

# Effect of Local Application of Curcumin and Ornidazole Gel in Chronic Periodontitis Patients - A Case Report

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## ABSTRACT

**Aim:** To compare the efficacy of local drug delivery of curcumin and ornidazole gel in chronic periodontitis patients.

**Materials and Methods:** 3 individuals of both sexes aged between 27 and 53 years diagnosed with chronic periodontitis having PPD >5 mm bilaterally were selected for this study, in a split-mouth design. The patients received a complete prophylaxis including scaling & root planing after which, both test gels were injected into the two experimental sites chosen, that had PPD >5 mm and were located in symmetric quadrants. All the parameters were recorded at 1 month.

**Results:** After 1-month, curcumin group showed a significant decrease in PPD, plaque index, and clinical attachment loss when compared to the ornidazole group. The results show a more favorable outcome with curcumin than ornidazole gel.

**Keywords:** Curcumin, local drug delivery, ornidazole.

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## INTRODUCTION

Periodontal disease is considered as an infection that involves both inflammatory and immune responses, which leads to increased pocket depth, clinical attachment loss, as well as destruction of alveolar bone and cementum [1]. Treatment modalities to resolve periodontal inflammation can be surgical or nonsurgical periodontal therapy based on the severity of periodontal destruction. Nonsurgical therapy includes both mechanical and chemotherapeutic methods to minimize or eliminate microbial biofilm which is the prime etiological factor of gingivitis and periodontitis. Advantages of local drug delivery

include minimum systemic involvement, better patient compliance, and minimum discomfort. Among the antimicrobial agents ornidazole, chlorhexidine and others have been applied subgingivally in gel forms or other sustained-release local delivery systems as varnishes, chips, or fibers [2].

During the past two decades, the reliability and usage of herbal products or ayurvedic medicines has gained increasing importance for oral health, due to the side effects and complications of many chemical and synthetic medicines. Turmeric a household spice used in India possesses anti-inflammatory, antioxidant, and antimicrobial properties along with hepatoprotective,

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immunosuppressant, antiseptic, antimutagenic, and many more properties [3]. Components of turmeric mainly include curcumin (diferuloylmethane), dimethoxy curcumin, bisdemethoxy curcumin, and various volatile oils including tumerone, atlantone, and zingiberone [4]. Nitroimidazole compound is one such agent that acts by inhibiting DNA synthesis. It works on the principle that inactive form passively diffuses into cell where it is activated by chemical reduction. The nitro group gets reduced to anion radicals which causes oxidation of DNA leading to strand breakage and cell death [5]. Hence, it has both anti-microbial and mutagenic effect. This study is done to evaluate the comparative effect of curcumin and ornidazole in treating chronic periodontitis.

### CASE REPORT

Three individuals of both sexes aged between 27 and 53 years diagnosed with chronic periodontitis having pocket depths >5 mm bilaterally were selected for this study, in a split-mouth design. Examination of plaque index, probing pocket depth, and clinical attachment level was measured for each patient. The patients received a complete prophylaxis including scaling and root planing after which, both test gels were injected into the two experimental sites chosen, that had probing depth (PD) >5 mm and were located insymmetric quadrants. Pocket PD, clinical attachment loss, and plaque index were recorded at days 0 and 30.

Intrasulcular applications of commercially available curcumin gel (10 mg) (Curenex, Abbott) and ornidazole gel (1.0% ornidazole gel Ornidazole, Mankind) [Figure 1] in periodontal pockets previously treated by scaling and root planing (SRP).

Subgingival delivery was performed with a 2 ml disposable syringe with a blunt needle bent at its shank by 130° [8]. Application of curcumin gel in [figure 2] and ornidazole in [figure 3]. This procedure continued until the pocket was completely filled without traumatizing or damaging the periodontal tissues. After insertion of the gel periodontal pack was placed, and patients were advised not to eat hard food. The two groups were again examined on the 30th day. Clinical parameters such as plaque index, probing pocket depth, and relative attachment level were recorded at baseline and 3 months. Table 1 shows intragroup comparison of ornidazole at baseline and 3 months. There was a significant ( $P < 0.001$ ) decrease in PD and clinical attachment level (CAL) from  $5.72 \pm 0.7$  to  $4.45 \pm 0.5$  and  $6.12 \pm 0.72$  to  $4.46 \pm 1.1$ , respectively. Table 2 shows intragroup comparison of curcumin at baseline and 3 months. There was a significant ( $P < 0.001$ )

decrease in PD and CAL from  $6.51 \pm 0.95$  to  $4.57 \pm 1.02$  and  $7.01 \pm 1.11$  to  $5.50 \pm 1.25$ , respectively. Table

parameter	Baseline	1 month	t	p
PD	$5.72 \pm 0.7$	$4.45 \pm 0.5$	19.5	0.001
CAL	$6.12 \pm 0.72$	$4.46 \pm 1.1$	7.01	0.001
Plaque index	$2.80 \pm 0.34$	$1.5 \pm 0.25$	1	0.001

3 shows intergroup comparison of curcumin and ornidazole at baseline and 3 months. Curcumin group showed significantly ( $P < 0.001$ ) better reduction in PD ( $1.94 + 0.60$ ), CAL ( $1.51 + 1.03$ ), and plaque index ( $1.75 + 0.10$ ) as compared to ornidazole group (PD [ $1.27 + 0.02$ ], CAL [ $1.66 + 0.5$ ], plaque index [ $1.30 + 0.09$ ]).

Table 1 : intragroup comparison of ornidazole  
Intra-group comparison. PD: Probing depth, CAL: Clinical attachment level

Table 2 : intragroup comparison of curcumin

parameter	Baseline	1 month	t	p
PD	$6.51 \pm 0.95$	$4.57 \pm 1.02$	18.5	0.001
CAL	$7.01 \pm 1.11$	$5.50 \pm 1.25$	6.4	0.001
Plaque index	$2.55 \pm 0.3$	$0.98 \pm 0.34$	3.5	0.001

Intra-group comparison. PD: Probing depth, CAL: Clinical attachment level

Table 3 : intergroup comparison of curcumin and ornidazole at 1 month

parameter	Ornidazole	Curcumin	p
PD	$4.45 \pm 0.5$	$4.57 \pm 1.02$	0.001
CAL	$4.46 \pm 1.1$	$5.50 \pm 1.25$	0.001
Plaque index	$1.5 \pm 0.25$	$0.98 \pm 0.34$	0.001

Intergroup comparison-unpaired *t*-test. PD: Probing depth, CAL: Clinical attachment level

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Figure no 1 Commercially available curcumin and ornidazole



Figure no 2: Subgingival delivery of curcumin



Figure no 3: Subgingival delivery of ornidazole



### DISCUSSION

Nonsurgical therapy includes both mechanical and chemotherapeutic approaches to minimize or eliminate the microbial biofilm. Thorough scaling and root planing (SRP) is required to prevent the recolonization of the subgingival area by periodonto pathogens. However, mechanical therapy may fail to eliminate the pathogenic bacteria completely because of their location within the gingival tissues or in areas in accessible to periodontal instrumentation. Local drug delivery systems used as an adjunct to nonsurgical therapy has drastically improved the periodontal tissue condition. Ornidazole specifically acts on gram negative anaerobic, facultative bacteria which are responsible for periodontal disease. Ornidazole requires a very low minimum inhibitory concentration to inhibit the growth of periodontal pathogens. The antimicrobial activity of Ornidazole has been proposed due to the reduction of nitro group to a more reactive

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amine that attacks microbial DNA, inhibiting further synthesis and causing degradation of existing DNA.[6] It was suggested that curcumin might reduce the risk of inflammatory disorders, such as cancer and ulcer.[7] These biological effects are attributed to its anti-inflammatory and antioxidant activities[8] and hence, this study was done. Intragroup comparison among curcumin and ornidazole groups at baseline and 3 months showed significant decrease in PD, CAL, and plaque index. Intergroup comparison between curcumin and ornidazole group showed a greater reduction in the curcumin as compared to ornidazole group. Numerous lines of evidence suggested that curcuminoids are potent anti-inflammatory agents working through multiple mechanisms, namely, suppression of the activation of nuclear factor-kappa B, inhibition of cyclooxygenase-2, down regulation of the expression of cell proliferation, antiapoptotic, and metastatic gene products. Curcuminoids also modulate the proliferation and cellular response of various immune cell types, such as T-cells, B-cells, macrophages, neutrophils, natural killer cells, and dendritic cells.[9] It causes shrinkage by reducing inflammatory edema and vascular engorgement of connective tissue. It promotes migration of epithelial cells to the wound area by promoting the localization of transforming growth factor-1 and inducing re-epithelialization.[10] Antimicrobial properties of curcumin are likely due to its ability to inhibit bacterial lipopolysaccharide induced cytokine expression and bacterial quorum sensing systems. Curcumin was shown to have a more profound effect on chronic periodontitis when compared to ornidazole.

### Conclusion

The results show a more favourable outcome with curcumin than ornidazole gel, thus local delivery of curcumin can be used as an adjunct to nonsurgical periodontal therapy.

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