DISINFECTION CAPACITY OF MOUTHWASHES USING AS ADMIX SOLUTION OF ALGINATE IMPRESSION

(SINIFIKASI OBAT KUMUR DENGAN MENGGUNAKAN SOLUSI CAMPURAN DARI CETAKAN ALGINAT)

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Abstract

Immersion and spraying with disinfectant solution are the effective disinfection methods for alginate impression. However, these methods cause dimensional changes on impression. Therefore, mouthwash, which also has disinfectant function on microorganisms, can be used as mixing solution for alginate impression material. The aim of this study is to analyze antibacterial capacity of mouthwashes that used as admix solution for alginate impression. Samples were made from alginate impression material in tablet form with 15 mm diameter and 1 mm thickness. Total samples are 35, 5 for admix with aquadest as control, chlorhexidine 0.1%, povidon iodine, sodium fluoride 0.1% wv, respectively. Samples were put on incubated Staphylococcus aureus in petri dish and kept in incubator for 24 hours at 37°C. Immersion was performed by dipping 15 samples of hygedent admix with aquadest into mouthwash liquids for 15 minutes. Inhibition zone was measured by using digital calliper. Statistic analysis was performed by using ANOVA one way and unpaired t-test. The admix with chlorhexidine 0.1% show the inhibition zone by 8.09 mm, povidon iodine 0.52 mm, and sodium fluoride 0.1% wv 2.91 mm. By using immersion method they show 7.63 mm inhibition zone for chlorhexidine 0.1%, 1.51 mm for povidon iodine, and 0.91 mm for sodium fluoride 0.1% wv. There are insignificant differences between admix and immerse with chlorhexidine 0.1% solution (p= 0.25). It can be concluded that chlorhexidine mouthwash 0.1% has the equal antibacterial capacity when used for admix solution nor immerse the alginate impression.

Keywords: alginate impression, mouthwash, disinfection.
INTRODUCTION

It has been known that impressions may transmit bacteria or virus from saliva and blood of the patient’s oral cavity to the operators. Washing the impression does not eliminate all of the microorganism or virus. This cross contamination should be avoid by disinfect the impressions immediately after their removal from the oral cavity. Commonly disinfection agents used are chlorine compound, iodofor, glutaraldehyde and phenol. There are several ways in which the impression can be disinfected including spray and immersion disinfection methods. Unfortunately these methods can affect the accuracy of alginate impression and other properties of impression materials.

The manipulation of alginate impression need liquid to be mixed. Usually tap water is used as admix solution. There were several studies about the admix of disinfectant to alginate impression materials and their effects to the properties of impression materials. Amalan et al. evaluated the properties of irreversible hydrocolloid impression materials mixed with disinfectant liquids such as pH changes during setting, measurement of gelation time, flow, gel strength, permanent deformation and surface detail reproduction. Dorner et al. investigated surface roughness and dimensional accuracy of dental stone cast after disinfection the impression. Other researchers did also show the effect of disinfection on properties of impression material. The purpose of this study is to evaluate the antibacterial activities of mouthwashes used as admix solution to alginate impression material.

MATERIALS AND METHODS

Table 1 gives the details of the materials used in this paper. Three mouthwashes, one alginate impression material and Cultured staphylococcus aureus were used in this study.

| No | Materials       | Type                        | Product                     | Batch/Lot number |
|----|-----------------|-----------------------------|-----------------------------|------------------|
| 1  | Impression mat. | Irreversible hydrocolloid alginate, regular set | Hygedent, Hygedent, Inc     | 1406051          |
| 2  | Mouthwash       | Chlorhexidine Gluconate 0.1% | Minosep, Indonesia          | 41231            |
| 3  | Mouthwash       | Povidon Iodine 1%           | Betadine, Indonesia         | C315098          |
| 4  | Mouthwash       | Sodium Fluoride 0.1% wv     | Total Care, Indonesia       | 142/3113         |
| 5  | Bacteria        | Staphylococcus Aureus       | Inoculated from stomatitis lesion |
| 6  | Aquadestilata   | H2O                         | Local Indonesia             |
|    |                 |                             |                             |

Table 1. Impression material, mouthwashes and bacteria used

Thirty five samples of alginate impression materials were built in tablet shape with 15 mm diameter and 1 mm thickness by using rubber ring. Alginate impression materials were mixed with aquadestilata, Chlorhexidine Gluconate 0.1%, Povidon Iodine 1% and Sodium Fluoride 0.1% wv mouthwashes. P/L ratio was 5 g powder and 11.5 ml liquid following the manufacturer instruction. Immersion method was performed by dipping the samples of hygedent admix with aquadest into mouthwashes for 15 minutes.

Staphylococcus aureus bacteria was incubated on Nutrient agar in petri dish for three days in incubator at 37°C. The admix samples were put on incubated Staphylococcus aureus in petri dish and kept in incubator for 24 hours at 37°C. The immersed samples were put also on Staphylococcus aureus layer by the same way as admix samples. Inhibition zone as transparent area of Staphylococcus aureus was measured by using digital calliper. Statistical analysis was performed by using ANOVA one way with the mean difference is significant at the 0.05 level.
RESULT

The transparent area around the samples as the inhibition zone of Staphylococcus aureus after treatment shown in Figure 1.

Figure 1. Inhibition zone of staphylococcus aureus bacteria around the samples
a. Hygedent + Aquadestilata (control)
b. Hygedent + Minosep
c. Hygedent + Betadine
d. Hygedent + Aquadestilata immersed in Menosep
e. Hygedent + Aquadestilata immersed in Betadine

Hygedent impression material admix with aquadestilata show have no transparent area of Staphylococcus aureus layer or inhibition zone. Hygedent admix with minosep and hygedent admix with aquadestilata immersed in minosep show wide inhibition zone. But hygedent admix with betadine nor hygedent admix aquadestilata immersed in betadine show a narrower inhibition zone as well as by using total care mouthwash both for admix nor immerse procedure.

The measurements of inhibition zone shown in Table 2.

Table 2. Inhibition zone measurements of several treatment on impression material

| No | Treatment                          | Inhibition zone Mean ± SD (mm) | n  | Inhibition zone Mean ± SD (mm) | n  |
|----|------------------------------------|--------------------------------|----|--------------------------------|----|
|    |                                     | Hygedent                        |    | Hygedent                        |    |
| 1  | Aquadestilata (Control)             | 0.00 ± 0.00                     | 5  |                                |    |
| 2  | Minosep                            | 8.09 ± 0.77                     | 5  | 7.63 ± 1.35                    | 5  |
| 3  | Betadine                           | 0.52 ± 0.14                     | 5  | 1.51 ± 0.54                    | 5  |
| 4  | Total Care                         | 2.91 ± 0.18                     | 5  | 0.91 ± 0.09                    | 5  |

Hygedent impression material admix with Minosep show 8.09 ± 0.77mm, and 0.52 ± 0.14mm for admix with Betadine and 2.91 ± 0.18mm for admix with Total Care mouthwashes. By using ANOVA one way all of this treatments show a significant differences \( p=0.00 \).

By using immersion methods with Minosep, Betadine and Total Care mouthwashes the result show inhibition zone as large as 7.63 ± 1.35 mm, 1.51 ± 0.54 mm and 0.91 ± 0.09 mm, respectively. Compare between admix method with immersion method there are insignificant differences for Minosep solution \( p=0.25 \) but significant with Betadine solution \( p=0.019 \) or Total Care \( p=0.00 \) solution mouthwashes.

DISCUSSION

Admix with mouthwash show a significant inhibition zone differences on incubated Staphylococcus aureus. Among these three mouthwashes Minosep has a very high capacity as an antibriacterial followed by Total Care. Meanwhile, Betadine mouthwash has a very low effect.

There are insignificant differences of inhibition zone between admix methods and immersion methods of Minosep which show a similar antibacterial effects. This study show that Minosep has the equal antibacterial capacity when used for admix solution or immerse the alginate impression material.

The result of this investigation coincidence with the result of investigation of Touyz et al. that chlorhexidine is an effective alginate disinfectant, when it is used as the liquid for alginate preparation and post-setting disinfection solution.10 Wang J. et al also noted that Chlorhexidine self-disinfecting irreversible hydrocolloid impression material can exhi-
bit varying degrees of antibacterial activity. Correia-Sousa also declared that hypochlorite disinfection is an efficient disinfection method for alginate impressions.

Wang et al. show that Chlorhexidine self disinfecting irreversible hydrocolloid impression material did not influence the three-dimensional accuracy of impression. The immersion and spray methods have a side effect as swelling on the impression due to its imbibition properties of hydrocolloids impression material. The admix methods have no imbibition process during the procedure of impression disinfection avoid a possibility of dimensional change on the impression occur. This phenomenon need to be examined further.

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