



# Comparison of the Effects of Chlorhexidine Mouthwash with Jaftex on Periodontal Index

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## Abstract

**Background:** Dental plaque is considered as the main factor of periodontal diseases. The use of mouthwashes is one of the most effective chemical methods for inhibiting plaques.

**Objectives:** This study aimed at evaluating the effect of Chlorhexidine (CHX) and Jaftex mouthwashes on periodontal indices.

**Methods:** In this double blind intervention, 20 male dental students were selected and randomly divided to two groups: 1) Group A: In this group, participants were given chlorhexidine mouthwash; 2) Group B: In this group, participants were given Jaftex mouthwash. Students were asked to use 15 cc of mouthwash, which they received, two times a day (each time for two minutes) for two weeks. Before taking the mouthwashes and two weeks later, the students were examined and the plaque index, gingival index, and tooth staining index were recorded. Independent t-test was used for data analysis.

**Results:** Both CHX and Jaftex reduced the amount of plaque and gingival indices ( $P < 0.001$ ). The CHX mouthwash had greater efficiency in reducing plaque and gingival indices compared to Jaftex, although the difference was not statistically significant ( $P > 0.05\%$ ). Furthermore, CHX and Jaftex increased the staining and the intensity of the stained area indicators yet the amount and intensity of the staining in the use of CHX was more, and the difference was not statistically significant.

**Conclusions:** Jaftex is a herbal mouthwash that is effective on periodontal indices and it is recommended that patients use it for chemical inhabitation of plaques.

**Keywords:** Chlorhexidine, Jaftex, Mouthwash, Periodontal Index

## 1. Background

Periodontal disease is the inflammation of tissues supporting the teeth can be caused by bacteria; in addition, it is one of the most common diseases of the mouth and teeth, and dental plaque is considered as the main cause of this disease (1).

Nowadays, dental plaque is considered as a special example of microbial biofilms, which will be formed on wet surfaces (2). Based on studies conducted by Theilade et al. in 1998 (3) and Loe et al. in 1955 (4), if oral health is not observed, a newly-formed supra-gingival plaque is grown and after two to three weeks, a gingiva disease will be caused. During these three weeks, plaque compounds will be changed and anaerobic gram-negative bacteria in plaque will be more and if gingivitis is not treated, the sticky periodontal system may be destructed and peri-

odontitis disease will be created.

Many studies have been conducted on the use of chemical agents in the prevention and treatment of periodontal diseases. With an emphasis on the issue that dental plaque is the most important factor causing periodontal diseases, and since many studies have been conducted in this field, it has been revealed that chemical agents, such as antimicrobial materials by inhibiting supragingival plaque and subgingival plaque, play an important role in the prevention and treatment of periodontal disease (5). The most effective and the most common way to inhibit plaques is through the use of mechanical methods of inhibiting plaques, which despite being effective, has disadvantages, such as being time consuming and difficult to learn, there being a need for strong motivation in the patient and high probability of plaque formation during

application of these procedures (1). Therefore, the use of chemicals, along with mechanical methods has been proposed, which are used in the form of mouthwash, chewing gum, and toothpaste. One of the most effective methods of chemical inhibition is the use of medicinal mouthwash (6). Among the used mouthwashes, Chlorhexidine has been investigated more than all mouthwashes in dentistry and it has been introduced as a mouthwash of the Golden standard. Chlorhexidine (CHX) is chlorine and Phenylbiguanide with a broad antimicrobial activity, which has been examined as an inhibitor of smooth surface caries, denture disinfectant, and plaque inhibitor in dentistry. However, it has different side effects, such as creating dental pigments, a change in the sense of taste, burning, and dryness of the mouth, scaling of gingiva, and negative systemic effects in case of swallowing (6).

Side-effects of chemical and industrial drugs caused several studies on medicinal plants (7), including studies of the effects of Persica mouthwash that have frequently been conducted (8-11). A study conducted on a mouthwash containing a multiple herbal extract, like chamomile, showed that taking the herbal mouthwash has more desirable effects (12). The aim of this study was to evaluate and introduce a consolidated herbal mouthwash on periodontal indices and compare it with CHX.

Jaftex is a combination of herbal solutions of aqueous extracts of jaft, Zataria Multiflora, and Satureja Bachtiarica.

The base of this herbal solution is oak fruit husks. Iranian oak is a tree of a height of two meters with large spherical crest in the family Apiaceae. The thin skin on the oak fruit, called the jaft, has medical and industrial use.

The inner bark of the oak fruit (jaft) has a huge impact on the treatment of viral and bacterial diseases, such as loss of the oral mucosa. A study conducted by Ebrahimi et al. (2008) on an oak extract showed that Iranian oak has compounds with antibacterial properties (13).

With regards to the mentioned contents, it is advisable that the effect of this herbal mouthwash is compared with chlorhexidine for a clinical and scientific investigation. The aim of this study was to compare the herbal mouthwash (Jaftex) with CHX on periodontal indices.

## 2. Methods

In this intervention-based double blind clinical study, the data were collected by a clinical evaluation and a comparison between plaque index, gingival index, and staining index. A number of 20 male dental students signed a written consent form and entered the study voluntarily.

Exclusion criteria: the presence of systemic disease, smoking, periodontal disease, partial prosthesis, taking

antibiotics, and other mouthwashes in the past three months.

Students were divided to two groups of 10 people and after accepting the conditions, they entered the study.

At 12 pm, the students were examined and all the indicators were recorded. Then the samples were precisely examined by a mirror and a Williams periodontal probe in terms of being a supragingival calculus and the lack of catching the periodontitis disease and if there was the supragingival calculus, the calculus were removed by ultrasonic device and then, brosaage was done for all people.

Jaftex and Chlorhexidine (2%) mouthwashes (Behsa, Iran) were poured in the same cast glass and given to the subjects. It should be noted that consolidated herbal mouthwash (called as Jaftex) is a compilation of the aqueous extract of herbal oak fruit husks as the base and the aqueous extract of zataria multiflora boiss, and aqueous extract satureja bachtiarica, which was invented by Mr. Yadu'llah Amiri (produced by a scientific method in the Pharmaceutical Development Center, approved and supervised by Dr. Ali Asghar Hemait, an academic member of School of Pharmacy, Ahvaz Jundishapur University of Medical Sciences).

The method of preparation of the Jaftex was as follows:

For preparation of Jaftex, initially, aqueous extracts of jaft of Oak, Zataria multiflora and Satureja bachtiarica were obtained individually and after the integration, 9 g of sodium chloride was added to them and with the distilled water, the volume of the solution reached 1 mL.

Students were randomly divided to two groups: 1) group A: Participants in this group were given Chlorhexidine mouthwash; 2) group B: participants in this group were given Jaftex mouthwash.

Students were asked to use an amount of 15 cc of mouthwash for two weeks and two times a day for two minutes without change in their oral hygiene procedures of a glass of mouthwash that they received for a period of two weeks.

Before taking the mouthwashes and two weeks later, the students were examined and clinical indices, including plaque index (the index O' Leary), gingival index (Loe and Silness), and dental staining index (stain index) were recorded (9).

To determine the plaque index (The O' Leary index) at the beginning, the detector solution was used on all supragingival dental surfaces. After the patient washed his mouth to remove additions of stain, each of the four surfaces, except for the occlusal surface, were examined to determine the presence or absence of colored deposits in dentogingival junction.

After recording all of the teeth, the plaque index was calculated using the following method:  $100 \times \text{total num-}$

ber of tooth surfaces/stained surfaces = PI (9)

For measurement of the gingival index, the O' Leary index was used. The soft tissue around the tooth is divided to four parts: footed distobuccal, footed mesiobuccal, and gingival margin level at the buccal surface and gingival margin at the oral surface and then on this base, the categorization is done in each of the four sections:

Zero is the absence of inflammation; one represents a mild inflammation; two is medium inflammation; and three represents severe inflammation. By summing up the four values obtained for each tooth and dividing it by four, gingival index of the corresponding teeth is obtained and the sum of the total number of gingival index on the volunteer's teeth divided by the total number of teeth specifies the gingival index of each individual. If this number is one or less, there is mild gingivitis; if this number is 1.1 to 2, gingivitis is medium; a number of 2.1 and above represents severe gingivitis.

The stain indicators were determined in two sections: the amount of stained areas and stain intensity. To check the stained areas, at the beginning, the buccal surface was divided to three parts, mesial, distal, and medial; then, all the oral surfaces as the surface were considered as a single surface. Then, the presence of stain on each of the surfaces were considered as a positive score and at the end, the staining index for each tooth was obtained from a total score of various surfaces divided by four. By summing up the score obtained from the volunteer's teeth divided by the number of his teeth, the volunteer's stain index was determined. To check the intensity of the stain of the teeth, the same procedure as the previous classification of the tooth surfaces was performed. For the calculation of the stain intensity, the number zero was used for no staining; one for staining, yellow or clear cream; two for staining, light brown; and the number three was equivalent to staining, a dark brown or black. The stain index for each tooth was obtained from the total score obtained in each of the dental surfaces divided by total dental surfaces (4).

Then, the stain intensity index was obtained by summing up the stain index of each of the investigated teeth divided by the whole examined teeth.

At the end, all the data obtained were analyzed by the independent t-test and using the SPSS version 20 software.

### 3. Results

Table 1 represents the comparison of the mean and standard deviation of the effect of Jaftex and CHX on the Plaque index, gingival index, and stain index of the teeth before and after taking the mouthwash. Based on the results of this study, the CHX mouthwash had greater efficiency in reducing the plaque index and gingival index

compared to Jaftex; although the difference was not statistically significant ( $P > 0.05\%$ ). The results in case of decreasing the rate of gingival index was similar to the reduction of the amount of plaque index and CHX in the context of reducing the amount of gingival index was more successful compared to Jaftex, yet these differences were not statistically significant. According to the results of the study, CHX and Jaftex mouthwashes both increased the stain index and the intensity of the stained area, yet the amount and intensity of stain in the use of CHX was more; however, no significant statistical difference was seen ( $P > 0.05\%$ ).

**Table 1.** Comparison of the Mean and Standard Deviation of the Effects of Jaftex and Chlorhexidine on the Periodontal Index Before and After Taking the Mouthwash

Group	Mean ± Std. Deviation	P Value	N
<b>PI before</b>			
A	32.800 ± 7.25412	0.786	10
B	31.800 ± 8.91690	0.786	10
<b>PI after</b>			
A	17.600 ± 4.19524	0.221	10
B	15.300 ± 3.91720	0.221	10
<b>GI before</b>			
A	1.1050 ± 0.70669	0.754	10
B	1.0110 ± 0.61022	0.754	10
<b>GI after</b>			
A	0.6750 ± 0.42406	0.796	10
B	0.6265 ± 0.40128	0.796	10
<b>Stain index</b>			
A	0.3690 ± 0.14487	0.485	10
Area before B	0.4250 ± 0.20079	0.484	10
<b>Stain index</b>			
A	0.6640 ± 0.21392	0.946	10
Area after B	0.6580 ± 0.17700	0.946	10
<b>Stain index</b>			
A	0.4270 ± 0.15734	0.286	10
Intensity. before B	0.5510 ± 0.31575	0.281	10
<b>Stain index</b>			
A	0.7560 ± 0.18087	0.298	10
Intensity after B	0.8820 ± 0.32096	0.294	10

Abbreviations: A, chlorhexidine; B, jaftex; GI, gingival index; PI, plaque index.

### 4. Discussion

Dental plaque is the most important etiological periodontal disease, and studies have shown that chemical agents, such as antimicrobial materials, by inhibition of

plaque, play an important role in the prevention and treatment of periodontal diseases (5). Based on the results of this study, both mouthwashes were effective on the plaque index and gingival index and reduced their amount, although CHX mouthwash exhibited more efficiency compared to Jaftex. In a study conducted by Chitsazi et al. in comparison of the effects of herbal and chemical mouthwashes, the results showed that CHX, Matrica, and Persica reduced the plaque index, and gingival index, and the changed rate of plaque index and gingival index using CHX was more than both herbal mouthwashes ( $P < 0.05\%$ ).

In terms of the breadth of the stained area, CHX increased the stain index to the extent of  $0.68 \pm 0.11$ ; in addition, CHX increased the stain intensity, to the extent of  $0.11 \pm 0.02$ , while, in terms of the breadth and intensity of the stained area, the effect of both herbal mouthwashes was the same and the difference was not statistically significant, yet compared with CHX, there was a significant difference (12).

In a study conducted by Willers Hausen et al. on the effect of herbal mouthwashes on the plaque index, the results represented a reduction of the plaque index 8.40 from 40.8% to 23.9% (14). In another study, during the four weeks, the researchers assessed the effects of the herbal mouthwash on plaque index in 50 healthy dental students, who did not have periodontal problems. The results of this study were similar to Chitsazi et al.'s study, yet no comparison was done between the oral mouthwash and the effects of herbal mouthwash (15).

Pistorius et al. investigated effect of herbal mouthwash (Chamomile) on gingivitis in patients. The results showed a reduction of gingival index, yet no significant change was seen in the plaque index (16).

Based on the results of this study, the intensity of the stained areas of the teeth after the application of Chlorhexidine and Jaftex increased, yet this increase and intensity of staining in Jaftex compared with Chlorhexidine was less, yet it did not show a statistical difference.

In order to investigate the effect of chemical and herbal mouthwashes on periodontal indices, the results of the study conducted by Chitsazi et al. showed that herbal mouthwashes of persica and matrica exhibited a lower intensity of staining compared with CHX and they had a statistically significant difference with CHX (12).

Since CHX has 12% alcohol, it may be contraindicated in some people, such as pregnant women (12). Jaftex mouthwash is a combination of the aqueous extract of the inner skin of oak (jaft), Satureja bachtiarica Bunge and thyme that was prepared in the Pharmacology Research Center of Ahvaz Jundishapur University of Medical Sciences. This is the first in vivo study to examine the effect of this mouthwash. Based on the current results, Jaftex reduces plaque

index and gingival index in dental male students. Interestingly, in comparison with CHX, no significant difference was observed. Based on the results of past studies, herbal mouthwashes like matrica and persica, which are available today, reduce gingival and plaque indices. They had a significant difference compared with CHX (12, 14, 15).

Mozaffari et al. reported that the antibacterial and cytotoxic effects of persica mouthwashes are much weaker than CHX (16).

As mentioned, matrica and persica have less power in reducing plaque and gingival indices, in comparison with CHX (12, 14). This difference is usually due to the chemical compounds of CHX, yet almost all of these mouthwashes did not have an affect on staining (6).

Based on the results of this study, Jaftex, as a herbal mouthwash, is not only able to reduce plaque and gingival indices, yet it is not significantly different from CHX and this point confirms more antibacterial power of this mouthwash compared to the available herbal mouthwash. The main base of the mouthwash is the fruit of the oak tree (jaft). The antibacterial effects of oak and jaft has been proven. Ebrahimi et al. reported that Persian oak has an antibacterial effect due to the tannins contained in its extract (13).

#### 4.1. Conclusions

Based on the results of this study, Jaftex enhanced the intensity rate of the stain of the teeth, and while it was less than chlorhexidine, no significant difference was seen indicating that the stain change was remarkable in comparison with matrica and Persica. Certainly, in vitro and in vivo studies seem to be necessary to examine the impacts of this mouthwash.

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