

Effect of coenzyme-q10 in the post-curettage against probing depth, relative attachment loss, and bleeding on probing

Aprilia Yuanita ANWARISTI¹

¹ Department of Periodontics, Dentistry Faculty, Universitas Muhammadiyah, Surakarta, Indonesia

*Corresponding Author, Email: aya427@ums.ac.id

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ABSTRACT The mechanical approach is one of the methods for periodontal disease treatment. Besides, medicine also was administered locally to reduce the number of pathogens present in the pocket. Coenzyme Q10 gel has low toxicity, biodegradable, prolongs drug release, and can accelerate tissue healing. The curettage action aims to establish adhesion intensity and remove calculus, bacteria, and granulation tissue. This study aimed to evaluate the effect of coenzyme Q10 gel on chronic periodontitis with curettage in relation to the probing depth (PD), relative attachment level (RAL) and bleeding on probing (BOP). The study sample consisted of 10 patients with curettage treatment and coenzyme Q10 gel application. The gel was applied to the pocket of chronic periodontitis patients after curettage. PD, RAL, and BOP of patients measured before and on days 21 and 30 after gel application. The results showed that there was a significant difference in BOP between observation times. There are differences in the reduction of PD and RAL. Coenzyme Q10 gel's application affected decreasing probing depth, relative attachment loss, and bleeding on probing after curettage.

Keywords: Coenzyme Q10, curettage, PD, RAL, BOP

INTRODUCTION

Chronic periodontitis is an infectious disease that is inflammatory in the soft tissue around the teeth, progressive loss of connective tissue, and bone loss. Periodontal treatment is an action taken to eliminate existing diseases and prevent their return with appropriate treatment. Scaling, root planing, curettage, and oral hygiene maintenance will improve the inflammation and periodontal pockets, even in individual patients can eliminate all existing diseases.¹

The chemotherapeutic agents are an adjunctive therapy in periodontal disease. It has more effective in accelerating healing than monotherapy with curettage.^{2,3} Additional therapy is coenzyme Q10, a vitamin-like substance, fat-soluble, required for primary cell function. The main role of coenzyme Q10 in cells occurs in the inner mitochondrial membrane by transferring electrons from the primary substrate to the oxidase system

while transferring protons outside the mitochondrial membrane.⁴

A thorough evaluation of periodontal disease's clinical features is essential in obtaining information used to detect the disease, determine its type, assess the severity of the disease, and the success of periodontal treatment.⁵ Several simple methods for measuring periodontal status's clinical state include measuring the periodontal pocket/probing depth (PD), measuring relative attachment loss, and checking the bleeding on probing (BOP).⁶ Coenzyme Q10 may reduce the probe depth (PD) and improve the gingival index (GI) in patients with gingivitis and periodontitis. It can use as an adjunct therapy after scaling and root planing.⁷ This research reported the effect of post-curettage coenzyme Q10 on probing depth, relative attachment loss, and bleeding on probing in cases of periodontitis.

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MATERIALS AND METHODS

Research approved the Ethics form Faculty of Dentistry Universitas Gajah Ma No. 0043/KKEP/FKG-UGM/EC/2019. This research is quasi-experimental in that influence of variables was the application of coenzyme Q10 after curettage. The observation time was 0, 21, and 30 days. The affected variables were Probing Depth (PD), Relative Attachment Loss (RAL), and Bleeding On Probing (BOP). Controlled variables were the research object in the form of 10 periodontal pockets on the teeth of patients with chronic periodontitis with a depth of 4-6 mm, single-rooted maxillary and mandibular teeth, and the volume of material inserted. The uncontrolled variable was the immunity of each subject.

Perio-QTM gel was used as a coenzyme in this study (PerioQ Inc., Manchester, USA). At the first visit, the patient has performed scaling and root planning (SRP). Meanwhile, at the second visit were measured PADA, RAL, and BOP by

periodontal probe UNC-15. It is located in distobuccal, buccal, mesiolingual, lingual, and distolingual mesiobuccal.

The patient was curetted using a curette Gracey. Then performed anesthesia, asepsis, and surgery. Furthermore, cleaning the pocket walls using a curette by scraping the pocket wall until it is clean from the granulation tissue. Subsequently, 0.1 ml of coenzyme Q10 was applied in a pocket or reaching the gingival margin.⁸ Use of a periodontal pack to assess the effectiveness of coenzyme gel during the pocket. The gel is applied once after curettage. On days 21 and 30 were measurements of PD, RAL, and BOP. BOP data were analyzed using non-parametric run tests. PD and RAL data obtained in the observation are quantitative data with a ratio scale. The first test is a normality test using the Shapiro-Wilk test, followed by a non-parametric run test.

RESULTS

Table 1 shows a change in the BOP score from positive (+) to (-). On day 0, BOP is positive (+) for all subjects. On day 21, BOP was positive (+) in only 1 study subject, while BOP was negative (-) in 9 research samples. On day 30, BOP

negative (-) in all study subjects. The study results were analyzed using a non-parametric run test with a significance limit of $p < 0.05$ as an indicator of significant BOP differences between observation times.

Table 1. Bleeding on probing on the treatment of periodontitis based on time

Treatment	N	0 day		21 days		30 days	
		(+)	(-)	(+)	(-)	(+)	(-)
Curettage+Coenzyme Q10	10	10	0	1	9	0	10

Table 2 shows the mean from day 0 (baseline) to day 30, indicating that the PD results have decreased. The Run test results on reducing PD on day 0 to day 30 showed a significant

difference with $p (0.001) < 0.05$. While the Run test results on RAL reduction from day 0 of treatment today, 30 are significant $p < 0.05$ (0.027 and 0.018)

Tabel 2. Treatment of currage by coenzim Q10

Currage treatment	N	$\bar{x} \pm SD$		
		0 Day	21 Days	30 Days
Probing depth (PD)	10	4,50 $\pm$ 0,53	2,90 $\pm$ 0,57	2,50 $\pm$ 0,53
Relative attachment level	10	13,10 $\pm$ 1,10	11,50 $\pm$ 1,18	11,20 $\pm$ 1,14

$\bar{x}$: Everage; SD: Standard Deviasi

DISCUSSION

The BOP data shows a trend of change. Observation between times of each result showed significantly different. Berglundh (2018). reported that significant changes in BOP occurred after 21 days of curettage and coenzyme Q10 application.⁹ Based on BOP observations, it is shown that curettage action and systemic use of Coenzyme Q10 aids in enhancing the inflammatory response. Coenzyme Q10 has an anti-inflammatory effect by reducing NF- κ B, which is a transcription factor in controlling several important genes in the inflammatory process by reducing the production of TNF- α and IL-6.¹⁰

The results of this study indicate a decreasing trend in PD. The reduction in PD between day 0- 21 and day 21-day 30 showed insignificant differences. The decrease in PD between day 0 to day 30 showed a significant difference, and this happened because the remodeling phase started after three weeks. The addition of Coenzyme Q10 as an antioxidant can suppress excessive reactive oxygen species (ROS) during periodontal inflammation.¹¹ Besides, antioxidants are more active because of hydrogen donors (scavenger) against free radicals, so they become more stable to prevent lipid oxidation.^{12,13} The mean of the RAL measurement results showed an improvement in clinical conditions in

the treatment, marked by a decrease in RAL over time of observation, starting from day 0 (baseline), decreasing after 21 days, and decreasing again after 30 days. The observations of time between day 0 to day 21 and day 0 to day 30 showed significant results. A reduction in the mean RAL indicates the formation of new adhesions to the periodontal tissue.¹⁴

Healing of the epithelial layer of the gingival sulcus after curettage occurred on days 5 to 12. The repair and epithelialization of the sulcus generally take from 2 to 7 days. The results showed that curettage significantly led to tissue adhesion. Also, to reduced RAL at three weeks after curettage. They were characterized by collagen fibers' presence parallel or perpendicular to the root's root surface that previously had periodontal disease or loss of periodontal attachment.^{11,15} Periodontal tissue regeneration can occur due to the interaction of various growth factors such as platelet-derived growth factor (PDGF), transforming growth factor- β (TGF- β), and vascular endothelial growth factor (VEGF). These cytokines will promote migration, proliferation, differentiation, angiogenesis, and matrix synthesis during tissue healing.¹⁴

CONCLUSION

The application of coenzyme Q10 has effects on reducing probing depth. Its impact on attachment loss and bleeding on probing after curettage in treating chronic periodontitis. It is

necessary to research the effect of coenzyme Q10 gel combination on various inflammatory mediators such as PGE2, cytokines IL-6, IL-2, and TNF-alpha in chronic periodontitis patient

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