

## Original Research

### Assessment of impact of denture cleansers on surface roughness of heat cure acrylic dentures

Sayqa Aziz<sup>1</sup>, Mohsin Malik<sup>2</sup>, Shazana Nazir<sup>3</sup>, Shazia Mir<sup>4</sup>

<sup>1</sup>MDS scholar, Department of Prosthodontics, Government Dental College, Srinagar;

<sup>2</sup>Registrar Prosthodontics, Ministry of health, Kuwait;

<sup>3,4</sup>Associate Professor Prosthodontics, Government Dental College, Srinagar

#### ABSTRACT:

**Background:** The denture cleansing and plaque elimination methods employed by a vast majority of patients are restricted to either rinsing under running water or brushing using normal toothbrush and toothpaste. Hence, the present study was conducted for assessing impact of denture cleansers on surface roughness of heat cure acrylic dentures. **Materials & methods:** A total of 30 specimens of heat cure denture base resin were fabricated for evaluation of effect of various denture cleaners on surface roughness. Disc shaped wax patterns (10 mm in diameter and 2 mm thick) for surface roughness testing were fabricated using stainless steel mould of desired dimension and were invested in Type III gypsum product in a metallic flask. All the specimens were divided into three study groups as follows: Group A; NaOCl was used, Group B: Vinegar was used and Group C; Control. Surface analyser was used to measure the surface roughness of each disc shaped specimens before and after immersion procedures. All the results were analysed by SPSS software. **Results:** Mean difference in the surface roughness among specimens of group A, group B and group C was found to be 0.26µm, 0.12 µm, and 0.02 µm respectively. While analysing statistically, it was seen that significant difference exists in relation to mean difference in surface roughness in between three study groups. **Conclusion:** Surface roughness is increased with sodium hypochlorite in comparison to Vinegar.

**Key words:** Denture, Cleansers, Surface roughness

**Received:** 23/05/2020

**Modified:** 02/08/2020

**Accepted:** 24/08/2020

**Corresponding Author:** Dr. Sayqa Aziz, MDS scholar, Department of Prosthodontics, Government Dental College, Srinagar, India

**This article may be cited as:** Aziz S, Malik M, Nazir S, Mir S. Assessment of impact of denture cleansers on surface roughness of heat cure acrylic dentures. J Adv Med Dent Sci Res 2020;8(9):98-100.

#### INTRODUCTION

Denture hygiene is of utmost importance because dentures are used by the patients throughout the day and are in constant touch with oral environment including various microorganisms. The microbial load of the prosthesis is responsible for increased incidence of oral problems such as denture stomatitis, inflammatory papillary hyperplasia etc.<sup>1,2</sup>

The denture cleansing and plaque elimination methods employed by a vast majority of patients are restricted to either rinsing under running water or brushing using normal toothbrush and toothpaste. These simple forms of plaque elimination are relatively insufficient and may not satisfactorily eliminate the accumulated microorganisms or fungal colonies from the denture surfaces.<sup>3,4</sup> Fracture of an

acrylic denture base is a common problem due to dropping of denture outside the mouth and occlusal forces during masticatory function inside the mouth because of base deformation and consequent resin fatigue. If denture cleansers negatively affect, the resins decreasing the strength greater incidence of fracture occur. Hence, it is of clinical importance to determine whether denture cleansers alter the properties of acrylic resins.<sup>5-7</sup> Hence, the present study was conducted for assessing impact of denture cleansers on surface roughness of heat cure acrylic dentures.

#### MATERIALS AND METHODS

The present study was conducted with the aim of assessing impact of denture cleansers on surface

roughness of heat cure acrylic dentures. A total of 30 specimens of heat cure denture base resin were fabricated for evaluation of effect of various denture cleaners on surface roughness. Disc shaped wax patterns (10 mm in diameter and 2 mm thick) for surface roughness testing were fabricated using stainless steel mould of desired dimension and were invested in Type III gypsum product in a metallic flask. De-waxing was done after the stone setting. This was followed by application of separating media. Packing of the Molds was done with heat polymerized acrylic resin. This was followed by processing as per manufacturer's condition. Vernier caliper was used for assessing the dimensions of all specimens. All the specimens were divided into three study groups as follows: Group A; NaOCl was used, Group B: Vinegar was used and Group C; Control. Surface analyser was used to measure the surface roughness of each disc shaped specimens before and after immersion procedures. All the results were analysed by SPSS software.

## RESULTS

Mean difference in the surface roughness among specimens of group A, group B and group C was found to be 0.26 $\mu$ m, 0.12 $\mu$ m, and 0.02  $\mu$ m respectively. While analysing statistically, it was seen that significant difference exists in relation to mean difference in surface roughness in between three study groups.

**Table 1: Mean difference in surface roughness ( $\mu$ m)**

| Group   | Mean difference in surface roughness ( $\mu$ m) | p- value              |
|---------|---|-----------------------|
| Group A | 0.26  | 0.00<br>(Significant) |
| Group B | 0.12  |                       |
| Group C | 0.02  |                       |

## DISCUSSION

Over the last three decades, developments in dentistry have largely been instigated as a result of scientific research. Of particular note, are developments in the field of dental materials and a drive toward the practice of evidence-based dentistry. Many aspects of prosthodontic treatment; be it clinical or laboratory based, have an impact on overall patient satisfaction and the clinical success of treatment. Denture cleansers are the most preferred chemical cleansing methods, which have been suggested for the disinfection of the prosthesis. The best cleanser should fulfill most of the requirements of an ideal cleanser while not causing any kind of alteration in the structure of the prosthesis. The chemically available denture cleansers can be broadly grouped under alkaline peroxides (percarbonate or perborate), alkaline hypochlorites, dilute organic or inorganic acids, and enzymes.<sup>6-9</sup> Hence, the present study was

conducted for assessing impact of denture cleansers on surface roughness of heat cure acrylic dentures.

In the present study, Mean difference in the surface roughness among specimens of group A, group B and group C was found to be 0.26 $\mu$ m, 0.12  $\mu$ m, and 0.02  $\mu$ m respectively. Moussa AR et al verified the influence of oral environment and denture cleansers on the surface roughness and hardness of two different denture base materials. A total of sixteen identical removable disc specimens (RDS) were processed. Eight RDS were made from heat-cured acrylic resin (AR) and the other eight were fabricated from thermoplastic injection moulded resin (TR). Surface roughness and hardness of DRS were measured using ultrasonic profilometry and Universal testing machine respectively. The surface roughness measurements revealed no significant difference ( $p > 0.05$ ) for both disc groups at baseline. However, both groups showed a significant increase in the surface roughness after three months with higher mean value for (TR) group. On the other hand, the (AR) group showed higher hardness mean value than (TR) group at baseline with no significant decrease in the hardness values ( $p > 0.05$ ) following three months follow-up period. Denture cleansers have an effect on the denture's surface roughness and hardness concurrently with an oral condition which will consequently influence the complete dentures' lifetime and patients' satisfaction.<sup>8</sup>

In the present study, while analysing statistically, it was seen that significant difference exists in relation to mean difference in surface roughness in between three study groups. Duyck et al. did a crossover randomized clinical trial and concluded that the use of cleansing tablets during overnight denture storage reduced the total bacterial count on acrylic removable dentures as compared to overnight storage in water. This type of cleansers is good in their cleansing efficiency but can lead to deterioration of the denture base material such as bleaching of acrylic resin, corrosion of metal, and deterioration of soft lining materials if used incorrectly. The research work of Pinto et al. stated significant increase in surface roughness after repeated cycles of chemical disinfection.<sup>9-11</sup>

Ragher Met al evaluated the changes in the impact strength of heat cure denture base resins when treated using denture cleansers. Study was conducted with sample size of 40 and dimension 65 mm length, 10 mm width, and 3 mm thickness as per the ISO 1567. Distilled water has been used as control group, in which 10 samples were immersed of 40 samples. Of remaining 30 samples, 10 were treated with Clinsodent, 10 were treated with VI-Clean, and 10 were treated with Clanden denture cleansers. The impact strength of these specimens from each group was tested with the help of Charpy-type pendulum impact strength tester. Impact strength of samples was significantly reduced after immersion in denture cleansers Clinsodent, VI-Clean, and Clanden solutions when compared to control group. Clinsodent, VI-

Clean, and Clanden denture cleansers decrease the impact strength of heat cure denture base resin after immersion.<sup>12</sup>

## CONCLUSION

From the above results, the authors concluded that surface roughness is increased with sodium hypochlorite in comparison to Vinegar.

## REFERENCES

1. Peracini A, Davi LR, de Queiroz Ribeiro N, de Souza RF, Lovato da Silva CH, de Freitas Oliveira Paranhos H, et al. Effect of denture cleansers on physical properties of heat-polymerized acrylic resin. *J Prosthodont Res.* 2010;54:78–83.
2. Rodrigues Garcia RC, Joane Augusto de S, Jr, Rached RN, Del Bel Cury AA. Effect of denture cleansers on the surface roughness and hardness of a microwave-cured acrylic resin and dental alloys. *J Prosthodont.* 2004;13:173–8.
3. de Freitas Fernandes FS, Pereira-Cenci T, da Silva WJ, Filho AP, Straioto FG, Del Bel Cury AA, et al. Efficacy of denture cleansers on candida spp. Biofilm formed on polyamide and polymethyl methacrylate resins. *J Prosthet Dent.* 2011;105:51–8.
4. Vojdani M, Bagheri R, Khaledi AA. Effects of aluminum oxide addition on the flexural strength, surface hardness, and roughness of heat-polymerized acrylic resin. *J Dent Sci.* 2012;7:238–44.
5. Suwannaroop P, Chaijareenont P, Koottathape N, Takahashi H, Arksornnukit M. In vitro wear resistance, hardness and elastic modulus of artificial denture teeth. *Dent Mater J.* 2011;30:461–468.
6. Yuzugullu B, Acar O, Cetinsahin C, Celik C. Effect of different denture cleansers on surface roughness and microhardness of artificial denture teeth. *J Adv Prosthodont.* 2016;8(5):333–338. doi:10.4047/jap.2016.8.5.333
7. Porwal A, Khandelwal M, Punia V, Sharma V. Effect of denture cleansers on color stability, surface roughness, and hardness of different denture base resins. *J Indian Prosthodont Soc.* 2017;17(1):61–67. doi:10.4103/0972-4052.197940
8. Moussa AR, Dehis WM, Elboraey AN, ElGabry HS. A Comparative Clinical Study of the Effect of Denture Cleansing on the Surface Roughness and Hardness of Two Denture Base Materials. *Open Access Maced J Med Sci.* 2016;4(3):476-481.
9. Duyck J, Vandamme K, Krausch-Hofmann S, Boon L, De Keersmaecker K, Jalon E, et al. Impact of denture cleaning method and overnight storage condition on denture biofilm mass and composition: A Cross-over randomized clinical trial. *PLoS One* 2016;11:e0145837.
10. Harrison A, Jagger DC. An in vitro investigation of the abrasive qualities of a selection of denture-cleaning pastes on poly (methyl methacrylate) denture base material. *Prim Dent Care* 1997;4:21-4.
11. Pinto Lde R, Acosta EJ, Távora FF, da Silva PM, Porto VC. Effect of repeated cycles of chemical disinfection on the roughness and hardness of hard relined acrylic resins. *Gerodontology* 2010;27:147-53.
12. Ragher M, Prabhu UM, Ittigi JP, Naik R, Mahesh CS, Pradeep MR. Efficacy of Denture Cleansers on Impact Strength of Heat polymerized Acrylic Resins. *J Pharm Bioallied Sci.* 2017;9(Suppl 1):S241-S245. doi:10.4103/jpbs.JPBS\_112\_17