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Difference in IL_1β Level and Bleeding on Probing Following the Use of Aloe Vera Containing Toothpaste in Treatment Plaque Induce Gingivitis

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ABSTRACT

Background: One of the most predominant periodontal diseases is the plaque induced gingivitis. Certain plant life used in folk medication glorify as a supply over medicine dealers as bear anti-inflammatory and other multipotential effects.

Aim: The aim of study is to evaluate the aloe vera toothpaste regarding reduction regarding plaque or gingivitis and on clinical periodontal parameter (PI &BOP) and determine the effect of aloe vera toothpaste on the pro inflammatory cytokines (IL_1β) in the gingival crevicular fluid.

Materials and methods: twenty-two adult patients (male and female) with generalized plaque induce gingivitis participated in the double-blinded randomized crossover trial was divided into two groups, (aloe vera and Colgate toothpaste). A week after receiving polishing and scaling,24hours plaque re-growth. In zero day, after 24h and 7 days' time points, plaque index and bleeding on probing was recorded, and then after the members entered a 7-day washout duration together with normal oral hygiene measures. And 7days to used other type of toothpaste (Aloe Vera or Colgate) in five visit. In the first visit (zero day) GCF collected from targeted sites(upper incisors, labial side). The GCF collected in third visit (after7 days), fourth visit (after wash out period) and fifth visit from the same teeth. Saliva collected in third and fifth visit.

Results: Toothpaste containing aloe vera confirmed great improvement in plaque and gingival index scores as well as significant decreased in level of IL-1β compared with Colgate dentifrice.

Conclusion: Toothpaste containing aloe vera may be a valuable home grown detailing for chemical plaque control specialists and improvement in plaque and gingival status.

Key words: Dental plaque, Aloe vera gingivitis, Toothpastes, Gingival crevicular fluid

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INTRODUCTION

The supragingival plaque is the cause of gingivitis and plays an essential part within the start of periodontitis [1]. Dental plaque is a soft mass accumulated onto tooth surfaces. Dental plaque requires around 24h to be clinically detectable [2,3]. Accumulated dental plaques onto tooth surfaces elicit inflammation in adjacent gingival tissue [4]. Thus, the removal of dental plaque from tooth surfaces on daily basis is essential as a preventive measure. The best control of tooth plaque is tooth brushing and using interdental aids. The expulsion of microbial plaque leads to determination of gingival aggravation, and cessation of plaque control leads to a repeat of inflammation. The significance of plaque control within the upkeep of gingival validity has been well set up within the literature [5,6]. It has been appeared that thorough self-performed plaque control over long periods of time diminished the levels and changed the composition of subgingival microbes and decreased the recurrence of profound periodontal pockets [7,8]. The failure of the common populace to perform satisfactory toothbrushing has driven to the rummage around for chemotherapeutic specialists to make strides plaque control [9]. These chemicals,

primarily triclosan and chlorhexidine, have been used as mouth washes or included to dentifrices to dodge plaque arrangement and advancement of gingivitis [9,10]. Because a few of these substances may have undesirable side impacts, such as tooth recoloring and taste alteration, phytotherapeutic operators with antimicrobial and anti-inflammatory properties have been explored [11,12]. The utilize of common items within the avoidance and treatment of oral conditions has increased recently and may well be useful to urban and provincial communities of moo financial levels [13]. Aloe vera may be a perpetual juicy plant having a place to the Aloe aceae family (subfamily of the Asphodelaceae) [14]. Among >400 aloe species, aloe vera is the foremost acknowledged species for different therapeutic, corrective, and nutraceutical purposes[15,16].Aloeverahasanti-inflammatory properties [2-6], antiulcer activity [7,8], and an astringent impact and may have the capacity to diminish scars and upgrade wound recuperating [9-11]. The aloe plant contains anthraquinone glycosides (particularly within the latex frame, which is diverse from the gel), polysaccharides, aloe gums, glucomannans, and b-sitosterol [16]. Antioxidative phenolic compounds were as of late confined from Aloe barbadensis and identified as aloe resin subordinates [17]. The above-mentioned properties, together with the ease of accessibility, no known antagonistic impacts, and taken a toll adequacy, make aloe vera an perfect candidate for plaque control, in this manner diminishing gingivitis and most likely inevitable periodontitis.Interleukin-1β is a pro inflammatory cytokine which is one from the family of interleukins. It is secreted by many cells in the body (mainly T cells and macrophages), frequently in response to an stimulation and involved in the beginning of effective stages of inflammation and immunity [1]. GCF is transcendently shaped by serum transudate and/or provocative exudate inferred from the periodontal tissues. Hence, the examination of biomarkers in GCF could be a broadly utilized non- obtrusive strategy to ponder the status of irritation of periodontal tissues and the have reaction to diverse periodontal treatments [2].

MATERIALS AND METHOD

Study design and population

This study was a randomized, double blinded crossover clinical trial. Subjects included in the study should be 20-30 years old, in good general health and had more than 20 teeth. However, subjected excluded from the study were those having active cavitated caries and/or periodontal disease, undergoing orthodontic treatment, having history of antibiotics treatment within the past 4 months, those need prophylactic antibiotic coverage and/or non-steroidal anti-inflammatory drugs (systemic/topical) for the past 4 months and subjects having heart valve replacement and/or any systemic disease. This study approved by ethical committee/ college of Dentistry/ University of Baghdad, follow the guidelines of Helsinki and Tokyo for humans (the reference no. 136619 in 2\12\2019) and written informed consent form was obtained from all participants.

Clinical measurements

Plaque index: The plaque quantity was recorded using modified Quigley Hein plaque index (PI) [18-20]. The labial/buccal and lingual/palatal surfaces of each disclosed tooth except wisdom teeth and filled tooth surfaces were recorded. The mean of PI was calculated by collecting the scores over the total number of surfaces examined. All plaque scores were recorded by single examiner. Alignment and assessment of the examiner was carried out as described by yagi et al. [21]. Absolute intra-examiner agreement, kappa value of 0.915, was achieved according to Landis et al. [22].

Bleeding on probing

- Assessment of Bleeding Tendency by a modified Sulcus Bleeding Index (mSB).
- The mSBI scores Description:

✓ No bleeding when a periodontal probe is passed along the gingival margin

✓ Isolated bleeding spots visibl[e

✓ Blood forms a confluent red line on margin

✓ Heavy or profuse bleeding.

Interventions: The Aloe vera and Colgate toothpaste were used in this study. All toothpastes tubes had a plain white covering, labeled only with lot numbers to ensure proper masking of the product from the patients and examiner, which were given random sequential number codes (A and B) by a third party not involved in this study. Thus, all participants had an equal probability

of assignment to the interventions sequence. This trial was double-blinded as the examiner and participants were unable to identify the corresponding intervention. Decoding was done at the end of the study.

Clinical trial: The study had been made in the Faculty of Dentistry/University of Baghdad at the morning because the day time make a difference on the level of IL-1β,so all samples were taken at the same period from 10 AM-12 PM [3]. After participants' selection, the point and stream of the clinical trial were outlined for the participants 7 days some time recently the dispatch of clinical trial and all members gotten oral hygiene education, scaling and polishing. In the clinical trial period, participants attended dental clinic at baseline (0h), after 24h and after 7 days. PI and B.O.P scores were recorded at 24h and after 7 days. At the starting of each period, participants' teeth were unveiled with a disclosing agent (erythrosine tablets) Then, participants' teeth were polished to have plaque-free teeth surfaces at baseline. After that, in(24h) GCF and saliva sample collected, PI and B.O.P were recorded .asked the participants to brushed teeth with Aloe vera or colgate total toothpaste ,then saliva collected after2 h from brushing , the GCF is collected from the maxillary incisors sites for all participant in the study . The collection is done by periopaper®. The samples will be collected from the GCF of the included site by a intracrevicular method utilizing periopaper®. The periopaper® should place for 30 sec inside the sulcus. Periopaper® suspected to be contaminated with saliva or blood were discarded and the procedure repeated. Immediately after collection of the GCF the periopaper® transferred into the pre-weighed Eppendorf tube by assuming that the density of GCF is (1mg/mL) [23-26] and by using the formula (Volume=Mass/Density), the volume will be equal to the mass.

Participants were asked to repeat the brushing at home twice daily for the next 7 days and to refrain from mechanical oral hygiene measures or using chewing gum for 7 days. At the following day, participants' plaques were disclosed and PI and B.O.P were recorded. The same procedure was repeated at day 7. After that, participants entered a 6-day wash out period and they were asked to resume oral hygiene measures. After the washout period, the same protocol was repeated for other type of toothpaste.

RESULTS

The participants were 22 (male and female) dental students with mean ± SD age of (22.81 ± 2.1). The mean ± SD values of PI, BOP and Interleukin 1β level at 24h and at day 7 were summarized in Tables 1 and 2, there were no statistical significant differences ($P \geq 0.05$) between study groups in all clinical parameters at 24h (baseline).

Table 2 shows the comparison between PI after 7 days with 24h(baseline) level in each study group. Mean of plaque index was significantly decreased in group A (aloe vera) after 7 days compared to that at 24h (0.3 versus 0.1, P= 0.001).

In group B (Colgate), no statistical significant decrease (P= 0.125) in mean of PI after 7 days compared to that at 24h (baseline).

Table 3 shows the comparison between bleeding on probing after 7days and baseline level in each study group. Means of BOP were significantly decreased in groups A and B after 7 days

Table 1: Comparison between study groups by certain Pl, BOP and Interleukin 1β at 24 hours (baseline).

Clinical parameters	Study group		Student t-test	P - Value
	A	B		
	N=22 (Mean ± SD)	N=22 (Mean ± SD)		
Plaque Index	0.3 ± 0.2	0.22 ± 0.14	1.517	0.137
Bleeding on probing (%)	1.14 ± 1.4	1.21 ± 1.5	0.143	0.887
Interleukin 1β	457.1 ± 51.2	444.4 ± 79.1	0.632	0.531

Table 2: Intra groups comparison between pi after treatment with pretreatment level in each study group.

Study group	Plaque Index		Paired t-test	P-Value
	Baseline	After 7days		
	Mean ± SD	Mean ± SD		
A (aloe vera)	0.3 ± 0.2	0.1 ± 0.2	4.263	0.001
B (Colgate)	0.22 ± 0.14	0.15 ± 0.16	1.598	0.125

Table 3: Comparison between bleeding on probing after 7 daysand baseline level in each study group.

Study group	Bleeding on probing (%)		Paired t-test	P-Value
	Baseline	After 7 days		
	N=22 (Mean ± SD)	N=22 (Mean ± SD)		
A (aloe vera)	1.14 ± 1.4	0.24 ± 0.7	4.718	0.001
B (Colgate)	1.21 ± 1.5	0.7 ± 1.0	3.225	0.004

Table 4: Comparison between interleukin-1β after 7 days and baseline level in each study group.

Study group	Bleeding on probing (%)		Paired t-test	P-Value
	Baseline	After 7 days		
	N=22 (Mean ± SD)	N=22 (Mean ± SD)		
A (aloe vera)	457.1 ± 51.2	405.58 ± 58.8	3.475	0.002
B (Colgate)	444.4 ± 79.1	443.76 ± 38.1	0.042	0.967

compared to that at baseline (1.14 versus 0.24%, P= 0.001; and 1.21 versus 0.7%, P= 0.004).

Table 4 shows the comparison between interleukin-1β after 7 days and baseline level in each study group. Mean of interleukin-1β was significantly decreased in group A (aloe vera) after 7 days compared to that at baseline (457.1 versus 405.58, P= 0.002). In group B (Colgate), no statistical significant change (P= 0.967) in mean of interleukin-1β after 7 days compared to that at baseline.

DISCUSSION

Aloe vera may be a characteristic item contained in home grown dentifrices with commercial offer on the control of plaque and gingivitis. The main finding in this study is the potent anti-plaque efficacy of aloe vera toothpaste. At day 7 following brushing with aloe vera toothpaste, PI scores were significant decrease as compared to Colgate toothpaste; a finding supported by a previous study [27]. Other finding effect of aloe vera toothpaste on the immunological marker IL-1β in GCF in human with plaque induced gingivitis, a try had been made to check the performance of aloe vera in the treatment of gingival inflammation as a toothpaste and calculate the level of IL-1β in GCF. At day 7 following used aloe vera the mean of interleukin-1β was significantly decreased compared to that at baseline at 24 h (457.1 versus 405.58, P=0.002) [28,29].

In group Colgate toothpaste, no statistical significant change (P=0.967) in mean of interleukin-1β after 7 days compared to that at baseline.in addition to the bleeding on probing were significantly decreased in aloe vera and Colgate toothpaste groups.

CONCLUSION

Brushing with Aloe Vera toothpaste twice day by day can altogether decrease dental plaque amassing and bleeding on probing after 7 days with no observed adverse effects. There was a positive reduction in the IL_ 1β in GCF after brushing with Aloe vera toothpaste for one week which is a sign of less periodontal destruction.

ETHICAL CLEARANCE

The research Ethical Committee at scientific research by ethical approval of both environmental and health and higher education and scientific research ministries in Iraq.

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