EVALUATION OF DIMENSIONAL STABILITY OF IMPRESSION MATERIALS IMMERSED IN DISINFECTANT SOLUTIONS USING A METAL TRAY

AVALIAÇÃO DA ALTERAÇÃO DIMENSIONAL DE MATERIAIS DE MOLDAGEM IMERSOS EM SOLUÇÕES DESINFETANTES USANDO UMA MATRIZ METÁLICA

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ABSTRACT

Introduction: When impressions are taken, saliva and [illegible] en in the material, and washing them does not always guarantee tha[illegible] n removed. Therefore, methods for disinfecting impressions (immersio[illegible] e a necessity, but they can affect the accuracy of dental impressions. [illegible] ned to evaluate the dimensional stability of dental impression ma[illegible] in disinfectant solutions. **Material and methods:** This study use[illegible] ssions, 45 of each of the following materials Impregun F® (polyethe[illegible] ide) and Hydrogun® (irreversible hydrocolloid). Sodium hypochlo[illegible] de were selected as disinfectants and the immersion times were 10 [illegible] pressions of each material were immersed in both solutions: 2% gl[illegible] lutacid® 2%) and sodium hypochlorite solution (Milton 1%), for 10 [illegible] npressions for 15 min. The other 5 impressions of each material w[illegible] group without immersion in disinfectant solutions. **Results:** Neith[illegible] lfide impressions showed any statistically significant difference (AN[illegible] neasurements after being soaked in the two disinfectant solutions. H[illegible] te impressions were disinfected by sodium hypochlorite for 15 minut[illegible] on (~0,122 mm) occurred, compared with control group. **Conclusion** [illegible] nis study it can be concluded that the immersion practices for disinf[illegible] e quality of impressions obtained, except when sodium hypochlorite v[illegible] and immersion time was 15 minutes.

UNITERMS: dimensional [illegible] npression materials.

[illegible] SUMO

Introdução: [illegible] *tenção de modelos para confecção de próteses, principalmente qu[illegible] áreas retentivas da boca, resíduos de saliva e sangue ficam retidos [illegible] nter microorganismos patogênicos. Somente a lavagem do molde en[illegible] rante que todo sangue e microorganismos aderidos à superfície do mold[illegible] minados. Assim torna-se necessária a desinfecção dos moldes para a qual os [illegible] desinfecção spray e imersão têm sido testados com várias soluções desinfetantes [illegible] aram sua eficiência para esse propósito. No entanto, esse procedimento pode afetar a e[illegible] abilidade dimensional do material de moldagem.* ***Objetivo:*** *Este estudo objetivou avaliar a estabilidade dimensional dos materiais de moldagem após a*

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imersão em soluções desinfetantes de hipoclorito de sódio 1% e glutaraldeído 2%. ***Material e métodos****: Foram realizadas 45 moldagens para cada um dos materiais: poliéter (Impregun F®), polissulfetos (Permlastic®), e hidrocolóide irreversível (Hydrogun®). 40 moldes de cada material foram imersos nas soluções desinfetantes variando-se o tempo entre 10 e 15 minutos. 10 moldes foram imersos em glutaraldeído a 2% por 10 min, 10 por 15 min, outras 10 imersos em hipoclorito de sódio a 1% por 10 min, e 10 por 15 min. Os demais moldes 5 não foram imersas em nenhum desinfetante e serviram como grupo controle.* ***Resultados****: Nos moldes obtidos foram medidas as distâncias (AB, CD, AC, BD) em um microscópio digital Mitutoyo (TM 500) e os resultados foram submetidos à análise de variância a 2 critérios e as diferenças pelo teste de Tukey com intervalo de confiança de 95%. A análise dos resultados mostrou que não houve diferenças estatísticas significantes para os moldes de poliéter e polissulfeto quando comparados ao grupo controle. No entanto, para os moldes de alginato desinfetados em hipoclorito de sódio a 1% por 15 min, observou-se uma distorção estatisticamente significante quando comparado ao grupo controle.* ***Conclusão:*** *Dentro dos limites dessa pesquisa pode-se concluir que a desinfecção dos moldes nas soluções de hipoclorito de sodio 1% e glutaraldeído 2% é uma prática segura, exceto para alginato que ...do imerso durante 15 minutos em hipoclorito de sódio apresentou distorção, mas o r... ...o foi observado para esse material quando o tempo de 10 minutos foi usado.*

UNITERMOS: *estabilidade dimensional; desinfecção; materiais de r...*

INTRODUCTION

During the past few decades, authors have perpetuated the notion that dental impressions can lead to transmitting diseases, such as B hepatitis, tuberculosis, herpes and AIDS (Bond et al.[3], 1983). When impressions are taken in retentive edentulous areas and subgingival preparation... blood has frequently been seen in the material, ... washing alone does not clear it away, so th... no guarantee whatever that all organisms fr... mouth that may have adhered to the im... surface have been removed (Look et ... Rios et al.[18], 1996). Thus, disinfec... have become a necessity; but thes... accuracy of dental impressions... 1987; Setcos et al.[20], 1985; S... Johnson et al.[9], 1998; Drer... 1985, The American D... ...) published guidelines f... in the dental office and ... ...bora- tory. Contaminated ... ...ssions should be cleaned an... ...ore being handled in the dental lab... ...non et al.[7], 1989).

Immersion and spray disinfectants, as well as many other solutions have been tested and proved to be effective for this purpose. The most reliable disinfection method is to immerse the impression to ensure that the disinfectant solution comes into contact with all the impression material surfaces and the tray (ADA[5], 1977; Durr et al.[8], 1987; Johnson et al[9], 1998; Johnson et al.[10], 1998; Langerw... Merchant et al.[15], 1984)

F... shown that chemical di... ...ve against the hepatitis B ... ...s of exposure (Bond et al.[3], ...l.[23], 1988). However other ... different immersion times for ... ...pressions and found results ... those of Bond and Tullner (Bergman ... ; Johnson et al. [10], 1998). Thus, this ...ed to evaluate the dimensional stability ...her, polysulfide and irreversible hydro- ... impressions when immersed in two disin- ...nt solutions 2% glutaraldehyde (Glutacid® 2%) ...d sodium hypochlorite (Milton 1%) for periods of 10 and 15 minutes.

MATERIAL AND METHODS

A metal master model was used as described in The American Dental Association specification number 19 shown in Figure 1.

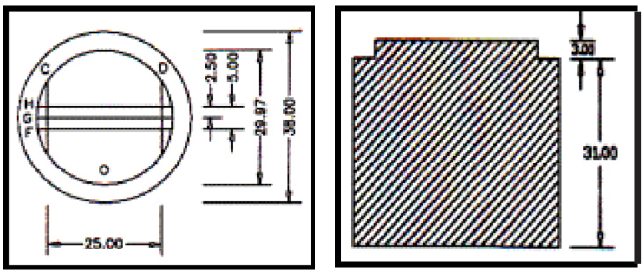
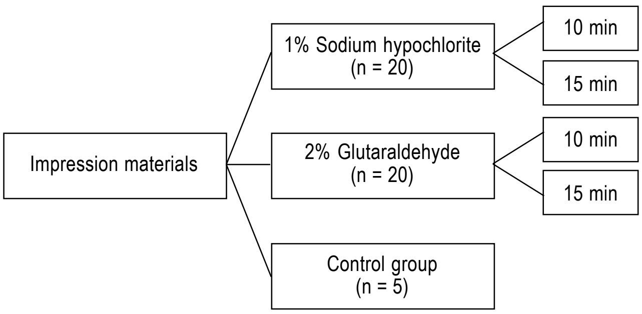


Figura 1 – Measurements of ADA specification nº 19.

Forty-five impressions were made with each of the following materials: Impregun F® (polyether), Permlastic® (polysulfide) and Hydrogun® (irreversible hydrocolloid). The selected disinfectants were: 1% sodium hypochlorite (Milton) and 2% glutaraldehyde (Glutacid®). They were freshly prepared for each experiment.

The experimental groups were divided according to the diagram:



Ten impressions from each group of materials were immersed in glutaraldehyde solution for 10 min, and 10 impressions of the same materials were immersed for 15 min. The same procedure was carried out with the sodium hypochlorite solution. Five (5) impressions of each material were used as control group, without being immersed ir any disinfectant solution.

The impression materials were dispe[illegible] and mixed according to the manufac[illegible] recommendations at room temperature (2[illegible] A gradual, constantly increasing pre[illegible] applied to a perforated metal cast in o[illegible] excess material. Afterwards, a 1 [illegible] placed over the cast and the im[illegible] separated from the tray after 6 minutes. They were measured immediately after the impression procedure, to prevent any risk of distortion. Next, every impression was immersed in a disinfectant solution for 10 or 15 minutes, removed and rinsed under cold running water for 30 seconds and dried with compressed air. Immediately after drying, the original impressions were magnified × 30 and the distances between the lines AB, CD, AC and BD as shown in Figure 1 were measured three times by two examiners, for each elastomeric material. Irreversible hydrocolloid impressions were measured twice, because this mate[illegible]ial is more susceptible to syneresis and drench [illegible]indir et al.[2], 2002). Mitutoyo digital meas[illegible]roscope (TM500) sensitivity of 1.0 μ[illegible]

The analysis [illegible] model was used to test t[illegible]at there was no differen[illegible]r a particular impressio[illegible]ectants and the control, [illegible] as used to analyze dimen[illegible] impression material after [illegible]ypotheses tested were co[illegible] of confidence.

[illegible]5 impressions were made and [illegible]tween control and experimental [illegible]phic presentation of the data in Table [illegible]s means and standard deviations. [illegible] deviations ranged from 0.009 to 0.140 [illegible]ginate impressions, 0.004 to 0.092 for [illegible]ther and 0.016 to 0.149 for polysulfide. [illegible]e results of the measurements obtained are expressed in millimeters.

TABLE 1 – means and standard [illegible]s.

Material/Co[illegible]	[illegible]ans/AB	Means/CD	Means/AC	Means/BD
Alginate/control	[illegible],062 ± 0.035	24,108 ± 0.053	4,197 ± 0.009	4,094 ± 0.016
Alginate/Hypochlorite [illegible]	24,008 ± 0.046	24,077 ± 0.140	4,208 ± 0.029	4,108 ± 0.044
Alginate/Hypochlor[illegible]	23,871 ± 0.123	23,804 ± 0.122	4,191 ± 0.035	4,182 ± 0.095
Alginate/Glutaraldehy[illegible]	23,945 ± 0.126	23,935 ± 0.094	4,165 ± 0.047	4,079 ± 0.049
Alginate/Glutaraldehyde 15 [illegible]	23,983 ± 0.090	23,982 ± 0.098	4,166 ± 0.040	4,071 ± 0.024
Polyether/Control	23,997 ± 0.092	24,049 ± 0.056	4,182 ± 0.052	4,125 ± 0.045
Polyether/Hypoclorite 10 min	24,061 ± 0.021	24,079 ± 0.029	4,204 ± 0.007	4,139 ± 0.004
Polyether/Hypochlorite 15 min	24,083 ± 0.014	24,106 ± 0.012	4,215 ± 0.010	4,140 ± 0.006
Polyether/Glutaraldehyde 10 min	24,081 ± 0.008	24,079 ± 0.015	4,207 ± 0.015	4,123 ± 0.013
Polyether/Glutaraldehyde 15 min	24,089 ± 0.014	24,097 ± 0.015	4,208 ± 0.015	4,115 ± 0.010
Polysulfide/Control	24,103 ± 0.018	24,092 ± 0.019	4,220 ± 0.029	4,175 ± 0.049
Polysulfide/Hypoclorite 10 min	23,974 ± 0.149	23,998 ± 0.117	4,174 ± 0.016	4,141 ± 0.045
Polysulfide/Hypoclorite 15 min	24,062 ± 0.067	24,067 ± 0.021	4,171 ± 0.041	4,172 ± 0.024
Polysulfide/Glutaraldehyde10 min	24,102 ± 0.039	24,080 ± 0.018	4,193 ± 0.034	4,154 ± 0.035
Polysulfide/Glutaraldehyde15 min	23,994 ± 0.044	23,985 ± 0.107	4,188 ± 0.054	4,161 ± 0.031

The Tukey Test was used to analyze the results and showed no significant dimensional changes in polyether and polysulfide impressions in all periods of disinfection with glutaraldehyde and sodium hypochlorite ($p = 0.05$).

Neither polyether nor polysulfide impressions showed any statistically significant differences from their control measurements after soaking in the two disinfectant solutions. The null hypothesis for theses experiments was that the mean distances measured in the control group were the same, irrespective of the impression being soaked in either one of the disinfectant solutions. However, after the alginate impressions were disinfected with sodium hypochlorite for 15 minutes a significant change was observed when compared with control group. A reduction in measurement represented alginate shrinkage. Macro and microscopic porosities were also found. The differences attained 0.3 mm (3×10^{-4} m) mainly in the largest distances (AB and CD).

DISCUSSION

The effects of different disinfectant solutions and times on three impression materials have been evaluated. There have been disagreements regarding their dimensional stability after the process (Drenon et al.[7], 1989; Johnson et al [illegible] 1998; Setcos et al.[20], 1985, Thouati et al.[22], 19[illegible]. According to the specifications provided b[illegible] Disease Control Centers, chemical disin[illegible] such as chlorine compounds, forma[illegible] glutaraldehydes, phenols, and iodoph[illegible] potential to eliminate hepatitis, her[illegible] viruses in 10 to 30 minutes (Matya[illegible] In this study, the choice was to e[illegible] polysulfide and irreversible hy[illegible] they are hygroscopic and t[illegible] polyvinyl siloxanes. Sod[illegible]d glutaraldehyde were ch[illegible]sin-fectants are more wi[illegible] also various types of tes[illegible]ll arch casts, cavities for in[illegible]tudy, the American Dental Associat[illegible]ation nº 19 was chosen for standardizing t[illegible]nfection and impression procedures, because it s usefulness in dentistry has been professionally recognized. Individual acrylic resin trays were not manufactured for the impressions because of the risk of water absorption and introduction of other variations. Stainless steel trays were used instead. For the same reason, the gypsum material was not poured.

The problem of disinfecting dental impressions (Lepe et al.[12], 2002), particularly irreversible hydrocolloid and hydrophilic ones, such as polyethers is a major concern. Herrera et al.[7] (1986); Merchant et al.[15] (1984), Langerwalter et al.[11] (1990) and Matyas et al.[14] (1990) did not find dimensional change after the use of a 0.5% sodium hypochlorite solution for 30 minutes. In this study, the concentration of sodium hypochlorite was 2 times greater, which could explain the differences in the results. However, Minagi et al.[16] (1987) showed that immersion in 2% glutaraldehyde for 60 minutes for irreversible hydrocol[illegible]id impression materials did not jeopardize su[illegible]details. When it was immersed in 1% sodi[illegible]ite for 15 minutes, however, it was [illegible] statistically significant differe[illegible] alterations, like little crate[illegible] final results of dentures[illegible] imperfections would be t[illegible] and subsequently to the fi[illegible]

Alt[illegible]ed no significant linear d[illegible] polyether impressions for [illegible]r studies have shown that [illegible]n of this material adversely [illegible]nt casts. The same authors [illegible]at polyethers should not be [illegible]isinfectant, because they may [illegible]ods exceeding 5 hours (Bergman et [illegible]hong et al.[4], 1969; Dellinger et al.[6], [illegible]on; et al.[7], 1989; Johnson et al.[9], 1998, [illegible] al.[20], 1985, Owen et al.[17], 1993; Sawyer [illegible], 1974). Disinfection of the polyether [illegible]essions using an alcoholic glutaraldehyde [illegible]ution (2%) and sodium hypochlorite solution [illegible]1%), for periods of 10 and 15 minutes led to non-significant variations in all measured distances (AB, CD, AC, BD) without loss of accuracy or surface detail, a result consistent with previous studies. (Johnson et al.[9], 1998; Drenon et al.[7], 1989, Johnson et al.[10], 1998). The results obtained with polysulfide impression disinfections shows no difference in mean values after all times of disinfection with both disinfectant solutions.

The results of this research are important to the dentist to select the appropriate disinfectant solution for specific clinical conditions such as fabrication of study models, removable partial dentures or fixed partial dentures.

CONCLUSION

Within the limits of this study it can be concluded that disinfect immersion practices did not influence the dimensional stability of impressions obtained, except when sodium hypochlorite and a 15-minute immersion time were used for disinfecting irreversible hydrocolloid impressions.

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