

Efficacy of Rinsing Chlorhexidine Digluconate 0,12% and Povidone Iodine 1% on Total Bacterial Count as Aseptic Technique at Department of Oral Surgery, Faculty of Dentistry, University of Sumatera Utara



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Abstract

Objective: To compare chlorhexidine digluconate 0.12% and povidone iodine 1% on total bacterial count after mouth rinsing at the department of oral surgery, Faculty of Dentistry, University of Sumatera Utara

Material and Methods: This was an experimental study with post-test only control group design approach. Purposive technique was applied to collect samples which are clinical students. In this study, sample were divided into 3 groups and each consisting of 12 people. Normal saline 0.9% was used as control group while chlorhexidine digluconate 0.12% and povidone iodine 1% was used

as the treatment group. Each member performed mouth rinsing for 30 seconds.

Results: The results were statistically analyzed using Kruskal Wallis and Mann-Whitney test. The comparison between chlorhexidine digluconate 0.12% and povidone iodine 1% showed a significant difference to the total bacteria count after mouth rinsing ($p < 0.05$) and the chlorhexidine digluconate 0.12% group showed a greater mean reduction.

Conclusion: Chlorhexidine digluconate 0.12% reduce more bacteria than povidone iodine 1%. However, both of the antiseptic agents can be a choice for mouth rinsing.

Keyword: Bacteria colonization, Chlorhexidine digluconate, Mouth rinsing, Povidone iodine

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Introduction

Asepsis is an important thing to do first before treatment. The purpose of asepsis is to prevent pathogenic microbes from entering the body as well as spread of certain infectious diseases.^{1,2} One of the asepsis technique is preoperative preparation by rinsing mouth with antiseptic agent before treatment.¹ Rinsing mouth with antiseptic agent could reduce the risk of postoperative infection. Furthermore, rinsing is more efficient than swabbing in reducing the number of bacterial colonization in oral cavity as swabbing is prone to inadequate cleansing of sheltered areas on and between teeth and mucosa.²

However, the preoperative use of antiseptics in oral and maxillofacial surgery is still not universally practised. A survey published that 67% of oral and maxillofacial surgeons used an intraoral preoperative preparation and only 46% believed that intraoral preparation was effective in reducing bacterial colonization, with 35% of respondents attributing the use of an intraoral preparation with a reduction in perioperative infection.³ Dental treatment that is often used in Indonesia is extraction. The results of Basic Health Research in 2013 showed that the DMFT index in Indonesia is 4.6 within an index of

2.9 represents that teeth have been extracted. The high index of extracted teeth should be the concern of dentists to prevent cross infection due to the large number of bacteria found in the oral cavity. One of the oral cavity bacteria that can cause infection is staphylococci aureus. Many researches showed that the incidence of bacterial endocarditis caused by staphylococcal species is getting higher.^{4,5}

The most common mouthwashes that are used are chlorhexidine and povidone iodine due to their antimicrobial activity. Chlorhexidine is available in digluconate forms and one of its common concentrations is 0.12%. Povidone iodine also available in various concentrations and one of its concentration that acceptable in oral cavity is 1%. Studies showed that chlorhexidine digluconate 0.12% and povidone iodine 1% showed good result in preventing infection postoperative and reduce bacterial colonization 1865 times for anaerob and 13 times for aerob as well as povidone iodine 1% reduce bacterial colonization 867 times for anaerob and 245 times for aerob.⁶

Material and Methods

This was an experimental study with post-test only control group design approach. The non probability

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sampling with purposive technique was applied to collect samples which are clinical students with a good oral hygiene at Department of Oral and Maxillofacial Surgery in Faculty of Dentistry, University of Sumatera Utara. In this study, sample were divided into 3 groups and each consisting of 12 people. Normal saline 0.9% used as control group while chlorhexidine digluconate 0.12% and povidone iodine 1% were used as the treatment group. The following procedure begins with doing oral prophylaxis by rinsing oral cavity with mineral water first then continued with rinsing 15 ml of antiseptic agent for 30 seconds. The used mouth-rinses were collected by using sterile tube. The samples were then sent to the microbiology laboratory for bacterial cultivation on plate count agar and incubated for 24 hours. The number of bacterial colonizations grown were then counted. Data processing was done with computer analyzed using Kruskal- Wallis and Mann- Whitney test.

Results

The mean result obtained for control group normal saline 0.9% was 55.416 ± 21.997 CFU/mL, for treatment group chlorhexidine digluconate 0.12% was 3.167 ± 1.898 CFU/mL and povidone iodine 1% was 13.667 ± 6.257 CFU/mL. [Table 1](#).

The statistic test between the three groups were analyzed using Kruskal-Wallis test [table 2](#). The results showed that there was a significant differences in the number of bacterial colonizations between the normal saline 0.9%, chlorhexidine digluconate

0.12% and povidone iodine 1% ($p < 0.05$).

Further test between two groups were analyzed using Mann- Whitney test [table 3](#). The result between chlorhexidine digluconate 0.12% and povidone iodine 1% group showed there was a significant difference, while between normal saline 0.9% and chlorhexidine digluconate 0.12% group so does between normal saline 0.9% and povidone iodine 1% group also showed the same result ($p < 0.05$).

Discussion

Based on the results of the study, normal saline 0.9% had the greatest number of bacteria colonization after mouth rinsing. Normal saline does not have bactericidal effect but it has a bacteriostatic effect because of its hypertonic condition.³ Furthermore, the concentration of normal saline is various but 0.9% is isotonic with body cells so it does not interfere oral health.

The comparison of the number of bacterial colonizations between the antiseptic chlorhexidine digluconate 0.12% and povidone iodine 1% after mouth rinsing showed a significant difference statistically and chlorhexidine digluconate 0.12% showed the greater mean reduction. This can be due to the mechanism of action of two gluconate chains which deliver the chlorhexidine faster to bind on bacteria cell membrane.⁶

Chlorhexidine has positively charged hexamethylene bridge that can bind to negatively charged surfaces, such as bacterial membranes and strongly adsorb to phosphate-containing compounds. Furthermore, chlorhexidine binds to phospholipids in the inner membrane, leading to disrupt the membrane and general loss of cytoplasmic components. This bactericidal activity cause an irreversible damage and stops the metabolism of the bacteria. Its digluconate chain is water soluble that helps chlorhexidine to bind on bacteria faster. A 15 ml of 0.12% chlorhexidine digluconate equals to 18 mg of chlorhexidine which this amount is an optimum dose that can be received in oral cavity.⁷

The mechanism action of povidone iodine is from its iodine molecule. Iodine molecules will penetrate the bacterial membrane and oxidize amino acids in membrane that leads to deactivate enzymes. This bactericidal activity cause an irreversible damage without rupturing the bacterial membrane. A 15 ml of 1% povidone iodine is an optimum dose that could cause bactericidal and bacteriostatic effect.⁸⁻¹⁰

The number of bacterial colonization on each groups are varied especially on control group. This may be caused by the different rinsing power and the number of bacterial colonization of each respondent.¹¹ The number of bacterial colonization

Table 1 Mean of total bacterial count after mouth rinsing

Group	n	Mean of total bacteria count (mean \pm SD)
Chlorhexidine Digluconate 0.12%	12	3.167 ± 1.898
Povidone Iodine 1%	12	13.667 ± 6.257
Normal Saline 0.9%	12	55.416 ± 21.997

Table 2 Data analysis using Kruskal-Wallis Test

Group	p-value
Chlorhexidine Digluconate 0.12%	0.001
Povidone Iodine 1%	
Normal Saline 0.9%	

Table 3 Data analysis using Mann-Whitney Test

Group	p-value
Chlorhexidine Digluconate 0.12% and Povidone Iodine 1%	0.001
Normal Saline 0.9% and Chlorhexidine Digluconate 0.12%	0.001
Normal Saline 0.9% and Povidone Iodine 1%	0.001

will be influenced by the flow rate of saliva, lifestyle of the individual and integrity of host defences which these factors do not always act the same in every individual. Nevertheless, the mean of total bacteria count on chlorhexidine digluconate 0.12% and povidone iodine 1% group do not surpass the mean of total bacteria on normal saline 0.9% group due to their antimicrobial actions.¹²

Conclusion

From the results of the discussion above, it can be concluded that chlorhexidine digluconate 0,12% reduce more bacteria than povidone iodine 1%. However, both of the antiseptic agents can be a choice for mouth rinsing. Additional studies are required to determine the further efficacy of these antiseptics for samples with bad oral hygiene.

Acknowledgment

None.

Conflict of Interest

The authors report no conflict of interest.

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