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ORIGINAL ARTICLE

Clinical evaluation of 0.8% hyaluronic acid gel adjunctive to scaling and root planning in the treatment of chronic periodontitis in Hyderabad Sindh.

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ABSTRACT… Objective: To determine the effect of hyaluronic acid as an adjuvant to root planning and scaling for the management of chronic periodontitis patients. **Study Design:** Prospective Randomized-controlled Clinical study. **Setting:** Department of Periodontology, Avicenna Medical and Dental College lahore. **Period:** 1st July 2022 to 31st June 2023. **Methods:** A total of 50 diagnosed patients of chronic periodontitis and assigned into two groups according to the treatment given. Group A received Hyaluronic acid+Scaling and Root Planning whereas group B patients received Scaling and Root Planning alone. Patients were clinically evaluated before receiving treatment. Periodontal Depth (PD), Clinical Attachment level (CAL), Blood on Probe (BOP), and Plague Index (PI) were recorded at Baseline appointments, 3rd-month appointments, and 6th-month appointments after receiving treatment. The results were analyzed by SPSS version 21. **Results:** in both groups, significant improvement was observed in the mean value of PD, and CAL after receiving treatment, while comparing both groups, Group A patients found more significant results (<0.05) as compared to Group B. The study also found a significant reduction in BOP and PI of both groups of patients after receiving treatment but there was not any significant difference found in the mean value of BOP and PI in both groups. **Conclusion:** The study was conducted to determine the effectiveness of Hyaluronic acid as an adjuvant therapy that may affect chronic periodontitis along with SRP. The current study concluded hyaluronic acid gel is an effective adjuvant therapy with SRP.

Key words: Chronic Periodontitis, Hyaluronic Acid, Scaling and Root Planning.

INTRODUCTION

Periodontitis is a chronic inflammatory condition caused by bacterial plaque that affects the periodontium and the tissues that surround the teeth, including the cementum, gingiva, alveolar bone, and periodontal ligament.[1] Periodontitis is a prevalent and potentially serious oral health disease, representing a progressive inflammation of the supporting structures around the teeth.[2] Unlike its precursor, gingivitis, periodontitis involves not only the superficial inflammation of the gums but also the deeper layers and structures that are crucial for tooth stability and overall oral health.[3] This condition emerges when untreated gingivitis, characterized by redness, swelling, and bleeding of the gums, advances to a more severe stage. The transformation is characterized by the formation of pockets between the gums and teeth, which act as reservoirs for harmful bacteria.[4] As these bacteria proliferate and interact with the body's immune response, a cascade of events unfolds, leading to the gradual breakdown of the bone and tissues that anchor the teeth.[5]

Dental plaque has an important role in periodontal diseases, plague is a bacterial film that sticks to teeth and causes periodontitis, which builds up over time. Plaque can produce chemicals that irritate and inflame the gums and start the progression toward periodontitis when it is not adequately removed by good oral hygiene habits (brushing, flossing, and routine dental cleanings.[6] The body's immunological and inflammatory response to bacteria in the oral environment is a key factor in the development and severity of the disease.[7] Whether the condition remains mild

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(gingivitis) or progresses to the more serious form of periodontitis depends on the interaction between the bacterial components and the host response. Other external factors like the use of tobacco, medication, and a diet lacking essential nutrients can play an important role in the development of periodontitis.[8] The treatment of chronic periodontitis typically involves a combination of professional dental care and good oral hygiene practices at home including tooth brushing, maintaining oral hygiene, and quiet smoking habits.[9] Mechanical removal of calculus (hardened plaque) and plaque through scaling and root planning (SRP) is indeed a fundamental and essential aspect of controlling and treating periodontitis. SRP is a cornerstone procedure in the management of periodontal disease.[10] The scaling and root planning method is a common non-surgical practice in dentistry for the mechanical removal of calculus and plaque, whereas SRP is also a fundamental tool for periodontal disease but it might not eliminate bacteria properly and can cause periodontitis, so there is a need for such an adjuvant therapy observed to treat chronic periodontitis.[11]

Hyaluronic acid (HA) is a naturally occurring substance found in various tissues of the human body, including the skin and joints.[12] Hyaluronic acid (HA) is a polysaccharide with a high molecular weight that belongs to the glycosaminoglycan family.[13] In recent years, there has been attention to using hyaluronic acid for various medical and dental applications, including in the field of periodontics. The production of HA is regulated by "fibroblast growth factor-2", which can be detected in human periodontal muscle cells, The anti-inflammatory, anti-edematous, and anti-bacterial activities of HA have been studied in the field of dentistry, notably in gingival disorders caused by microorganisms present in sub gingival plaques.[14] According to this study hypothesis in the context of periodontal treatment, hyaluronic acid gel can be proven effective due to its anti-inflammatory and antibacterial properties. Therefore the goal of the study was to evaluate the clinical efficacy of 0.8% Hyaluronic Acid (HA) gel (commercially available) as an adjuvant to scaling and root planning in the treatment of chronic periodontitis.

METHODS

This "prospective randomized-controlled" clinical study was conducted for one year of the period from 1st July 2022 to 31st June 2023. This clinical trial was carried out at the "Periodontology Department, Avicenna Medical and Dental College Lahore".

A total of 50 clinically diagnosed chronic periodontitis patients were enrolled in the study. The study purpose was informed to all participants and written consent was obtained from each participant. Patients aged 18 to 55 years with diagnosed periodontitis, willing to participate, according to the 2017 World Workshop at least five locations with a probing depth of 5 mm, at least 20 teeth, and stage II-III periodontitis falling in inclusion criteria were comprised in the study, whereas patients with system illness, having antibiotics for at least three months, pregnant women, lactation, hypersensitive, drug allergic and age below 18 years or above 55 years excluded from the study.

A total of 50 patients were randomly assigned to two groups A and B. Each group consists of 25 chronic periodontitis patients. The clinical variables including Plague Index (PI), Periodontal Depth (PD), clinical tooth attachment (CAL), and Blood on probe (BOP) of all teeth were measured in a four-point measurement per tooth (mesiobuccal, distobuccal, mid-oral buccal, and) using a simple manual periodontal probe at three appointments: before SRP (baseline), 3rd and 6th months after receiving treatment. Under local anesthesia, all the patients of both groups received full mouth SRP. Patients of group A treated with 0.8% Hyaluronic Acid gel by a syringe into a deep periodontal pocket immediately after SRP. While group B patients received SRP alone. All the patients were advised to brush twice a day and use mouthwash, quit the habit of smoking and other addictions, and try to maintain oral hygiene.

Data Analysis

After the clinical trial, PI, PD, BOP, and CAL were

measured after the third and sixth months. Data was recorded on "Excel Worksheet 2013" Data was analyzed by SPSS version 21. The mean SD and percentage of patients was calculated. Wilcoxon test and Mann-Whitney U test were applied to compare both the A and B group.

RESULTS

A total of 50 "chronic periodontitis patients" who received treatment were enrolled in the clinical trial after being assigned to Group A and Group B, out of 50 32 (64%) were male patients, and 18 (36%) were female patients. The mean age of male participants was recorded as 36.51±9.12 years and for females was 34.12±10.51 years, with the age group ≥18 to ≤55 years.

The clinical results of chronic periodontitis patients were recorded during Baseline, 3rd month, and 6th month appointments. At the baseline clinical examination, the mean Periodontal depth (PD) was 5.2±0.7mm in group A and 5.1± 0.7 mm in group B, the mean CAL was 4.9±1.1 mm in group A and 5.1± 0.6 mm in group B, BOP was 19.3±8.7% in Group A and 21.8±11.1% in group B, whereas PI was recorded 23±12% in group A and 24±10% in group B. Statistically, no significant difference was found in both groups at baseline (shown in Table-I)

Variables	Group A	Group B	P (U test)
PD (mm)	5.2±0.7	5.1± 0.7	0.235
Sites with PD	33±19	28± 17	0.133
CAL (mm)	4.9±1.1	5.1± 0.6	0.158
Sites with CAL	89±18	94 ± 14	0.218
BOP (%)	19.3±8.7	21.8±11.1	0.642
PI (%)	23±12	24±10	0.959

Table-I. Comparison of clinical results in Group A and Group B at baseline

Significant clinical improvement was observed on the 3rd and 6th-month appointments after receiving treatment in both groups. After analysis of periodontal depth (PD) and clinical attachment level (CAL) significant in group A (p=0.05) as compared to group B. The mean PD was recorded at 1.8±0.7with a mean difference of 4.6±0.0at a 3rd-month appointment, and0.2±0.9with a mean difference of 5.0±0.2at a 6th-month appointment in group A. In group B the PD was recorded2.5±1.0with a mean difference of 2.6±0.3at 3rd month and 1.1± 0.9with a mean difference of4.0±0.2at 6th month appointment (Elaborated in Table-II). Whereas, the mean CAL was 1.3±1.1in the 3rd month while 9.0± 1.7 in the 6th month in group A, whereas the mean CAL recorded 1.3± 1.1 in the 3rd month and 0.84±0.9was reported at the 6th-month appointment in group A, while in group B the mean CAL was recorded 3.1± 0.6and 1.7±0.9 (as Shown in Table-II). Correspondingly, the number of places with PD ≤5 mm was condensed more in Group A than in Group B (P = < 0.05 and 0.085). According to study results, there was no significant difference found between POB and IP in both groups.

The mean difference in the CAL and PD in both groups at different appointments is described in Table-II

DISCUSSION

Chronic periodontitis is a common and serious inflammatory condition that affects the supporting structures of the teeth, including the gums, periodontal ligament, and alveolar bone. It can lead to gum recession, tooth mobility, and even tooth loss if left untreated. Beyond the physical consequences, chronic periodontitis can have a significant impact on the quality of life of patients. Scaling and root planning is a common and effective procedure known for the management of periodontal diseases including gingivitis. Besides this Hyaluronic Acid is well well-known for its anti-inflammatory properties and wound healing abilities.[15] Because of these properties, HA has received much research attention in medical literature in the last several years. Therefore, this study aimed to evaluate the efficacy of Hyaluronic acid with SRP and compare it with SRP alone in the management of chronic periodontitis. The study explores many important results that can be proven effective in the field of dentistry.

The study included 50 patients of chronic periodontitis by following inclusive criteria,

Variable	Group A (n=25)			Group B (n=25)			P(Utest)
	Mean±SD	Mean Diff:	P(Wilcoxon test)	Mean±SD	Mean Diff:	P(Wilcoxon test)	
PD (mm)							
3rd Month	1.8±0.7	4.6±0.0	<0.001	2.5± 1.0	2.6±0.3	<0.001	0.025
6th Month	0.2±0.9	5.0±0.2	<0.001	1.1± 0.9	4.0±0.2	<0.001	0.475
Sites with PD							
3rd Month	15±2.3	18±16.7	<0.001	18±5.7	10±11.3	<0.001	0.021
6th Month	9.0± 1.7	24±17.3	<0.001	15±2.1	13±14.9	<0.001	0.052
CAL (mm)							
3rd Month	1.3±1.1	3.6±0.0	<0.001	3.1± 0.6	2.0±0.0	<0.001	0.019
6th Month	0.84±0.9	4.1±1.8	<0.001	1.7±0.9	3.6±0.3	<0.001	0.063
Sites with CAL							
3rd Month	45.9±1.8	44.9±16.2	<0.001	62.7±1.0	32.7±13.0	<0.001	0.042
6th Month	34.6±09	85.6±17.1	<0.001	51.1±2.1	43.1±11.9	<0.001	0.065
BOP (%)							
3rd Month	2.91±1.4	16.6±7.3	0.684	3.1±1.5	16.7±9.5	0.974	0.072
6th Month	0.90±0.7	20.1±8.0	0.052	1.0±0.9	19.8±10.8	0.064	0.082
PI (%)							
3rd Month	1.2±0.76	22.7±11.36	0.581	1.3±0.6	21.7±9.4	0.563	0.056
6th Month	0.4±0.45	22.6±11.6	0.153	0.6±0.9	22.4±9.1	0.456	0.045

Table-II. Comparison of clinical results in Group A and Group B at 3rd and 6th month appointments

randomly all patients were assigned into groups, group A patients were treated with Hyaluronic Acid addition to SRP, while group B patients received SRP alone. This treatment variation is due to the evaluation of the effects of HA.

According to this current research study, a significant improvement in PD and CAL was observed in Group A as compared to Group B. The mean PD recorded during 3rd and 6th-month appointments was 1.8±0.7 and 0.2±0.9 in group A, whereas in group B it was recorded at 2.5±1.0 and 1.1± 0.9 respectively. The mean difference was calculated between baseline and after-treatment appointments. The mean difference was 4.6±0.0 at the 3rd-month appointment and 5.0±0.2 at the 6th-month appointment in group A, and in group B it was measured at 2.6±0.3 and 4.0±0.2. The mean CAL was calculated at 1.3±1.1 and 0.84±0.9 (with a mean difference of 3.6±0.0 and 4.1±1.8) in group A and 3.1± 0.6, 1.7±0.9 (with a mean difference of 2.0±0.0 and 3.6±0.3) in group B during both appointments However, the study results are also comparable with the study of Sigrun et al (2013).[16] A study in patients of chronic periodontitis treated with Hyaluronic acid as an adjuvant tool to SRP found significant improvement when compared with patients who received SRP alone. The study also reported a significant reduction in the mean value of CAL and PD during multiple appointments in the patients treated with HA+SRP as compared to SRP alone.

The Plague Index is a major contributing clinical factor in the development of chronic periodontitis. During the study PI and BOP were recorded at multiple appointments, therefore the study found a significant reduction in both groups of patients after receiving treatment but there was not any important variance found in the mean value of BOP and PI in both groups. Padma et al (2014) reported a significant improvement in patients who were treated with Hyaluronic acid with SRP.[17] According to Sigrun et al (2013), the study reported significant improvement in both the test and control groups but when compression of both groups there was no significant difference found.[16]

CONCLUSION

The study was conducted with the aim of determining an effective adjuvant therapy that may affect chronic periodontitis along with SRP.

The current study concluded hyaluronic acid gel is an effective adjuvant therapy with SRP. However study found a significant reduction in clinical parameters including CAL, PD, BOP, and IP.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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2	Saba Parveen Soomro	Study design, questionnaire design, Literature review.	
3	Khurram Anwar	Experimental work, data interpretation.	
4	Naveed Irfan	Data analysis and proof reading.	
5	Arsalan Ahmed	Data collection, Drafting in literature search.	
6	Kundan	Review, Patient selection.	