

COMPARATIVE EVALUATION OF EFFICACY OF LOCALLY DELIVERED CO-ENZYME Q10 GEL AS AN ADJUNCT TO SCALING AND ROOT PLANING IN THE TREATMENT OF CHRONIC PERIODONTITIS

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ABSTRACT:

Background & Objectives: To evaluate and compare the clinical outcomes of locally delivered co-enzyme q10 gel as an adjunct to scaling and root planing with scaling and root planing alone in participants with generalized chronic periodontitis.

Methodology: In this clinical study, a total of 32 sites were included, where in 16 sites in test group and 16 sites in control group. Test group treated with SRP + perio-q gel and control group treated with SRP only. The clinical parameters measured were plaque index (PI), bleeding index (BI), probing depth (PD), gingival index (GI) at baseline and 6th weeks.

Result: Inter group comparison showed, more reduction in PI in test group but difference was not statistically significant. ($p=0.495$) However, reduction in BI, PD and GI showed statistically significant difference between two groups, more in test than in control group at 6th weeks follow-up ($p<0.001$) ($p=0.003$) ($p=0.001$).

Conclusion: Intra pocket application of perio-q gel as an adjunct to scaling and root planing might have effect on improvement in clinical parameters than scaling and root planing alone.

Keywords: Chronic periodontitis; Co-enzyme q-10; Perio-q gel; scaling and root planing.

INTRODUCTION:

Periodontitis is an immuno-inflammatory disease process resulting from the interaction of a bacterial attack and host inflammatory response, causing inflammation of the supporting tissues of the teeth leading to tissue destruction and tooth loss. Arrays of molecule are considered to mediate the inflammatory response at one time or another, among these is free radicals (FRs) and reactive oxygen species (ROS) like superoxide anion radicals, hydrogen peroxide, hydroxyl radicals and hypochlorous acid. All these molecules are capable of damaging either cell membranes

or associated bio-molecules. Periodontal pathogens can induce ROS overproduction and thus may cause collagen and periodontal cell breakdown.^[1] It may be necessary to deliver anti-oxidants selectively to specific cell types and to define the concentrations suitable for blocking inappropriate cell responses but leaving the unimpaired physiological levels of FR/ROS activity necessary for normal cell function.^[2]

Coenzyme Q10 was discovered by Fred Crane and his colleagues in 1957 in beef heart mitochondria.^[3] It was first isolated from the mitochondria of bovine hearts in 1957 at the University of Wisconsin. Identification of the

chemical structure and synthesis was completed by 1958. Because of its ubiquitous presence in nature and its quinone structure (similar to that of vitamin K), Coenzyme Q10 is also known as ubiquinone.^[4] It is known to play a crucial role in the generation of adenosine triphosphate (ATP) and cellular respiration. It exists in two molecular forms, ubiquinone, the oxidized form, and ubiquinol, the reduced form, which are the basis for its antioxidant properties. Hence, Co-Q10 also functions as an intercellular antioxidant.^[5] Other than antioxidant action, it has also been shown in the literature that CoQ10 acts as an immune enhancer and also accelerates tissue healing.^[6,7]

A deficiency of coenzyme Q10 in the gingival tissue may exist independently of and/or because of periodontal disease. Clinical trials showed a positive relation between Co-Q10 administration and improved periodontal health and immune response^[3]. The mechanism of Co-Q10 had not been known until Littaru and Nakamura reported its deficiency in patients with Periodontal disease.^[8]

So, The aim of the present study was to evaluate and compare the clinical outcomes of locally delivered co-enzyme q10 gel as an adjunct to scaling and root planing with scaling and root planing alone [without q10 gel] in participants with generalized chronic periodontitis.

MATERIALS AND METHODS:

This was a randomized control clinical study, to compare the two treatment modalities: scaling and root planing + intra pocket application of co-enzyme q10 gel (Perio-q

gel) and scaling and root planing alone in patient with chronic periodontitis. The study was done in Department of Periodontology, K. M. Shah Dental College and Hospital, Vadodara. Before the beginning of the study, ethical approval from the ethics committee and informed consent from the patients was obtained. Age group of 30-60 years from both sexes was included in this study.

Inclusion criteria were patients who were diagnosed with localized or generalized chronic periodontitis, systemically healthy patients, patients with at least two nonadjacent sites with 4-6mm of probing pocket depth, patients who were not received any antibiotics and periodontal therapy for past 6 months. Exclusion criteria were patients with habit of smoking and tobacco chewing, patients with aggressive periodontitis, pregnant and lactating women, patients with history of systemic disease that could influence the course of periodontal disease, patients who were not willing for participation in the study and further follow-up.

A total 32 sites from 15 patients were included in the study, in which 16 sites each were randomly assigned by flip coin method in to two groups:

GROUP I: SRP + Co enzyme q10 gel (perio q gel) (test group)

GROUP II: SRP alone (control group)

Perio-Q gel supplied as a pack of gel, contained a mixture of coenzyme Q10 and vegetable glycerin base in a ratio of 1:9.

Periodontal parameters plaque index (PI), bleeding index (BI), pocket probing depth (PD), gingival index (GI) were assessed at baseline and 6 weeks.

Patients were selected according to the inclusion and exclusion criteria. Each Patient was received initial periodontal treatment, including oral hygiene instructions and scaling and root planing.

After the Phase I therapy, the patients were recalled after a week for the treatment. At this appointment, patients who were in group I, the drug was delivered in localized pocket by using a 24 gauge syringe until some of the drug overflows from the pocket. The sites were covered with periodontal pack for 7 days. The pack was removed after 7 days. Patients were then recalled at 6th week for follow-up and again clinical parameters PI, BI, PPD and GI were measured and compared with baseline parameters and evaluated.

STATISTICAL ANALYSIS:

Independent t test was used to compare the clinical parameters between test and control groups. Paired t test was used for comparison of before and after values of each parameter in test and control group.

RESULTS:

At baseline, no statistically significance difference was there for any clinical parameters. **(Table 1, Graph 1)**

At 6 weeks, the difference between the two groups was statistically non-significant for plaque index ($p = 0.495$). The difference between the two groups was statistically significant for BI ($p < 0.001$). The difference between the two groups was statistically significant for PD ($p = 0.003$). The difference between the two groups was statistically significant for GI ($p = 0.001$) **(Table 2, Graph 2)**

The difference from baseline to 6 weeks between the two groups was statistically non-significant for PI ($p = 0.803$). The difference from baseline to 6 weeks between the two groups was statistically significant for BI ($p = 0.001$). The difference from baseline to 6 weeks between the two groups was statistically significant for PD ($p = 0.008$). The difference from baseline to 6 weeks between the two groups was statistically significant for GI ($p = 0.001$). **(Table 3, Graph 3)**

On intra group comparison, in the control group, the difference from baseline to 6 weeks was 2.13 ± 0.89 which was statistically significant for PI ($p < 0.001$). The difference from baseline to 6 weeks was 1.63 ± 0.72 which was statistically significant for BI ($p < 0.001$). The difference from baseline to 6 weeks was 1.00 ± 0.63 which was statistically significant for PD ($p < 0.001$). The difference from baseline to 6 weeks was 0.19 ± 0.40 which was not statistically significant for GI ($p = 0.083$). **(Table 4, Graph 4)**

In the test group, the difference from baseline to 6 weeks was 2.06 ± 0.44 which

was statistically significant for PI ($p < 0.001$). The difference from baseline to 6 weeks was 2.44 ± 0.51 which was statistically significant for BI ($p < 0.001$). The difference from baseline to 6 weeks was 1.75 ± 0.86 which was statistically significant for PD ($p < 0.001$). The difference from baseline to 6 weeks was 0.75 ± 0.45 which was statistically significant for GI ($p < 0.001$). (Table 4, Graph 5)

DISCUSSION:

The primary objective of periodontal therapy is to reduce the microbial load thereby leading to an improvement in clinical parameters. Scaling and root planing is considered as a gold standard therapy for non-surgical management of chronic periodontitis. But the inaccessibility in areas of periodontal pocket renders it insufficient to completely treat the same. The use of locally delivered antimicrobial agents has been studied over the years for overcoming the limitations of conventional periodontal therapy i.e. scaling and root planing and the use of sustained release formulations to deliver antimicrobial agents to the site of infection in periodontal pockets has become successful therapy. Here we used co-enzyme q-10(perio-q) gel as a local drug delivery agent.

The result of the present study indicated the efficacy of the coenzyme q10 gel (perio-q gel) in improving PI, BI, PD and GI. Results were similar to the study done by **Hans M et al**⁹ in which clinical parameters like PI, GBI, PD, CAL were improved with the use of

perio-q gel as an adjunct to scaling and root planing.

In our study there was also significant improvement in BI, PD and GI seen between test and control group from baseline to 6 weeks. Study done by **Chaudhry S et al in 2014**¹⁰ in which they used co-enzyme q-10 in gel form in patients with chronic periodontitis. They concluded that intra pocket application of perio-q gel along with SRP showed significant reduction for PI, GI, PPD, RAL in comparison to SRP alone.

With these results, it can be established that, the locally delivered drugs have a better result as compared to SRP alone and can be used in the treatment of isolated periodontal pockets.

The limitation of the present study was that microbiological evaluation was not done. That would provide a better understanding of the actual action of the drugs on the periodontal pathogens. Further studies with large sample size and longer follow-up period were necessary to confirm the effect of co-enzyme q10 gel in periodontal therapy.

CONCLUSION:

Within the limitation of the study, it can be concluded that we can use a perio-q gel as an adjunct to scaling and root planing in the treatment of isolated pockets. Also no side effect was noted in test group who were received perio-q gel as local drug delivery. It is also cost effective treatment for patient with localized periodontitis. So, local drug delivery of perio-q gel can be used as an

adjunct to SRP. Although further randomized controlled trials with larger sample size with long term follow-up are required to confirm the effect of perio-q gel as an adjunct to SRP for periodontal

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TABLES:

Table no. 1: Comparison PI, BI, PD, GI at baseline among control and test group:

Parameters	GROUP	N	Mean±SD	P VALUE
BASELINE :PI	Control	16	2.69 ± 0.48	0.295
	Experiment	16	2.5 ± 0.52	
BASELINE :BI	Control	16	3.13 ± 0.5	0.287
	Experiment	16	3.31 ± 0.48	
BASELINE :PD	Control	16	4.56 ± 0.51	0.532
	Experiment	16	4.69 ± 0.60	
BASELINE :GI	Control	16	2 ± 0.00	-
	Experiment	16	2 ± 0.00	

(P<0.05 statistically significant)

Table no. 2: Comparison PI, BI, PD, GI at 6 week among control and test group:

Parameters	GROUP	N	Mean ± SD	P VALUE
6 WEEK :PI	Control	16	0.56 ±0.51	0.495
	Experiment	16	0.44 ±0.51	
6 WEEK :BI	Control	16	1.5 ±0.52	<0.001
	Experiment	16	0.88 ±0.34	
6 WEEK :PD	Control	16	3.56 ±0.51	0.003
	Experiment	16	2.94 ±0.57	
6 WEEK :GI	Control	16	1.81 ±0.40	0.001
	Experiment	16	1.25 ±0.45	

Table no. 3: Difference between clinical parameters at baseline and 6 week among test and control group

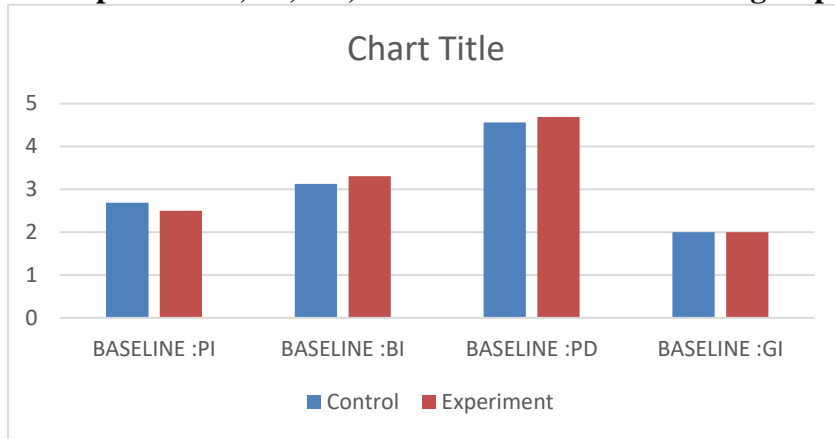
	GROUP	N	Mean ± SD	P VALUE
DIFFERENCE :PI	Control	16	2.13 ± 0.86	0.803
	Experiment	16	2.06 ± 0.44	
DIFFERENCE :BI	Control	16	1.63 ± 0.72	0.001
	Experiment	16	2.44 ± 0.51	
DIFFERENCE :PD	Control	16	1 ± 0.63	0.008
	Experiment	16	1.75 ± 0.86	
DIFFERENCE :GI	Control	16	0.19 ± 0.40	0.001
	Experiment	16	0.75 ± 0.45	

Table no 4: Intra group comparison of clinical parameters at baseline and 6 weeks for control and test group:

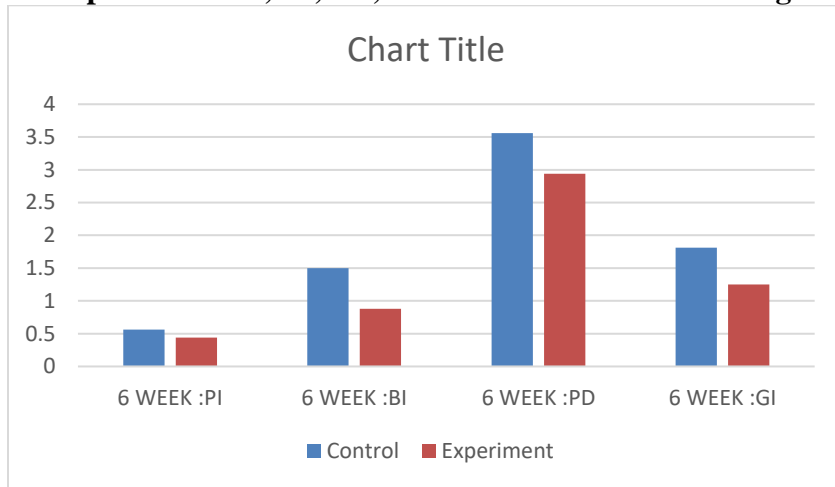
GROUP		N	Mean ± SD	Mean Differences ± SD	P VALUE
Control	BASELINE :PI	16	2.69 ± 0.48	2.12 ± 0.89	<0.001
	6 WEEK :PI	16	0.56 ± 0.51		
	BASELINE :BI	16	3.13 ± 0.5	1.63 ± 0.72	<0.001
	6 WEEK :BI	16	1.5 ± 0.52		
	BASELINE :PD	16	4.56 ± 0.51	1.00 ± 0.63	<0.001
	6 WEEK :PD	16	3.56 ± 0.51		
Experiment	BASELINE :GI	16	2.00 ± 0.00	0.19 ± 0.40	0.083
	6 WEEK :GI	16	1.81 ± 0.40		
	BASELINE :PI	16	2.5 ± 0.52	2.06 ± 0.44	<0.001
	6 WEEK :PI	16	0.44 ± 0.51		
	BASELINE :BI	16	3.31 ± 0.48	2.43 ± 0.51	<0.001
	6 WEEK :BI	16	0.88 ± 0.34		
BASELINE :PD	16	4.69 ± 0.60	1.75 ± 0.86	<0.001	
6 WEEK :PD	16	2.94 ± 0.57			
Experiment	BASELINE :GI	16	2.00 ± 0.00	0.75 ± 0.45	<0.001
	6 WEEK :GI	16	1.25 ± 0.46		

GRAPHS:

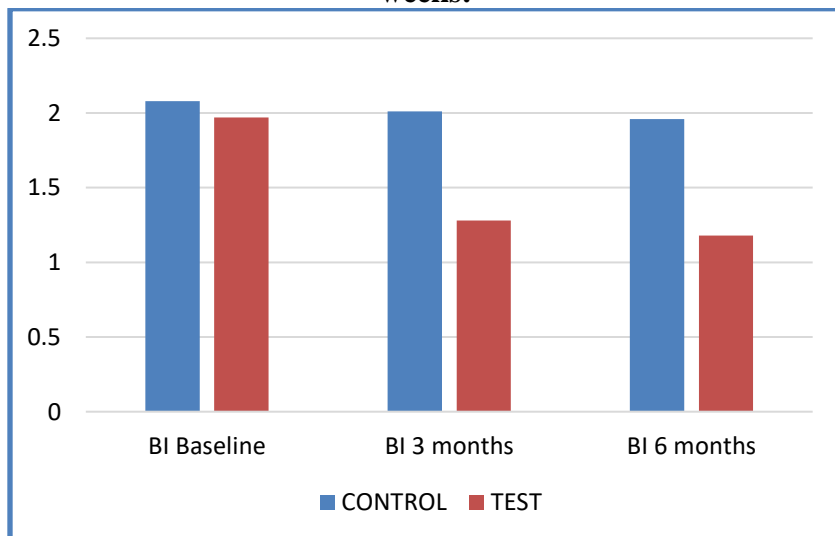
Graph no.1: Comparison PI, BI, PD, GI between control and test group at baseline:



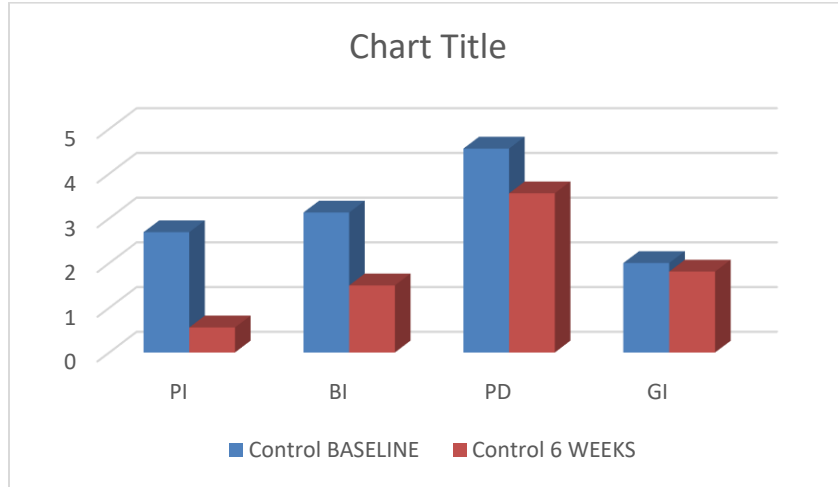
Graph no.2: Comparison of PI, BI, PD, GI between control and test group at 6 weeks



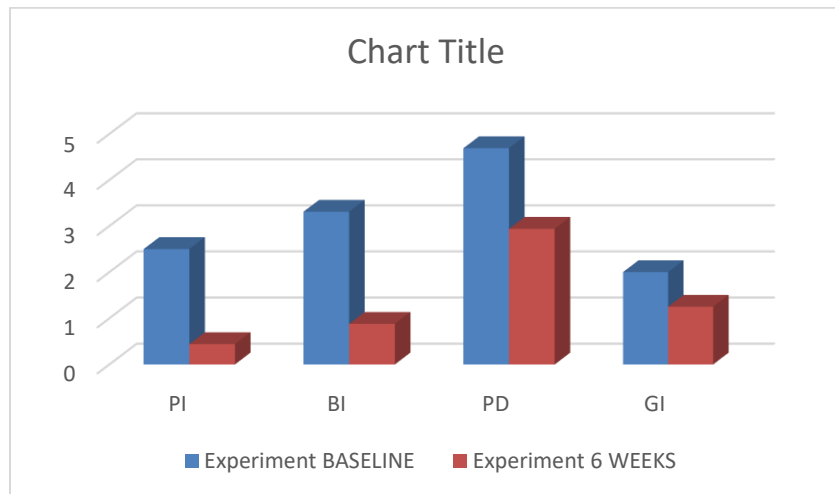
Graph no.3: Difference of PI, BI, PD, GI between control and test group from baseline to 6 weeks:



Graph no 4: Intra group comparisons of clinical parameters at baseline and 6 weeks in control group:



Graph no 5: Intra group comparisons of clinical parameters at baseline and 6 weeks in test group:



FIGURES:



Photograph 1: perio-q gel (co-enzyme-q10)



Photograph 2: pocket probing depth



Photograph 3: Intrapocket application of perio-q gel



Photograph 5: placement of periodontal pack



Photograph 4: application of Perio-q gel



Photograph 6: 6 weeks follow-up