



Effect of Denture Cleansers on the Attachment System of Conventional and Digital Implant Retained Overdentures

Radwa Essam El-Din* , Maged Gaber, Mahmoud Ammar

Codex : 02/2024/10

Aadj@azhar.edu.eg

KEYWORDS

Denture cleanser; attachments; overdenture; CAD/CAM, oral health; oral hygiene, quality of life

Department of Removable Prosthodontics, Faculty of Dental Medicine, Al-Azhar University, Assiut, Egypt

* Corresponding Author e-mail:
rookaessam24@gmail.com

ABSTRACT

Aim :An in vitro study was conducted to compare the effects of various denture cleansers solution on the retention of attachment systems in both conventional and digital implant- retained overdentures. **Materials and Methods:** The study was conducted according to the cleansing solution used, where divided equally into five groups: Group A: the overdenture including retentive elements were cleaned by soaked in Corega tabs Group B: soaked in chlorhexidine. Group C: soaked in Fittydent solution. Group D: soaked in Sodium hypochlorite solution. Group E: soaked in EDTA cleansing solution. Each group were placed into cleanser put in glass cup immersed in the solution during the entire soaking period according to the manufacturers' instructions for the time equivalent of 24 hrs., one month and six months. Acrylic blocks were held on a universal testing machine for a pull-out test to record the dislodgement force. Measurements were conducted after 1 months (T1) and 6 months (T2). **Results:** The study revealed that, there were significant statistical differences between the different manufacturers regarding the retention forces of the attachment's retentive force (Before soaking), (After 24hrs), (After 1month) and (After 6 months) where ($p<0.001$) Except in Corega group ,there is no statistical difference . For the cleaning solution groups, different significant statistical results between five group at different time interval follow up. Where ($p<0.001$). **Conclusion:** Selecting denture cleaners that necessitate minimal soaking time is vital for both conventional and CAD/CAM-based implant-retained overdentures with attachments, as it aids in extending the lifespan of the components.

INTRODUCTION

Prosthetic rehabilitation using complete dentures is the most recognized treatment for an edentulous condition. The success of the denture in restoring the patient's oral functions, along with the patient's psychological acceptance, are crucial factors in achieving favorable outcomes from complete denture treatment. One of the most common disadvantages of complete dentures is that mandibular dentures often fail to restore masticatory function due to issues with retention and stability, which can impact patient satisfaction and quality of life. To address this

issue, prosthetic management with implant-retained overdentures is highly beneficial. Rehabilitation using implant-supported overdentures is considered the primary treatment approach that improves both retention and patient satisfaction concerning prosthetic treatment⁽¹⁾.

Enhancing the durability, stability, aesthetics, and comfort of overdentures necessitates careful selection of attachment types. There are multiple systems on the market, each offering varying levels of retention as per their manufacturers' claims. These retention systems can be independent, non-splinted attachments that connect directly to the implant (such as magnets, balls, locators, or telescopic systems), or they can splint the implants together using a bar and bar-clip attachment⁽²⁾.

Prosthetic treatments require meticulous oral hygiene to minimize the risk of peri-implant infections and other complications. Overdentures are prone to accumulating plaque, stains, and calculus, particularly around their attachment systems. The oral cavity is a natural reservoir for numerous microorganisms, influenced by oral hygiene practices. Microbes adhering to dental materials can negatively impact oral and peri-implant tissues, cause bad breath, or lead to serious conditions such as chronic infections, peri-implantitis, and additional bone loss. These problems can threaten the success of the dental prosthesis. Therefore, regular cleaning of overdentures is crucial to prevent microbial buildup under their base, especially since this type of prosthesis has a concave design that matches the residual ridge and requires removal for proper cleaning.⁽³⁾

Denture cleaning methods encompass mechanical, chemical, or a combination of both. Patients often prefer the chemical method, as it can be challenging for the elderly to manually brush their dentures. Chemical solutions tend to be more effective than mechanical techniques in cleaning dentures. However, despite their effectiveness, denture cleansers may negatively affect prosthetic

materials, potentially affecting the retention of overdentures. The market provides a range of denture cleansers, such as Corega tabs, sodium hypochlorite, EDTA, chlorhexidine, and Fittydent cleansing solutions^(4,5).

Selecting a cleaning solution that ensures optimal long-term retention for specific attachment systems is crucial. Chlorhexidine gluconate, is one of denture cleaner substance which has a broad-spectrum antiseptic, effectively inhibits *Candida albicans* and other common non-*albicans* yeast species. It is frequently used as a supplementary treatment for oral candidiasis. Andrade et al. noted that a 0.12% chlorhexidine solution could eliminate denture biofilm without adverse effects or staining the denture⁽⁶⁾.

Corega tabs considered the most effective denture cleansers globally. According to the manufacturer, Corega tablets contain sodium bicarbonate, citric acid, potassium carbonate, sodium carbonate, peroxide, TAED, sodium benzoate, sodium lauryl sulfoacetate, and flavoring agents. An analysis of Corega's properties, excluding common ingredients, reveals high levels of oxidizing and acidic compounds, which may explain the absence of increased retention in attachments when used⁽⁷⁾.

Moreover, sodium hypochlorite is another denture cleanser, deemed superior to other commercially available options. However prolonged exposure to sodium hypochlorite can significantly diminish the retention of attachments due to its corrosive nature, adversely affecting the attachment components, as reported by Watcharapichat et al⁽⁸⁾.

Fittydent, another denture cleanser, is proficient in reducing dental biofilm, including *Candida* species. It shares essential components with Chlorhexidine, such as sodium bicarbonate, potassium mono per sulphate, and detergent⁽⁹⁾.

An EDTA solution serves as an alternative denture cleanser, consisting of 17% EDTA, 10% carbamide peroxide, purified water, a thickening



agent, and various excipients. The effectiveness of EDTA in eliminating biofilms from salivary inocula or pure cultures of *Candida albicans* on polymethyl methacrylate (PMMA) denture base discs and toothbrushes has been assessed. Its capacity for virus neutralization has also been explored. Overnight application of the EDTA solution has been shown to decrease viable counts in both salivary and *C. albicans* biofilms⁽¹⁰⁾.

Cleansing solutions are a critical factor in maintaining attachment retention. The selection of cleansing solutions should take into account both the effectiveness in microbial elimination and the preservation of materials used in oral rehabilitation. Thus the aim of this study was to evaluate the effect of different denture cleaning solution on retention systems in conventional overdenture systems and the digital implant retained over denture. The null hypothesis stated is that the tested denture cleansers would have a similar effect on the microbial adherence and surface topography of conventional and 3D-printed overdenture.

MATERIALS AND METHODS

This study was designed as an experimental in-vitro controlled study, that was carried out in the Removable Prosthodontic Department, Faculty of Oral and Dental Medicine, AL-Azhar University (Assiut branch). Because this work was conducted in vitro without using any human or animal tissue, no ethical approved was necessary.

The aim of the current study was to compare the effects of various denture cleansers solution on the retention of attachment systems in both conventional and digital implant- retained overdentures.

Firstly, Conventional Implant Retained Overdenture: Fig (1,2,3)

- We fabricated metal molds for implants and O-ring housings, creating two metal flasks measuring $1.5 \times 3.5 \times 2$ cm. One mold was

allocated for the implants and the other for the O-ring housings. We then mixed self-curing acrylic resin, poured it into the molds, and allowed it to polymerize into solid acrylic resin blocks.

- After polishing acrylic resin block “A,” we created a circular hole on the upper part of block A, extending to the edge to serve as the index for block “B.” Additionally, a central hole was made in the block to accommodate the implant analog. The implant was positioned 1 mm above the block’s surface. We mixed self-polymerizing acrylic resin, filled the hole, and waited for it to harden completely.
- Consequently, the apex of each implant extended 1 to 2 mm above the surface of block A. After the acrylic resin hardened, we placed the O-ring housings onto the implant analogs. A metal mold was then positioned over block A. We mixed more self-polymerizing acrylic resin and poured it into the upper mold to form block B, following the same method used for block A.
- We tested the acrylic block for load-to-dislodgement, measuring the retentive force in Newtons with a Universal Testing Machine (model 3377 UK) before soaking. Retention levels were assessed at various times: before immersion in denture cleanser, and after simulated soaks of 24 hours, one month, and six months.
- We sorted the O-rings into five groups based on the denture cleanser utilized. Each group contained 12 acrylic blocks, each fitted with an implant and an O- ring. The groups were immersed in one of the following solutions: 0.12% chlorhexidine, Corega Tabs, Fittydent cleansing tabs, NaOCl diluted 1:10 in tap water, or an EDTA solution.
- The O-rings from each group were placed in a glass cup filled with the cleanser, ensuring they were completely submerged for the duration of the soaking **period**.

* **Secondly, Digital implant retained overdenture: Fig (4,5,6,7,8,9)**

- A complete denture was crafted using traditional techniques on an acrylic resin model .
- The trial denture base was meticulously adjusted on the model to ensure a perfect fit. Cross-linked acrylic teeth of appropriate size were placed on the wax base. The occlusal plane was set below the height of the retromolar pad, and the artificial teeth were left unchanged and unground. Following the manufacturer's standard instructions, the denture was waxed and finalized .
- To facilitate the insertion of two implants, holes were drilled at the canine positions. Once the implants were placed in the canine area, ball attachments were affixed .
- For the design and fabrication of a 3D-printed implant-retained overdenture, the model underwent scanning with an extraoral optical scanner (Medit I700, South Korea), and the scans were exported as Standard Tessellation Language (STL) files. The overdenture design file was then sent to a Halot 3D Printer for printing.
- After completing the 3D-printed denture, the metal housing was connected to the ball abutments. Block-out rubber sheets were used around the ball abutments to address undercuts and assist in the pick-up process.
- The base was verified to be securely in place, indicated by no movement, and a self-curing acrylic resin was mixed according to the manufacturer's instructions and applied to the denture's modified areas .
- Retention was assessed at specified intervals: before and after soaking in denture cleanser for simulated periods of 24 hours, one month, and six months.
- The O-rings were divided into five groups based on the denture cleanser type used. Each group, consisting of 12 acrylic resin models and 3D printed dentures with implants and O-rings, was immersed in different solutions, including 0.12% chlorhexidine and Corega Denture Cleanser.



Fig. (1) Acrylic resin block



Fig. (2) Acrylic resin block A&B.

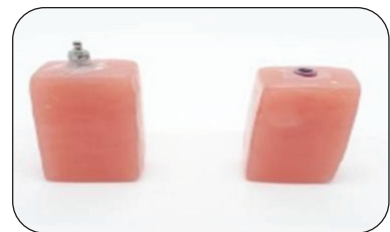


Fig. (3) Lower part containing implant while attachment system in corresponding upper part



Fig. (4) A ready-made acrylic resin model



Fig. (5) Acrylic resin model with 2 implantat at canine area

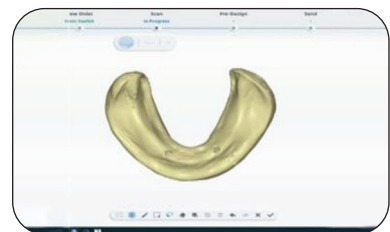


Fig. (6) Scanning of acrylic resin model.



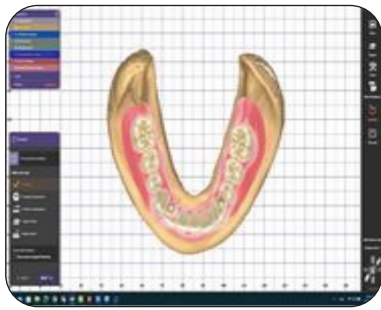


Fig. (7) Digital design of Implant retained overdenture



Fig. (8) Halot 3D Printer



Fig. (9) 3D printed overdenture with two holes before complete pick-up procedure



Fig. (10) 3D Printed overdenture soaked in different cleanser solution. 1.Corega soln. 2. Chlorhexidine soln. 3.fittydent soln. 4.Sodiumhypochlorite 5. EDTA

RESULTS

The mean and standard deviation values were calculated for each group in each test. Data were explored for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests and showed parametric (normal) distribution. One-way ANOVA followed by Tukey post hoc test was used to compare between more than two groups in non-related samples. Repeated measure ANOVA test was used to compare between more than two groups in related samples. Paired sample t-test was used to compare between two groups in related samples. Two-way ANOVA was used to test the interaction between different variables. The significance level was set at $P \leq 0.05$. Statistical analysis was performed with IBM® SPSS® Statistics Version 20 for Windows.

Regarding our results, there was a statistically significant difference between the groups (Before soaking), (After 24 hours), (After 1 month),

and (After 6 months) where with all denture cleansers, except in the Corega group (no statistical differences). According to multiple comparisons (post-hoc testing using Bonferroni correction) of different denture cleansers before soaking, the chlorhexidine group showed a statistically significant difference compared to the Fittydent group and the NaOCl group, and no significant difference with other groups. After 24 hours of soaking, the NaOCl group showed a statistically significant increase compared to the chlorhexidine group, the Corega group, the Fittydent group, and the EDTA group. One month after soaking, the NaOCl group continued to show a statistically significant increase compared to the chlorhexidine group, the Corega group, the Fittydent group, and the EDTA group. Six months after soaking, there was a statistically significant difference in retention between all denture cleansers, except between the chlorhexidine group and the Corega group.

Table (1) Results of conventional implant retained overdenture: Means, SDs, and statistical significance of effect of different denture cleansers on the attachment systems at different time intervals

	Before soaking		After 24hrs		After 1m		After 6m		p-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Chlorhexidine 0.12%	0.589	0.087	0.607	0.089	0.670	0.076	0.676	0.090	<0.001*
Corega tabs	0.640	0.095	0.635	0.063	0.656	0.093	0.703	0.074	<0.001*
Fitty dent	0.673	0.089	0.678	0.088	0.767	0.093	1.121	0.089	<0.001*
NaClO 1:10	0.699	0.064	2.188	0.676	1.241	0.087	1.014	0.051	<0.001*
EDTA Solution	0.695	0.094	1.339	0.167	1.256	0.137	1.208	0.114	<0.001*
p-value	<0.001*		<0.001*		<0.001*		<0.001*		

Table (2) Results of Digital implant retained overdenture: Means, SDs, and statistical significance of effect of different denture cleansers on the retention of the attachment system at different time points.

Recall times	Chlorhexi dine 0.12%	Corega	Fitty dent	NaCLO	EDTA	P value
	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	Mean ±SD	
Before soaking	0.66592±0.082876	0.74331±0.113584	0.85123±0.082669	0.82169±0.078707	0.74608±0.124246	< 0.001*
24 hours	0.68377±0.083472	0.73762±0.109246	0.85723±0.116518	2.30769±0.622505	1.38885±0.212852	< 0.001*
One month	0.74754±0.077033	0.75892±0.093721	0.94392±0.100621	2.30769±0.622505	1.38885±0.212852	< 0.001*
Six months	0.75315±0.103228	0.80531±0.086379	1.29869±0.125136	1.13608±0.062427	1.24800±0.164482	< 0.001*

Table (3) Pairwise comparison of the denture cleansers before soaking, After 1 day, 1 month after 6 months immersion.

#NAME?	Before soaking		After 1 day		After 1 month		After 6 months	
	Mean	P value	Mean difference	P value	Mean difference	P value	Mean difference	P value
Chlorhexidine 0.12% vs. Corega	-0.07739	0.491	-0.05385	1	-0.01139	1	-0.05215	1
Chlorhexidine 0.12% vs. Fitty dent	-0.18531	<0.001*	-0.17346	1	-0.19639	1	-0.54554	<0.001*
Chlorhexidine 0.12% vs. NaOCL	-0.15577	0.002*	-1.62392	<0.001*	-1.56015	<0.001*	-0.38292	<0.001*
Chlorhexidine 0.12% vs. EDTA	-0.08015	0.418	-0.70508	<0.001*	-0.64131	<0.001*	-0.49485	<0.001*
Corega vs. Fitty dent	-0.10792	0.068	-0.11962	1	-0.185	1	-0.49339	<0.001*
Corega vs. NaCLO	-0.07839	0.463	-1.57008	<0.001*	-1.54877	<0.001*	-0.33077	<0.001*
Corega vs. EDTA	-0.00277	1	-0.65123	<0.001*	-0.62992	<0.001*	-0.44269	<0.001*
Fitty dent vs. NaCLO	0.029538	1	-1.45046	<0.001*	-1.36377	<0.001*	0.162615	0.006*
Fitty dent vs. EDTA	0.105154	0.083	-0.53162	<0.001*	-0.44492	0.004*	0.050692	0.004*
NaCLO vs. EDTA	0.075615	0.543	0.918846	<0.001*	0.918846	<0.001*	0.918846	<0.001*



DISCUSSION

Retention is vital for the success of complete denture treatments. A common method to retain implant overdentures involves using a ball-shaped implant and an O-ring. Conventional overdenture attachment systems greatly improve retention, phonetics, mastication, and patient satisfaction. The application of CAD/CAM technology in creating overdentures is expected to produce frameworks with enhanced precision and retention. It is crucial to ensure the durability of the attachment components of overdenture. Daily clinical interest in prosthetic maintenance is key for successful long-term outcomes. Implant-retained overdentures require meticulous hygienic maintenance; proper denture hygiene helps prevent and manage oral infections in edentulous individuals. Although brushing alone is considered insufficient for thorough denture cleaning, it is still widely used. Additionally, the manual cleaning ability of older patients is often compromised. Chemical denture cleansing solutions are recommended as adjunctive to mechanical cleaning methods. The impact of cleaning solutions on the retention capabilities of overdenture attachments has been studied. A tensile force with a crosshead speed of 2 inches per minute was applied, mimicking the speed at which patients typically remove overdentures from their Locator abutments. The retention of each specimen was tested at four intervals: before soaking in denture cleanser, after a simulated 24-hour soak, after a simulated 1-month soak, and after a simulated 6-month soak, to solely assess the effect of denture cleansers on retention over time. ^(11,12) The study evaluated the ball and socket Locators by Zest Anchors, which are highly favored in the market due to their self-aligning system that removes the need for splinting, offers dual retention, and boasts the lowest profile height among all evaluated systems. The research also examined the impact of various commercial denture cleansers (Corega, Fittydent, chlorhexidine 0.12%, NaClO, and EDTA solution) on locator attachment wear. The primary goal of our study was to examine

the impact of various cleaning solutions on the retention and degradation of different overdenture attachment systems parts.

These denture cleansers proved more effective than water in plaque reduction. Corega is one of most popular choices for denture cleaning which has the ability to remove light stains and deposits from the denture base. After six months of simulated use, Corega (5 minutes) did not significantly affect Locator retention, corroborating the findings of You et al. and Nguyen et al.⁽¹³⁾ thus confirming its suitability as a routine denture cleanser with a brief soaking duration for patient convenience. Fittydent another popular cleansing solution that is known for its ability to reduce *C. albicans* adhesion to denture base materials ⁽¹⁴⁾. Sodium hypochlorites (NaOCl), such as Clorox Bleach, consider as one of the effective denture cleansers because they remove stains, dissolve mucus, and other organic substances, and have bactericidal and fungicidal properties. Francine et al. have suggested that 1% sodium hypochlorite is an efficient disinfectant for acrylic resin. However, the American College of Prosthodontists (ACP) advises against soaking dentures in sodium hypochlorite for more than 10 minutes daily to avoid damage ⁽¹⁵⁾. Chlorhexidine gluconate is another routine denture cleanser, especially beneficial for patients with oral candidiasis, and it has been shown to significantly increase attachment retention. This aligns with Andrade et al.'s findings and suggests it is more cost-effective. The increase in retention may be due to alterations in the surface texture, as observed by Piyapanna Pittayachawan and colleagues ⁽¹⁶⁾. EDTA is a cleansing solution composed of 17% EDTA, 10% carbamide peroxide, purified water, thickening agents, and excipients. Its effectiveness in eliminating biofilms from salivary inocula or pure cultures of *Candida albicans* on polymethyl methacrylate (PMMA) denture bases or toothbrushes was evaluated. EDTA also demonstrated virus neutralization capabilities. An overnight soak in EDTA solution reduced the viable counts of salivary and *C. albicans* biofilms.

This treatment altered the texture, making the surface rougher and increasing friction. However, prolonged soaking for one month or six months may lead to material degradation, resulting in a softened Locator. Consequently, retention decreased even without extended soaking periods. Therefore, EDTA is not recommended as a routine denture cleanser, corroborating the findings of You et al. and Nguyen et al. (17,18). Derafshi et al. (7) investigated the effects of sodium hypochlorite, Corega denture cleaning solution on O-ring attachments, finding that Corega significantly reduced attachment retention. Sodium hypochlorite also led to a 48% reduction in O-ring attachment retention. These findings align with our own, likely due to the use of similar Locator and O-ring attachments. The acidic and oxidizing characteristics of Corega, along with the corrosive nature of sodium hypochlorite, may account for the reduced retention. In contrast, Christin et al. (19) examined the effects of Corega denture cleansers on the retention of blue, pink, and transparent Locator attachments, noting a significant increase in retention after immersion in these solutions, which is at odds with our results. In our study, Corega markedly decreased attachment retention.

It is necessary to bear in mind that this in vitro study has several limitations. Patients can remove and insert their overdentures more frequently than three times a day and physical changes in the abutment and the attachments can occur during the testing procedure. Additionally, on a daily basis, intervals of overdenture maintenance are interrupted by intervals of usage, while in this study, the attachment caps were continuously immersed in solution for a simulated period of 12 months followed by simulated cycles of function. This study simulated a 12-month period of daily oral hygiene and overdenture use; however, similar to Ayyıldız et al.'s 2020 study, further investigation with longer periods of time is necessary (20).

CONCLUSION

- Immersing dentures in any cleansing solution can lead to decreased retention within the attachment system of implant-retained overdentures.
- Sodium hypochlorite and EDTA significantly reduces the retention of denture attachments and is not recommended for cleaning due to its severe adverse effects.
- Corega, due to its oxidizing and acidic properties, poses a risk of diminished retention; therefore, its use should be prudent. Nonetheless, a five-minute immersion in Corega solution has not shown a significant effect on retention within the attachment system.
- Fittydent and chlorhexidine appear to have a much smaller impact on retention, so they are popularly recommended.

RECOMMENDATION

Better to avoid using NaOCl and EDTA solution as a routine denture cleanser as they shown a more decrease in retention compared with other cleansers.

Ethical approval: Ethical approval for the study was obtained from the ethical committee Faculties of Dental medicine, Al-Azhar University, Assiut Branch.

Competing interests: The authors declare that they have no competing interests in this section.

Funding: The authors declare that there have no funding sources for this study, only the authors pay all the fundings.

Availability: public available.

REFERENCES

1. Laurito D, Lamazza L, Michael J Spink, Alberto De Biase. Tissue-supported dental implant prosthesis (overdenture) the search for the ideal protocol: A literature review. *Annali di stomatologia (Roman)*. 2012; 3: 2-10.



2. Gray, D.; Patel, J. Implant-supported overdentures: Part 1. *Br. Dent. J.* 2021, 231, 94–100.
3. S. Ayyıldız, C. Şahin, F. Emir, and B. Ersu, “Effect of denture cleansing solutions on the retention of locator attachments over time,” *Journal of Prosthodontics*, 2020; 3, 237–42.
4. Albant AD, Kalkancı A, Filiz B, Kustimur S. Effectiveness of different cleaning agents against the colonization of *Candida* spp and the in vitro detection of the adherence of these yeast cells to denture acrylic surfaces. *Yonsei medical journal.* 2008;49: 647-54.
5. Valentini-Mioso, F.; Maske, T.T.; Cenci, M.S.; Boscato, N.; Pereira-Cenci, T. Chemical hygiene protocols for complete dentures: A crossover randomized clinical trial. *J. Prosthet. Dent.* 2019, 121, 83–9.
6. I. Kırkcıoğlu, S. E. Ozkir, A. Koroğlu, O. Sahin, and B. Yılmaz, “Effect of denture cleansing solutions on different retentive attachments,” *The Journal of Prosthetic Dentistry*, 2016; 115, 5, 606–10.
7. Derafshi R, Mohaghegh M, Saki M, Safari A, Haghighi MR. The effects of denture cleansing solutions on the retention of attachments of implant supported overdentures. *J Dent (Shiraz).* 2015;16: 68-72.
8. K. Shay, “Denture hygiene: a review and update,” *The Journal of Contemporary Dental Practice*, 2000: 1, 2, 36–43.
9. J. Mok, E. Emami, T. Kobayashi, and J. S. Feine, “An oral hygiene brochure for your implant overdenture patients,” *Journal of the Canadian Dental Association*, 2007: 73, 8, 713.
10. C. T. Nguyen, R. Masri, C. F. Driscoll, and E. Romberg, “The effect of denture cleansing solutions on the retention of pink locator attachments: an in vitro study,” *Journal of Prosthodontics*, 2010; 19, 3, 226–30.
11. Ayyıldız, C. Şahin, F. Emir, and B. Ersu, “Effect of denture cleansing solutions on the retention of locator attachment over time,” *Journal of Prosthodontics*, 2020; 29, 3, 237–42.
12. Kobayashi M, Srinivasan M, Ammann P, Perriard J, Ohkubo C, Müller F, et al. Effect of in vitro cyclic dislodging on retentive force and removal torque of three overdenture attachment system. *Clin Oral Implants Res.* 2014 ;25(4):426-34.
13. Nguyen, Tuan & Cannata, Marisa & Miller, Jason. Understanding student behavioral engagement: Importance of student interaction with peers and teachers. *The Journal of Educational Research.* 2016;111. 1-12. 10.1080/00220671.2016.1220359.
14. J. Mok, E. Emami, T. Kobayashi, and J. S. Feine, “An oral hygiene brochure for your implant overdenture patients,” *Journal of the Canadian Dental Association*, 2007; 73, 8, 713.
15. Barnabé W, Mendonça T, Neto A, Pimenta FC, Pegoraro LF, Scolaro JM. Efficacy of sodium hypochlorite and coconut soap used as disinfecting agents in the reduction of denture stomatitis, *Streptococcus mutans* and *Candida albicans*. *J Oral Rehabil* 2004;31 :453–9.
16. Cruz, Patrícia Costa, Ingrid Machado de Andrade, Amanda Peracini, Maria Cristina Monteiro de Souza- Gugelmin, Cláudia Helena Silva-Lovato, Raphael Freitas de Souza et al. “The effectiveness of chemical denture cleansers and ultrasonic device in biofilm removal from complete dentures.” *Journal of Applied Oral Science*: 2011;19; 668 - 73.
17. Ayyıldız, Simel & Sahin, Cem & Emir, Faruk & Ersu, Bahadır. Effect of Denture Cleansing Solutions on the Retention of Locator Attachments Over Time. *Journal of Prosthodontics*. 2020; 10.1111/jopr.13144.
18. You, W.; Masri, R.; Romberg, E.; Driscoll, C.F.; You, T. The Effect of Denture Cleansing Solutions on the Retention of Pink Locator Attachments after Multiple Pulls: An In Vitro Study. *J. Prosthodont.* 2011, 20, 464–9.
19. Arnold C, Fraedrich D, Setz JM, Boeckler AF. Effect of cleansing solutions on the retention of Locator attachments. *Int Poster J Dent Oral Med.* 2011; 13(2):534.
20. Mariotto, L.; Valente, M.; de Castro, D.; dos Reis, A. Effects of Denture Cleansing Solutions on Different Materials Used for Fabrication of Polymer Attachment Components. *Int. J. Prosthodont.* 2020, 33, 74–80.



تأثير منظفات أطقم الأسنان على نظام ربط أطقم الأسنان التقليدية والرقمية المحتفظ بها

رضوى عصام الدين*، ماجد السعداوى، محمود عمار

1. قسم الاستعاضة المتحركة، كلية طب الأسنان، جامعة الأزهر، أسيوط، مصر.

* البريد الإلكتروني: ROOKAESSAM24@GMAIL.COM

الملخص :

الهدف: تم إجراء دراسة في المختبر لمقارنة آثار محاليل منظفات الأسنان المختلفة على الاحتفاظ بأنظمة التثبيت في كل من أطقم الأسنان التقليدية والرقمية التي يتم الاحتفاظ بها بالزرع.

المواد والاساليب: أجريت الدراسة باستخدام المحلول المنظف المستخدم. حيث تم تقسيمها بالتساوي إلى خمس مجموعات: المجموعة أ: تم تنظيف طقم الأسنان بما في ذلك العناصر المحتفظ بها بنقوعها في أقراص كوريجا المجموعة ب: منقوعة في الكلورهيكسيدين. المجموعة ج: منقوع في محلول FITTYDENT. المجموعة د: منقوع في محلول هيبوكلوريت الصوديوم. المجموعة E: منقوعة في محلول التنظيف EDTA. تم وضع كل مجموعة في المطهر الموضوع في كوب زجاجي مغمور في المحلول خلال فترة النقع بأكملها حسب تعليمات الشركات المصنعة لمدة تعادل 24 ساعة وشهر وستة أشهر. تم وضع كتل الأكريليك على آلة اختبار عالمية لاختبار السحب لتسجيل قوة الخلع. تم إجراء القياسات بعد شهر واحد (T1) و6 (T2).

النتائج: أظهرت الدراسة وجود فروق ذات دلالة إحصائية بين الشركات المصنعة المختلفة فيما يتعلق بقوى الاحتفاظ بالقوة الاحتفاظية للمرفق (قبل النقع). (بعد 24 ساعة). (بعد شهر واحد). (بعد 6 أشهر) حيث ($P < 0.001$). باستثناء مجموعة كوريجا. لا يوجد فرق إحصائي. بالنسبة لمجموعات محلول التنظيف. تم الحصول على نتائج إحصائية معنوية مختلفة بين خمس مجموعات في فترات زمنية مختلفة للمتابعة. حيث ($P > 0.001$).

الخلاصة: يعد اختيار منظفات أطقم الأسنان التي تتطلب الحد الأدنى من وقت النقع أمرًا حيويًا لكل من أطقم الأسنان التقليدية والمعتمدة على CAD/CAM والمثبتة بالزرعات مع الملحقات. لأنها تساعد في إطالة عمر المكونات.

الكلمات المفتاحية : منظف أسنان؛ المرفقات؛ أسنان زائدة. CAD/CAM. صحة الفم؛ نظافة الفم، ونوعية الحياة