



RESEARCH ARTICLE

EFFECT OF CHLORHEXIDINE AND HYALURONIC ACID CONTAINING MOUTHWASH ON PERIODONTAL STATUS OF POST-MENOPAUSAL PATIENTS WITH PERIODONTITIS

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Abstract

Introduction: Periodontitis is an infectious disease that results in production of several tissue degradation enzymes such as ALP and the disease has higher prevalence in post-menopausal women.

Aim: The aim of the study was to assess the serum ALP in post-menopausal women with periodontitis after non-surgical periodontal therapy adjunct to novel CLOHEX HEAL®.

Materials and methods: The study included total 20 post-menopausal women with periodontitis and divided into two groups. In group 1, scaling and root planning was done and subgingival irrigation with novel CLOHEX HEAL® and in group 2 only scaling and root planning was performed. Clinical parameters and serum ALP was assessed at baseline and after 1 month.

Results: In this study, serum ALP level showed significant improvement in both groups 1 month postoperatively but better result were seen in Group A as compared to Group B. Following the treatment, both Groups showed statistically significant improvements in GI, PPD and CAL but only Group A showed statistically significant improvements in PI.

Conclusion: SRP with or without CLOHEX HEAL® improves the clinical parameters in post-menopausal periodontitis. However, addition of CLOHEX HEAL® provided better plaque control and higher reduction in ALP levels.

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Introduction:

Periodontitis is an inflammatory condition affecting the supporting structures of the tooth namely the periodontal ligament, cementum, and alveolar bone.¹

In periodontal disease, the equilibrium between collagen synthesis and degradation is disrupted, leading to the breakdown of collagen fibrils in the periodontal ligament and the supporting alveolar bone. Researchers have explored various enzymes involved in both intracellular and extracellular tissue destruction as potential diagnostic markers for periodontitis. Among these, alkaline phosphatase (ALP) has garnered significant attention as a possible indicator of active periodontal damage.²

Alkaline phosphatase (ALP) is a glycoprotein primarily located in the liver, kidney, and bone. It plays a crucial role in the turnover of the periodontal ligament, cementum formation, and bone homeostasis within periodontal tissues. High ALP activity is evident in the periodontal ligament, contributing to the formation of acellular cementum.

Serum ALP levels are associated with bone diseases, indicating that they may also reflect changes in alveolar bone due to periodontal disease. ALP is involved in periodontal inflammation and regeneration by facilitating bone mineralization through organic phosphate and by releasing and hydrolysing inorganic pyrophosphate.³

During menopause, women experience a deficiency in estrogen, which disrupts the balance between bone formation and resorption, leading to increased bone resorption. Bhattarai T et al. found that postmenopausal women have elevated serum levels of alkaline phosphatase (ALP). The reduction in estrogen contributes to alveolar bone loss, clinical attachment loss, and tooth loss. Consequently, estrogen deficiency is viewed as a risk factor for periodontal disease. ALP levels in saliva and gingival crevicular fluid (GCF) are being explored as potential diagnostic markers for periodontitis.⁶

Several studies have reported that the level of ALP enzyme reduced following the scaling and root planing procedure. Use of chlorhexidine as an adjunct to SRP showed significant improvement in the level of ALP enzyme.^(7, 8, 9)

CLOHEX HEAL[®] a novel mouthwash containing chlorhexidine gluconate and hyaluronic acid (HA) as active ingredients. Hyaluronic acid (HA) has demonstrated anti-inflammatory, antibacterial, and antifungal effects, as well as promoting angiogenesis and osteoinduction, which support wound healing across various tissues, including periodontal tissues. Its ability to retain water in the tissue further aids in tissue regeneration.¹⁰ The application of HA gel alongside scaling and root planing (SRP) has been shown to improve clinical outcomes in periodontitis more effectively than SRP alone.^(7,11,12)

There are few studies examining periodontal disease activity in postmenopausal women, and it is hypothesized that these women are more susceptible to alveolar bone loss. Additionally, serum levels of alkaline phosphatase (ALP) are considered potential indicators of periodontal disease in this group. Therefore, the aim of the study was to assess the serum alkaline phosphatase level in post-menopausal women with periodontitis after non-surgical periodontal therapy along with the use of novel CLOHEX HEAL[®] as an adjunct.

Material and Methods:

This randomised clinical trial was conducted at the Department of Periodontology and oral implantology, ITS Dental College, Murad Nagar, Ghaziabad.

A total of 20 post-menopausal female participants with the age ≥ 45 years with ≥ 5 mm of probing pocket depth and having at least 20 teeth, were included in the study. Patients with any systemic diseases were excluded. All the participants in the study were informed about the nature of the study and all the participants signed an informed consent form.

Patients were randomly allocated to either group by a flip of the coin.

Group A- Non-Surgical Periodontal Therapy and subgingival irrigation with novel CLOHEX HEAL[®]

Group B- Non-Surgical Periodontal Therapy and subgingival irrigation with normal saline.

A CONSORT flow diagram of the randomization procedure and the study design is presented in figure 1.

Clinical parameters assessed were Plaque Index (PI), Gingival Index (GI), Clinical Attachment Level (CAL), Probing Pocket Depth (PPD) and Serum Alkaline Phosphatase (ALP) at baseline and after 1 month.

Pre-Procedure

All the clinical parameters Plaque Index (PI), Gingival Index (GI), Clinical Attachment Level (CAL), Probing Pocket Depth (PPD) and Serum Alkaline Phosphatase (ALP) were measured before scaling and root planing.

Procedure

Scaling and root planing were done in all the patients. In Group A, subgingival irrigation was done with novel CLOHEX HEAL[®] and in Group B, subgingival irrigation was done with normal saline.

Post-Procedure

All Patients were instructed to brush twice daily. In Group A, patients were asked to use CLOHEX HEAL[®] mouthwash daily twice a day for 15 days and in Group B, patients were asked to use warm saline rinses twice daily for 15 days.

All the patients were recalled after 1 month and all the clinical parameters Plaque Index (PI), Gingival Index (GI), Clinical Attachment Level (CAL), Probing Pocket Depth (PPD) and Serum Alkaline Phosphatase (ALP) were assessed again.

Results:

A comparison of the serum alkaline phosphatase (ALP) among the groups subjected to scaling and root planning (SRP) with or without adjunctive CLOHEX HEAL[®] is presented in Table 1. In Group A (SRP with CLOHEX HEAL[®]), the baseline ALP levels were slightly higher than in Group B (SRP alone), with means of 152.91 ± 13.15 and 142.09 ± 32.72 , respectively; however, this difference did not reach statistical significance ($p = 0.504$). Postoperatively, the serum ALP levels of both groups were found to have decreased, with Group A exhibiting a mean post-treatment serum ALP level of 147.94 ± 18.93 and Group B exhibiting a mean of 140.11 ± 20.99 . Again, the results of the comparison between the groups did not yield a difference that was statistically significant ($p = 0.937$). When evaluating the changes that occurred within each group, however, both groups demonstrated a statistically significant drop in ALP levels from pre-treatment to post-treatment ($p = 0.01$). Group A had a larger mean change, coming in at 4.97 ± 5.78 , with a 3.25% decrease, whereas Group B had a smaller mean change, coming in at 1.98 ± 11.73 , with a 1.39% decrease. These findings suggest that both SRP treatments, with or without CLOHEX HEAL[®], led to a reduction in serum ALP levels within each group with better reduction in group A; however, the difference in ALP reduction between the two treatment modalities was not statistically significant.

All of the clinical parameters, plaque index (PI), gingival index (GI), probing pocket depth (PPD), and clinical attachment level (CAL), showed no statistically significant differences between the two groups at baseline. Following treatment, both groups demonstrated improvements in these clinical parameters, as evidenced by a decrease in their respective baseline values for PI, GI, PPD, and CAL. Nevertheless, when comparing the changes within each group from baseline to post-treatment levels, Group A showed statistically significant improvements in PI, GI, and PPD ($p=0.05$), as well as CAL ($p=0.03$). Group B also showed statistically significant improvements in GI, PPD, and CAL but no statistical significance in PI. Group A showed better results as compared to Group B though the statistical significance was seen in PPD only.

Discussion:

This clinical study was conducted to evaluate the level of serum ALP in postmenopausal females with periodontitis before and after nonsurgical periodontal therapy. All clinical parameters were measured at baseline with blood samples collected on the same day and then 30 days after Phase I periodontal therapy.

In this study, serum ALP level showed significant improvement in both groups 1 month postoperatively but better results were seen in Group A as compared to Group B. Following the treatment, both Groups showed statistically significant improvements in GI, PPD and CAL but only Group A showed statistically significant improvements in PI. These findings suggest that the addition of CLOHEX HEAL[®] as an adjunct to SRP in Group A may have contributed to more significant improvements in plaque index (PI).

Jayshree et al¹³ (2018) demonstrated the similar results and they found that serum ALP levels were significantly decreased following Phase I periodontal therapy in chronic generalized periodontitis along with improvement in clinical parameters. Koppolu et al¹⁴ (2020) found a statistically significant decrease in mean serum ALP levels in groups gingivitis and periodontitis after SRP and also observed significant change in the PD and CAL in periodontitis group after SRP. However, contrary to our findings Kunjappu et al¹ (2012) found statistically significant decrease in GCF ALP levels after SRP along with reduction in probing depth but the lack of correlation of ALP levels with the plaque index may attribute to the fact that even though the plaque bacteria are a source of alkaline phosphatase the percentage contribution to the total GCF ALP levels is not significant. Humoto et al³ (2021) found Serum ALP value more in menopausal patient as compared to perimenopausal patient in severe periodontitis. Serum ALP was significantly correlated with the severity of periodontitis, clinical attachment loss, and the number of teeth lost among perimenopausal and postmenopausal women and in postmenopausal patients more periodontal

breakdown was seen. Bhattarai et al¹⁵ (2014) found that the ALP level was slightly higher in the post-menopausal group than in the pre-menopausal group while serum calcium level was significantly lower in the post-menopausal group than in the pre-menopausal group. Therefore, an increase in bone turnover accelerates bone mass reduction in post-menopausal women, whereas a decrease in bone turnover is associated with the preservation of bone mass.

All the studies conducted so far has aimed to rationalize the use of ALP from either saliva or serum or GCF in patients with chronic periodontitis and even comparison of the same with periodontally healthy individuals. However, none of the studies have compared the serum ALP levels in menopausal patients in periodontitis before and after phase 1 periodontal therapy with novel CLOHEX HEAL[®] as an adjunct. This was the first study to compare and evaluate the ALP levels in serum in menopausal patients with periodontitis after periodontal therapy with novel CLOHEX HEAL[®].

In our study, the changes in levels of ALP in serum is positively correlated to changes in clinical parameters in both the groups but better results were seen in group A (SRP with CLOHEX HEAL[®]) with statistically significant improvement in PI postoperatively.

Limitations of the study include small sample size, short follow up. It is recommended that future researchers conduct similar studies with a larger sample size with long follow up to ascertain the impact of non-surgical periodontal therapy in post-menopausal women.

Tables

Table 1:- Mean Serum ALP Pre and Postoperative 1 Month.

Serum ALP	Group A- SRP with CLOHEX HEAL [®]	Group B- SRP	p-value (Intergroup)
Baseline	152.91±13.15	142.09±32.72	0.504
Post treatment	147.94±18.93	140.11±20.99	0.937
Mean Change	4.97±5.78	1.98±11.73	-
Percentage Change	3.25% decrease	1.39% decrease	-
p-value (Intragroup)	0.000	0.01	

Table 2:- Mean of clinical parameters Pre and Postoperative 1 month.

Clinical Parameters		Group A- SPR with CLOHEX HEAL [®]	Group B- SPR	p-value
PI	Baseline	2.6±0.516	2.4±0.516	0.398
	Post treatment	0.7±0.483	0.90±0.316	0.288
	p-value (Intragroup)	0.00	0.447	
GI	Baseline	2.8±0.422	2.6±0.516	0.355
	Post treatment	1.2±0.422	1.4±0.516	0.355
	p-value (Intragroup)	0.00	0.035	
PPD	Baseline	5.4±0.516	5.6±0.516	0.398
	Post treatment	3.5±0.707	4.4±0.843	0.019
	p-value (Intragroup)	0.00	0.00	
CAL	Baseline	2±0.667	1.8±0.422	0.433
	Post treatment	1.2±0.422	1.4±0.516	0.355
	p-value (Intragroup)	0.00	0.03	

Conclusion:

Within the limitations of the present study, it can be concluded that SRP with or without CLOHEX HEAL[®] improves the clinical parameters in post-menopausal periodontitis. However, addition of CLOHEX HEAL[®] provided better plaque control and higher reduction in ALP levels.

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