An Evaluation of 0.2% Hyaluronic Acid Gel (Gengigel®) in the Treatment of Gingivitis: A Clinical & Microbiological Study

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Abstract

Aim: Hyaluronic acid is a glycosaminoglycan with anti-inflammatory & anti edematous properties. This study is seeking to ascertain whether Hyaluronic acid gel formulation is clinically and microscopically effective in treatment of gingivitis.

Methods: In longitudinal, randomized, and placebo-controlled clinical trial, 105 patients with chronic plaque induce gingivitis were randomly divided into three groups; negative control group, placebo control group and test group. Patients were instructed to apply gel on inflamed gingiva twice daily in addition with routine oral hygiene maintenance. The clinical parameters Plaque Index (PI), Gingival Index(GI) and Papilla Bleeding Index (PBI) were determined at intervals of 1 week, 2 weeks and 4 weeks from baseline, microbiological parameters were monitored at the interval of 4 weeks from baseline.

Results: An improvement of all clinical variables was observed ($p<0.05$) for all treatment modalities. Clinically, There is significant difference ($p<0.05$) for GI & PBI in test group as compared to other groups, but reduction in PI was non-significant. In negative control and placebo control groups, the difference between clinical parameters was non-significant. Statistically significant ($p<0.05$) reduction in percentage of anaerobic gram negative bacilli and relative increase of gram positive coccoid cells was seen in all treatment groups at 4 weeks as compared to baseline. However, results were not statistically significant ($p>0.05$) in pair wise comparison in between groups.

Conclusion: Local application of 0.2 % HA gel adjunct to non surgical periodontal treatment provided a significant improvement in clinical parameters than placebo control and negative control groups. Microbiologically experimental group does not showed any spastically significant results.

Key Words: Dental scaling, Gingivitis, Hyaluronic acid, Microorganisms

Introduction

Plaque-induced gingivitis is very common, and generally follows a cyclical or relapsing pattern. Periodontal disease is the commonest reason for tooth extraction and unfortunately, its incidence is rising. Because of painless nature, patients often fail to recognize gingival disease. Therefore maximum attention should be given to gingivitis therapy as a strategy for preventing periodontitis.

A treatment plan for gingivitis may include debridement of tooth surfaces to remove supra and subgingival plaque & calculus, patient motivation and oral hygiene instructions [1]. After mechanical debridement of teeth, various modes of treatment in home care have been tried with varied success. All the products had been shown to have anti-bacterial and anti-plaque effect on local application, but they have less penetration, substantivity and reparative action.

With the advances in understanding of inflammatory mechanisms and wound healing process associated with periodontal diseases, numerous extracellular matrix components like hyaluronic acid, chondroitin sulphate and fibronectin are identified as promoters of periodontal healing and regeneration [2].

Hyaluronic Acid (HA), also known as hyluronan or hyluranate, is a connective tissue glycosaminoglycan which forms glue like extracellular matrix of connective tissue. It acts as a barrier to plaque bacteria and fulfils a variety of extracellular functions that are vital to the maintenance of healthy gingival tissue. It has a number of embreyogenic and wound healing properties, including the facilitation of cell migration and differentiation during tissue formation and repair [3]. It is composed of repeated nonsulfated disaccharide units consisting of D-glucoronic acid and N-acetyl-D-glycosamine linked by β (1-3) and β (1-4) glycoside linkages respectively [4].

These substances provide stability and elasticity to the tissue. Reports by various authors support the assumption that hyaluronic acid is critically important in the localization of blood vessels, wound healing, and tissue regeneration [5].

As a consequence of its non-toxicity, biocompatibility and numerous biochemical & physiochemical properties, the use of exogenous hyaluronic acid based biomaterials, applied topically to inflamed periodontal sites would offer beneficial effects in modulating and accelerating the host response [2]. It is available as spray form, gel form and mouthwash form. As it is a newer drug fewer studies has been carried out using 0.2 % Hyaluronic Acid gel (Gengigel®, Ricerfarma S.R.L, Milano, Italy) in plaque induced gingivitis.

The purpose of this clinical & microbiological trial was to evaluate the effects of 0.2% Hyaluronic Acid gel under controlled conditions in patients with gingivitis over a 4-week period following a professional oral hygiene session.

Aim

To evaluate the therapeutic efficacy of 0.2% Hyaluronic Acid Containing Gel (Gengigel®) in cases of gingivitis as an adjunct to scaling, on clinical i.e. plaque index, gingival index and

papillary bleeding index and microbiological parameters i.e. cultural estimation of microorganisms and compare it with scaling and placebo.

Methods

This four week clinical and microbiological trial included 105 subjects comprising of both the sexes, age ranging from 15-40 years, from the Out Patient Department of Periodontology, Government Dental College and Hospital, Ahmedabad, Gujarat, India. Patients who diagnosed as suffering from chronic gingivitis, bleeding while brushing and at least 2-3 interproximal sites affected in each of four quadrants, with minimum 20 remaining teeth in the oral cavity and willingness to come for follow up visits were included in study. The institutional review board and ethical committee approved the study protocol, and written and verbal informed consent was obtained from all study participants.

Patients having history of any local and/or systemic antibiotic therapy, within past 6 months, any immune compromised condition or chronic illness like diabetes, or those receiving radiotherapy or chemotherapy, pregnant and lactating females, history of periodontal surgical intervention, smokers were excluded from this study.

After selecting the patients, preliminary information was recorded in specially designed proforma. Clinical examination was done in a dental chair under standard conditions of light, using mouth mirror and graduated UNC-15 periodontal probe. Subjects selected had at least 2-3 interproximal sites in each quadrant exhibiting bleeding on probing.

Before therapy, patients were called and clinical parameters recorded:

1. Gingival index (GI) (Loe and Silness Gingival index) [6].
2. Plaque index (PI) (Turesky Gilmore Glickman modification of the Quingley Hein plaque index) [7].
3. Papillary Bleeding Index (PBI) (Saxer et al.) [8].

After recording of clinical parameters, initial periodontal therapy including oral hygiene instructions, motivation of patient and scaling and root planning done.

Study design

All patients were evaluated based on demographic and clinical data at baseline, divided in 3 equal groups of 35 each and randomly assigned to different treatment modalities (*Table 1*):-

1. Negative control group: Scaling.
2. Placebo control group: Scaling plus placebo gel.
3. Test group: Scaling plus Hyaluronic Acid Gel

After debridement was finished, group 3 patients are given 0.2 % Hyaluronic Acid gel and group 2 patients were given placebo gel for home use application. The patient is advised to take constant length of 1.5cm gel which was found to be equal to 1 ml of gel and place it in the inflamed area of the buccal and lingual gingiva twice daily. The placebo product consisted of the gel excipients only, so that it was indistinguishable from the product containing the active constituent in terms of texture, flavor, color and taste. Tooth brushing or eating was avoided for next 3 hours. No restriction of the individual oral hygiene procedures was given.

Microbiological examination

Sample for microbiological examination was taken just before starting therapy. All the detectable supragingival deposits were removed and teeth isolated and dried by cotton rolls. Sterile curette was moved to the bottom of respective pocket and put into a vial containing anaerobic culture media, Thioglycolate broth. Care was taken to prevent the exposure and contamination of the specimen. Microbiological sampling at the re examination was performed immediately before clinical examination at 4 weeks.

Method of anaerobic culturing

The specimen in Thioglycolate broth was inoculated on Blood Agar and Mac Conkey Agar plates. Blood Agar is a good enrichment medium and haemolysis if any is enhanced when blood agar is incubated anaerobically. Thus, colony appearance and haemolysis on Blood Agar assists in identification of the anaerobes. Along with Blood Agar, a plate of Mac Conkey Agar was also inoculated for each sample, as Mac Conkey Agar will enhance the growth of gram negative bacilli.

The plates were labelled first and then inoculated with sterile loop. The plates were then immediately kept in anaerobic jar. The Gaspak sachet was cut from side and 10 ml water was put in it. The sachet was then immediately kept inside the anaerobic jar and jar closed tightly to ensure that the air inside does not interact with the air outside the jar. The reaction in the sachet starts and in the presence of Palladium catalyst, anaerobic conditions achieved within 1-2 hours. The jar was kept in incubator for 48-72 hours at 37°C.

After 48-72 hours, the jar was taken out of incubator and plates were removed to observe the growth. The plates with growth were taken as positive and those without growth were taken as negative. Bacteria were identified based on their morphotype i.e. shape, size and motility and were divided into three groups: Gram positive cocci, Gram negative bacilli (straight rods, curved rods, motile rods) and filamentous bacteria. From 100-150 bacteria examined, data was recorded as relative percentage of each of these bacteria.

Patients were recalled after 1 week, 2 weeks and after 4 weeks for recording clinical parameters. Microbiological examination was performed immediately before clinical examination, and at 4 weeks. All data obtained was appropriately tabulated and a statistical analysis was performed to assess and compare the levels of significance (P value < 0.05) for mean percentage reduction by applying Paired T test for intra-group comparison and Student's T test for inter-group comparisons.

Results

A total of 105 patients, aged between 15-40 years were treated in present study. None of the patient treated with this method, showed any untoward side effect. Patients were randomly divided in three equal groups.

Results of this clinical trial for Negative control group

Table 1. Demographics of study population.

Study Population	Total no. of cases 105			Age Range (Years)	Sex Distribution	
	Scaling	Scaling + Placebo	Scaling+ Gengigel®		Male	Female
Subjects Included	35	35	35	15-40	48	57

(Scaling) showed statistically significant difference in PI (p<0.05) at 1 week, 2 weeks and 4 weeks which shows decrease of 14%, 15% and 13% respectively. GI showed statistically significant difference (p<0.05) by decrease of 27% at all time interval. It also presented statistically significant difference in PBI (p<0.05) at 1 week, 2 weeks and 4 weeks, which shows decrease of 33%, 31% and 33% respectively (*Table 2*).

Results of *Table 2* show Placebo control group (Scaling plus placebo gel) indicating statistically significant difference in PI (p<0.05) at 1 week, 2 weeks and 4 weeks which shows decrease of 16%, 12% and 10% respectively. This group also showed statistically significant difference in GI (p<0.05) at all time interval which shows decrease of 22%, 20% and 16% respectively. It also produced statistically significant difference in PBI (p<0.05) at 1 week, 2 weeks and 4 weeks which shows decrease of 26%, 21% and 19% respectively.

In this study Test group (Scaling plus Hyaluronic Acid Gel) showed statistically significant difference in PI (p<0.05) at 1 week, 2 weeks and 4 weeks which shows decrease of 25%, 31% and 27% respectively. This group showed statistically significant difference in GI (p<0.05) at 1 week, 2 weeks and 4 weeks which shows decrease of 31%, 36% and 48% respectively. It also produced statistically significant difference in PBI (p<0.05) at all time interval which shows decrease of 47%, 48% and 53% respectively (*Table 2*).

By using independent *t*-test for data of different groups, comparisons between two groups are made.

Group comparisons indicates that test group gives significantly better results (p<0.05) in reduction of inflammation than placebo control and negative control groups. It showed significantly better results with GI and PBI at 1week, 2 weeks and 4 weeks. No significant difference was noted with PI at all time intervals when comparing experimental group with both groups. When comparing placebo control and negative control group, there is no significant difference found in all clinical parameters at 1week, 2 weeks and 4 weeks interval (*Table 3*).

Table 4 shows mean & standard deviation values and p values by ANOVA for all groups. It shows no significant difference (p > 0.05) between groups at baseline for Plaque Index, Gingival Index and Papillary Bleeding Index. It also shows no significant difference (p>0.05) for Plaque Index at 1 week, 2 weeks and 4 weeks for all groups.

Microbiology results

In present study, microbiological examinations of samples were done. There was reduction in the number of gram negative bacilli and relative increase in the number of positive coccoid cells, in all three treatment modalities compared to baseline (*Table 5*).

Negative control group showed decrease in gram negative bacilli (45.2% at baseline to 30% at 4 week) and relative increase in gram positive coccoid cells (54.80% at baseline to 70% at 4 weeks). In present study Placebo control group showed decrease in gram negative bacilli (45.86% at baseline to 29.6% at 4 weeks) and relative increase in gram positive coccoid cells (54.13% at baseline to 69.13% at 4 weeks). Test group presented decrease in gram negative bacilli (45.2% at baseline to 27.4% at 4 weeks) and relative increase in gram positive coccoid cells (54.80% at baseline to 72% at 4 weeks).

In group comparison there was no statistically significant difference found in microbiological parameters (p>0.05).

Discussion

The use of Hyaluronic Acid in the treatment of inflammatory process is established in orthopedics, dermatology and ophthalmology. Significant improvements of clinical parameters could be found in the treatment of osteoarthritis of the knee in rheumatoid arthritis and cataract surgery [9-12]. In the field of dentistry, preliminary clinical trials have been done by Vangelisti and Pagnacco et al. on gingivitis cases [13]. Koshal et al. compared post-operative healing following non-surgical debridement augmented with and without hyaluronan [14]. Effect of hyaluronic acid in the treatment of periodontitis is well studied by Xu Y et al. [15]. Ballini et al. studied effect of esterified hyaluronic acid in Treatment of infrabony periodontal defects [16]. Park et al. used hyaluronic

Table 2. Intra-group comparison of t value, p value & percentage at different intervals (paired t test).

Only Scaling Group									
Indices	**Baseline to 1 Week**			**Baseline to 2 Week**			**Baseline to 4 Week**		
	Difference (In%)	**t value**	**p value**	**Difference (In%)**	**T Value**	**p value**	**Difference (In%)**	**t value**	**p value**
Plaque Index	14	2.56	< 0.05	15	2.7	< 0.05	13	2.52	< 0.05
Gingival Index	27	8.92	< 0.05	27	6.77	< 0.05	27	5.94	< 0.05
Papilla Bleeding Index	33	5.75	< 0.05	31	4.98	< 0.05	33	4.86	< 0.05
Scaling + Placebo Group									
Indices	**Baseline to 1 Week**			**Baseline to 2 Week**			**Baseline to 4 Week**		
	Difference (In%)	**t value**	**P Value**	**Difference (In%)**	**T Value**	**p value**	**Difference (In%)**	**t value**	**p value**
Plaque Index	16	3.48	< 0.05	12	2.47	< 0.05	10	2.63	< 0.05
Gingival Index	22	5.64	<0.05	20	7.13	<0.05	16	5.87	<0.05
Papilla Bleeding Index	26	7.17	<0.05	21	4.35	<0.05	19	6.95	<0.05
Scaling + 0.2% Hyaluronic Acid Gel Group									
Indices	**Baseline to 1 Week**			**Baseline to 2 Week**			**Baseline to 4 Week**		
	Difference (In%)	**t value**	**p value**	**Difference (In%)**	**t value**	**p value**	**Difference (In%)**	**t value**	**p value**
Plaque Index	25	6.99	<0.05	31	7.63	<0.05	27	8.08	<0.05
Gingival Index	35	7.52	<0.05	36	4.99	<0.05	44	11.26	<0.05
Papilla Bleeding Index	47	6.19	<0.05	48	6.4	<0.05	53	7.27	<0.05

Table 3. Group comparisons (Independent t- test).

Group comparison between only Scaling and Scaling + Placebo				
	Difference of Mean ± SD			
Indices	Baseline	1 Week	2 Week	4 Week
Plaque Index	0.10 ± 0.15	0.13 ± 0.18	0.00 ± 0.21	0.00 ± 0.16
Gingival Index	0.02 ± 0.07	-0.05 ± 0.07	-0.09 ± 0.08	-0.14 ± 0.06
Papilla Bleeding Index	0.10 ± 0.14	-0.05 ± 0.09	-0.13 ± 0.10	-0.17 ± 0.09
Group comparison between only Scaling And Scaling + 0.2 % Hyaluronic Acid Gel				
	Difference of Mean ± SD			
Indices	Baseline	1 Week	2 Week	4 Week
Plaque Index	-0.17 ± 0.15	0.20 ± 0.18	0.34 ± 0.21	0.30 ± 0.16
Gingival Index	0.03 ± 0.07	0.14 ± 0.07 *	0.16 ± 0.08 *	0.29 ± 0.06 *
Papilla Bleeding Index	0.05 ± 0.14	0.28 ± 0.09 *	0.32 ± 0.10 *	0.39 ± 0.09 *
Group comparison between Scaling + Placebo and Scaling + 0.2 % Hyaluronic Acid Gel				
	Difference of Mean ± SD			
Indices	Baseline	1 Week	2 Week	4 Week
Plaque Index	-0.27 ± 0.15	0.06 ± 0.18	0.34 ± 0.21	0.30 ± 0.16
Gingival Index	0.01 ± 0.07	0.20 ± 0.07 *	0.24 ± 0.08 *	0.43 ± 0.06 *
Papilla Bleeding Index	-0.05 ± 0.14	0.33 ± 0.09 *	0.44 ± 0.10 *	0.56 ± 0.09 *

* indicates statistically significant difference

Table 4.Comparison of mean change for only scaling, scaling + placebo and scaling + 0.2 % hyaluronic acid gel, for all indices from baseline to 4 week (Anova).

Indices	Time Interval	Scaling	Scaling + Placebo	Scaling + 0.2% hyaluronic acid gel	p value
Plaque Index	Baseline	2.99 ± 0.37	2.89 ± 0.41	3.16 ± 0.42	0.19
	1 Week	2.58 ± 0.58	2.44 ± 0.49	2.38 ± 0.40	0.55
	2 Week	2.53 ± 0.56	2.53 ± 0.64	2.19 ± 0.54	0.20
	4 Week	2.60 ± 0.47	2.60 ± 0.49	2.30 ± 0.36	0.11
Gingival Index	Baseline	1.54 ± 0.14	1.52 ± 0.15	1.51 ± 0.24	0.92
	1 Week	1.13 ± 0.16	1.18 ± 0.20	0.98 ± 0.23	0.03
	2 Week	1.12 ± 0.19	1.21 ± 0.11	0.97 ± 0.29	0.01
	4 Week	1.13 ± 0.22	1.27 ± 0.12	0.85 ± 0.17	0.00
Papilla Bleeding Index	Baseline	1.81 ± 0.32	1.72 ± 0.20	1.77 ± 0.53	0.77
	1 Week	1.22 ± 0.22	1.27 ± 0.21	0.94 ± 0.27	0.00
	2 Week	1.24 ± 0.27	1.36 ± 0.31	0.92 ± 0.22	0.00
	4 Week	1.22 ± 0.31	1.39 ± 0.21	0.83 ± 0.24	0.00

Table 5. Microbiological parameter.

Gram Positive Cocci (% Age Gain)				Gram Negative Bacilli (% Age Reduction)			
Group	Baseline	4 week	Difference	Baseline	4 week	Difference
Only Scaling	54.8	70	15.2	45.2	30	15.2
Scaling + Placebo	54.13	69.73	15.6	45.86	29.6	16.26
Scaling + 0.2% hyaluronic acid gel	54.8	72.6	17.8	45.2	27.4	17.8
p	0.14 which indicates not significant			0.26 which indicates not significant		

acid bi-layer films for periodontal barrier applications in Guided bone regeneration [17]. De Araújo Nobre studied effect of hyalurinc acid in treatment of peri-implant pockets [18]. Nobre et al. compared the effect of chlorhexidine and hyaluronan on immediate functional implants inside maintenance protocol and Klinger and Ratevatalla et al. studied the effect of hyaluronan at bone implant interface [19,20]. Prato used cell hyaluronic acid as autologous graft for gingival augmentation procedures [21].

The inflammatory process is linked with increase in activity of tissue destructing enzyme like proteases & mostly leucocyte derived lysosomal enzymes [22,23]. The lysozyme

activity of GCF is increased in gingivitis & periodontitis and the paroxidase activity is increased in gingivitis [24,25].

Non surgical mechanical periodontal treatment is the cornerstone of periodontal therapy and most preferred approach to treat periodontal diseases [26]. Periodontal therapy includes both mechanical approach like scaling & root planing and chemotherapeutic approaches include topical application of antiseptics in the form of mouthwashes, tooth pastes, gel form or sustained-release local drug delivery agents [27,28].

For the treatment of gingivitis and to restore the extracellular matrix of gingiva, the newly discovered extracellular matrix

component, Hyaluronic Acid is the most promising one [29]. Hyaluronan [H³] was shown by autoradiography to disseminate through all layers of intact skin in mouse and human. A study shows that by local application, the drug reaches the dermis within 30 minutes and remains there for 8 hours [30] so that maximum effect of the drug can be gained. Based on above concept and to overcome the disadvantages of other home care treatment modalities, 0.2% Hyaluronic Acid gel was used for the present study.

The present study was a longitudinal, randomized, and placebo-controlled clinical and microbiological trial on the adjunctive effect of Hyaluronic Acid gel in treatment of gingivitis. In this trial, a placebo gel was used, which did not contain the HA and having same gel matrix.

The study period of four weeks follows the recommendation of Chilton and Fliss to undertake trials regarding gingival inflammation [31]. Results of PI and GI are influenced not only by oral hygiene but also by inflammation [32]. PI considers the plaque quantity on the buccal or labial tooth surfaces. The enhanced stream of crevicular fluid functions as a nutritional reservoir for the plaque bacteria to further plaque growth [33]. GI provides an assessment of gingival inflammation that can be used to compare gingival status at recall visits. PBI is extremely useful for detecting early inflammatory changes & inflammatory lesions located at base of the pocket.

Subgingival plaque sample can be taken using sterile paper points, barbed broach or curette. In the present study, it was done by using sterile curette. Bacterial culturing is considered as a "Gold Standard" for detection of periopathogens. It enables the identification of major plaque components [34].

At the time of the baseline examination, no significant differences were observed in age, sex distribution, PI, GI or PBI in the subjects of different study groups, allowing the assumption of homogeneity of the patient population. Patients with age range of 15-40 years were selected as to avoid influence of pubertal hormonal changes [35].

Results of this clinical trial showed that, the patients treated with negative control and placebo control group having statistically significant difference in all parameters ($p < 0.05$) from baseline at 1 week, 2 weeks and 4 weeks. Scaling is effective in reducing plaque and gingivitis and it is most promising treatment since years. Above findings were as a result of local debridement, which decreases bacterial load of periodontal tissue [36,37]. These results in reduced severity of inflammatory infiltrate in the periodontal soft tissue, thereby providing conductive environment for diseased periodontal tissue to heal.

This healing effect can be enhanced by HA gel because it helps in reducing lysozomal enzymes like hyaluronidase and chondroitinase. It also showed significant improvement in gingivitis by decreasing gingival bleeding and crevicular fluid flow [38,39]. In our study there is significant decrease in GI and PBI from baseline at all time intervals because of adjunctive effect of hyaluronic acid gel after scaling. Test group showed statistically significant difference in PI ($p < 0.05$) at all time interval from baseline, which correlates with study of Pagnacco et al. 1997 ($p < 0.05$) [40]. HA gel is additionally known to enhance formation of extracellular connective tissue matrix leading to non inflamed and healthy

periodontal tissue that is less susceptible to bleeding on probing. It has shown bacteriostatic effect on actinobacillus *actinomycetemcomitans* and *Porphyromonas gingivalis* [41].

Results of group comparisons between Negative control group and Placebo control group showed no significant difference ($p > 0.05$) in all clinical parameters at all time intervals as results may primarily because of scaling only. Study by Cohen et al. also stated that there is no significant effect of placebo gel on PI [42].

In group comparison showed significant improvement in GI and PBI in Test group as compare to other groups because hyaluronic acid is having anti-inflammatory, anti-edematous and tissue regenerative properties [43,44]. Results of this clinical trial are in correlation with Pagnacco et al. who stated that hyaluronic acid gel is effective in promoting more rapid healing and complete remission of symptoms after an oral hygiene session. Studies by Pomowski et al. and Pagnacco A et al. shows that 0.2% hylauronic acid gel is not having significant effect on plaque accumulation [39,40]. In present study Group comparisons also showed no significant difference in PI among the all three groups. These results are in also in accordance with Pistorius et al. [38].

The effect of HA are molecular weight and concentration dependent and is cell-specific [3]. HA levels within extracellular matrix have been shown to promote or inhibit the state of differentiation of several mezenchymal progenitor cell types and to participate directly in cell to cell aggregation events. These matrix induces effects on cells are in turn supported and directed by a wide variety of HA binding protein, which interact with HA within the extracellular matrix proper. Whereas other interact with HA at the plasma membrane of cell, as cell-surface matrix "receptors" because of this reason HA gel helps in tissue regeneration.

Till date effect of hyaluronic acid on plaque was studied in limited number of studies specifically in cases of gingivitis. In present study, microbiological examinations of plaque samples were done. There was reduction in the number of gram negative bacilli and relative increase in the number of coccoid cells, in all three treatment modalities compared to baseline (*Table 4*). In group comparison there is no statistically significant difference was found in microbiological parameters ($p > 0.05$) as 0.2% Hyaluronic Acid Gel may be not effective on microorganisms in periodontal environment. Above observation is in accordance with Yi Xu et al. 2004, who showed no significant improvement in microbiological parameters by adjunctive use of 0.2% Hyaluronic Acid gel to scaling and root planning alone in cases of chronic periodontitis [15].

There are clinical trials done in which application of HA gel is used in form of local drug delivery system, but there is disadvantages like drug washout with GCF flow so, optimal concentration can't achieved for longer period of time and frequent visits of dental clinic. However, this study must be interpreted with due consideration to its limitations viz. relatively small sample size and short evaluation period. Also, further large scale randomized, controlled clinical trials into the therapeutic effects of 0.2 % Hyaluronic Acid gel are required.

Conclusion

Adjunctive use of 0.2% Hyaluronic Acid gel was evaluated in this study was safe and provided statistically significant results. It is the first topically applied anti-inflammatory product that has been specifically developed for dental use. It was very well tolerated and well accepted by patients. It can reduce the tendency to relapse in patients with plaque induced gingivitis at the same time it has very limited antimicrobial effect.

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