Comparison between the effects of Aloe vera and chlorhexidine on clinical periodontal parameters

Sarah Adil Abed, B.D.S. [1]
Basima Ghafory Ali, B.D.S, M. Sc.. [2]
Hanaa Jawad Mohsin, B.D.S, D.D.S, [3]

ABSTRACT

Background: Periodontal diseases are one of the major dental pathologies that affect human populations worldwide at high prevalence rates The term periodontal disease usually refers only to plaque related inflammatory disease of the dental supporting tissues. Mouth rinses which act as an anti-plaque agents mostly used as adjuncts to oral hygiene.

Aims of the study: To Estimate and compare the effects of Aloe vera relative to chlorhexidine on the clinical periodontal parameters (plaque index, gingival index, bleeding on probing).

Material and method: A total of 44 subjects with plaque-induced gingivitis, baseline of data were collected for (PLI, GI, and BOP) and underwent oral hygiene instruction, scaling and polishing, then divided into: Study group I : 15 patients instructed to use Aloe vera mouth wash (100% pure Aloe vera juice) for home application twice daily for 7 days. Study group II: 15 patients instructed to use chlorhexidine (0.2%) mouthwash twice daily for 7 days. Control group: 14 patients instructed not to use any adjunct.

Results: PLI and BOP showed significant differences between 1st and 2nd visits in all groups with the larger effects were found in chlorhexidine followed by Aloe vera while the lowest change was found in control group. GI showed significant change between 1st and 2n visits in study groups (chlorhexidine and Aloe vera groups) with the larger effects was in chlorhexidine group, while there was no significant changes were found in control group.

Conclusion: chlorhexidine remain the bench mark control as adjunct to periodontal therapy but Aloe vera can be used as alternative to chlorhexidine when it cannot be used.

Key word: Aloe vera, chlorhexidine, clinical periodontal parameters. **(Received: 2/1/2018; Accepted: 11/2/2018)**

INTRODUCTION

The term periodontal disease usually refers only to plaque related inflammatory disease of the dental supporting tissues. Although wide variety of diseases of the oral mucosa can also affect the gingiva occasionally, so that conditions as diverse as tuberculosis or lichen planus can produce lesions in this area. Such conditions referred as “non-plaque induced gingivitis” do not play any significant part in the development of periodontal disease in its commonly accepted sense.(1)

Gingivitis and periodontitis are the two main periodontal diseases and may be present concurrently. Gingivitis is a form of periodontal disease in which gingival tissues are inflamed but their destruction is reversible while periodontitis is a chronic inflammatory response to the subgingival bacteria with irreversible changes.(2)

Chlorhexidine is (a cationic bisbiguanide) that has been used as a broad-spectrum antiseptic in medicine since the 1950s. In Europe, a 0.2% concentration of chlorhexidine has been used for years as a preventive and therapeutic agent.

Chlorhexidine acts either bacteriostatic or bactericidal, depending on the dose. Adverse effects of chlorhexidine include an increase in calculus formation, dysgeusia (altered taste), and permanent staining of teeth.(3) It may be particularly useful for older adults who have difficulty with plaque removal and those who take phenytoin, calcium channel blockers, or cyclosporines and who are at risk for gingival hyperplasia.(4)

For thousands of years and in many countries in the world, Medicinal plants were traditionally used as a treatment for a variety of human diseases and persistently used as a major source of medicine in rural areas of the developing countries. About 80% of the people in developing countries use traditional medicines for their health care. Medical plants contain natural products that have been demonstrated to be a copious source of biologically active compounds, many of which have been the basis for the development of new chemicals for pharmaceuticals.(5)

Aloe vera (Lilaceae family), a cactus like plant, with a core mucilaginous tissue that has been used as a gel which act as a laxative as well as to treat multiple conditions including: sunburn, wounds, and digestive tract disorders. Pharmacological attributes to Aloe vera that it acts as an antibacterial, antiviral, antifungal,

1. Master student
2. Assistant Professor, Department of Periodontics, College of Dentistry, University of Baghdad.
3. Assistant Professor, Department of Periodontics, College of Dentistry, University of Baghdad.

antioxidant, and anti-inflammatory.[6] Aloe vera extract which may be tested as one such oral hygiene aids to reduce plaque formation .[7]

Aloe vera gel exhibits its wound-healing effects through several mechanisms, which include keeping the wound moist, enhance the migration of epithelial cells, quicker collagen maturation and an anti-inflammatory effect.[8]

A study done by Abed and Al-Hijazi in 2016 used Aloe vera gel in periodontium defect relate its ability to accelerate wound healing as it increase syndecan 1 expression in epithelial cells, precursor progenitor cells and in early stage of cell proliferation of mesenchymal cell, and in inflammatory cells, and cementoblast.[9]

Glucomannan, a mannose-rich polysaccharide and gibberellin, a growth hormone, stimulate fibroblastic activity and proliferation through the interaction with growth factor receptor on the fibroblast, which in turn enhance the synthesis of collagen after topical and oral application. Following oral and topical application, aloe vera has been proven to increase the hyaluronic acid and dermatan sulfate synthesis in the granulation tissue of a healing wound.[10]

The objective of the study was to Estimate and compare the effects of Aloe vera on the clinical periodontal parameters (PLI, GI, BOP) as compared to chlorhexidine.

MATERIALS AND METHODS

Human sample

A total of 44 subjects (12 males, 32 females) with plaque- induced gingival overgrowth / age range (15-30) years attending the clinics at the Department of Periodontics in the teaching hospital at College of dentistry - University of Baghdad / Iraq and Al Baladiyate specialized dental center.

Exclusion criteria: included the presence of less than twenty natural teeth, history of habits (alcohol or tobacco); any systemic situation that could affect the host's periodontal health or that would require antibiotics treatment procedures (e.g. Heart conditions and joint replacements); patients under corticosteroid therapy; use of antibiotics and/or anti-inflammatory drugs within the last three months; and drug-induced gingival enlargement; patients undergo radiation therapy or chemotherapy; gingival enlargement due to drug therapy (phenytoin, cyclosporine, or calcium channel blockers) and patients with periodontitis.

Study Design

All participants were informed about the purpose of the study and their consents were provided prior to their inclusion into the study. All the subjects were examined for checking their appropriateness for the study. Then, they received baseline examination; collection of base line data include: plaque index (PLI)[11] , gingival index (GI)[12] , and bleeding on probing(BOP)[13] and underwent the 1st phase of periodontal treatment including oral hygiene instructions, scaling and polishing ,then the patients divided into three group:

- Study group I (Aloe vera group): 15 patients with gingivitis receive oral hygiene instruction and motivation, scaling and polishing, and Aloe vera mouth wash for home application twice daily for seven days.
- Study group II: (Chlorhexidine group) 15 patients with gingivitis receive oral hygiene instruction and motivation, scaling and polishing, and chlorhexidine mouthwash twice daily for seven days .
- Control group: 14 patients with gingivitis, receive oral hygiene instruction and motivation, scaling and polishing.

The second measurements were recorded at the second visits (after 7 days).

Statistical Analysis

Data were calculated and entered into a computerized data base structure. Statistical analysis was done using SPSS software. Mean and SD, paired t-test, and the effect of size (EZ) for normally distributed data and Median, Mean rank, Wilcoxon Sign rank, and EZ for not normally distributed data. Level of significance was 0.05.

RESULTS

Plaque index:

Table (1) reveals descriptive and statistical changes in plaque index between the visits.

Plaque index showed high significant changes between visits in all groups with the greatest changes in chlorhexidine group as the median values were changed (from 1.340 to 0.58) at 1st and 2nd visits respectively, followed by Aloe vera group as the median values at 1st visit and 2nd visit were (1.650) and (0.82) respectively while the lowest changes were in control group as the median values at 1st visit and 2nd visit were (1.575) and (1.005) respectively.

The effect of size (EZ) showed large value in all groups with highest value chlorhexidine group (0.8805), followed by Aloe vera group (0.8655) while the lowest value were in control group (0.8650).

Gingival index:

Table (2) reveals descriptive and statistical changes in gingiva index between the visits.

Gingival index showed high significant changes between visits in study group with the greatest

changes in chlorhexidine group as the median values at 1st and 2nd visits were changed (from 1.65 to 1.30) respectively, followed by Aloe vera group (from 1.64 to 1.27) respectively while there is a significant changes between the visits in control group as (from 1.62 to 1.5) respectively.

The effect of size (EZ) showed large value in chlorhexidine group and Aloe vera group with highest value in chlorhexidine group (0.8799), followed by Aloe vera group (0.865) while the control group showed medium effect of size (0.596).

Bleeding on probing:

Table (3) reveal descriptive and statistical changes in bleeding in probing (BOP) between the visits.

Bleeding of probing shows significant changes between visits in all groups with the greatest changes in chlorhexidine group as the mean value at 1st and 2nd visits were (64.400, 32.100) respectively, followed by Aloe vera group as the mean value at 1st visit and 2nd visit were (59.200, 26.560) respectively while the lowest changes between visits were in control group as the mean value at 1st visit and 2nd visit were (61.143, 50.779) respectively.

The effect of size (EZ) showed large value in all groups with highest value in chlorhexidine group (1.722), followed by Aloe vera group (1.682) while the lowest value were in control group (1.630)

Table (1) Descriptive and statistical tests of PLI change within groups.

Groups	PLI[3] 1&2	N[4]	Median	Mean rank	Wilcoxon Sign rank	P-value**	EZ
Control	PLI1	14	1.575	8	3.237	0.001	0.865
	PLI2	14	1.005	1			
chlorhexidine	PLI1	15	1.340	8	3.410	0.001	0.8805
	PLI2	15	.580	0			
Aloe vera	PLI1	15	1.650	8.5	3.352	0.001	0.8655
	PLI2	15	.820	1			

**=highly significant at P<0.01. EZ=t/√N, 0.2=small, 0.5 medium, 0.8 Large.

Table (2) Descriptive and statistical tests of GI change within groups.

Groups	GI[5] 1&2	N[6]	Median	Mean rank	Wilcoxon Sign rank	P-value	EZ
Control	GI1	14	1.62	8	2.230	0.026	0.596
	GI2	14	1.50	5.67			
chlorhexidine	GI1	15	1.65	8	3.408	0.001	0.8799
	GI2	15	1.30	0			
Aloe vera	GI1	15	1.64	8.5	3.351	0.001	0.865
	GI2	15	1.27	1			

NS=not significant at P>0.05, HS=highly significant at P<0.01.EZ=t/√N, 0.2=small, 0.5 medium, 0.8 Large.

Table (3) Descriptive and statistical test of BOP change within groups.

Groups	BOP[7] 1&2	Mean %	Paired T test	df	P-value**	EZ
Control N=14	BOP1	61.143	6.100	13	0.000	1.630 large
	BOP2	50.779				
chlorhexidine N=15	BOP1	64.400	6.670	14	0.000	1.722 large
	BOP2	32.100				
Aloe vera N=15	BOP1	59.200	6.513	14	0.000	1.682 large
	BOP2	26.560				

**=highly significant at P<0.01. EZ=t/√N, 0.2=small,0.5 medium, 0.8 Large.

[3] Plaque index in first and second visits.
[4] number of cases
[5] Gingival index in first and second visits.
[6] Number of cases
[7] Bleeding on probing. in first and second visits.

DISCUSSION

Plaque index showed high significant reduction between the first and second visits in all study and control groups. This may indicate good oral hygiene instructions and motivation as well as an appropriate maintaining of oral hygiene over the period of the study time, and also may related to the antimicrobial activity of chlorhexidine that exhibits anti-microbial effects against Gram-positive, Gram-negative, yeast and fungi[5] A study done by Al-Timimi and AL-Casey in 2012 showed that Chlorhexidine is still more effective than other agents in reduction the counts of salivary streptococci and Mutans Streptococci bacteria when compared to Thymus Vulgaris extract and normal saline.(14) As well as the anti-microbial effect Aloe vera as it is very effective in fighting of bacteria and preventing gingival inflammation .(15)

Gingival index showed high significant reduction between the first and second visits in the study groups (chlorhexidine and Aloe vera). This may attributed to wound healing and anti-inflammatory effect of Aloe vera constituents on gingival tissue as they obstruct the cyclooxygenase pathway and reduce prostaglandine E2 that results in reduction of gingival inflammation. Aloe vera also contains vitamin C which involved in synthesis of collagen as well as increase O2 concentration in the site of inflammation that lead to fibroblast activation and the proliferation of collagen in this area.(8, 16)

Bleeding on probing shows high significant reduction between first and second visits in all groups which may indicates that there were an adequate reduction in the inflammatory process after scaling and polishing as well as maintaining of a good patients personal oral hygiene practice throughout the time of the study, also it related to the reduction effect of Aloe vera in the instances of gingival bleeding as it have healing and soothing properties, reduce swelling, and soft tissue edema that lead to stop the bleeding and to the restoration of gingival tissue health.(17) It also may indicate the anti-plaque activity of chlorhexidine as it has a wide range inhibition of glycosidic and proteolytic bacterial dental plaque enzymes and also has concentration dependent bacteriostatic and bactericidal effects, in the fact that wound healing is more likely to be affected by the presence of pathogenic bacteria.(18)

These results were in agreement with the results of the studies done by (Cchina, 2016) and similar results have been reported by (Nair and malaiappan, 2016; Gupta et al, 2014; Karim et al, 2014; and Vangipuram et al, 2016).

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الخلاصة

خلفية: أمراض اللثة هي واحدة من أمراض الأسنان الرئيسية التي تؤثر على السكان في جميع أنحاء العالم بمعدلات انتشار عالية. يشير مصطلح أمراض اللثة عادة فقط إلى مرض التهاب اللويحات المرتبطة بالأنسجة الداعمة للأسنان. غسول الفم الذي يعمل كعوامل مضادة للوحة غالبًا ما يستخدم كعوامل مساعدة لنظافة الفم.

أهداف الدراسة: تقدير ومقارنة آثار الألو فيرا او جل الصبار بالنسبة إلى الكلورهيكسيدين على المعلمات اللثوية السريرية (مؤشر البلاك ، مؤشر اللثة ، النزيف عند التسبير).

كلمريض ثم قسموا الى PLI)، GI، و (BOP المواد والطريقة: تم جمع ما مجموعه 44 شخصًا مصابين بالتهاب اللثة الناجم عن البلاك وخضعوا لتعليمات النظافة الفموية ، التنظيف والتلميع ، وتم جمع البيانات الأساسية قسموا إلى: مجموعة الدراسة 1:15 مرض تلقوا التعليمات لاستخدام غسل الفم الصبار (100 ٪ عصير الصبار النقي) للاستخدام المنزلي مرتين يوميا لمدة 7 أيام. مجموعة الدراسة الثانية: 15 مريضاً تلقوا تعليمات باستخدام غسول الفم بالكلورهكسيدين (0.2٪) مرتين يوميًا لمدة 7 أيام. مجموعة االضابطة14 مريضا تلقوا : تعليمات بعدم استخدام أي مساعد.

افروق ذات دلالة إحصائية بين الزيارات الأولى والثانية في جميع المجموعات ذات التأثيرات الأكبر في الكلورهيكسيدين تليها الصبار بينما تم العثور على أقل تغيير في المجموعة الضابطة. اما ن PLI و BOP أظهر النتائج: الزيارات 1 و 2 ظهر فرق واضح مجموعات الدراسة (مجموعات الكلورهيكسيدين والألو فيرا) مع الآثار الأكبر كان في مجموعة الكلورهيكسيدين ، في حين لم يكن هناك تغييرات كبيرة وجدت في المجموعة الضابطةGI .

الخلاصة: يظل الكلورهيكسيدين عنصر التحكم في علامة مقاعد البدلاء كعامل مساعد لعلاج اللثة ولكن يمكن استخدام الألو فيرا كبديل للكلورهكسيدين عندما لا يمكن استخدامه.

الكلمة الأساسية: الصبار ، الكلورهيكسيدين ، معلمات اللثة السريرية.