

**Comparison of dimensional accuracy of denture base  
cured by the conventional method and by the new press  
technique.**

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**BRANCH VI PROSTHETIC DENTISTRY**

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## **CERTIFICATE**

Certified that the dissertation on the “**COMPARISON OF DIMENSIONAL ACCURACY OF DENTURE BASE CURED BY THE CONVENTIONAL METHOD AND BY THE NEW PRESS TECHNIQUE**” done by **Dr.Abby Abraham** Postgraduate student (MDS), **Branch VI Prosthetic Dentistry**, Saveetha Dental College and Hospitals, submitted to The Tamil Nadu Dr.M.G.R. Medical University in partial fulfillment for the M.D.S.degree examination in February 2005, is a bonafied dissertation work.

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## INTRODUCTION

Acrylic resins were introduced to dentistry in 1937, and to date is regarded as one of the best materials to be used as denture bases for removable prosthesis<sup>9</sup>. Denture bases are responsible for artificial tooth retention, stability, and distribution of masticatory forces over a large tissue-bearing area<sup>4</sup>. Skinner and Cooper suggested that a lack of dimensional stability must be accepted as one of the disadvantage of acrylic resin base. Two recognized dimensional changes are unavoidable in every acrylic resin denture, namely, shrinkage and expansion<sup>9</sup>.

With developments in clinical technique's in the field of Prothodontic's, dimensional stability and adaptability of the denture base has become much more important. In a clinical situation, decreased gap between the denture base and the tissue surface, should contribute to improved denture retention<sup>4</sup>. Previous studies<sup>4</sup> reported that variations in measurements from less than 0.25 to 0.27 mm in the fit of the record bases to the master cast would appear to have little clinical significance in the serviceability of dentures, because tissue displacement of only 0.25mm would be required to allow almost complete seating of a maxillary denture on the oral tissues<sup>4</sup>. Retention of a maxillary denture requires a close adaptation to the tissue surface, where the most important physical force for retention is the saliva film, the average thickness of which is reported as 17 to 25 $\mu$ m<sup>4</sup>. It has been suggested that discrepancies ranging from 0.4to 0.58mm may not be easily corrected after denture processing.

When the acrylic resin flasking procedure is performed under routine laboratory conditions, the combination of , polymerization shrinkage, thermal contraction during flask cooling, and strain accompanying stress

release during de-flasking may cause diminished adaptation of the denture to the tissues<sup>4</sup>.

In spite of the improvements in acrylic resin properties, the problem of undesirable dimensional shrinkage remains unresolved<sup>7</sup>. Several previous literature and reviews have shown that, there always exist a gap between the base and the tissues when the denture base is processed by the conventional method. The need for an alternative technique was recognized and Rafael and Saide introduced an improved processing technique which proved to decrease the magnitude of this gap. The RS system produced dentures with more accurate adaptability<sup>4</sup>. Reduced dimensional changes in the denture base processed with a RS system suggest that the flask closure maintained acrylic resin dough under constant flask pressure, because the flask halves remained in contact when the flask was removed from the press. This inhibits the pre-mature release of the residual internal stresses from the acrylic resin dough before polymerization.

Previous studies<sup>4</sup> that have been conducted to compare the dimensional stability of the denture base processed by the conventional method and by the RS system have shown that the RS system produced denture base with lesser discrepancies.

However, the studies conducted, only measured the adaptability of the base with the cast in the palatal region. It must be realized that a study in only one direction cannot justify the results. The study should include changes in different directions, in different areas.

The purpose of the study is to investigate the dimensional accuracy of denture bases processed with the conventional heat – Polymerization technique and the RS tension system (Rafael and Saide) and to confirm the results of the previous study based on the system, taking a multidirectional approach.

## **REVIEW OF LITERATURE**

**Robert G. Vig (1975)** conducted experiments to study the hypothesis that, shift of teeth occurred mainly in the maxillary dentures. Processing of resin dentures was a frustrating experience for the dentist and technicians because of volumetric change in the resin occurring during polymerization. Two problems were considered in the study (1) tooth shift during processing and (2) incisal pin opening as a result of this shift.

**Ezio. T. Mainiers Et Al (1980)** compared two methods of investing a complete maxillary denture to study tooth movement and dimensional change of denture base material by (1) the use of a silicone rubber and gypsum base to cover all the denture teeth and (2) the generally accepted procedure of investing in a total gypsum environment. The main purpose of this comparison was to obtain information on the amount and direction of tooth movement which could be related to pin opening in the processing of complete dentures. Another aim was to determine the dimensional changes in the resin denture base after processing.

**Mainieri ET, Boone ME, Potter RH. 1980**

**Tooth movement and dimensional change of denture base materials using two investment methods.**

This in vitro investigation evaluated methods of investing a maxillary denture (1) by using a silicone rubber and gypsum base covering all the artificial teeth and (2) by following the generally accepted procedure of investing in a total gypsum environment. The amount of vertical opening found in dentures processed with silicone investment was approximately the same as for those processed with the all-gypsum technique; the horizontal

movement of the teeth was more lingual in the silicone investment technique. The relined denture base provided a more accurate fit than a heat-cured denture processed in both types of investment, silicone and all-gypsum. Finally, a special device was developed that permitted tooth movement in processed dentures to be measured simply and accurately.

**David N Firtell Et al (1981)** determined the effect of processing temperatures on the accuracy of fit of a complete denture and the accuracy of a special acrylic resin processed in boiling water and compared it to poly methyl methacrylate processed by conventional procedures.

**Ronald P. Pagniano Et Al (1982)** studied the linear dimensional change of four commercial cold curing acrylic resin custom tray materials. A continuous 24 hour measurement of the materials was done to determine the period when most change occurred. Another aspect of the study measured the dimensional changes of the acrylic resin after the specimens were placed in boiling water.

**Lechner SK, Lautenschlager EP 1984**

**Processing changes in maxillary complete dentures.**

A technique that allows for comparison of undercuts palatal thickness, and double curing has been described for measurement of curing changes in acrylic resin dentures. The technique involves a precision cast and denture positioner in front of the x-ray tube and the transfer of a lead foil strip from cast to denture. Radiographs made of this strip are projected at X20 magnification, and subsequent tracings are measured and superimposed to note shrinkage and contour changes.

**T.J. O'toole Et Al (1985)** studied whether the processing technique acrylic resins affected their dimensional stability. Several curing methods were suggested to improve the quality of acrylic resin restoration. The methods include (1) bench curing (2) curing under a Coat of petroleum jelly, (3)

curing in a monomer atmosphere and (4) curing under pressure in air and/ or under water.

**Polyzois GL, Karkazis HC, Zissis AJ, Demetriou PP 1987**

**Dimensional stability of dentures processed in boilable acrylic resins: a comparative study.** An investigation was conducted to evaluate and compare the dimensional stability of three fast boilable denture resins with a conventional and a high-impact denture resin processed with a long-curing cycle. The results of this investigation indicate that all five denture resins produced dentures that shrink. Linear shrinkages of denture bases and teeth distances were less than 1%. Flange-to-flange and molar-to-molar changes were less than 0.5 mm and 0.2 mm respectively. Maxillary complete dentures processed in boilable resins presented less distortion in the midpalatal area across the posterior section than dentures processed in the conventional heat-cured resin. Although linear changes reported in this investigation were thought to be clinically insignificant.

**Takamata T, Setcos JC.**

**Resin denture bases: review of accuracy and methods of polymerization. 1989**

Traditional compression molding and heat-activation methods for polymerization of denture base resins have been widely used. Studies have shown that stresses introduced during processing can lead to the distortion of denture bases. Chemical-, microwave-, and light-energy activation, and various combinations (including polymerization under pressure) have been offered as alternative ways to make dentures. These methods have been attempts to improve the accuracy of fit of the dentures, but sometimes the goal has also been to provide a more convenient laboratory technique. This extensive review covers studies that have investigated the accuracy of acrylic and other types of resins for making dentures using the known range

of fabrication methods.

**Takamata T, Inoue Y, Hashimoto K, Sugitou S, Arakawa H, Kurasawa I. . 1989**

**Adaptation of acrylic resin dentures polymerized using various activation modes**

The purpose of this in vitro study was to compare the dimensional accuracy of maxillary dentures made using a conventional heat-activated PMMA resin, a pour resin, a visible light-activated resin, and a microwave-activated acrylic resin. Two simple methods for measuring dimensional accuracy were used: (1) weight of impression material entrapped between the base and master die and (2) measurement of the posterior border gap at five locations. The volume of space between the denture base and the master die was determined by (1) computation and (2) estimation. all groups showed a processing contraction, most apparent from buccal flange to buccal flange, (2) the poorest fitting group was processed in a brass flask and a water bath at a temperature which rose from 70 to 100 degrees C, using a heat activated resin (Acron), (3) the visible light activated resin (Triad) produced dentures of intermediate accuracy, as did Acupac 20 when either heat or microwave activated, (4) the two best fitting groups were prepared from a chemically activated resin system using pressure at low heat (PER form), and the resin developed for microwave activation (Acron MC).

**Philippe Mojon Et Al (1990)** evaluated dimensional changes of two self-curing acrylic resins marketed as patterns and index material. Earlier volumetric changes were measured with a dilatometer and linear changes were recorded with an inductive transducer. Results suggested that shrinkage was significantly increased when the proportion of powder in the mix was diminished. The results suggested that the resins should be used with some method to compensate for shrinkage, when used as index material.

**Latta GH Jr, Bowles WF 3rd, Conkin JE 1990**

**Three-dimensional stability of new denture base resin systems.** Ten maxillary dentures were constructed on standard-sized casts in each of four acrylic resins. Uniform placement of the artificial teeth and thickness of the base were maintained by use of a silicone rubber mold. Metal shot was luted in preselected positions to the dentures and the land of the cast. Frontal, lateral, and occlusal radiographs were made of the dentures at time intervals of (1) before processing, (2) after processing, (3) immediately after removal from the cast, and (4) 30 days later. Study of the radiographs revealed significant variations in position of the metal shot from the before-processing baseline within each group of dentures and significant differences between groups of dentures.

**Sykora O, Sutow EJ. 1990**

**Comparison of the dimensional stability of two waxes and two acrylic resin processing techniques in the production of complete dentures.** Two base plate waxes and two denture processing techniques were independently compared for dimensional stability. Acrylic resin bases were processed by a trial packing technique, and a continuous injection system. Tooth movement was measured in the horizontal and vertical planes to assess wax and denture base dimensional changes at various steps in the process, and after 1, 3, and 8 weeks of denture base immersion in water at room temperature. Measurement of tooth movement in the horizontal and vertical planes showed no significant differences between the two processing techniques for times prior to immersion in water, whereas after 8 weeks immersion the continuous injection technique showed smaller dimensional changes, relative to the original dimensions at the time of investing.

**DaBreo EL. 1991**

**Dimensional change in maxillary prosthetic obturators.**

Dimensional stability of obturator bases and changes in occlusal relationships are areas of clinical importance in the oral rehabilitation of maxillectomy patients. The dimensional change in maxillary prosthetic obturators constructed with three different denture base resins was investigated. The results indicate that a light-polymerized material had the least percent of change between base and teeth positions

**Jerolimov V, Jagger RG, Milward PJ. 1991**

**Effect of the curing cycle on acrylic denture base glass transition temperatures.** Glass transition temperature of a polymer is an important physical property which may have a major effect on the dimensional stability of denture base materials. Thermo mechanical analysis has been used to determine the glass transition temperature of specimens of denture base materials which had been produced by various selected curing cycles. It was found that different curing cycles produced variations in glass transition temperature of up to 20 degrees C.

**Craig RG.**

**Denture materials and acrylic base materials. 1991**

Modifications in denture plastics, including acrylics containing butadiene-styrene, block copolymers to increase toughness, and those with added soluble heavy-element salts to increase radiopacity are described. Developments in processing of denture bases by microwave, laser, and injection methods are described. Also reviewed are acrylics and their dimensional stability, including the effect of artificial saliva on properties. Adhesion of polymers to plastics and metals is reviewed, as well as the biocompatibility and adhesion of organisms to denture plastics. Soft denture materials are reviewed with respect to research on new materials and to clinical evaluations of existing products. Finally, studies on the wear of denture teeth are summarized.

**E.L. Da Breo Et Al (1991)** put forward a new method of measuring linear dimensional change in denture base resins. In the study, the precision in determining the distances between two points was investigated. Chrome steel ball bearings 1.57 mm in the diameter were invested in a stone mold. Random measurements were made to an accuracy of 0.00 2 mm. The dimensional change of light or cured, heat cured, and self cured denture base resins were also determined with this method.

**Huggett R, Zissis A, Harrison A, Dennis A 1992**

**Dimensional accuracy and stability of acrylic resin denture bases.** The aim of this study was to evaluate a recently developed injection (dry heat) procedure of processing compared with press-pack dough molding utilizing three curing cycles. The dimensional accuracy and stability of acrylic resin bases produced by the two molding procedures were compared. Dimensional changes were assessed over a period of 4 months using an optical comparator. The results demonstrate that base plates produced by the injection molding procedure exhibit less shrinkage than those produced by the conventional press-pack procedures.

**Harrison A, Huggett R, Zissis A. 1992**

**Measurements of dimensional accuracy using linear and scanning profile techniques.** This investigation introduces a computerized coordinate measuring machine (CCMM) and compares it with two methods routinely used for assessment of the accuracy of fit of denture base materials. The results demonstrate that the three methods (digital calipers, optical comparator, and CCMM) are acceptable for linear measurement. The CCMM was also used in its scanning mode to define and to quantify the contour changes of the resin bases. The advantages of the CCMM become apparent when two-dimensional changes require assessment.

**Huggett R, Zissis A, Harrison A, Dennis A.**

### **Dimensional accuracy and stability of acrylic resin denture bases. 1992**

The aim of this study was to evaluate a recently developed injection (dry heat) procedure of processing compared with press-pack dough molding utilizing three curing cycles. The dimensional accuracy and stability of acrylic resin bases produced by the two molding procedures were compared. Dimensional changes were assessed over a period of 4 months using an optical comparator. The results demonstrate that base plates produced by the injection molding procedure exhibit less shrinkage than those produced by the conventional press-pack procedures.

**Donna I. Dixon Et al (1992)**

### **Linear dimensional variability of three denture base resins after processing and in water storage**

They compared the amount of linear dimensional change that occurs in three denture base resins after curing . in addition the linear dimensional change that occurs in the resin after storage in water over time were recorded and compared . No significant differences were found between any of the resins. The resins that were used in the study included Triad, Accelar 20, Lucitone 199.

**Turck MD, Lang BR, Wilcox DE, Meiers JC.**

### **Direct measurement of dimensional accuracy with three denture-processing techniques. 1992**

The Michigan Computer-Graphics Coordinate Measurement System (MCGCMS) was used to determine the dimensional accuracy of dentures processed by three different techniques: conventional heat compression, microwave, and visible-light activation. Standardized dentures were fabricated from casts made in an RTV silicone mold. All casts were duplicated with hydrocolloid and 42 dentures were made (i.e., 14 dentures for each technique). The MCGCMS measured 22 points on two frontal

planes to compare master casts to dentures. The results showed no significant difference in overall dimensional accuracy. At specific sites, however, the visible-light-activated technique produced significantly more flange distortion than did either the conventional or microwave techniques.

**Braden M, Wright PS 1993**

**Water absorption and water solubility of soft lining materials for acrylic dentures.** Soft lining materials undergo two processes when immersed in water. Plasticizers and other soluble materials are leached into the water, and water is absorbed by the polymer. The balance between these two processes affects both the compliance and dimensional stability of the materials.

**Jackson AD, Lang BR, Wang RF.**

**The influence of teeth on denture base processing accuracy. 1993**

The Michigan Computer Graphics Coordinate Measuring System was used to determine the influence of denture teeth on the accuracy of processed denture bases. Three different processing methods--compression molding, injection pressing, and vacuum-assisted resin pouring--were used. The presence of denture teeth was determined to affect the accuracy of the processed denture bases of all three techniques. For denture bases without teeth, the compression-molding technique demonstrated significant differences in accuracy; however, no significant differences were found in the injection-pressed or resin-poured denture bases.

**Heath JR, Boru TK, Grant AA. 1993**

**The stability of temporary prosthetic base materials. I: Introduction, angular changes and dimensional stability.**

The retention of shape and dimension of strips and sheets of grey and pink shellac, filled cold cure acrylic resin and wax were tested following molding over stylized upper edentulous casts. The thermoplastic materials were softened over a flame or in a water bath. Specimens were prepared with and

without folding along the long axes of the strips. Optimally manipulated shellac materials exhibit less change after moulding than cold cure acrylic resin or modeling wax.

**Sadamori S, Ganefiyanti T, Hamada T, Arima T. 1994**

**Influence of thickness and location on the residual monomer content of denture base cured by three processing methods** The influence of thickness and location on the residual monomer content of acrylic resin plates was examined when they were processed by three methods: a conventional method, fluid resin technique, and a microwave curing method. The residual monomer contents were measured by gas liquid chromatography. These results suggest that dimensional accuracy and stability of acrylic resin dentures could be influenced by the processing method, the thickness of the bases, and the shape and size of the dentures.

**Stipho HD. 1994**

**Stabilized record base plate with cold curing acrylic resin.**

A well adapted and structurally stable base plate is very important to verify the accuracy of previous records in denture construction. Shellac base plate is widely recognized for records base, it is inexpensive and readily available in uniform shapes, but it lacks adequate strength and dimensional stability. Reheating makes it brittle, thus limit its use. This paper discusses a technique used to stabilize and improve the strength of shellac base plates. The technique was found simple, easy to adapt, produce and transfer accurate maxillandibular jaw relations record during denture construction.

**Elahi JM, Abdullah MA. 1994**

**Effect of different polymerization techniques on dimensional stability of record bases.** In this study, discrepancies in the adaptation of the posterior borders of maxillary record bases to their casts were analyzed with five polymerization techniques: (1) bench curing, (2) curing under a coat of

petroleum jelly, (3) curing in a monomer atmosphere, (4) curing under air pressure, and (5) curing under warm water and air pressure. Ten record bases were made with each of the five techniques and were tested immediately for dimensional accuracy. Measurements of adaptations were made at three points that represent the right and left crest of the ridge and midpalatal region with a measuring microscope equipped with a filar unit-measuring eyepiece. Dimensional changes were observed under all test conditions. The monomer atmosphere technique produced the least dimensional change when compared with other techniques.

**Jaffar. M.Elahi Et Al (1994)** studied discrepancies in the adaptation of the posterior borders of maxillary record bases to their casts. Five polymerization techniques were followed (1) bench curing, (2) curing under a coat of petroleum jelly, (3) curing in a monomer atmosphere, (4) curing under Air pressure, and (5) curing under warm water and a pressure. Measurements were made at three points that represent the right and Left crest of the ridge and mid-palatal region with a measuring microscope equipment with a filar unit - measuring eye piece. The monomer atmosphere technique produced the least dimensional change when compared with other techniques.

**Abuzar MA, Jamani K, Abuzar M. 1995**

**Tooth movement during processing of complete dentures and its relation to palatal form.**

Tooth movement during processing of acrylic resin complete dentures was investigated in relation to palatal form. Eleven clinical casts were radiographed at four denture-processing stages. Seven points were located across each cast. Radiographs were digitized and the images obtained were processed and analyzed for precise measurement of tooth movement. A palatal form index was developed. With respect to a relationship between

tooth movement and palatal form, certain trends were found with varying degree and direction, shedding light on the behavior of base material and the dimensional changes that occurred during processing.

**Jagger RG. 1996**

**Dimensional accuracy of thermoformed polymethyl methacrylate.**

The purpose of this study was to determine the dimensional accuracy of thermoformed polymethyl methacrylate specimens. Five blanks of the acrylic resin were thermoformed on stone casts prepared from a silicone mold of a brass master die. The distances between index marks were measured both on the cast and on the thermoformed blanks with an optical comparator. It was concluded that it is possible to thermoform Perspex polymethyl methacrylate accurately.

**Rudd KD -Processing complete dentures. 1996**

When this procedure is followed carefully, a strip of 0.0005-inch shim stock meets resistance when an attempt is made to withdraw it from between the teeth in occlusion and the incisal pin and its table simultaneously. Therefore, it is possible to process complete dentures by using compression molding and external heat for polymerization. The procedure involves a precise step-by-step method with particular emphasis on (1) investing properly in dental stone, (2) packing only one denture at a time with only one mix of acrylic resin, (3) using minimum packing pressure with maximum flow time, (4) trial packing until no flash is evident, and (5) careful deflasking.

**Boberick KG, McCool J. 1998**

**Dimensional stability of record bases fabricated from light-polymerized composite using two methods**

This study evaluated the pattern of gap formation that occurs over the palatal area of a maxillary record base fabricated from light-cured composite (Triad), and determined whether changes in the fabrication method affects

the size and pattern of gap formation. Effects of composite width and passage of time on gap formation were also analyzed. Twenty record bases were fabricated with two methods: (1) according to the manufacturer's directions, the entire surface of the record base was exposed to the curing light; and (2) the palatal area of the record base was covered with foil to prevent light penetration, and the base was light cured in three stages with re-adaptation of the uncured composite between stages. Dimensional changes were observed in both procedures. The largest discrepancy occurred at the posterior border of record bases fabricated using method 1. The average gap size due to stage curing (method 2) was never greater than the corresponding gap that arose from the use of the manufacturer's recommendations (method 1). Limiting the amount of surface area exposed to the curing light and readapting the uncured composite to the cast between curing episodes can significantly reduce the mean gap size occurring at the posterior border.

**Nogueira SS, Ogle RE, Davis EL.**

**Comparison of accuracy between compression- and injection-molded complete dentures. 1999**

This laboratory study compared incisal pin opening, dimensional accuracy, and laboratory working time for dentures fabricated by this new injection system with dentures constructed by the conventional compression molding technique. Two groups of 6 maxillary and 6 mandibular dentures were evaluated as follows: group 1 (control), Lucitone 199, compression molded with a long cure cycle; and group 2, Lucitone 199, injection molded with a long cure. Incisal pin opening was measured with a micrometer immediately after deflasking. A computerized coordinate measuring machine was used to measure dimensional accuracy of 3-dimensional variations in the injection molding method produced a significantly smaller incisal pin opening over

the standard compression molding technique. The injection molding technique, using polymethyl methacrylate, was a more accurate method for processing dentures. There were no appreciable differences in laboratory working time between the injection and compression molding techniques.

**Reeson MG, Jepson NJ. 1999**

**Achieving an even thickness in heat-polymerized permanent acrylic resin denture bases for complete dentures.**

This article describes a method for achieving a consistent thickness in a heat-polymerized, permanent, acrylic resin denture base through the use of a vacuum-formed, thermoplastic blank as a template. The method is simple, and results in a denture base with a consistent even thickness.

**Debby M.S. Wong Et Al (1999)** investigated linear dimensional changes and water sorption of dentures processed by dry and wet heat with different rates of cooling. Dry heat processed and water bath processed acrylic resin dentures did not exhibit significant differences in shrinkage at water saturation. Water uptake of dry and wet heat processed acrylic resin dentures after deflasking was in both cases low, and the dentures did not reveal significant differences in shrinkage at water saturation. Air oven processed and water bath processed acrylic resin dentures show similar dimensional shrinkage at water saturation.

**Sinclair GF, Clark RK.**

**Dimensional change in dentures processed in silicone and stone moulds .2002**

This study investigates differences in dimension during processing when putty is used. Two groups of ten standardized dentures, one group with silicone, one group without were processed. Cross arch measurements were made before and after processing using an eight hour curing cycle followed by slow cooling. No statistically significant difference in change in

dimension was observed between the two groups, indicating that this is an acceptable method.

**Consani RL, Domitti SS, Consani S 2002**

**Effect of a new tension system, used in acrylic resin flasking, on the dimensional stability of denture bases.** The purpose of this study was to investigate differences between the dimensional stability of standardized simulated denture bases processed by traditional moist heat-polymerization and those processed by use of a new tension system. Denture bases processed with the new tension system exhibited significantly better base adaptation than those processed with traditional acrylic resin packing. .

Within the limitations of this study, the new tension packing system was associated with decreased dimensional changes in the simulated maxillary denture bases processed with heat-polymerization.

**Yau WF, Cheng YY, Clark RK, Chow TW. 2002**

**Pressure and temperature changes in heat-cured acrylic resin during processing.**

The aims of this study were to measure the pressure and temperature changes of acrylic resin during processing, to record the highest temperature reached when fast cured in boiling water and to determine the elevated boiling point of monomer under high pressure. A subminiature pressure transducer (temperature compensated to 94 degrees C) and a thermocouple were placed on the palate of a standardized maxillary complete denture base. Recordings of pressure and temperature (n=6) were made at initial clamping of denture flasks and throughout the processing cycles of resin. The highest temperature reached by heating of resin during processing is well below the elevated boiling point of monomer. Monomer therefore does not boil in clamped denture flasks under sufficient pressure. Thus adequate clamp pressure prevents gaseous porosity irrespective of curing cycle used.

**Philip L.J. Keenan Et Al (2003)** compared differences in dimensional changes of simulated maxillary complete dentures during polymerization and storage in water after injection molding and conventional polymerization, or microwave polymerization against a control of conventionally packed and polymerized simulated maxillary complete dentures.

**G J Prronycchh Et Al (2003)** compared the dimensional stability and dehydration of a thermoplastic Poly carbonate DENTURE base resin with two conventional Poly methyl methacrylate denture base resins. measurements where conducted at five palatal locations immediately after processing at seven and 30 days during dehydration and at seven and 30 days during immersion in water (23 degree Celsius). It was concluded that the thermoplastic resin showed dimensional changes in service comparable with the conventional resins, but less dimensional change caused by dehydration

**Cucci AL, Giampaolo ET, Leonardi P, Vergani CE.**

**Unrestricted linear dimensional changes of two hard chair side reline resins and one heat-curing acrylic resin.** This study compared the dimensional change of two hard chair side reline resins (Duraliner II and Kooliner) and one heat-curing denture base resin (Lucitone 550). A stainless steel mold with reference dimensions (AB, CD) was used to obtain the samples. The materials were processed according to the manufacturer's recommendations. The only resin that exhibited shrinkage after 60 days of storage in water was Duraliner II; these changes could be clinically significant in regard of tissue fit.

**Yilmaz H, Aydin C, Caglar A, Yasar A. 2003**

**The effect of glass fiber reinforcement on the residual monomer content of two denture base resins.**

The purpose of this study was to investigate the effect of glass fiber reinforcement on the amount of residual methyl methacrylate released from two different denture base resins (heat cured and auto polymerized Continuous unidirectional and woven pre-impregnated glass fiber reinforcements (Stick and Stick Net) were used to reinforce heat-curing and auto polymerizing denture base resins. The release of residual methyl methacrylate from heat-cured and auto polymerized test specimens reinforced with glass fibers was significantly higher than that from unreinforced test specimens. Glass fiber reinforcement increases the residual monomer content of denture base resins. The level of residual monomer ranged from 0.11% to 0.37% in heat-cured resin and from 0.18% to 0.46% in auto polymerized denture base resin.

**Kobayashi N, Komiyama O, Kimoto S, Kawara M.**

**Reduction of shrinkage on heat-activated acrylic denture base resin obtaining gradual cooling after processing. 2004**

The purpose of this study was to examine the development of residual stress relaxation in resin denture base samples in the region where shrinkage was restricted, in order to clarify how cooling variations in the stone mould influenced the shrinkage. Flat, dumbbell-shaped specimens were used. Thermocouples and strain gauges were embedded in the resin for measuring temperature and strain during the dough-stage of resin packing. Results suggest that a gradual cooling course for 12 h or more after processing a heat-activated acrylic denture base is effective for lessening deformation of the prosthesis.

**SUMMARY AND CONCLUSION**

An in- vitro study was conducted to determine the effect of premature release of the residual internal stresses from the acrylic resin dough before polymerization. Dimensional change that occurred during processing

of dentures were thought to be due to the release of stress as the flask was packed and transferred from the bench press to a traditional clamp. The new press method was proposed by Consani RL, Domitti SS, and Consani S and used special clamps that helped maintain the stress during flask closure after packing.

A standard edentulous maxillary mold was used. The stone cast was randomly assigned to 2 groups; Group I acrylic resin flasking with conventional technique and Group II acrylic resin flasking with RS tension system.

A uniform denture base was made by the same operator on the stone cast with 1.5 mm thickness wax measured with a caliper. Copper wire 2mm in diameter were cut to lengths of approximately 3mm. The jig was used to mark seven spots on the wax base plates. They include the incisal papilla (A), the canine region on either side (B, C), the molar area on either side (E, G), and two spots on the mid palatine area one in the anterior region between the line joining the two canine (D) and posteriorly between the two molar areas (F).

The copper points were placed on all the wax base plates and the inter-distance was measured using a traveling microscope with a magnification of 10 x. A total of 12 readings were obtained from each sample.

Each of the group 1 samples was processed by the conventional method. And each of the group II samples was processed by the new press method.

The samples both group I and group II were then measured, as previously done with a traveling microscope. The readings were made by a single operator, to reduce error. The readings obtained before and after processing the denture base was tabulated and compared.

The results of the study show that

- 1) The dimensional changes between the dentures produced with the new press method and the conventional method were statistically insignificant
- 2) The dimensional change occurred at various positions across the denture base and maximum distortion occurred along the slopes of the anterior segment of the palate and the slopes in the posterior segment between the molar and mid palate.
- 3) The difference in values between the two methods ranged from 0.002 to 0.11.
- 4) The dimensionally stable areas during processing were the canines and the most unstable were the posterior palate.

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