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COMPARISON OF EFFICACY OF GLUTARALDEHYDE AND U.V.LIGHT DISINFECTION AND THEIR EFFECT ON DIMENSIONAL STABILITY OF POLYVINYL SILOXANE IMPRESSIONS- AN IN-VITRO STUDY.

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ABSTRACT:

Dental impressions need to be washed and disinfected immediately after making, to control transfer of infectious diseases from saliva and blood of the patient to dentists and technicians. Since sterilization of impressions is not possible because of high temperature and time needed, disinfection is the method of choice. But disinfection process may sometimes affect the properties of impression material. This study has undertaken to evaluate the efficacy and effect of chemical and U.V light disinfection on poly vinyl siloxane impressions.

KEYWORDS: Disinfection, Dimensional stability, Poly vinyl siloxane impression material.

INTRODUCTION

Impression making is an important aspect in fabricating prostheses. Impressions are believed to carry various micro-organisms from the oral cavity due to direct contact with saliva and blood sometimes. Because of greater awareness and concern about infection control, impression disinfection has been suggested to reduce the transmission of infectious diseases to dentists and technicians [1,2]. The American Dental Association first recommended disinfection of impressions in 1985. Accordingly, the impression should be thoroughly rinsed under tap water to remove any saliva or blood before disinfection. If infected impressions are allowed directly into the laboratory that put lab technician at risk. The reverse path of contamination from the laboratory back to the dentist and patient also has to be considered. It is therefore imperative that the recommendations for disinfecting dental impressions presented by the centers of disease control and the ADA are followed for all patients[3]. When considering the methods for disinfection two factors are important:-

1. Efficacy of disinfection process
2. Effect of disinfection procedure on properties of impression material

This study has undertaken to evaluate the efficacy of 2% glutaraldehyde and U.V.light as disinfectants and the effect of disinfection with glutaraldehyde and U.V.light on the dimensional stability of polyvinyl siloxane (elastomeric) impressions.

Materials and method:

In this in-vitro study a typodont model of dentulous mandibular arch was used for making impressions with poly vinyl siloxane elastomeric impression material. Dentulous stainless steel stock trays were used for making impressions. Sterile swabs were used for seeding the microorganisms on to the impressions. The present study has conducted in 2 phases.

Phase I includes obtaining stock cultures of *staphylococcus aureus, Escherichia coli and Candida albicans*, standardization, impression making, inoculation, infecting the impressions, disinfecting the impressions and then collecting samples after disinfection to be inoculated into the culture media. **Phase II** includes evaluation of the effect of disinfectants on the dimensional stability of impressions. *S.aureus, E.coli and Candida albicans* obtained from stock cultures (McFarland Nephalometer standards) and are seeded on to the impressions with sterile swabs dipped in nutrient broth suspension containing 9 $X10^8$ CFU/M^1 of micro organisms. Then one group (A) of impressions was disinfected by immersion in 2% glutaraldehyde for 10 minutes. Another group (B) of impressions placed in the sterile work table of U.V.disinfecting chamber for 15min. Another group (C) impressions were poured without any disinfected and were used as control casts. After disinfection, samples were collected from impressions and placed in nutrient broth (culture media) and incubated for 24 hrs at 37^oc (Nutrient broth is a simple medium for cultivation of bacteria it contains peptone, meat extracts, Nacl and H_2o).

After incubation there was no growth of micro organisms. After disinfection impressions rinsed with tap water and poured immediately with die stone. The casts were separated from impressions after setting. Casts obtained from polyvinyl siloxane impressions, treated with 2% glutaraldehyde are grouped as casts '**A**' obtained from impressions treated with U.V. light disinfection are grouped as '**B**' and control casts obtained from impressions without any disinfection are grouped as '**C'**. Each cast was measured 5 times from 3 reference distances. 'X' is the distance from mesioincisal angle of canine to distal of 2nd moral. 'Y' is distance between disto incisal angle of one lateral incisor to disto incisal angle of the other. The 'Z'-- cross arch width distal to 2nd molar region; Measurements are accomplished by using a digital vernier calipers having an accuracy of 0.001mm.

Results:

The data was analyzed statistically using ANOVA and results were tabulated(Tables 1-6)

Discussion:

One area which has received little attention and is source of disease transmission is the "Handling of dental impressions". Several authors have stressed the importance of disinfection of impressions before pouring the cast or being sent to the dental laboratory. There are many previous studies concerning the disinfection of impressions, yet, nearly all of them study the chemical disinfectants. Such studies show that these chemicals have undesirable effects an impression materials and need for alternative. Therefore, it was decided to conduct an in vitro study to compare the effect of chemical andU.V.light disinfection on the dimensional stability of polyvinyl siloxane impressions. The clinical relevance of disinfection by U.V.rays was strengthened by published data revealing the application of "germicidal" U.V.rays for disinfecting drinking water, culture media, titanium implants , impression materials, dental hand pieces etc[4,5]. The effectiveness of U.V.light as a sterilizing agent increases with decrease in wavelength.

In this study the UV chamber consisted of an UV lamp (15w) which emits UV light of 253.7mm wave length with in the enclosed unit was used[6,7]. Short term disinfection was preferred, because long term can lead to dimensional changes. Staphylo coccus aureus, Escherichia coli and Candida albicans were used to infect the impressions, based an 'R.Runnels' 23 common cross infections in dentistry8,9,10. After inoculation of impressions with micro organisms one group (A) of impressions were disinfected by impression in 2% glutaral dehyde for 10 minutes. Group 'B' impressions were disinfected with U.V.light. Control group 'C' impressions were used as control.

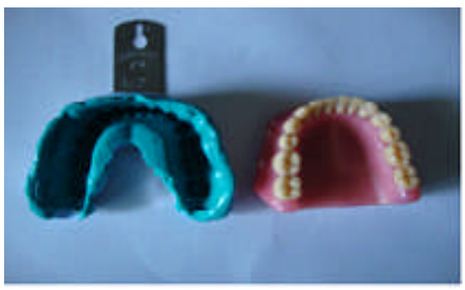

Fig.1. Showing the typodont mandibular dentulous arch and the impression.

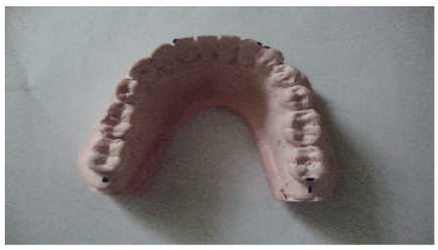

Fig.2. Showing reference points.

Fig.3.Materials used for microbiologic study.

After disinfection the growth of micro organisms was checked with samples taken and incubated and it showed no growth of micro organisms. Several direct and indirect procedures have been used for the study of dimensional changes. The method employed in their study was direct and relative one for the assessment of linear dimensional charges. The digital vernier caliper having an accuracy of 0.01mm was used for measuring the linear dimensions[8].

The statistical analysis of this in-vitro study revealed that in impressions disinfected with 2% glutaraldehyde arithmetic mean for measurement 'X' was 40.37, for 'Y' was 29.63 and for Z was 44.35 and for impressions disinfected with U.V.light the mean was 40.21, 29.66 and 44.20 respectively for measurements X, Y, Z. And for control casts the arithmetic mean was 40.42, 29.51, and 43.93 for X, Y, Z measurements. But results were not significant statistically. There was more difference in dimensional changes in impressions disinfected with 2%

glutaraldehyde when compared to control casts than U.V.light. This study had some short comings. The U.V.light intensity could not be regulated to observe whether further decrease in time interval was possible. More accurate method for measuring dimensional change would be preferable only bacterial growth was checked and virology was not studied.

Table.1 Distance from mesial of canine to distal of second molar(X)

	Group 'A'	Group 'B'	Group 'C'
Mean	40.37	40.21	40.42
SD	0.539	0.458	0.632

Table.2 Distance from distal of lateral incisor to distal of lateral incisor(Y)

	Group 'A'	Group 'B'	Group 'C'
Mean	29.63	29.66	29.51
SD	0.382	0.509	0.492

Table.3 Inter arch width from distal of second molars (Z)

	Group 'A'	Group 'B'	Group 'C'
Mean	44.35	44.20	43.93
SD	0.877	0.523	0.369

Table.4 ANOVA Summary for measurement 'X'

	SS	df	MS	F	P
Between Groups ABC	0.4611	2	0.2306	0.77	0.4677
Error	17.087	57	0.2998		
Total	**17.54**	**59**			

Table.5 ANOVA Summary for measurement 'Y'

	SS	df	MS	F	P
Between Groups ABC	0.6291	2	0.3146	1.7	0.1918
Error	10.527	57	0.1847		
Total		**59**			

Table.6 ANOVA Summary for measurement 'Z'

	SS	df	MS	F	P
Between Groups ABC	1.5839	2	0.792	2.09	0.133
Error	21.61	57	0.379		
Total	**23.20**	**59**			

CONCLUSION:

U.V.light and 2% glutaraldehyde have been able to inactivate S.aureus, E.Coli and Candida albicans on polyvinyl siloxane rubber base impression material statistical analysis led us to conclude that the immersion method of disinfection in 2% glutaraldehyde and U.V.light disinfection did not show any statistically significant dimensional change on polyvinyl siloxane impressions, but 2% glutaraldehyde showed comparatively more dimensional change than U.V.light.

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