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Effect of Jaftex and Chlorhexidine Mouthwashes on Oral Microorganism: A Comparative Study

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ABSTRACT

Introduction: One of the effective ways to reduce the number of microbes in the oral environment is the use of mouthwashes. This study aimed to compare the effect of the Jaftex and Chlorhexidine (CHX) mouthwashes on oral microorganisms.
Materials and Methods: In this double-blind clinical trial study, the study population was a group consisting of 44 dental students in Ahvaz Jundishapur University of Medical Sciences. At first, before the intervention, the saliva of volunteers was collected and sent to the lab for counting the number of microbial colonies. Students were randomly divided into two groups: A and B. In group A (n=22), the participants received Jaftex mouthwash and in group B (n=22), the participants were given CHX mouthwash. They were asked to use mouthwashes for one week, twice a day, under certain conditions. After one week, the volunteers' saliva samples were collected and sent to the laboratory. The collected data were analyzed by using T-test and the significance level was considered to be less than 0.05.
Results: The results of this study showed that the Jaftex mouthwash (Group A) significantly reduced the number of microorganisms (p=0.005). The CHX mouthwash (Group B) also reduced significantly the number of microorganisms in the mouth (p<0.001). The comparison between the two groups showed that the mean number of microorganisms in group B was lower than group A, but this difference was not significant.
Conclusion: The Jaftex mouthwash reduces the number of microorganisms in the mouth, but it has a less antimicrobial effect compared to CHX. The Jaftex is recommended as an anti-bacterial mouthwash.

Key words: Chlorhexidine, Jaftex, Mouthwash, Oral microorganisms, Saliva

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INTRODUCTION

The profession of dentistry has a lot of charm. However, this profession in the clinical setting also presents risks to dentists and patients [1-6]. There are about 500 species of microbes in the mouth, some of which are the cause of infectious oral disease. Reduction of pathogenic microbes is important in wound healing and oral infections [7].

Dental caries is the most common chronic disease in the world. Despite the fact that today its rate and severity have been greatly reduced, millions of children and adults still experience caries, loss of teeth and malocclusion. Tooth decay is an infectious disease due to the colonization of bacteria that begins with decalcification of the inorganic part of the tooth and causes the destruction of the organic matrix of the teeth [8].

Mouthwash as an auxiliary tool, and along with mechanical methods of plaque control, namely, brushing and using dental floss in reducing the number of bacteria in the mouth, such as *Streptococcus mutans*, and thus reducing decay play an important role in reducing caries. The desired mouthwash, in addition to the antimicrobial spectrum, should have a small drug resistance and at the same time cause less likely to destroy the natural microflora of the mouth [9].

Chlorhexidine gluconate (CHX) is a chlorine phenylbiguanide with a broad antimicrobial activity, which has been examined as an inhibitor of smooth surface caries, dentures disinfectant and for reducing the

microbial plaque in dentistry. Hence, it is known as a gold standard for microbial plaque control. This mouthwash has undesirable effects, such as a change in the sense of taste, dryness and burning in the mucosa, negative systemic effects by the swallowing, and the color change of the tooth restoration.

There have been more tendencies to herbal medicines over the past years due to their antimicrobial, antifungal, anti-cancer and fewer side effects. Herbal mouthwashes are more suitable than CXH because they contain organic compounds, more fitness with body physiology and have lower toxicity; so, it is recommended in people who cannot use chemical mouthwashes [10].

One of these medicinal plants with many therapeutic properties is Oak. The inner layer of the fruit is called "jaft", which has medical and industrial uses. Jaft has a huge impact on treating bacterial and viral diseases. The antimicrobial properties of various oak species are mentioned in various sources. The antimicrobial properties of different oak species are discussed in the literature. Fruit of the oak is known for having a disinfectant effect.

Jaftex is a new herbal mouthwash that consisted of Jaft (Oak Fruit) aquatic extract as a base and aquatic extracts of Thyme (*Zataria multifio*) and *Saturej bachtiarica*; it has been prepared scientifically in the pharmaceutical plant growth center of Ahvaz Jundishapur University of Medical Sciences; the main basis for this oral mouthwash is jaft [11,12].

According to a review of the past studies, Thyme and *Saturej bachtiarica* have some antibacterial effects. The antibacterial effects of these two products are attributed to their compounds and elements. Thymol and Carvacrol have been reported to be one of the most important compounds in *Saturej bachtiarica* and Thyme [13-18].

The purpose of this study was to compare the effect of Jaftex mouthwash and CHX on the oral microorganisms.

MATERIALS AND METHODS

In this double-blind randomized clinical trial study, 44 dental students with an age range of 19-26 years old were selected. This research was conducted at the faculty of dentistry. The participants and researchers did not know the type of content of the glasses. The mouthwashes were prepared in the same glasses by the drug center. The inclusion criteria included: 1) do not take antibiotics in the past month; 2) good oral health; 3) not smoking, and 4) lack of orthodontic plaque. The study was conducted in two stages.

The participants randomly were divided into two equal groups. Before the intervention, all volunteers were taken saliva samples. Initially, the participants were asked to do not take any meal and drink an hour before sampling to prepare a saliva sample. At 10 o'clock, each of them received a 5 cc physiology serum to wash one's mouth for 5 seconds and then it was collected in a sterile container. The specimens were stored in an ice-chamber and sent to the microbiological laboratory within 1 hour to count the number of microbial colonies. Subsequently, in group A, participants (n=22) were given the Jaftex mouthwash; in group B, participants (n=22) received the CHX mouthwash 2% (Iran, Tehran, Shahrdaru).

The students were asked to do not change their usual mechanical sanitary procedures (such as dental floss and a toothbrush without toothpaste). They should use the mouthwashes for a week, twice a day (in the morning and at night), 5 ml each time and 30 seconds. At the end of this period (one week after mouthwash use), the saliva sample was again collected from the volunteers listed above and sent to the microbiology laboratory.

In the laboratory, at first, each of the specimens was transferred slowly onto a plate of Blood Agar solid culture medium, using a standard loop (equivalent to 0.01 milliliters) (Theron Lob, Tehran, Iran). Plates were placed in an incubator (Munich, Germany, Gallenkamp, CO_2) at 37°C for 24 hours. Finally, the grown colonies were counted and multiplied by the dilution coefficient (multiplied by 100) and the number of colonies per ml of physiological serum was determined (UFC/ml). All the data were analyzed by the t-test and using the SPSS version 20.

RESULTS

The aim of this study was to compare the effect of Jaftex and CHX mouthwashes on oral microorganisms. A total of 44 healthy individuals with a range of 19-26 years old were selected. There were 22 (50%) male and 22 (50%) female among the 44 participants. The average age of participants in the intervention and control groups has been 22.5 years old.

Table 1 represents the mean and standard deviation of the effect of Jaftex and CHX mouthwashes on the oral microorganisms before and after taking the mouthwash.

The results of t-test showed that Jaftex mouthwash (Group A) could significantly reduce the number of microorganisms in the mouth (p=0.005).

The results of the dependent t-test showed that the CHX mouthwash (Group B) has also been able to significantly reduce the number of microorganisms in the mouth (p<0.001).

Table 1: Distribution of the means and standard deviation for jaftex and chlorhexidine mouthwashes on oral microorganisms

Group	Before Mouthwash use	After Mouthwash use	p-value
	Mean ± SD	Mean ± SD	
A	164545.45 ± 77112.61	113636.36 ± 34989.18	0.005
B	180681.82 ± 79091.50	108500 ± 39858.98	<0.001

Abbreviations: A:Jaftex; B:Chlorhexidine; SD:Standard Deviation

There was no significant difference between the number of microorganisms before and after consuming mouthwashes in both groups.

The independent t-test was used to compare the effect of Jaftex and Chlorhexidine mouthwashes on the oral microorganisms.

The results showed that there was no significant difference between the number of microorganisms in both groups (p>0.05) (Table 2).

Table 2: Comparison of the means and standard deviation for jaftex and chlorhexidine mouthwashes on oral microorganisms

Mouth microorganisms	Mouthwash Jaftex	Mouthwash Chlorhexidine	p-value
	Mean ± SD	Mean ± SD	
Before Mouthwash use	164545.45 ± 77112.61	180681.82 ± 79091.50	0.491
After Mouthwash use	113636.36 ± 34989.18	108500 ± 39858.98	0.652

Abbreviations: SD:Standard Deviation

DISCUSSION AND CONCLUSION

This study aimed to compare the effect of Jaftex and CHX mouthwashes on oral microorganisms. The results of this study showed that CHX mouthwash and Jaftex reduce the number of microorganisms in the mouth. One of the effective ways to reduce the number of microbes in the oral environment is the use of mouthwashes [12]. The CHX mouthwash is one of the most effective antiseptic agents for the prevention and elimination of microbial platelets [19,20]. Hence, nowadays, more attention has been paid to herbal medicines with the goal of obtaining drugs with minimal side effects [21]. The favorable therapeutic effects of the medicinal herbs with the minimal side effects have been proven over many years [22,23]. In this study, the CHX mouthwash showed a greater antibacterial effect that may be due to the chemical base of this solution [24-26]. The antimicrobial effects CHX have been proven in various studies [24,26,27]. The results of this study showed that Jaftex mouthwash has antibacterial properties. The Little research has been done on this herbal mouthwash [11,12]. The findings of the present study are similar to other studies that have been conducted in this field. In an *in vitro* study, Babadi et al. compared the antibacterial effects of CHX with Jaftex on some common oral microorganisms. They reported that Jaftex has antibacterial effects, but it is less effective in inhibiting the growth of oral bacteria compared to CHX [12]. Also in another study, Babadi et al. reported that the Jaftex has a greater inhibitory effect on bacterial growth than Matrica and Persica [11]. Jahanghirnejad et al. noted that Jaftex reduces the amount of plaque and gingival index [28]. The present study is the first clinical research which surveys the antibacterial effect of Jaftex mouthwash on salivary microorganisms while the above studies have examined the antibacterial effect of Jaftex in the laboratory environment. Our results are based on clinical findings that are considered more realistic. The Jaftex mouthwash is a combination of jaft extract as a basis, and thyme and *Saturej bachtiarica* extracts. The antibacterial property of this mouthwash is largely attributed to the extract of oak jaft. In a number of previous studies, the antibacterial effect of oak jaft has been proven [9,29-31]. According to the experts, the therapeutic importance of oak trees is more closely related to tannins that are provided in their different members. Tannin is a common name for a group of molecular polymeric materials with high-molecular weight (500-3000 Daltons), which is one of the important classes of secondary metabolites in plants [32,33]. Tannins can prevent the presence of food proteins available to the microbes [9,32].

Another ingredient in the Jaftex mouthwash is Thyme. The use of Thyme essence in dentistry has been studied as the root canal cleanser and the denture stomatitis treatment [33,34]. In general, the antimicrobial property of Thyme is mostly due to the presence of its thymol and carvacrol compounds, with antibacterial, antiviral, antioxidant and anti-inflammatory effects. These compounds increase the permeability and the breakdown of the cell wall of the bacteria and ultimately discharge its contents and intracellular material [13,14].

Reviewing the past studies also shows that *Saturej bachtiarica* has some antibacterial effects [15,16]. The antibacterial effects of *Saturej bachtiarica* are attributed to its compounds and elements. Thymol and Carvacrol have been reported to be one of the most important compounds in *Saturej bachtiarica* [17,35]. Many studies have shown that carvacrol and thymol are one of the most important compounds in the essences and plant extracts that have a high antibacterial effect [36,37].

Based on the results of this research, it seems that the antibacterial effect of the Jaftex mouthwash is related to all three ingredients in its composition which further studies are needed in this area.

The use of herbal mouthwash of Jaftex is recommended as an anti-bacterial mouthwash. We suggest another study is to investigate the effect of the Jaftex mouthwash on the kind of the salivary microorganisms.

ETHICAL CONSIDERATIONS

This study has been approved according to the guidelines of the ethics committee of Ahvaz Jundishapur University of Medical Sciences (Ethical Code: IR.Ajums.REC. 1397.244).

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CONFLICT OF INTEREST

The authors declare that there is no conflict of interest regarding the publication of this manuscript.

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