EFFICACY OF HYALURONIC ACID, CHLORHEXIDINE MOUTHWASH AS ADJUNCT TO SCALING AND ROOT SURFACE DEBRIDEMENT IN CHRONIC PERIODONTITIS PATIENTS

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ABSTRACT

Background: Chronic Periodontitis is an infectious disease that results in inflammation of the protective tissues of the teeth, progressive loss of connective tissue, alveolar bone loss, and even tooth's loss if left without treatment nonsurgical mechanical therapy is the base of periodontal treatment.

Aim: The study aimed to evaluate the effect of hyaluronic acid (HA) mouthwash (0.025%) and chlorhexidine (CHX) mouthwash (0.12%) as adjunct to scaling and root surface debridement (S&RSD) in the treatment of chronic periodontitis patient.

Method: Sixty patients within the age group of 30-55 years enrolled to participate in the study. They were divided randomly into three groups (20 in each): First group received scaling and root surface debridement followed by HA, and the second group received scaling and root surface debridement followed by CHX, and the third group received scaling and root surface debridement only. Plaque index (PI), gingival index (GI), probing pocket depth (PPD) and clinical attachment loss (CAL) were recorded at baseline and two months after periodontal therapy.

Result: In all three groups a significant reduction in PI, GI, PPD and CAL were observed between base line and after two months of periodontal therapy (p<0.05)

Conclusion: The local uses of hyaluronic acid (HA) and chlorhexedine (CHX) mouth washs in conjunction with SRP has a significant beneficial effect on periodontal health in patients with chronic periodontitis with higher effect of hyaluronic acid (HA).

KEY WORDS: hyaluronic acid, chlorhexidine, chronic periodontitis, periodontal therapy, periodontal pocket.

INTRODUCTION

Chronic periodontitis is a common disease of the oral cavity consisting of chronic inflammation of the periodontal tissues that is caused by the accumulation of profuse amounts of dental plaque.(shaddox and Walker, 2010).

Periodontitis of advanced severity can result in tooth mobility, occasional pain and discomfort, compromised ability to masticate food, and eventual tooth loss(Charles, 2008). The main goal of periodontal therapy is to eliminate inflammation, arrest progression of periodontal disease, improve esthetics, and create an environment conductive to maintenance of periodontal health (Plessas, 2014).

Scaling and root surface debridement is effective means of treating and controlling periodontal disease. Scaling and root surface debridement are the thorough cleaning of the root surfaces to remove dental plaque and calculus from periodontal pockets as well as to smoothen the tooth root to remove bacterial toxins (Drisko, 2001)though, conventional mechanical debridement procedures do not remove all periodontopathic bacteria from the subgingival environment, especially those in inaccessible areas such as furcation, grooves, concavities, and deep pockets (Tanwar et al., 2016).

Chlorhexidine (CHX) digluconate is considered to be one of the most frequently used compounds; since 1950, it has been used as a potent broad-spectrum antiseptic agent in medicine with a pronounced antimicrobial effect on both Gram-negative and Gram-positive bacteria, as well as on fungi and some viruses. Moreover, the ability of CHX to inhibit the formation and development of bacterial plaque for several hours was demonstrated in 1970's because of its high affinity for oral surfaces (Aghili et al., 2015).

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In recent years, hyaluronic acid (HA) has obtained growing attention since promising results have been demonstrated in the treatment of inflammatory processes in medical areas such as dentistry, dermatology, ophthalmology, and orthopedics (Bansal J et al., 2010)

Hyaluronan (HA) mouthwash is a novel product that contains high molecular weight fraction of hyaluronic acid that is produced by a non-animal-derived biotechnological process. Hyaluronan is a linear polymer derived from two repeating disaccharide subunits (D-Glucuronic acid and N-acetylglucosamine), and is a natural constituent of the body's glycosaminoglycan (GAG) population. As a result of its non-toxicity, biocompatibility and numerous biochemical & physiochemical properties, the topical application of hyaluronic acid-based biomaterials , to periodontal pockets would offer beneficial effects in accelerating its healing and reducing its depth (Moseley et al., 2002).

Most of the studies were done on the effect of non-surgical periodontal therapy (scaling and root surface debridement) on serum inflammatory parameters in chronic periodontitis. In searching online databases no study was found in Iraq generally and Kurdistan Region especially about the healing effect of hyaluronic acid (0.025%) as mouthwash and comparing its effect with a dose of chlorhexidine (0.12%) in treatment of chronic periodontitis patients through clinical periodontal and biochemical parameters that's why this study is designed to accomplish the bellow aims:

Aims of the study

To evaluate the effect of hyaluronic acid mouth wash (0.025%) and chlorhexidine mouth wash (0.12%) as an adjunct to scaling and root surface debridement as combined therapy in patients with chronic periodontitis, clinically on gingival index, plaque index, clinical attachment loses and probing pocket depth

MATERIALS AND METHODS

Setting of the study

The present study was conducted in periodontics department /collage of dentistry/ University of Duhok, Duhok city. The patients were attending the Department of periodontics. The study was performed by single trained dentist.

Patient selection and design of study

The clinical comparative study conducted on 60 patients (male and female) with chronic periodontitis , their ages were ranged between 30-55 years old, The inclusion criteria for patients were as follow: Patients with moderate to severe periodontitis , presence of at least 8 teeth, periodontal pocket depth ≥ 5 mm , CAL = 1-2 mm for mild and CAL = 3-4mm for moderate (Armitage, 1999) , indicated for scaling and root surface debridement (S&RSD) as a definitive method of therapy. all the patients fitted the following criteria which was no history of systemic disease, no smoking, no history of periodontal treatment in the previous 3 months prior to baseline examination, chronic periodontitis involving both sides of both jaws, no antibiotics taken in the last 3 months, the presence of 20 teeth, the willingness to participate and to follow up until the end of the study and no orthodontic appliance.

The entire participant already attended to periodontal department who suffering from periodontal disease, after agreement to participate in the study and to return back after two months. At baseline the clinical periodontal parameters (plaque index (PI), gingival index (GI), periodontal pocket depth (PPD) and clinical attachment level (CAL) were recorded. The patients were asked to come back two months later to register the clinical periodontal parameters.

Methodology

The participants were divided by randomly method into three main groups treated with scaling and root surface debridement, (20) for each group. The first group, group A received 0.025% of hyaluronic acid as mouth wash twice daily for 10 days. The second group, group B received chlorhexidine mouthwash in a concentation of 0.12% twice daily for 10 days, and the third group, group C (control group) not received any mouth wash. The dose of mouth wash was 10 ml , and the rinsing was done for 1 minute after ½ hour of tooth brushing and the patient was refined from eating or drinking for at least½ hour after mouth rinse.

RESULTS

Statistical analyses

The data were expressed as mean and standard deviation. The comparison of clinical parameters between baseline and two months was examined in paired-t test. The homogeneity of the clinical periodontal parameters among study groups was examined in one-way ANOVA. The comparison of means improvements of clinical periodontal parameters was examined in one-way ANOVA test. P-value <0.05 was considered as significant. The statistical analyses were performed by statistical package for social sciences version 25 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp).

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Periodontal parameters

Sixty patients were participated in the study consist of 34 male (62.2%) and 26 female (37.8 %), with an age of 30 -55 years old with mean age (41.41+3.26). The mean recordings for clinical periodontal parameters are seen in table (1). The results showed that there were reductions in mean value of plaque index(PI), gingival index(GI), probing pocket depth(PPD) and clinical attachment loss (CAL) in group A (HA+ S&RSD), group B (CHX+ S&RSD) and group C (only S&RSD) from baseline to two months after periodontal therapy. The difference in the mean value scores was significance P value < 0.005.

Comparison of clinical periodontal parameters between baseline and at two months after periodontal therapy

Table 1, shows that the mean values of plaque index (PI), gingival index (GI), probing pocket depth (PPD) and clinical attachment loss (CAL) in group A (HA+ S&RSD) at the baseline before treatment were 2.36 ± 0.22, 2.15 ± 0.24, 5.91 ± 0.48 and 6.25 ± 0.5 then their mean values were significantly reduced into 0.79 ± 0.18, 0.89 ± 0.21, 4.10 ± 0.43 and 4.91 ± 0.50 respectively after two months of periodontal therapy ($P < 0.005$).

The mean values of PI,GI, PPD and CAL in group B (CHX+ S&RSD) at base line were 2.32 ± 0.23, 2.10 ± 0.20, 5.87 ± 0.36 and 6.07 ± 0.39 and significantly reduced to 1.03 ± 0.17, 1.11 ± 0.23, 4.41 ± 0.43 and 5.21 ± 0.39 respectively after two months of periodontal therapy ($P < 0.005$).

In the group C (only S&RSD) the mean values of PI,GI, PPD and CAL at base line before treatment were 2.28 ± 0.11, 2.13 ± 0.11, 5.73 ± 0.34 and 6.01 ± 0.31 and significantly reduced into 1.41 ± 0.16, 1.42 ± 0.16, 4.74 ± 0.31 and 5.51 ± 0.30 respectively after two months of periodontal therapy.

Table (1): Comparison of clinical periodontal parameters plaque index PI, gingival index GI, probing pocket depth PPD and clinical attachment loss CAL at baseline and two months after periodontal therapy in group A (HA+ S&RSD), group B (CHX+ S&RSD) and group C (only S&RSD).

| Paired Samples Statistics			
	mean ±SD	mean ±SD	P-Value
Group A (HA+S&RSD)/n=20	**Baseline**	**Two months**	
PI	2.36 ±0.22	0.79 ±0.18	<0.001
GI	2.15 ±0.24	0.89 ±0.21	<0.001
PPD	5.91 ±0.48	4.10 ±0.43	<0.001
CAL	6.25 ±0.50	4.91 ±0.50	<0.001
Group B (CHX+S&RSD)/n=20	**Baseline**	**Two months**	**P-Value**
PI	2.32 ±0.23	1.03 ±0.17	<0.001
GI	2.10 ±0.20	1.11 ±0.23	<0.001
PPD	5.87 ±0.36	4.41 ±0.43	<0.001
CAL	6.07 ±0.39	5.21 ±0.39	<0.001
Group C (only S&RSD)/n=20	**Baseline**	**Two months**	**P-Value**
PI	2.28 ±0.11	1.41 ±0.16	<0.001
GI	2.13 ±0.11	1.42 ±0.16	<0.001
PPD	5.73 ±0.34	4.74 ±0.31	<0.001
CAL	6.01 ±0.31	5.51 ±0.30	<0.001
Paired t-test was performed for statistical analyses.			

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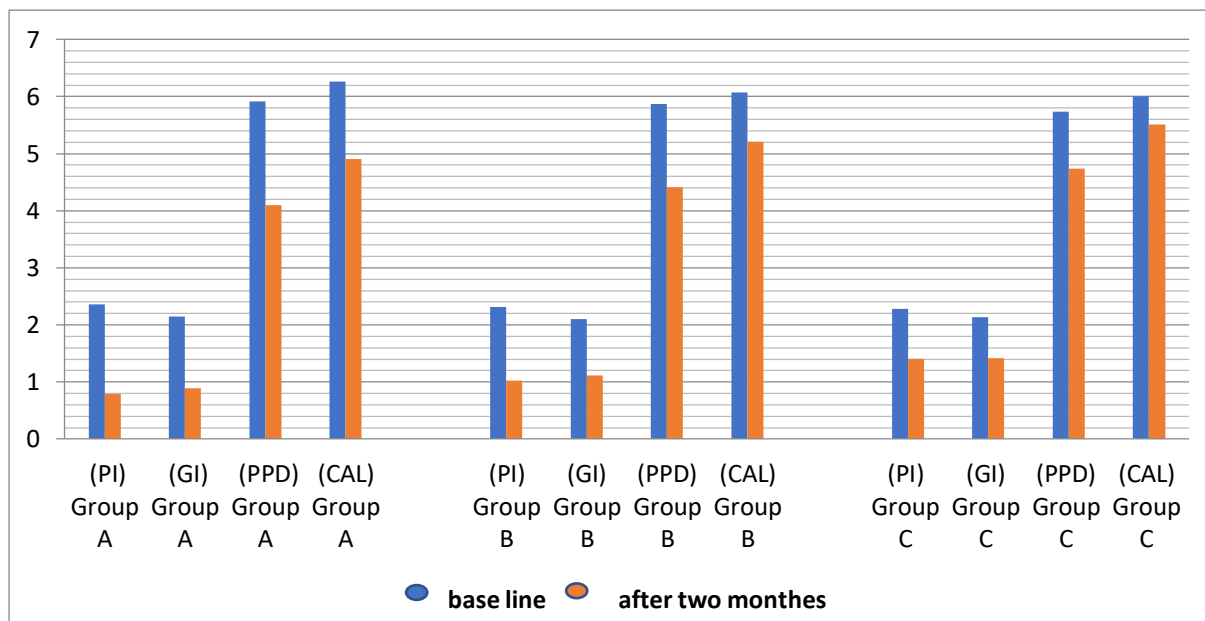
Fig. (1): Comparison of clinical periodontal parameters PI, GI, PPD and CAL at baseline and two months after periodontal therapy in group A, group B   and group C

Comparison of clinical periodontal parameters (PI, GI, PPD and CAL) improvement between test groups (A&B) and control group C.

Table 2,shows that the mean improvement of PI, GI, PPD and CAL were (1.57±0.18), (1.26 ± 0.17), (1.81±0.17) and (1.33±0.20) respectively in group A , which was significantly (P< 0.005) higher than the mean improvement of PI,GI,PPD and CAL in group B (1.28±0.12), (0.99±0.15), (1.51±0.09) and (0.86±0.11) and group C (0.88±0.11), (0.72±0.14), (0.99±0.22)and (0.50±0.10) respectively after two months of periodontal therapy.

The mean improvement of PI, GI, PPD and CAL were (1.28±0.12), (0.99±0.15), (1.51±0.09) and (0.86±0.11) respectively in group B, which was significantly (P< 0.001) higher than the mean improvement of PI, GI, PPD and CAL in group C (0.88±0.11), (0.72±0.14), (0.99±0.22) and (0.50±0.10).

On comparison between the two groups, group A and group B after two months of periodontal therapy the difference was significant P<0.005..Similerly the same result was seen between group A and group C, group B and group C P value <0.005.

Table (2): Comparison of clinical periodontal parameters (PI, GI, PPD and CAL) improvement between test groups (A&B) and control group C.

Group Statistics					
	Group	**N**	**Mean**	**Std. Deviation**	**P-Value**
PI improvement	A (HA+ S&RSD)	20	1.57	0.18	<0.001
	B (CHX+ S&RSD)	20	1.28	0.12	
	A (HA+ S&RSD)	20	1.57	0.18	<0.001
	C (only S&RSD)	20	0.88	0.11	
	B (CHX+ S&RSD)	20	1.28	0.12	<0.001
	C (only S&RSD)	20	0.88	0.11	
	Group	**N**	**Mean**	**Std. Deviation**	**P-Value**
GI improvement	A (HA+ S&RSD)	20	1.26	0.17	<0.001
	B (CHX+ S&RSD)	20	0.99	0.15	
	A (HA+ S&RSD)	20	1.26	0.17	<0.001

	Group	N	Mean	Std. Deviation	P-Value
	C (only S&RSD)	20	0.72	0.14	
	B (CHX+ S&RSD)	20	0.99	0.15	<0.001
	C (only S&RSD)	20	0.72	0.14	
	Group	**N**	**Mean**	**Std. Deviation**	**P-Value**
PPD improvement	A (HA+ S&RSD)	20	1.81	0.17	<0.001
	B (CHX+ S&RSD)	20	1.51	0.09	
	A (HA+ S&RSD)	20	1.81	0.17	<0.001
	C (only S&RSD)	20	0.99	0.22	
	B (CHX+ S&RSD)	20	1.51	0.09	<0.001
	C (only S&RSD)	20	0.99	0.22	
	Group	**N**	**Mean**	**Std. Deviation**	**P-Value**
CAL improvement	A (HA+ S&RSD)	20	1.33	0.20	<0.001
	B (CHX+ S&RSD)	20	0.86	0.11	
	A (HA+ S&RSD)	20	1.33	0.20	<0.001
	C (only S&RSD)	20	0.50	0.10	
	B (CHX+ S&RSD)	20	0.86	0.11	<0.001
	C (only S&RSD)	20	0.50	0.10	

Independent t-test was performed for statistical analyses.
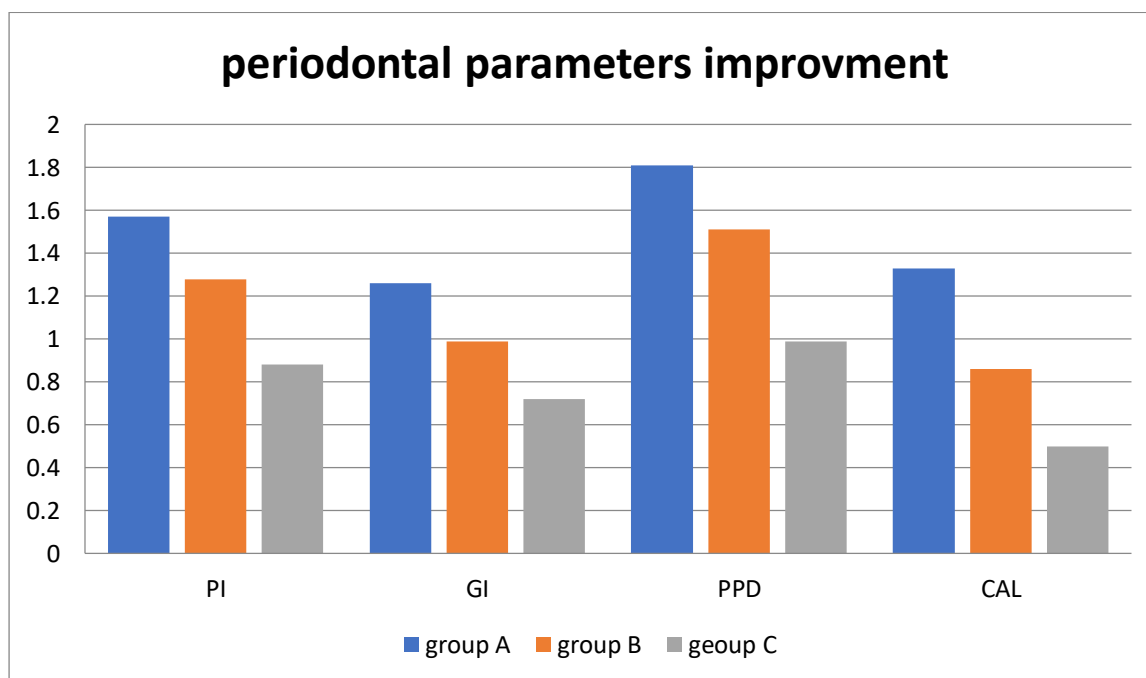

Fig. (2): Comparison of clinical periodontal parameters (PI, GI, PPD and CAL) improvement between test groups (A&B) and control group C.

DISCUSSION

Effect of combined therapy in chronic periodontis

The current study was designed to evaluate the effect of hyaluronic acid (HA) as mouth wash (0.025%) on periodontal health status of patients with chronic periodontitis and comparison its efficiency with standard dose of chlorhexidine CHX mouthwash (0.12%) in treated chronic periodontitis patients throughout evaluation of clinical periodontal parameters like plaque index(PI), gingival index(GI), probing pocket depth (PPD) and clinical attachment loss (CAL) in treatment of chronic periodontitis before and after two months of scaling and root surface debridement (S&RSD).

The study groups showed significant reduction in clinical periodontal parameters after two months of periodontal therapy (P < 0.005).

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Significant differences were seen between group A and group B in relation to clinical periodontal parameters after periodontal therapy P < 0.05.

Clinical periodontal parameters before and after scaling and root surface debridement (S&RSD)

This study showed reduction of inflammatory reaction and improvement of periodontal tissue throughout significant reduction decrease of PI, GI, , PPD and CAL values in group A (HA+ S&RSD), group B (CHX+ S&RSD) and group C (only S&RSD) after two months of scaling and root surface debridement, this may be attributed to alteration or elimination of putative periodontal pathogens and resolution of inflammation, creating an environment conducive to periodontal health and decreasing the likelihood of disease progression (Refulio et al., 2013).

In chronic periodontitis, especially in pockets greater than 5 mm it has been thought that maintaining adequate levels of oral hygiene using mechanical methods alone is insufficient; therefore it is logical that local antimicrobial mouth rinses of other chemotherapeutic agents may enhance the clinical and microbial benefits of mechanical debridement. and this has led to help prevent and control chronic periodontitis (Haffajee et al., 2007) .

In the existing study, we have focused on the effectiveness of hyaluronic acid (HA) as mouthwash on periodontium as an adjunct to mechanical periodontal therapy in management of chronic periodontitis in comparison to chlorhexidine mouthwash. Inflammation occurs in response to bacterial biofilm present in the marginal gingiva and periodontal pockets this is important in the pathogenesis of periodontal disease. Scaling and root surface debridement are effective in altering the flora and the hyaluronic acid (HA) has known to enhance the formation of extracellular connective tissue matrix leading to non-inflamed and healthy periodontal tissue that is less susceptible to swollen and bleed on probing. These results are in agreement with the previously done studies by (Pomowski et al., 2003).

In this study, the clinical periodontal parameters showed statistically significant reductions following hyaluronic acid mouthwash as an adjunct oral hygiene measure in group A as compared to group C. This mean reduction in periodontal parameters was in accordance with the study (Chauhan et al., 2013)

Jentsch *et al*.,(Jentsch et al., 2003) Johannsen *et al*.,(Johannsen et al., 2009) and Pistorius *et al*,(Pistorius et al., 2005) also reported significant improvement in gingival and periodontal health after application of HA as an adjunct to S&RSD. Improvement in clinical periodontal parameters as in PI, GI, PDD and CAL in HA/S&RSD group may be attributed to its ability to promote regeneration and its anti‑edema and anti‑inflammatory properties that positively influence the local inflammation(Xu et al., 2004).

Similar mechanism might be involved in the effect of the combination of CHX rinses and S&RSD leads to a better reduction in clinical periodontal parameters as in PI, GI, PDD and CAL as compared with scaling and root surface debridement alone in treatment of chronic periodontitis (Faveri et al., 2009).

Both S&RSD alone (control group) and adjunctive use of HA and CHX mouth washes (test groups) resulted in statistically significant reduction in the clinical periodontal parameters. Improved clinical parameters were observed due to treatment (S&RSD with or without mouth washes) modalities, along with improved oral hygiene practices commonly observed in the study subjects(Johannsen et al., 2009).

In the current study, we achieved a significant improvement at two months after scaling and root surface debridement in the clinical periodontal parameters of group C (S&RSD alone), although the gain of improvement in group C was non-surgical therapy can moderately improve the oral-health-related quality of life (Shanbhag et al., 2012).

It was seen that subjects from both groups, group A (HA+ S&RSD) and group B (CHX+ S&RSD) exhibited significant reduction in the clinical periodontal parameters after two months when compared to the baseline (p<0.001). These results were found to be consistent with the previous studies done by Chauhan (Chauhan et al., 2013) and contrast to study done by (silvia et al, 2010) reason is back to the frequency uses of hyaluronic acid and the biological properties also dose of CHX used by their study.

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