
The Effectiveness of 0.2% Chlorhexidine Mouthwash to Reduce Dental Plaque for Students of the Department of Dental Health, Poltekkes Kemenkes Makassar

Syamsuddin Abubakar¹, Nurwiyana Abdullah², Bahtiar³ (corresponding author)

¹Department of Dental Health, Poltekkes Kemenkes Makassar, Indonesia

²Department of Dental Health, Poltekkes Kemenkes Makassar, Indonesia

³Department of Nursing, Poltekkes Kemenkes Makassar, Indonesia; bahtiar.poltekkes@gmail.com

Submitted: February 26, 2021 -Revised: December 29, 2021 -Accepted: January 25, 2022 -Published: February 28, 2022

ABSTRACT

Chlorhexidine is an antiseptic that is absorbed by the tooth surface and has antibacterial properties against organisms that try and is the most effective mouthwash to reduce plaque. Dental plaque is a soft, non-calcified layer of bacteria that accumulates and adheres to the teeth. In the form of a thin layer, dental plaque is generally invisible and can only be seen with the help of a disclosing agent. The purpose of this study was to analyze the effectiveness of 0.2% chlorhexidine mouthwash on plaque formation in students of the Department of Dental Health, Poltekkes Kemenkes Makassar 2019. This type of research was pre-experimental with a one-group pretest-posttest design. The research subjects were 30 students of Department of Dental Health, Poltekkes Kemenkes Makassar, selected by purposive sampling technique. Data on plaque before and after mouthwash was measured by plaque index. The difference in plaque index between before and after the intervention was analyzed using the Wilcoxon test. The results of the analysis showed that before the intervention, the majority of respondents had a plaque index in the good category (63%), while after the intervention, the majority of respondents also had a plaque index in the good category, with a larger proportion of 77%. Furthermore, it was concluded that 0.2% chlorhexidine mouthwash was effective in reducing plaque on teeth.

Keywords: chlorhexidine 0.2%; mouthwash; plaque index

INTRODUCTION

Dental plaque will grow through the internal division of bacteria that were previously attached to the biofilm and bacteria on the surface. Clinically, dental plaque is a soft, non-calcified layer of bacteria that accumulates and adheres to the teeth. In the form of a thin layer, dental plaque is generally invisible and can only be seen with the help of a disclosing agent. Nearly 70% of dental plaque consists of microorganisms. The most common carbohydrates found in plaque are bacterial products of dextran, levan, and dextrose. ⁽¹⁾

A common factor that causes dental caries and periodontal disease is plaque. Streptococcus mutans is a gram-positive bacterium that plays a role in the formation and increase in plaque accumulation and as the main organism causing caries. The glucosyl transferase enzyme produced by S. mutans can facilitate the formation of glucans, thereby helping the attachment and aggregation of other bacteria to form plaque biofilms that are not cleaned regularly will experience maturation of pathogenicity produced by bacterial complexes that can cause caries, gingivitis and periodontitis. ⁽²⁾ Therefore, plaque control is needed as an effort to maintain dental and oral health.

Generally, plaque control is done mechanically through tooth brushing and interdental cleaning, but in fact there are individuals who find it difficult to control plaque mechanically well. This may occur due to lack of motivation and skills to perform plaque control accurately. Mechanical plaque control can be supported through the use of mouthwash to reach areas that are not reached by brushing, and the use of dental floss. ⁽³⁾

Inadequate dental cleaning can lead to plaque accumulation. Plaque is a thin layer, colorless, contains a collection of bacteria, adheres to the surface of the teeth and is always formed in the mouth and when mixed with sugar in food will form acid and will be visible for one to two days if there are no oral cleaning steps. ⁽⁴⁾

Gargling is one of the methods in how to clean teeth and mouth, often done after brushing teeth. Gargling can be done efficiently if accompanied by a great will. Willingness to take the time, good way of gargling and normal function of the muscles of the lips, tongue and cheeks. ⁽⁵⁾

Chlorhexidine is one of the most effective antiplaque agents ⁽⁶⁾, a cationic bisguanide derivative with broad spectrum antimicrobial activity, is the most effective mouthwash to reduce plaque and gingivitis. The cationic component binds to tooth enamel hydroxyapatite, pellicle, plaque bacteria, and extracellular polysaccharides from plaque, especially to mucous membranes. Chlorhexidine absorbed into hydroxyapatite is believed to inhibit bacterial colonization. Antibacterial chlorhexidine mouthwash is a bisguanide derivative which has been shown

to be effective in reducing plaque accumulation. The different concentrations include 0.5%, 0.1%, 0.12%, and 0.2%, each of which has a different effectiveness.

After making direct observations of students from the Department of Dental Health, Poltekkes Kemenkes Makassar, it turns out that many students have used mouthwash and many have not used mouthwash. They use various kinds of mouthwash and there are only a few students who routinely use mouthwash containing chlorhexidine. The reason they use mouthwash is to freshen breath and inhibit plaque formation. Because they believe that to remove plaque on the surface of the teeth it is not enough just to brush your teeth but need chemical assistance, namely by using anti-plaque mouthwash, especially the inside of the teeth. However, none of the students who used the anti-plaque mouthwash knew the effectiveness of the mouthwash they had used.

Based on the description above, it is necessary to conduct research on the effectiveness of 0.2% chlorhexidine mouthwash on plaque formation in students of the Department of Dental Health, Poltekkes Kemenkes Makassar.

METHODS

This type of research was pre-experimental with a one-group pretest-posttest design. The study was conducted from June to April 2019 at the Department of Dental Health, Poltekkes Kemenkes Makassar, Indonesia. The research population was students of the Department of Dental Health, Poltekkes Kemenkes Makassar. The sample size was 30 students. Sample members were selected by purposive sampling technique.

The independent variable was the administration of 0.2% chlorhexidine mouthwash, while the dependent variable was plaque formation. Data on plaque before and after mouthwash was measured in the form of plaque index.

The application of the research design is as follows:

- 1) On the first day of clinical examination, namely measuring plaque index, then respondents were asked to rinse 10 ml of 0.2% chlorhexidine solution for 30 seconds
- 2) On the second day until the sixth day, respondents were asked to rinse their mouth at home, namely before breakfast and before going to bed at night
- 3) On the seventh day, the plaque index was measured

The difference in plaque index between before and after the intervention was analyzed using the Wilcoxon test.

RESULTS

Data on plaque index before using 0.2% chlorhexidine mouthwash is presented in table 1.

Table 1. Distribution of index plaques before using 0.2% chlorhexidine mouthwash

Plaque index	Before	Frequency	Percentage
Very good	-	-	0
Good	0,5	19	63
Medium	1,4	11	37
Bad	-	-	0
Total	1,9	30	100

Table 2. Distribution of index plaques after using 0.2% chlorhexidine mouthwash

Plaque index	Before	Frequency	Percentage
Very good	-	-	0
Good	0,4	23	77
Medium	1,2	7	23
Bad	-	-	0
Total	1,6	30	100

The results of the Wilcoxon test showed a p value = 0.04 (> 0.05) so it could be interpreted that there was a difference in plaque index between before and after 0.2% chlorhexidine mouthwash.

DISCUSSION

Based on the results of data analysis, it is known that before and after the application of 0.2% chlorhexidine mouthwash for 7 days, out of 30 respondents there was no one who had very good oral hygiene criteria. Before administering 0.2% chlorhexidine mouthwash, there were 19 respondents who had good oral and dental hygiene (63%). After using mouthwash for 6 days, the number of respondents who had good oral hygiene increased to 23 people (77%).

The results of data analysis also showed a change in the plaque index. The mean plaque index score of the students before administration of 0.2% chlorhexidine mouthwash was 2.00; while after using mouthwash, the average plaque index decreased to 1.70. This shows that, the students who used 0.2% chlorhexidine mouthwash experienced an improvement in their dental and oral hygiene status.

Plaque control and prevention has the main goal of preventing periodontal disease. Therefore, mechanical cleaning of the teeth and mouth and the use of mouthwash is highly recommended because it can control the formation of plaque in the mouth. Brushing and other mechanical tooth cleaning is considered the most effective way of controlling plaque when done properly and regularly. However, in reality, many respondents find it difficult to brush their teeth properly. Therefore, brushing teeth needs to be assisted with chemical cleaning, one of which is the use of 0.2% chlorhexidine mouthwash which can reach areas that cannot be reached by a toothbrush.

Before the application of the mouthwash the plaque index criteria were in the moderate category and after the application of the mouthwash the plaque index criteria were in the good category. In other words, there has been a decrease in plaque index as a result of the intervention of 0.2% chlorhexidine mouthwash. Chlorhexidine is one of several cationic antiseptics which because of its positive charge permeates the dental tissues, into the acidic proteins that cover the teeth and oral mucosa. Chlorhexidine is an antiseptic that is absorbed by the tooth surface and has antibacterial properties against organisms that try to stick to it. The rate of cations from the tooth surface determines its effectiveness as an anti-plaque agent. ⁽⁷⁾

Based on the results in this study, it was found that there was a difference in plaque index after rinsing with chlorhexidine twice for 30 seconds for 7 days. This shows that the plaque index has changed significantly after 7 days of mouthwash. Thus it can be said that 0.2% chlorhexidine mouthwash is effective in reducing plaque formation on teeth. The effectiveness of chlorhexidine is good for two years or more. However, plaque formation will return to normal after the use of chlorhexidine is stopped. ⁽⁸⁾

CONCLUSION

Based on the results of the study, it can be concluded that 0.2% chlorhexidine mouthwash is effective in reducing plaque formation on teeth.

REFERENCES

1. Anggayanti NA, Adiatmika IPG, Nyoman A. Berkumur dengan Teh Hitam Lebih Efektif daripada Chlorhexidine Gluconate 0,2% untuk Menurunkan Akumulasi Plak Gigi. *Jurnal PDGI*. 2013;62(2):36.
2. Forssten SD, Björklund M, Ouwehand AC. *Streptococcus mutans*, Caries and Simulation Models. *Nutrients*. 2010;2(3):290-8.
3. Toar AI, et al. Daya Hambat Obat Kumur Cetylpyridium Chloride dan Obat Kumur Daun Sirih Terhadap Pertumbuhan *Streptococcus mutans*. *Jurnal Biomedik*. 2013;5(1):163-168.
4. Pantow CB, et al. Pengaruh Penyuluhan Cara Menyikat Gigi Terhadap Indeks Plak Gigi Pada Siswa SD Inpres Lapangan. Manado: Universitas Sam Ratulangi Manado; 2009.
5. Nirmaladewi A, et al. Status Saliva dan Gingivitis Pada Penderita Gingivitis Setelah Kumur Epigalocatechingallate (EGCG) dari Ekstrak The Hijau (*Camelia Sinensis*). Yogyakarta: Universitas Gadjah Mada; 2010.
6. Pangesti AD, Susanti DNA, Kusumadewi S. Perbedaan Efektivitas Obat Kumur yang Mengandung Chlorhexidine dan Essential Oils terhadap Penurunan Tingkat Halitosis. *Bali Dental Journal*. 2010;2(1):49-53.
7. Edwina AMK, Sally J. Dasar-Dasar Karies, Penyakit, dan Penanggulangannya. Translater: Narlan Sumawinata & Safrida Faruk. Jakarta: EGC; 1992.
8. Nuriene N. Efek Samping Penggunaan Klorheksidin 0,2% pada Penderita Gingivitis. Medan: Universitas Sumatera Utara; 1997.