

## Original Research

### Assessment of effects of local application of hyaluronic acid (HA) in the management of chronic periodontitis in smokers and non-smokers

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#### ABSTRACT:

**Background:** Chronic periodontitis is a common form of periodontal disease, which is an inflammatory condition affecting the tissues surrounding the teeth. The present study was conducted to assess the effects of local application of hyaluronic acid (HA) in the management of chronic periodontitis in smokers and non-smokers. **Materials & Methods:** 40 patients with chronic periodontitis of both genders were divided into 2 groups of 20 each. Group I was smokers and group II was non-smokers group. Scaling and root planing (SRP) was performed for all the patients. The test sites received 0.8% HA gel whereas the control site received placebo gel in each group. The clinical parameters plaque, gingival and bleeding indices were evaluated at baseline, 1 and 3 months. **Results:** Group I had 12 males and 8 females and group II had 9 males and 11 females. The mean plaque index at baseline at 1 month at control site was 0.026 and at test site was 0.421 and at 3 months at control site was 0.736 and at test site was 0.528. The mean bleeding index at 1 month at control site was 4.3 and at test site was 4.6 and at 3 months at control site was 28.4 and at test site was 20.7. The mean gingival index at 1 month at control site was 0.061 and at test site was 0.042 and at 3 months at control site was 0.42 and at test site was 0.35 group I. The difference was non-significant ( $P > 0.05$ ). The mean plaque index at baseline at 1 month at control site was 0.067 and at test site was 0.061 and at 3 months at control site was 0.542 and at test site was 0.526. The mean bleeding index at 1 month at control site was 6.3 and at test site was 6.6 and at 3 months at control site was 22.5 and at test site was 22.7. The mean gingival index at 1 month at control site was 0.062 and at test site was 0.049 and at 3 months at control site was 0.35 and at test site was 0.38 group II. The difference was non-significant ( $P > 0.05$ ). **Conclusion:** The use of locally delivered 0.8% HA gel may be useful as an adjunct to SRP in the treatment of chronic periodontitis.

**Key words:** Chronic periodontitis, hyaluronic acid, plaque index

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#### INTRODUCTION

Chronic periodontitis is a common form of periodontal disease, which is an inflammatory condition affecting the tissues surrounding the teeth.<sup>1</sup> It is characterized by the gradual and long-term

destruction of the gums, periodontal ligament, and alveolar bone that support the teeth. This condition is typically caused by a combination of factors, including bacterial infection, poor oral hygiene,

genetic predisposition, and certain systemic conditions.<sup>2</sup>

The primary cause of chronic periodontitis is the accumulation of dental plaque, a sticky film of bacteria that forms on the teeth. When plaque is not adequately removed through regular brushing and flossing, it can harden and form tartar (calculus), which further harbors bacteria and irritates the gums.<sup>3</sup> Over time, this bacterial infection triggers an immune response, causing inflammation and tissue destruction. Chronic periodontitis often progresses slowly and may not cause noticeable symptoms in the early stages. However, as the condition worsens, symptoms may include red, swollen, or bleeding gums, bad breath, gum recession, tooth sensitivity, formation of deep pockets between the teeth and gums, loose or shifting teeth, and changes in the bite or alignment of the teeth.<sup>4</sup>

It has been demonstrated that scaling and root planing (SRP) is efficient in lowering gingival inflammation and probing depths. In recent years, when SRP is combined with nonmechanical therapy, substantial improvements in clinical parameters have been found. Local medication delivery are utilised as a supplement to SRP, maintenance therapy, and for patients for whom surgery is contraindicated or for whom surgical intervention is refused.<sup>5</sup>

The extracellular matrix component hyaluronan is involved in tissue hydrodynamics, cell motility, proliferation, and bacteriostatic activity. It also inhibits tissue deterioration and promotes healing, acting as an anti-inflammatory. As a result, it is increasingly used as a local chemotherapeutic agent for treating periodontal disease.<sup>6</sup> The present study was conducted to assess the effects of local application of hyaluronic acid (HA) in the management of chronic periodontitis in smokers and non-smokers.

## MATERIALS & METHODS

The present study consisted of 40 patients with chronic periodontitis (smokers and non-smokers) of both genders. All gave their written consent to participate in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 20 each. Group I was smokers and group II was non-smokers group. Scaling and root planing (SRP) was performed for all the patients. The test sites received 0.8% HA gel whereas the control site received placebo gel in each group. The clinical parameters plaque, gingival and bleeding indices were evaluated at baseline, 1 and 3 months. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

## RESULTS

**Table I Distribution of patients**

Groups	Group I (20)	Group II (20)
Status	Smokers	Non-smokers
M:F	12:8	9:11

Table I shows that group I had 12 males and 8 females and group II had 9 males and 11 females.

**Table II Assessment of parameters in group I**

Parameters	Baseline		1 month		3 months	
	Control	Test	Control	Test	Control	Test
Plaque index	0	0	0.026	0.421	0.736	0.528
P value	0		0.12		0.84	
Bleeding index	0	0	4.3	4.6	28.4	20.7
P value	0		0.81		0.75	
Gingival index	0	0	0.061	0.042	0.42	0.35
P value	0		0.19		0.28	

Table II shows that mean plaque index at baseline at 1 month at control site was 0.026 and at test site was 0.421 and at 3 months at control site was 0.736 and at test site was 0.528. The mean bleeding index at 1 month at control site was 4.3 and at test site was 4.6 and at 3 months at control site was 28.4 and at test site was 20.7. The mean gingival index at 1 month at control site was 0.061 and at test site was 0.042 and at 3 months at control site was 0.42 and at test site was 0.35 group I. The difference was non-significant ( $P > 0.05$ ).

**Table III Assessment of parameters in group II**

Parameters	Baseline		1 month		3 months	
	Control	Test	Control	Test	Control	Test
Plaque index	0	0	0.067	0.061	0.542	0.526
P value	0		0.18		0.92	
Bleeding index	0	0	6.3	6.6	22.5	22.7
P value	0		0.85		0.78	
Gingival index	0	0	0.062	0.049	0.35	0.38
P value	0		0.14		0.23	

Table III shows that mean plaque index at baseline at 1 month at control site was 0.067 and at test site was 0.061 and at 3 months at control site was 0.542 and at test site was 0.526. The mean bleeding index at 1 month at control site was 6.3 and at test site was 6.6 and at 3 months at control site was 22.5 and at test site was 22.7. The mean gingival index at 1 month at control site was 0.062 and at test site was 0.049 and at 3 months at control site was 0.35 and at test site was 0.38 group II. The difference was non-significant ( $P > 0.05$ ).

## DISCUSSION

Chronic periodontitis can be particularly problematic for individuals who smoke. Smoking has been identified as a significant risk factor for the development and progression of periodontal disease, including chronic periodontitis.<sup>7</sup>

Smoking has a detrimental effect on blood vessels, leading to a decrease in blood flow to the gums and other oral tissues.<sup>8</sup> This impairs the delivery of essential nutrients and oxygen to the gums, making them more susceptible to infections and hindering their ability to heal. Smoking weakens the immune system, impairing the body's ability to fight off infections, including those caused by bacteria in the mouth.<sup>9</sup> As a result, smokers may experience a higher bacterial load in their oral cavity, leading to an increased risk and severity of periodontal disease. Smoking negatively impacts the body's ability to heal damaged tissues, including the gums.<sup>10</sup> Slower healing in the gums makes it more difficult to control and manage the inflammation and infection associated with chronic periodontitis. Smoking can mask some of the common signs and symptoms of periodontal disease. Nicotine and other chemicals in tobacco smoke can constrict blood vessels and reduce bleeding from the gums, making it difficult to detect early signs of gum disease, such as bleeding or swelling.<sup>11</sup> The present study was conducted to assess the effects of local application of hyaluronic acid (HA) in the management of chronic periodontitis in smokers and non-smokers.

We found that group I had 12 males and 8 females and group II had 9 males and 11 females. mean plaque index at baseline at 1 month at control site was 0.026 and at test site was 0.421 and at 3 months at control site was 0.736 and at test site was 0.528. The mean bleeding index at 1 month at control site was 4.3 and at test site was 4.6 and at 3 months at control site was 28.4 and at test site was 20.7. The mean gingival index at 1 month at control site was 0.061 and at test site was 0.042 and at 3 months at control site was 0.42 and at test site was 0.35 group I. Vajawat et al<sup>12</sup> assessed the effects of adjunctive use of hyaluronic acid (HA), clinically and microbiologically in smokers and non-smokers, in the management of chronic periodontitis. 48 sites from 24 chronic periodontitis patients, including smokers and non-smokers with probing depth  $> 5$  mm, were

selected for the study. A split-mouth design was followed. Scaling and root planing (SRP) was performed for all the patients. The test sites received 0.8% HA gel whereas the control site received placebo gel. The clinical parameters plaque, gingival and bleeding indices, Pocket Probing Depth (PPD), and clinical attachment level (CAL) were evaluated at baseline, 1 and 3 months. Microbiological parameters were evaluated at baseline and 1 month. The results showed reduction in PPD and gain in CAL in both smokers and non-smokers at the end of 3rd month. The improvements in the test sites were statistically significant when compared with that of control sites. The microbiological analysis showed a significant reduction in *Aggregatibacter actinomycetemcomitans* and *Porphyromonas gingivalis* at the test sites when compared to the controls in both the groups.

We observed that mean plaque index at baseline at 1 month at control site was 0.067 and at test site was 0.061 and at 3 months at control site was 0.542 and at test site was 0.526. The mean bleeding index at 1 month at control site was 6.3 and at test site was 6.6 and at 3 months at control site was 22.5 and at test site was 22.7. The mean gingival index at 1 month at control site was 0.062 and at test site was 0.049 and at 3 months at control site was 0.35 and at test site was 0.38 group II. Xu et al<sup>13</sup> in their study 20 patients with chronic periodontitis were included in this split-mouth study. Sulcus fluid flow rate (SFFR) and sulcus bleeding index were monitored at baseline and after 1, 2, 3, 4, 5, 6, and 12 weeks; probing depth and clinical attachment level were monitored at baseline and 6 and 12 weeks. Subgingival plaque samples were also taken at these same three appointments to determine the presence of *Actinobacillus actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella forsythensis*, and *Treponema denticola*. All patients were treated with full-mouth scaling and root planing (SRP); in addition, an HA gel was administered subgingivally in the test sites every week for 6 weeks. An improvement of all clinical variables was observed ( $P < 0.05$ ) in both groups. Clinically, no difference between test and control sites could be found. No difference between test and control sites was seen in the tested microorganisms.

The limitation the study is small sample size.

## CONCLUSION

Authors found that the use of locally delivered 0.8% HA gel may be useful as an adjunct to SRP in the treatment of chronic periodontitis.

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