

Comparative evaluation of Coenzyme Q₁₀ (Perio-Q) as an adjunct to scaling and root planing in smokers and non-smokers with chronic periodontitis

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Abstract

Background: Chronic periodontitis is an inflammatory disease which shows progressive tissue destruction, effectiveness of scaling and root planning is compromised in patient with smoking history. Co-Enzyme Q₁₀ (Perio-Q) is known to act as adjunct to Scaling and root planing and improve the treatment

outcomes by reducing the oxidative stress and promote periodontal healing

Material & Methods: This study was a randomized controlled clinical trial, to compare clinical effectiveness of Scaling and Root Planing (SRP) alone versus SRP with adjunctive Coenzyme Q₁₀ (Perio-Q) in the treatment of chronic periodontitis in smokers and non-smokers. Clinical parameters (Plaque Index, Gingival

Index, Probing Pocket Depth, Clinical Attachment level) will be recorded at baseline and 01-month post intrasulcular application of Co-enzyme Q₁₀ (Perio-Q) gel. Patients are divided by computer generated randomisation in 04 groups on the basis of intervention and whether they are smoker or non-smoker.

Result: Patients receiving Perio-Q showed reductions in PPD, improved CAL compared to SRP alone. Smokers treated with Perio-Q demonstrated better healing than those undergoing SRP alone.

Conclusion: Perio-Q enhances periodontal therapy, particularly by counteracting smoking-related oxidative stress, and may serve as an effective adjunct in periodontal treatment.

Keywords: Chronic Periodontitis, Co-enzyme Q₁₀, Smokers and Non-smokers.

Introduction

Long term inflammation of periodontal tissues leading to destruction is chronic periodontitis, it worsens over time if left untreated. It ultimately leads to extensive destruction of tissue and loss of tooth which left untreated¹. Although scaling and root planning is among the most effective non-surgical therapy, however various external variables such as smoking, host immune response and oxidative stress often have a limiting effect on the treatment outcome¹. So, adjunctive therapies that can improve the treatment outcomes and improve periodontal healing are an area of major interest.

Smoking is among the major risk factors of periodontitis which contributes in disease severity and progression.² It majorly contributes in reduced treatment outcome, thus they exhibit greater periodontal destruction and delayed tissue healing.³ Increased disease severity in smokers is due to impaired vascularisation & increased oxidative stress and delayed wound healing all of which compromise the periodontal therapy. These difficulties

provide as justification for the need to explore adjunctive treatments that can contribute to periodontal healing, particularly in smoking.

Co-enzyme Q₁₀ (Perio-Q) is a naturally occurring antioxidant that is essential in cellular energy metabolism and free radical neutralization.⁴ CoQ₁₀, on intrasulcular application has been found in prior studies to shown enhanced periodontal healing & reduces clinical signs of inflammation. Despites its known benefits, research on CoQ₁₀ in periodontal therapy is limited, particularly comparative effectiveness on smokers and non-smokers. A major contributing factor of chronic periodontitis is oxidative stress, especially smokers. CoQ₁₀ may offer significant therapeutic advantages.⁸ There is a need for well-structured clinical trials to validate these findings and establish standardized protocols for its use.

Materials and Methods

A randomized controlled clinical trial was done in Department of Periodontology & Implantology at Chhattisgarh Dental College & Research Institute, Rajnandgaon. The study was carried in a period of 1 year with clearance from Institutional ethical committee (Registration no.- EC/NEW/INST/2020/1034).

Inclusion and Exclusion criteria:

Study had a sample size of 40 patients who were aged between 20-60 years with chronic periodontitis, had probing pocket depth ≥ 5 mm, smokers who smoke at least 10 cigarettes per day for ≥ 5 years. Individuals who are non-smokers and have abstained from smoking for more than five years.

Participants were excluded from study if they had a history of alcohol use, systemic illnesses that affected their periodontal health, were pregnant, or had used antibiotics and periodontal therapy during the previous three months.

Study Design

Participants were randomly selected into four groups using a computer-generated randomization table:

Group I: SRP alone in Non-smokers

Group II: SRP alone in Smokers

Group III: SRP with Perio-Q in Non-smokers

Group IV: SRP with Perio-Q in Smokers

The study sought to evaluate the clinical effectiveness of scaling and root planing (SRP) alone and in combination with supplemental Coenzyme Q10 (Perio-Q) in treating chronic periodontitis in smokers and non-smokers.

The UNC-15 (University of North Carolina) Periodontal Probe was used to capture clinical parameters such as Plaque (PI), Gingival Index (GI), Pocket Probing Depth (PPD), which is measured from the free gingival margin to the most apical section of the sulcus, and Clinical Attachment Loss (CAL). A professional examiner examined the patients.

On the initial visit, measurements were taken of all clinical markers, including the Plaque, Gingival Index, Probing Pocket Depth, and Clinical Attachment level. Each quadrant's scaling and root planing were subsequently completed using standard periodontal instruments.

Intra-sulcular application of Perio-Q was done using a special syringe with a blunt-tipped applicator for direct pocket delivery. Intra-pocket application of gel was done. After the application, patients were told to wait an hour before eating, drinking, or spitting. After a week and one month, patients were called back for follow-up. Each measurement was noted at baseline and after a month.

Statistical analysis

Data analysis was performed using SPSS software version 25.0

Results

Group IV (Perio-Q in Smokers) outperformed all other groups in Plaque, Gingival Index, Probing Depth, and CAL, as per statistical analysis. At one month, statistically significant differences favoring Group IV over other groups were found by inter-group comparisons ($p < 0.05$). The findings suggest that Perio-Q in Smokers is an effective intervention for improving clinical parameters.

Discussion

Use of an alternative to improve treatment outcome of SRP is a significant area of interest, especially in patients with unfavourable habits and environmental factors. Periodontal tissues require efficient energy production for reversing the damage and promoting healing, and depend on an adequate supply of Coenzyme Q₁₀ for metabolic functions. Periodontitis if left untreated can lead to severe destruction and even loss of tooth. In case of smokers, the severity of disease increases due to delayed healing and treatment response.

CoQ₁₀ is an antioxidant found in mitochondria. Being a naturally occurring enzyme, it contributes to production of ATP in mitochondria through redox activity & electron transport among enzymes. Additionally, it supports redox activity in endo-membranes and cell membranes. It scavenges free radicals and prevents lipid peroxidation. It is important for membrane stabilization and fluidity.^[1] This study aimed to evaluate the efficacy of an anti-oxidant (Perio-Q), if used along with mechanical debridement.

All of the groups in this study demonstrated notable improvements in gingival, plaque index, probing pocket depth, & clinical attachment loss; however, Group IV, underwent SRP before intra-pocket application of co-enzyme Q10 (Perio-Q), showed the greatest improvement.

Conclusion

Better clinical results were shown in all groups when Perio-Q gel was used intrapocket in conjunction with non-surgical periodontal therapy, but this was especially true for individuals who had a history of smoking and persistent periodontitis. The study's findings recommended use of CoQ10 gel as a supplement to non-surgical treatment, particularly for patients who smoke. For a more thorough assessment of Perio-Q gel's usage as a supportive intervention in conjunction with non-surgical periodontal treatment, the study recommends longer-span clinical trials with a larger sample size.

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