

# METRONIDAZOLE DENTAL GEL AS AN ADJUNCT TO SCALING AND ROOT PLANNING: A CLINICAL STUDY

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**Keywords:** periodontal disease, scaling and root planning, metronidazole

**Abstract:** Background: due to limitations of scaling and root planning in certain cases of periodontal disease, the adjunctive use of antimicrobials, systemically or locally, has been indicated in order to improve the clinical outcomes of these conditions. Aim: to evaluate the efficiency of metronidazole dental gel associated to scaling and root planning in the improvement of periodontal parameters. Material and methods: a split mouth randomized clinical study was conducted in 40 patients with chronic periodontitis receiving scaling and root planning alone, metronidazole dental gel alone and scaling and root planning associated with metronidazole dental gel. Clinical examinations were performed at baseline, 1 month and 3 months. Results: scaling and root planning combined with metronidazole gel showed short term advantages in improving the clinical parameters, the best results being noted at 3 months. Conclusion: subjects with chronic periodontitis have significant benefits from scaling and root planning when used with metronidazole dental gel as an adjunct.

**Cuvinte cheie:** boală parodontală, netezirea suprafeței radiculare, metronidazol

**Rezumat:** Introducere: tratamentul mecanic de netezire a suprafeței radiculare are anumite limite în unele forme de boală parodontală. Pentru a îmbunătăți rezultatele clinice în asemenea situații este recomandată folosirea adjuvantă a unor agenți antimicrobieni locali sau generali. Scop: Evaluarea eficienței gelului cu metronidazol, asociat tratamentului mecanic de netezire a suprafeței radiculare, în îmbunătățirea parametrilor clinici parodontali. Material și metodă: Am cuprins în studiul nostru clinic randomizat 40 de pacienți cu parodontită marginală cronică care au beneficiat pe câte o hemiarcadă de detartraj și netezirea suprafeței radiculare, de aplicarea de gel cu metronidazol și tratamentul mecanic asociat cu aplicarea locală de gel. Înregistrarea parametrilor clinici a fost făcută la momentul inițial, la o lună și la trei luni. Rezultate: detartrajul și netezirea suprafeței radiculare asociate cu aplicare locală de metronidazol gel au adus avantaje pe termen scurt a parametrilor clinici, cele mai bune rezultate fiind observate la trei luni. Concluzii: asocierea detartrajului și netezirii suprafeței radiculare cu aplicarea locală de metronidazol gel aduce beneficii semnificative la pacienții cu parodontită marginală cronică.

## INTRODUCTION

Periodontitis is a multifactorial infectious disease that affects the adult population in a clinically significant manner. Besides the susceptibility of the host, a key role in its etiopathogenesis is represented by the presence of periodontopathogenic species. Left untreated, this plaque-induced inflammatory condition may lead to destruction of the tooth-supporting apparatus and eventually tooth loss.

Periodontal diseases are caused by pathogenic bacterial species that adhere to dental surfaces forming complex communities, known as oral biofilms. From more than 700 different species identified in the oral microbiota, only a small group of 10-15 species are considered to be significantly associated with the initiation and progression of periodontitis.

In spite of this microbial specificity, the standard treatment of periodontal disease remains highly unspecific, consisting mainly of mechanical debridement of the dental root surfaces, which has been proven successful on a long-term basis for many patients, even though a small, but relevant proportion of sites and patients might not respond adequately. A limited efficacy of scaling and root planning was noted especially in

cases with deep pockets or furcation involvements, with areas that can be left untreated and lead to frequent development of secondary effects as gingival recession, loss of tooth substance or dentin hypersensitivity.

Due to these limitations, the adjunctive use of antimicrobials has been indicated to improve the clinical outcomes in certain patients and periodontal conditions, that can be used either systemically or locally.(1)

The local application has been indicated in patients with localized pockets or nonresponding and recurrent sites because there are fewer adverse effects, less chance of developing bacterial resistance, better compliance than with the use of systemic antimicrobials (2,3) and by limiting the drug to its target site a much higher concentration can be achieved.(4)

Periodontitis is localized to the immediate environment of the periodontal pocket therefore it represents the perfect natural site for antimicrobial treatment with local sustained-delivery systems.

Metronidazole is the most common broad-spectrum antibiotic and is active against most of the periodontal pathogens.(5)

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## CLINICAL ASPECTS

### PURPOSE

The main objective of this study was to evaluate the efficacy of metronidazole dental gel as an adjunct to scaling and root planning treatment of periodontal diseases.

### METHODS

This study was a controlled clinical trial with Split Mouth Design. It was carried out on 40 patients referred to the periodontology department, Dental School of University of Medicine and Pharmacy Tg. Mures, selected of all patients who were referred to the periodontology department and diagnosed with generalized chronic periodontitis.

The inclusion criteria were as follows:

- the diagnosis of generalized chronic periodontitis,
- presence of at least 16 teeth, and four non adjacent sites with periodontal pocket depth of  $>$  or  $=$  5 mm,
- age between 20–45 years old, irrespective of sex,
- proper cooperation.

The exclusion criteria were as follows:

- presence of systemic disease,
- poor oral hygiene after oral hygiene instruction,
- smoking,
- pregnant or lactating women,
- periodontal treatment over the previous 6 months,
- antibiotic therapy over the last year.

After explaining the objectives of the study for each patient and obtaining a written consent, quadrants were randomly divided in four groups:

- group A - one session of scaling and root planning,
- group B - metronidazole 25% dental gel applied on day 0 and day 7,
- group C - scaling and root planning adjunctive to metronidazole 25%,
- group D - no treatment(control).

All patients received initial periodontal therapy including motivation and instruction in oral hygiene methods. In the quadrants treated with 25% metronidazole dental gel the whole pocket was filled up and some gel was visible on the surface.

The patients were asked not to eat or drink for 1 h after the application and instructed to carry out routine oral hygiene maintenance protocol throughout the study period.

The clinical parameters, plaque index (PI), bleeding on probing (BOP), probing pocket depth (PPD) were assessed at six sites (distofacial/buccal, midfacial/buccal, mesiofacial/buccal, distolingual/palatal, midlingual/palatal and mesiolingual/palatal) of each tooth included in the study at baseline, 1 month and 3 months.

The statistical analysis was done using SPSS version 15.0 statistical analysis software. The values were represented in number (%) and mean  $\pm$  standard deviation (SD).

### RESULTS

For evaluation of data a proportional change was used to study the post-treatment effect of different groups. At 1 month, as compared to baseline, for all three parameters, maximum proportional change was observed in group C followed by group A and then group B. For all parameters, the intergroup differences were significant statistically ( $p < 0.001$ ) (table no. 1).

Similarly at 3 months, as compared to baseline, for all three parameters, maximum proportional change was observed in Group C, followed by Group A and then Group B.

For all three parameters, the intergroup differences were significant statistically ( $p < 0.001$ ) (table no. 2)

**Table no. 1. Comparison of proportional change (in percentage %) in periodontal parameters in groups between baseline and 1month**

| Parameter | Group A           | Group B          | Group C          | Group D         |
|-----------|-------------------|------------------|------------------|-----------------|
| PI        | 38.31 $\pm$ 8.12  | 27.64 $\pm$ 3.84 | 57.25 $\pm$ 2.54 | 1.24 $\pm$ 0.45 |
| BOP       | 52.86 $\pm$ 10.22 | 41.35 $\pm$ 7.43 | 60.73 $\pm$ 5.23 | 2.01 $\pm$ 0.33 |
| PPD       | 20.16 $\pm$ 3.15  | 6.08 $\pm$ 0.45  | 29.01 $\pm$ 2.25 | 0               |

**Table no. 2. Comparison of proportional change (in percentage %) in periodontal parameters in groups between baseline and 3 month**

| Parameter | Group A          | Group B          | Group C          | Group D         |
|-----------|------------------|------------------|------------------|-----------------|
| PI        | 37.75 $\pm$ 8.06 | 29.27 $\pm$ 3.40 | 59.68 $\pm$ 3.25 | 1.06 $\pm$ 0.54 |
| BOP       | 50.06 $\pm$ 9.58 | 42.12 $\pm$ 7.69 | 63.20 $\pm$ 4.78 | 1.87 $\pm$ 0.38 |
| PPD       | 20.16 $\pm$ 3.15 | 5.61 $\pm$ 0.82  | 31.51 $\pm$ 2.43 | 0               |

### DISCUSSIONS

The aim of this study was to explore the usefulness of metronidazole gel in improving the clinical outcome of periodontal sites following mechanical periodontal therapy. In this study, in Group A, significant improvement in periodontal indices was seen at 1 month which was noted also after 3 months ( $p < 0.001$ ). These findings are consistent with other studies demonstrating improvement in the periodontal parameters after scaling and root planning.(6,7)

Combined treatment, applied in group C, responded to therapy with better resolution of clinical parameters compared with the pure mechanical procedures (group A) and pure metronidazole treatment (group B). These findings are in accordance with the results obtained in studies conducted by Stelzel et al.(8) Griffiths et al.(9), Salvi et al.(10) The results shown by Riep et al (11), Awartani et al (12) were not in agreement with the results of the current study, the repeated local application of metronidazole as an adjunct to scaling and root planning (SRP) and the mechanical treatment alone showed similar clinical effects without statistically significant differences.

At the end of the study, groups A,B,C had statistically significant improvement in probing pocket depth ( $p < 0.02$ ), and in plaque and bleeding indices ( $p < 0.05$ ) when compared to day 0 and group D. However, group C had statistically significantly greater improvement ( $p < 0.03$ ) in probing pocket depth than groups A and B. Both groups A and B had statistically significantly greater improvement ( $p < 0.05$ ) in probing pocket depth than control group D). On the other hand, both groups were not statistically significantly different from each other in probing pocket depth improvement. It is suggested that topical metronidazole treatment may improve periodontal health as well as subgingival scaling and root planning therapy, and adjunctive treatment could obtain an additional therapeutic effect.

Noyan *et al* observed that local metronidazole in combination with scaling and root planning seems to be more effective in terms of producing both clinical and microbial improvements.(13) Since anaerobic bacteria are believed to be the predominant causative factor in periodontitis and metronidazole specifically targets anaerobic microorganisms it might be advantageous to use it in the treatment of chronic periodontitis.(14,15,16,17,18)

Local anti-infective agents combined with SRP appear to provide additional benefits in PD reduction and CAL gain compared to SRP alone. The decision to use local anti-infective adjunctive therapy remains a matter of individual clinical judgment, the phase of treatment, and the patient's status and preferences.(19,20,21,22,23)

### CONCLUSIONS

The clinical outcome of generalized chronic periodontitis can be improved after initial phase of periodontal therapy. Reduction of probing pocket depths and bleeding on probing demonstrate the efficacy of scaling and root planning in controlling the progression of this disease.

The association of metronidazole dental gel to scaling and root planning gave the best results and it certifies that it has an important role in improvement of periodontal condition, preparing best conditions for periodontal surgery in more severe cases.

Further clinical studies are needed in order to evaluate the long-term results of this local antimicrobial treatment and compared to systemic administration of antibiotics associated with the initial phase of periodontal therapy.

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