# Influence of Microwave Disinfection on the Linear Dimensional Stability of Complete Dentures: A Clinical Study

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This clinical study evaluated the effect of two microwave disinfection protocols at 650 W for 3 minutes (group 1, once a week; group 2, three times a week) on the linear dimensional stability of complete dentures. Measurements were taken across four reference points: before the first microwave disinfection (baseline) and after each week of disinfection. Furthermore, the dentures were monitored clinically. Group 2 showed significantly greater shrinkage than group 1 in all evaluated weeks. During clinical monitoring, no significant findings were observed. Even though dimensional changes occurred, the clinical evaluation did not yield any changes in either group. *Int J Prosthodont 2010;23:318–320.*

Microwave energy has been recommended as an alternative to the traditional methods for disinfecting complete dentures to prevent or treat denture stomatitis.[1] However, microwave disinfection may negatively affect the polymer structure because of the heating of the material that occurs during irradiation, resulting in distortions[2] that could affect the clinical fit of the denture.

Therefore, the purpose of this clinical study was to evaluate the effect of two microwave disinfection protocols (both 3 minutes at 650 W per disinfection) on the dimensional stability of complete dentures.

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## Materials and Methods

Maxillary complete dentures were constructed for 40 patients and evaluated as follows: group 1 = 20 patients whose dentures were submitted to microwave disinfection once a week for 4 weeks and group 2 = 20 patients whose dentures were submitted to microwave disinfection three times a week for 4 weeks.

The linear dimensional stability of the dentures was inferred by measuring the distances and area between reference points made on the buccal cusps of the first premolars and the distobuccal surfaces of the second molars (Fig 1). Photographs of the dentures were obtained before disinfection protocols (baseline) and after each week of disinfection (Fig 2). The distances were measured on the photographs using ImageLab 2.4 software (Dircom Bio Informatica). The mean of the cross-palatal distances AB and CD (first premolar to first premolar and second molar to second molar) defined the mean value for the mediolateral dimension. The mean of distances AD and BC (first premolar to second molar on each side) defined the mean value for the anteroposterior dimension. Area ABCDA (the entire palatal area from the first premolars to second molars) was calculated as the sum of the area of two triangles (ΔABD and ΔBCD). Dimensional changes were estimated by using percentage differences in relation to baseline.

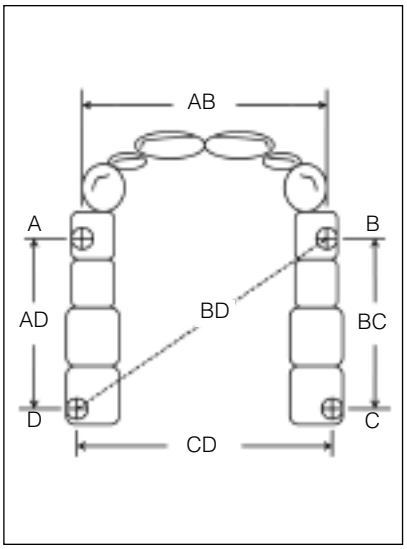
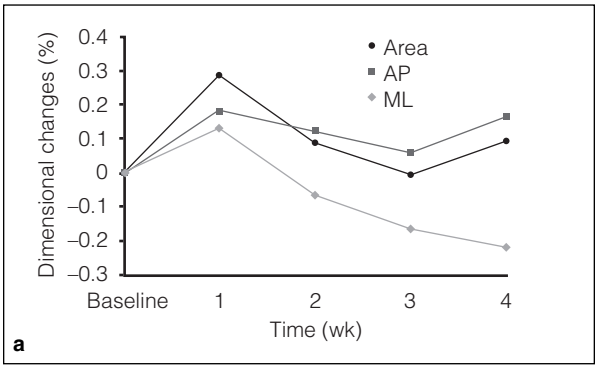
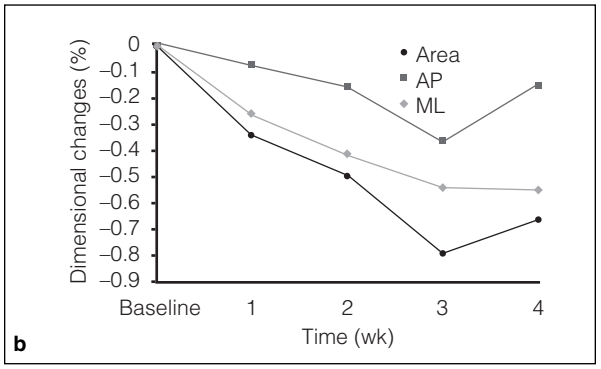



**Fig 1** *(left)* Reference points and measured horizontal distances marked on a mock maxillary complete denture.

**Fig 2** *(right)* A standardizing device was used to fix the distance between the camera and the maxillary complete dentures when taking the photographs for comparison.




**Figs 3a and 3b** Dimensional changes observed for **(a)** group 1 and **(b)** group 2. ML = mediolateral; AP = anteroposterior.

All dentures were also assessed by the following parameters: pressure spots, loss of denture adaptation, or complaints by the patients. Data were analyzed using two-way analysis of variance and the Tukey test ($\alpha = .05$).

## Results

For the mediolateral and anteroposterior dimensions and the area calculated between the reference points, group 2 showed significantly greater shrinkage than group 1 in all evaluated weeks (Figs 3a and 3b). For the mediolateral dimension, the comparisons revealed that only weeks 2, 3, and 4 were significantly different from week 1 in both groups. For the anteroposterior dimension and the area between reference points, only week 3 was significantly different from week 1 in both groups. During clinical monitoring, no additional pressure spots, loss of denture adaptation, or complaints by patients were observed.

## Discussion

Although in both groups the same pattern of dimensional change was observed between weeks, the findings of this study demonstrate that group 2 always exhibited greater shrinkage.

The heat generated by microwave irradiation in an already polymerized material provides greater mobility of the monomer molecules still present in the material.[3] This could result in further polymerization, making the resin vulnerable to warping. Furthermore, during heating via a microwave, the inherent stress established during processing may be released.[4,5]

The dimensional changes found in this study were lower than 1% and no significant clinical findings were observed, demonstrating that both microwave disinfection protocols may be used without causing damage to the dentures and supporting tissues. Oral tissues remain healthy under conditions of dimensional changes up to 1% in acrylic resin.[5]

Although the clinical results of this study were favorable, other types of resin that are used clinically should be considered in further investigations. Since distortion can be asymmetric, studies should be conducted to verify the change in the vertical direction.

## Conclusion

Even though three microwave disinfections per week compared to one per week showed statistically significant greater shrinkage, the clinical evaluation did not show any change in either group. Therefore, the findings of this investigation suggest that microwave irradiation may be used for the treatment of denture stomatitis.

## Acknowledgment

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