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# Evaluation Of Dimensional Changes in Denture Base Resins in Different Storage Medium

## INTRODUCTION

Acrylic resin is used as a denture base material for the past 80 years and has created a huge impact or a change in dentistry. It can be utilized with a straight forward strategy for the development of dentures.

Resin polymers have been presented as denture base materials and these denture bases are made utilizing polymethyl methacrylate (PMMA). These materials have adequate physical features and esthetics with adequately reduced toxic quality, high mechanical strength, easy to repair and can be cured by simple procedures when compared to other denture materials, hence, for fabricating denture bases, PMMA was the most common material that was used. [1,2]

The perfect fitting and occlusal relation of the denture with the underlying oral mucosa is affected by the dimensional changes which take place in heat cure acrylic resins that is shrinkage and expansion[18].

Despite the fact that acrylic resin polymer is known for its novel properties, it has its own particular disadvantages and is not perfect in all its angles and one of these is dimensional change after a complete processing. Differences in the dimensions of denture base resin can arise by curing shrinkage and expansion through absorption of water,[3] and other previous examinations expressed that dimensional change would be an aftereffect of polymerization shrinkage,[4,5] thermal shrinkage,[4,6] relief from internal stress,[6] water absorption,[7,8] and dry shrinkage.[9] The denture base subsequent to curing, around may have contracted directly as much as 0.5%.

[10] It could lead to distortion of the denture, and although this shrinkage may be compensated with expansion by water absorption, this change would result in poor adaptation of the denture to its tissue, and decrease of denture stability and retention.[6,11]

Concerning water absorption, some studies demonstrated that the greatest dimensional changes was occurred during the first month and no remarkable changes took place after two months.[12] Due to PMMA denture base should be influenced by water absorption, some authors insisted that occlusal adjustment of denture would be delayed until PMMA has become saturated with water.[7] However, Some authors researched about changes in dentures during storage in water and in service for 18 months, and concluded a posterior linear expansion of heat curing resin was less than 1.0% and the dimensional changes did not affected the fit of denture,[8] and other studies also reported that there was no significant volumetric deformation in denture when denture was being stored in water.[13]

Most of previous studies tried to measure deformation and accuracy of the denture 2-dimensionally.[14-16] Nowadays, some authors tried to investigate the dimensional stability, and it is possible to compare two objects three-dimensionally by using surface matching

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program and scanning device.[17]

It is well known that denture should be stored in the water in order to minimize distortion and shrinkage, when they are once removed from the mouth.[7,14] However, it was not known shrinkage was occurred in certain pattern of form when denture was kept in dry condition, nor which portion of the denture should be watched carefully, if the patient who stores his denture in the air comes and want to relieve discomfort due to his denture.

Exact duplication of trial denture into the final prosthesis is the coveted point amid handling in the lab. In any case, certain properties like dimensional errors of the materials trade off the achievement of this objective ideally.

Consequently, a satisfactory medium ought to be chosen for storage of denture with a specific end goal to limit the distortion for dependable utilization. So it is vital to find what sort of storage medium can be prescribed keeping in mind the end goal to avert dimensional changes of the denture. Considering the importance of dimensional changes occurring during storage, the present study was undertaken to determine linear dimensional changes of commercially available heat cure acrylic resins in four liquid mediums.

## **MATERIALS AND METHOD**

This in-vitro experimental study was conducted on four types of liquid medium (water, saline, artificial saliva, vinegar) with heat cure acrylic resins. Based on the number of mediums, five denture bases were determined for each group (N=20). Hence, each medium was allotted 5 denture bases which was 20 dentures in total [fig 1]

The fabricated denture bases were stored into following storage environments: water, saline, artificial saliva, vinegar. Fusayama meyer Artificial saliva was used for this study. It was prepared in the Biochemistry Department, Saveetha Dental College. Saline and water mediums were kept at room temperature whereas artificial saliva and vinegar mediums were stored at refrigerator temperature. The dentures were allowed to be stored in the mediums for 4 weeks where every 2 days the dentures were placed in the cast were measured using digital vernier caliper to check for any distortion. The denture bases were measured in the posterior-palatal region, the interface between the cast and the denture [Fig 2]. After four weeks, all the measurements that were taken, were compared with the base measurements and analyzed by Paired T-test using SPSS software version 20 at significant P-value of 0.05.

## **RESULTS**

Table-1 represents the dimensional changes of measured dentures in four different storage mediums after every two days for four weeks.

To determine the difference in each sample before and after storage in the liquid mediums, paired t -test was used which is shown in table 1. The data showed the dentures stored in vinegar and saline contracted 0.052mm and 0.040mm respectively and the dentures which were stored in water and artificial saliva contracted 0.031mm, 0.015mm respectively.

## **DISCUSSION**

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The studies done in the past years indicate that the acrylic denture base resins tend to absorb water, in this manner expansion can make up when minimal polymerization shrinkage takes place. This can clarify the minimal measure of dimensional changes seen in acrylic heat cure denture resins which were put in water which is as per the findings of this study. [19-21]

Wong et al [19], revealed that the tendency to retain water in acrylic resins show shrinkage amid setting. Expansion that follows absorption of water can make up for a part or the majority of the polymerization shrinkage or even expansion can happen.

Goodkind [23] conducted a study which indicated that water immersion had no critical impact on denture base measurements.

Consani [22] reported that 90 days of storage of denture bases in water did not result in significant changes in distances between the teeth in comparison to deflasking period.

Miessi [24] studied that 180 days of storage in water caused major dimensional changes and adjustment issues in denture bases. A few researches have suggested that water immersion of acrylic denture bases brings about extension because of water absorption. Water absorption powers the macromolecules separated and brings about acrylic extension[25]. The polymerisation shrinkage of acrylic resin is repaid by this extension which in turn leads to adjustment of denture bases with soft tissues and mucosa.[24]. The present examination additionally affirmed this finding and demonstrated that in both trial groups, 30 days of capacity in water brought about a noteworthy diminishing in dimensional changes and repaid the polymerization shrinkage.

## **CONCLUSION**

Within the limitations of this study, water and artificial saliva were the best mediums to be used as a storage medium.