gel in chronic periodontitis patients: A pilot study. J Indian Soc Periodontol 2014;18:575-80.

16. Mathur V, Tijare M, Desai A, Gupta S, Kallianpur S. Curcumin oral cure from the Indian curry. Inter J Pharmacother 2014;4:137-40.
17. Wachtel H, Schenk G, Böhm S, Weng D, Zuhr O, Hürzeler MB, et al. Microsurgical access flap and enamel matrix derivative for the treatment of periodontal intrabony defects: A controlled clinical study. J Clin Periodontol 2003;30:496-504.
18. Bose S, Gundannavar G, Chatterjee A, Mohan RR, Viswanath RA, Shetty S. Comparison of the early wound healing following periodontal flap surgery in periodontitis patients with and without periodontal dressing. Indian J Dent Sci 2013;5:25-9.
19. Muhammad NH, Ghani BA. Histological evaluation of the effect of topical application of curcumin powder and essential oil on skin wound healing. J Baghdad Coll Dent 2015;27:58-63.
20. Meghana MV, Deshmukh J, Devarathanamma MV, Asif K, Jyothi L, Sindhura H. Comparison of effect of curcumin gel and non-eugenol periodontal dressing in tissue response, early wound healing, and pain assessment following periodontal flap surgery in chronic periodontitis patients. J Indian Soc Periodontol 2020;24:54-9.
21. Checchi L, Trombelli L. Postoperative pain and discomfort with and without periodontal dressing in conjunction with 0.2% chlorhexidine mouthwash after apically positioned flap procedure. J Periodontol 1993;64:1238-42.
22. Bulboacă AE, Bolboacă SD, Stănescu IC, Sfrângeu CA, Bulboacă AC. Preemptive analgesic and antioxidative effect of curcumin for experimental migraine. Biomed Res Int 2017;2017:4754701.
23. Suhag A, Dixit J, Dhan P. Role of curcumin as a subgingival irrigant: A pilot study. PERIO 2007;1:115-21.
24. Siddharth M, Singh P, Gupta R, Sinha A, Shree S, Sharma K. A Comparative Evaluation of Subgingivally Delivered 2% Curcumin and 0.2% Chlorhexidine Gel Adjunctive to Scaling and Root Planing in Chronic Periodontitis. J Contemp Dent Pract. 2020;21(5):494-499.
25. Katuri KK, Alluri KJ, Karyamsetti S, Bollepalli CA. Comparative evaluation of oral rinsing with 0.1 Curcumin and 0.2 chlorhexidine mouthwash as an adjunctive to scaling and root planing in the treatment of moderate periodontitis. 2022; 11: 592-600.