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(RESEARCH ARTICLE)

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The effectiveness of Oxyfresh® mouthwash to reduce inflammatory gingival status in patients at University of Jember Dental Hospital

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Abstract

Background: Gingivitis is an inflammatory disease caused by plaque bacteria. Gingivitis prevention can be done by chemical plaque control using mouthwash. Oxyfresh® is a mouthwash that contains sodium chlorite, which can inhibit the growth of plaque bacteria.

Aim: To determine the effectiveness of Oxyfresh® mouthwash to reduce the gingivitis status of patients who come to the Dental Hospital of the University of Jember.

Material and Methods: This research is descriptive research. The participants of this study were 30 patients who came to the Dental Hospital of University of Jember over the period of September-October 2022. The criteria of patients who came to the Dental Hospital aged between 20-40 years, did not have any systemic disease, did not smoke, and were willing to complete the informed consent form. Gingivitis status was assessed by the Gingival Index (GI). The teeth examined according to the Ramfjord were 16, 21, 24, 36, 43, 44. The observed surfaces were facial, mesial, distal, and lingual. Gingival status was checked before scaling, and then the patient was asked to rinse 5 ml Oxyfresh® twice daily for 2 minutes. On the 7th post-scaling day, the gingival status was checked. The data were analyzed using SPSS software.

Results: Gingivitis scores in 30 patients showed 10% mild, 76% moderate, and 14% severe gingivitis. The results showed that gargling with Oxyfresh® as much as 5 ml twice daily can reduce the gingival score by 70% in one week. Data analysis showed a significant difference in gingival status before and after scaling after being given Oxyfresh® mouthwash ($p<0.05$).

Conclusion: Oxyfresh® mouthwash effectively reduces the severity of gingivitis in patients at the Dental Hospital of University of Jember.

Keywords: Gingivitis; Mouthwash; Scaling; Plaque Score

1. Introduction

The main cause of gingivitis is dental plaque. Dental plaque is clinically defined as an elastic, structured substance attached to a hard surface in the oral cavity. The substance consists of bacteria in the salivary glycoprotein matrix and extracellular polysaccharides. Plaque-induced gingivitis is the most common form of gingival disease. It results from the interaction of microorganisms in the dental plaque biofilm and hosts tissue and inflammatory cells.[1,2] Thus, it can be said that the elimination of dental plaque is a priority in treating gingivitis.

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Plaque control is the routine elimination of dental plaque and also prevents its accumulation on the tooth surface. Tooth brushing is considered the most reliable mechanical plaque control measure in removing plaque. But the toothbrush is less able to reach the interproximal area, so another additional method is needed, namely the control of plaque in a chronic manner. This method, in the form of the use of mouthwash, adding to prevent plaque accumulation, can also prevent the development of gingivitis.[3,4]

Mouthwash allows the storage of active ingredients to be released slowly. This helps maintain an effective concentration of mouthwash in the mouth.[5,6] Based on its composition, mouthwash is distinguished into alcoholic and alcohol-free mouthwash. Alcohol content (ethanol) is known to cause some unwanted effects, such as a burning sensation in the oral cavity, xerostomia, pain in the mouth, staining in the teeth, the risk of oral cavity cancer and reactive action on dental restoration materials. Alcoholic mouthwash is also not recommended for use in children, pregnant and lactating women, people with diabetes, alcoholics, patients taking metronidazole, patients with xerostomia and mucositis, patients undergoing head and neck irradiation and patients with weak immunity.[7]

Based on this, the use of alcohol-free mouthwash becomes an option. One mouthwash on the market that does not contain alcohol is Oxyfresh®. This study aims to determine the effectiveness of the Oxyfresh® mouthwash in reducing the status of gingivitis in patients who come to the Periodonsia Clinic at Jember University Dental Hospital.

2. Methods

The participants of this study were 30 patients who came to the Jember University Dental Hospital (RSGM) in September-October 2022. The participants signed informed consent form after being explained about the research procedure. This research has been approved by the Health Research Ethics Committee (KEPK) of the Faculty of Dentistry, University of Jember No.1773/UN25.8/KEPK/DL/2022.

Inclusion criteria include men/women suffering from chronic gingivitis, aged 20-40 years, with≥ 20 teeth. Exclusion criteria include: having a smoking habit, receiving medication that affects the gingiva, being under orthodontic treatment, having systemic abnormalities, being pregnant/breastfeeding women, and receiving periodontal treatment for the last six months. Initial screening is done by examining the Gingival Index (Ramfjord) before scaling. The teeth examined were 16, 21, 24, 36, 43, and 44. The observed surfaces are facial, mesial, distal and lingual. After scaling, the participants were asked to rinse Oxyfresh® 5ml twice daily for 2 minutes for seven days. On the 7th day after scaling, the Gingival Index examination was repeated.[5] Participants were asked not to use other oral hygiene tools, such as interdental cleaning aids or mouthwash other than Oxyfresh®, during the study period. Data analysis using tabulation and SPSS software with a different test with a significant value of $p<0.05$.

3. Results

Gingivitis score on the first day (baseline) before scaling was obtained in as many as six people in the light category (20%), 19 people in the medium category (64%), and five people in the severe category (16%). After scaling and using Oxyfresh® mouthwash for seven days, nine people in the mild category (30%), 20 people in the medium category (66.4%) and one person in the severe category (3.3%) were found (Table.1).

Table 1 Distribution of Scoring Category of Gingivitis

Variable	**Scoring Category of Gingivitis**						**Total**	
	Mild		**Moderate**		**Severe**			
	N	%	N	%	N	%	N	%
Baseline	6	20	19	64	5	16	30	100
H-7	9	30	20	66.4	1	3.3	30	100

The statistical analysis results showed significant differences in the baseline group's low gingivitis score and day 7 ($p<0.05$), where the number of low gingivitis scores increased after using mouthwash. The gingivitis score group had moderate differences but no significant differences ($p>0.05$). In the severe gingivitis score group, there was a very significant difference where the number of cases of severe gingivitis score decreased compared to the baseline (Figure 1).

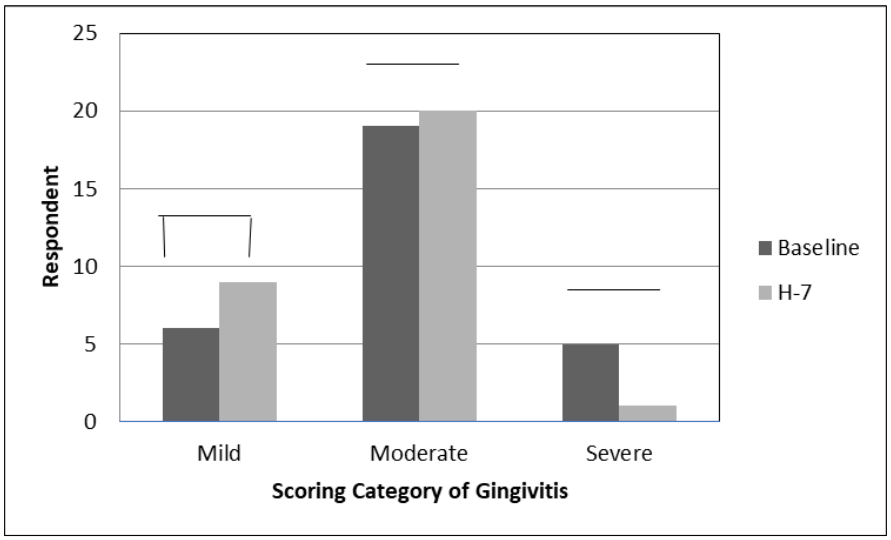

Figure 1 Gingivitis Score Distribution Chart

Figure 2 Patients aged 30 years with moderate gingivitis score on the baseline and after the use of mouthwash after seven days become mild gingivitis score

Figure 3 Patients aged 21 years with a score of severe gingivitis on the baseline and after the use of mouthwash after seven days became moderate gingivitis

4. Discussion

Gingivitis is an inflammation of the gums caused by plaque bacteria that accumulate on the surface of the teeth due to inadequate cleaning of the oral cavity. Effective cleaning of the oral cavity, such as brushing teeth, is essential to ensure adequate disposal of food waste, which prevents further plaque development.[8,9] Plaque that forms on the surface of the tooth will then enter the gingival tissue, especially the gingival sulcus, and cause the marginal area to become susceptible to microbial infections. Microbial species commonly involved in gingivitis are *Streptococcus sp., Fusobacterium sp., Actinomyces sp., Veilonella sp., Treponema sp*., and several others.[10,11] If left untreated, gingivitis can progress to periodontitis, which can cause permanent damage not only to the gums but also to the surrounding bone that supports the teeth.

In this case study, gingivitis scores before scaling (baseline) were obtained from as many as six people in the mild category (20%), 19 people in the moderate category (64%), and five people in the severe category (16%). A thorough examination of gingival changes such as colour, consistency, texture, and size were also observed. Moderate to severe gingivitis has more significant discolouration, consistency, texture, and size of the gingiva than mild gingivitis. Inflamed gums will appear erythematous and oedematous and bleed when probing. As gingivitis develops, the gingiva will become fluctuate up to the presence of purulent exudates.[3,10]

The main goal of treatment in plaque-induced gingivitis is to reduce dental biofilm and eliminate inflammation. Therefore, the complete elimination of biofilms or dental plaque from the surface of the teeth and gingival sulcus is essential. Plaque and debris formed within <24 hours can be removed by brushing your teeth effectively. However, sediment that is not cleaned will be calcified and difficult to clean, called dental calculus. Scaling is needed to eliminate dental calculus.[4,12] The use of mouthwash is also beneficial in preventing the development of plaque and gingivitis.[5,13]

The use of mouthwash with chlorine dioxide content as an additional therapy after scaling in this study proved effective in alleviating gingivitis and preventing plaque formation. The results of this study showed an improvement in the category of gingivitis, whereas the group of mild gingivitis and severe gingivitis significantly improved clinically. The results of this study are in line with the research of Rajiv Saini (2015), who explained that the use of mouthwash with chlorine dioxide content as an additional therapy showed faster clinical improvement in people with gingivitis than without additional mouthwash therapy.[14]

Oxyfresh® mouthwash contains sodium chloride (a stable form of chlorine dioxide), zinc acetate, and peppermint oil (xylitol). Stabilized chlorine dioxide-based products were used in this study (Oxyfresh® mouthwash). Sodium chloride (a stable form of chlorine dioxide) can act as a potent ingredient to inhibit the proliferation of the subgingival anaerobic microbiota through oxygenation and neutralization of toxins (bacterial proteolytic enzymes) produced by bacteria in the oral cavity. Sodium chloride can also destroy volatile sulphide compounds, which further reduces the trigger of gingival inflammation. Another benefit of Oxyfresh® mouthwash is that it does not cause staining on the teeth, is alcohol-free, does not irritate, does not change the taste, and is free of sodium lauryl sulphate (a foaming ingredient in toothpaste that triggers canker sores).[14,15]

Other studies revealed that the bactericidal activity of stabilized chlorine dioxide mouthwash (Oxyfresh® mouthwash) has a pronounced bactericidal effect against the pathogens of periodontitis, namely Aa, Fn, Pg and Pi.[15] Zinc acetate with xylitol further prevents colonization of the initial plaque formation and eliminates halitosis leading to volatile organic compounds.[16] Therefore, the use of mouthwash (Oxyfresh® mouthwash) as adjunctive therapy for gingivitis effectively improves clinical improvement more quickly.

5. Conclusion

Mouthwash (Oxyfresh® Mouthwash) may lower gingivitis scores after the seventh day of use in patients with gingivitis.

Compliance with ethical standards

Disclosure of conflict of interest

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

Statement of informed consent

Informed consent was obtained from all individual participants included in the study.

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