وزارة التعليم العالي والبحث العلمي
جامعة ميسان
كلية التربية الاساسية

Ministry of Higher Education and Scientific Research
University of Misan
College of Basic Education

Misan Journal for Academic Studies
Humanities, social and applied sciences

مجلة ميسان للدراسات الاكاديمية

العلوم الانسانية والاجتماعية والتطبيقية

ISSN (Print) 1994-697X
(Online)- 2706-722X

المجلد 24 العدد 53 اذار 2025

VOL24 Issue53 Mar 2025

مجلة ميسان للدراسات الاكاديمية

العلوم الإنسانية والاجتماعية والتطبيقية

كلية التربية الأساسية / جامعة ميسان / العراق

Misan Journal for Academic Studies

Humanities, social and applied sciences

College of Basic Education/University of Misan/Inq

ISSN (Print) 1994-697X (Online) 2706-722X

المجلد 24	العدد 53	اذار	2025
VOL24	Issue53	Mar	2025

INTERNATIONAL STANDARD SERIAL NUMBER INTERNATIONAL CENTRE

OJS / PKP

www.misan-jas.com

IRAQI Academic Scientific Journals

doi

Crossref

ORCID

OPEN ACCESS

journal.m.academy@uomisan.edu.iq

رقم الايداع في دار الكتب والوثائق بغداد 1326 في 2009

Misan Journal for Academic studies
Vol 24 Issue 53 Mar 2025
مجلة ميسان للدراسات الاكاديمية
مجلد 24 العدد 53 اذار 2025

ISSN (Print) 1994-697X
ISSN (Online) 2706-722X

DOI:
https://doi.org/10.54633/2333-024-053-003

Received:14/11/2024
Accepted:1/1/2025
Published online:31/3/2025

EFFECT OF HYPOCHLOROUS ACID ON SURFACE ROUGHNESS AND WETTABILITY OF ZINC OXIDE EUOGENOL IMPRESSION PASTE

Israa J.Taha [1*], ***Shorouq M. Abass*** [2]
[1.2] Department of Prosthodontics Dentistry, College of Dentistry, University of Baghdad, Iraq.
Corresponding author: Israa J.Taha , E-mail: Israa.Taha2301m@codental.uobaghdad.edu.iq
https://orcid.org/0009-0009-4385-4384

Abstract:

Aim: Dental impression materials may be infected when touched with patient plaque, saliva, and blood and immediately contaminated with potentially harmful germs. The spread of infection can be prevented through disinfection of the impression materials. The disinfection solution may change the impression materials' properties, The study goal was to investigate the effects of two disinfectants(2% glutaraldehydes (G.A.) and hypochlorous acid(HOCl) 200ppm,400ppm for ten minutes) on the wettability and surface roughness of the zinc oxide-eugenol (ZOE) impression material.

Materials and Methods: Eighty zinc oxide- eugenol impression material specimens were randomly classified into four groups for each test ten specimens ,A custom-produced mold, a circular in shape 2mm thickness and 20 mm in diameter made. A profilometer device was used for the surface roughness (Ra) measurement, and a goniometer device was used for the contact angles measurement to determine Wettability, The Statistical analysis was done using IBM's Statistical Package for the Social Sciences.The One Way Analysis of Variance (ANOVA) test was used to data analysis.

Results: The results of this study revealed that HOCl and 2%glutaraldehyde demonstrate no effect on the wettability and surface roughness of zinc oxide-eugenol impression paste compared to the control group (P>0.05).

Conclusion: Considering the limitation of this investigation, the hypochlorous acid (200ppm 400ppm) is recommended for use as an efficient disinfection without a negative impact on the surface roughness and wettability of the ZOE impression paste

Keywords: Hypochlorous acid ;Immersion Disinfection; Surface roughness; Wettability; ZINC OXIDE-EUGENOL

Introduction:

The dental impressions are used for an accurate register of the patient's tooth form and its relation with other oral structures,[1]When the impressions touch the patient's saliva, blood and plaque, they are immediately contaminated with potentially harmful germs. Which could result in cross-contamination between laboratory personnel, dentists, and dental assistants as infectious illnesses spread among them,Many viruses, fungi, and bacteria found in the prosthodontic environment have been connected to fatal and debilitating diseases. Therefore, it is imperative to take all possible precautions to prevent the cross-contamination of these microbes and the potential transmission of diseases in the prosthodontic setting.[2]In a healthy patient, there is a low danger of contamination from other patients, but in a patient with a debilitating illness or weakened immune system, the risk of cross-contamination is considerable and poses a significant hazard if a suitable caution is not followed.[3] Consequently, a technique that prevents cross-infection without altering the Ra and Wettability of the impressions is required.[4] Numerous studies have focused on removing bacteria with various disinfection solutions without altering the Ra and Wettability of the impressions.[5,6] Disinfection methods such as spraying and immersion of impression were usually used. [7,8]The American Dental Association (ADA) recommended to use the immersion technique due to its permit the disinfection solution come into contact with all surfaces of impression. [9] The risk of cross-infection may be reduced by immersion disinfection technique. However, a harmful effect on the dental impression and the resulting dental cast have been frequently documented .[10-11]

Nevertheless, the immersion method may modify the dimension of impressions, lowering the standard of prosthetic outcomes attained in dental practice.[12-13-14]There are different concepts of whether the disinfecting methods worse impression or altered it.[15]The Advisory British Dental Association Service recommended frequently cleaning the impression by water from the tap throughout daily dental practice. Nevertheless, this method may eliminate several bacteria adhering to the dental impression surface, but a significant amount remains. While some countries have halogenated compounds in their tap water, during routine dental procedures, the Advisory British Dental Association Service recommends using tap water for washing impression materials.[16] More than 90% of bacteria remain on the surface of the impression removed in this way.[17]

The most common disinfectants used are glutaraldehydes, chlorhexidine, Sodium hypochlorite and hydrogen peroxide.[18] since no disinfection can be used for all impression materials, choosing a disinfectant that has a potent antibacterial capabilities without compromising dimensional stability or the impression’s surface quality is essential .[19] A disinfectant must meet two requirements: killing the bacteria without altering the size of the impression materials or the cast made from it. It is crucial if you want a completed appliance that fits properly and functions as intended.[20]

Zinc oxide-eugenol was extensively used in dentistry and became available since the 1930s; [21-22] it is a rigid and irreversible impression material, widely used for complete denture final impression made due to special features of the ability to record fine minute tissue details, distribute pressure equally and accuracy, cost-effectiveness and ease of manipulation.[23-24-25]

The ZOE is hydrophobic; the disinfection procedure should be done without affecting the characteristics of the impression, like the wettability and surface roughness, to ensure the success of

the cast made from the impression.[25] Hummodi,2019 evaluated the result of disinfection of ZOE through immersion methods in Lemon Juice and Apple Vinegar on surface roughness for 10 and 15 minutes; the result showed an adverse impact on the ZOE surface roughness.[26]

Gluteraldehydes are recommended for disinfection of the ZOE impression paste.[25] it serves as a positive control in this investigation. Gluteraldehydes have adverse effects on the respiratory system, such as difficulty breathing, bronchitis, wheezing, coughing, asthma, skin rash, discolouration, allergic reactions, and dermatitis. All workplace safety measurements must utilize local ventilation and change the air every hour (greater than 15 cycles each hour).[27] Shetty et al. examined how the Wettability of the polyether impression material changed when it was immersion for 10 and 30 minutes in 2% G.A., 5.25% phenol, 0.05% iodophor, and 5% sodium hypochlorite, respectively. Only the iodophor showed The contact angle did not significantly change.[28]

One of the most effective natural and nontoxic chemicals is Hypochlorous acid [29].The Prevention and Control of Diseases and The U.S. Environmental Protection Agency, because of extensive usage of HOCL, consider it a very high-level disinfectant. Several viruses and bacteria have uncomplicated chemical compositions that can death rapidly and essentially.[8-30]

This investigation aimed to evaluate the effect of different concentrations of HOCl (200,400)disinfectant by the immersion method for ten minutes on the ZOE impression paste's wettability and surface roughness.

The null hypothesis states the immersion ZOE impression paste in HOCl solution has no adverse effect on wettability and surface roughness, while alternative hypothesis States the immersion of ZOE impression paste in HOCl solution will adversely affect its surface roughness and Wettability.

Methods:

Eighty specimens of zinc oxide-eugenol paste(WHITE, Prime Dental Manufacturing Ltd, Gemba House, Stephenson Drive Gloucester, GL2 2HAUK) were split blindly into four test groups; each test group had ten specimens,40 specimens for surface roughness test and 40 specimens for wettability test.

There were four test groups as follows:

•Control group (C): no treatment.

•Experimental group (GA 2%): the ZOE impression paste specimens were disinfected by immersing for 10 minutes in 2% Glutaraldehydes, which is considered a positive control.

•Experimental group (HOCl 200ppm): the ZOE impression paste specimens immersion in 200 ppm HOCl for 10 minutes.

•Experimental group (HOCl 400ppm): the ZOE impression paste specimens immersion in 400 ppm HOCl for 10 minutes.

Specimen preparation of ZOE impression paste:

A custom-produced mold, circular in shape, 2mm in thickness and 20 mm in diameter, were produced.[31] Following the guidelines of the manufacturer's instruction, the zinc oxide-eugenol specimens(WHITE, Prime Dental Manufacturing Ltd, Gemba House, Stephenson Drive Gloucester, GL2 2HAUK) were made. Two glass slabs, one above and one below the mold were used; this produced a uniform dimension of the specimens and extracted them without causing any distortion.

Manual pressure was applied to make a flat surface for 30 seconds; after setting the ZOE specimens, the specimens were removed from the water bath maintained about 35 °C to resemble the warmth of the oral cavity . The tweezer handled the impression specimens and kept them in a container to prevent external contamination during the experiment.[12]

Disinfection procedure:

Glutaraldehydes (G.A.) functioned as a positive control in the research as recommended for disinfection of the ZOE impression paste; it is considered a high-level disinfection.[25] Many research indicates it's used to disinfect zinc oxide-eugenol paste for 10 minutes without affecting the quality of impression material.[32] The ZOE specimens were immersed in a 2%GA group, ready to use and available in the market (Iraq- Baghdad -Al-Madaan) for 10 minutes. The HOCl (200 and 400 ppm) was made on-site according to the manufacturer's instructions(Top sanitize, china). The ZOE specimens in HOCl were immersed for 10 min, and the control group had no treatment. Each group's specimens used distilled water to wash them (Pioneer, Iraq) for fifteen seconds and after being properly dried, kept in closed containers.[33]

Wettability:

The Wettability of each specimen surface was evaluated with an Optical Tensiometer (FI-02130 Espoo, Finland). Each specimen's contact angle was calculated using mean of two values(12), as shown in (Figures 1 and 2).

Figure 1. The contact angle goniometer

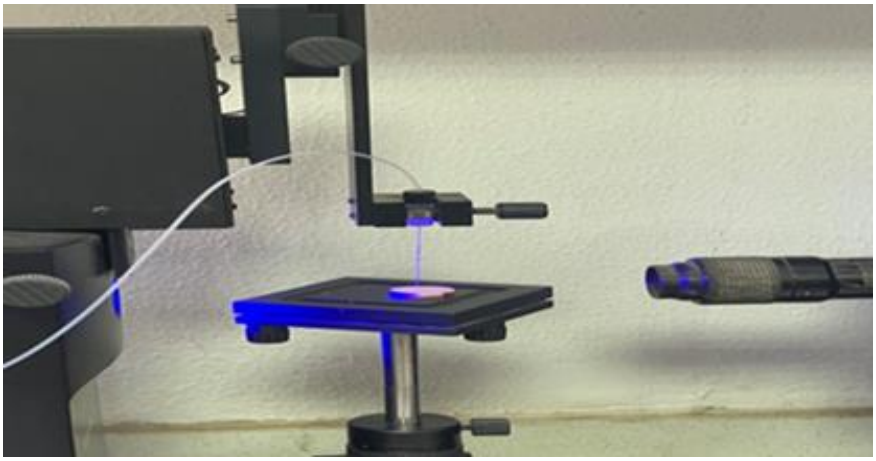

Figure 2. Wettability measurement of zinc oxide-Eugenol specimens

Surface roughness:

The surface roughness of the specimens was measured strictly within 0.001 µm in accuracy using a stylus type, and the digital roughness tester (Ra) was used (Profilometer, JIMEC, China). The reading should show on the digital scale recorded in the surface roughness parameter when the stylus touches the initial point and moves over the sample surface. The roughness value was reported as the mean of the three values,[19] as shown in Figure 3.

Figure3. Surface roughness tester (profilometer).

Statistical Analysis:

Statistical analysis done using SPSS software IBM's Statistical Package for the Social Sciences (IBM® SPSS® Statistics, Version 26.0. Armonk, NY), analyzed the data to compare means for the roughness and Wettability among the groups One Way Analysis of Variance (ANOVA) test was used, a probability P values greater than 0.05 were regarded as statistically insignificant. In contrast, a probability P values less than 0.05 were regarded as statistically significant.

Results:

The average and standard deviation of wettability and the surface roughness findings are shown in (Table 1 and Table 2), the mean value for control group of surface roughness was 0.69 ,the higher mean was for HOCl 200ppm 0.77,the lower mean was for HOCl 400ppm 0.73,while in between for 2%G.A.

Table 1. descriptive statistics for Surface Roughness and Wettability.

Variables	Groups	N	Min	Max	Mean	SD	SE
Surface Roughness	**Control**	**10**	**0.16**	**1.159**	**0.69**	**0.29**	**0.09**
	HOCl 200ppm	**10**	**0.48**	**1.27**	**0.77**	**0.23**	**0.07**
	HOCl 400ppm	**10**	**0.22**	**1.22**	**0.73**	**0.31**	**0.09**
	2%G.A	**10**	**0.38**	**1.11**	**0.74**	**0.26**	**0.08**
Wettability	**Control**	**10**	**91.25**	**101.90**	**98.2380**	**3.41239**	**1.07909**
	HOCl 200ppm	**10**	**90.62**	**104.80**	**97.5080**	**4.73025**	**1.49584**
	HOCl 400ppm	**10**	**93.42**	**108.50**	**99.6950**	**5.91857**	**1.87162**
	2%G.A	**10**	**91.59**	**106.30**	**97.5440**	**4.86518**	**1.53850**

Table 2. ANOVA for Surface Roughness and Wettability.

Variables		Sum of Squares	df	Mean Square	F	Sig.
Surface Roughness	Between Groups	.034	3	.011	.147	.931
	Within Groups	2.811	36	.078		
	Total	2.845	39			
wettability	Between Groups	31.371	3	10.457	. 451	.718
	Within Groups	834.472	36	23.180		
	Total	865.844	39			

The mean value for control group of wettability was 98.2380, the higher mean was for HOCl 400ppm 99.6950,the lower mean was for HOCl 200ppm 97.5080, while in between was for 97.5440.

According to the ANOVA analysis shows an insignificant difference between all test groups compared to the control group, with P value >0.05.

The result showed an insignificant influence on ZOE specimens' surface roughness and wettability after immersion in HOCl (200ppm,400ppm) for ten minutes; the null hypothesis was accepted, and the alternative hypothesis refused.

Discussion:

The potential for cross-infection and contamination through dental impressions has long been discussed.[34] The immersion technique was used in this research because it is more efficient. This could be due to the disinfectant covering all of the impression's surfaces and the longer time for exposure by immersion of the impression material to the disinfectant rather than through spraying HOCl in a watery solution, which could function as a strong oxidizer produced by breakdown into OCL- and H+ and gathering and denaturing proteins. Furthermore, HOCl produces chloramine, nitrogen with nitrogen-centered radicals that inactivate viruses and subsequently cause single- and double-stranded DNA breaks of microorganisms, washing impressions with water alone is ineffective in disinfection. Therefore, dentists must disinfect the impression before sending it to the laboratory .

The current study used hypochlorous acid in two concentration 200ppm and 400ppm as a new disinfection solution for the immersion of ZOE impression material.

The topography and physiochemistry of a specific surface affect its Wettability and surface-free energy.[35] The contact angle indicates how much a liquid has wetted the substrate. It is a crucial metric for determining a surface's wettability and free surface energy—the greater the contact angle, the lower the wettability value. [36] " A tangent to both the solid surface and the liquid drop forms the contact angle " .[37]

The research outcome agrees with Kadhim and Abass, [6]who evaluated the wettability and surface roughness of polyether impression material altered followed being immersed in the chemical disinfectants (200 ppm HOCl for 15 minutes and 2% glutaraldehyde for 10 minutes), which was found the Wettability no statistical difference when compared with the control group (P>0.05).

Also, the outcome of the research agrees with Mohammed and Abass ,[38] study of how the surface roughness and Wettability of the addition silicon impression was modified followed by immersed in the disinfectants 200 ppm hypochlorous acid (HOCl) for 15 minutes and 5.25% sodium hypochlorite (NaOCl) for 10 minutes, which discovered that HOCl was efficient at disinfecting without changing addition silicon surface wettability.

The result agree with Abdulaali and Abass[12],study how the wettability change of the addition silicon impression after immersed in 16 mg/ml Propolis disinfectant for 10 min, which found insignificant effect on the Wettability property of additional silicone materials after disinfection.

The result of the research disagrees with Shetty et al. ,[28] this may be due to the use of different impression materials and the long disinfection period.

surface roughness:

Another significant issue is the roughness of the surface; the dental cast and impression material should both accurately mirror the features of the oral cavity. Ultimately, in the prosthesis. The surface roughness of casts made from rough impressions will be higher than that of the impression; thus, the roughness of the impression is not supposed to be changed through sterilizing or disinfecting procedures; the prosthesis's rougher surfaces have the potential to inflame the soft tissues that support it quickly. [39-40]

This outcome agrees with Kadhim and Abass while disagreeing with Mohammed and Abass this may be due to using different impression materials or different test measurements, which found the Ra was significantly decreased in the Hocl group compared to the control group.[6-38]

The result of the study disagrees with Hummodi, which may be due to the use of natural disinfection, which affects the roughness of the surface.[26]

Also, the result disagree with result of Farooqui and Aras[31],which found the surface roughness of two polyvinylsiloxane impression materials following chemical disinfection, may be due to used different impression and disinfection.

Study limitations :Some of the limitations of this study the difficulty in mixing and handling of ZOE, small size of the specimens ,future study need to evaluate the effect of HOCl on the details reproduction and dimensional stability.

Future research need to evaluate how HOCl acid effect on other properties of ZOE impression paste such as surface details ,dimensional stability and compatibility with gypsum product.

Conclusion:

Consider the limitations of this research, ZOE impression paste can be immersed in HOCl (200,400) for 10min for disinfect it, without effect on surface roughness and wettability.

References:

[1]Chidambaranathan AS, Balasubramanium M. Comprehensive review and comparison of thedisinfection techniques currently available in the literature. Journal of Prosthodontics. 2019 Feb;28(2):e849-56. https://doi.org/10.1111/jopr.12597

[2] Al-khafaji AM, Abass SM, Khalaf BS. The effect of SOLO and sodium hypochlorite disinfectant on some properties of different types of dental stone. Journal of Baghdad College of Dentistry. 2013;25(2):8-17. https://doi:10.12816/0014925

[3] Nasser AA, Abass SM. Effect of Disinfection with Hypochlorous Acid on Compatibility with impression materials of type III dental Stone. (Humanities, social and applied sciences) Misan Journal of Academic Studies. 2023 Sep 30;22(47):339-47. https://orcid.org/0000-0002-2035-7600

[4] Abass SM, Ibrahim IK. The effect of addition of calcium hypochlorite disinfectant on some physical and mechanical properties of dental stone. Scientific Journal Published by the College of Dentistry–University of Baghdad. 2012:36. https://api.semanticscholar.org/CorpusID:136228427

[5] Mohammed MJ, Abass SM. Influence of Hypochlorous acid on Dimensional change, reproduction of details and compatibility with gypsum products of Addition Silicon Impression Material. (Humanities, social and applied sciences) Misan Journal of Academic Studies. 2023 Sep 30;22(47):417-27. https://orcid.org/0000-0002-4455-588X

[6] Abass SM, Kadhim HA. Effect of Disinfection with Hypochlorous Acid on Wettability and Surface Roughness of Polyether Impression Material. Journal of Medicinal Chemistry.2023;6(5): 938–945. https://doi: 10.26655/JMCHEMSCI.2023.4.25

[7] Noori ZS, Al-Khafaji AM, Dabaghi F. Effect of tea tree oil on candida adherence and surface roughness of heat cure acrylic resin. J. Bagh. Coll.Dent . 2023 Dec 15; 35(4): 46-54. https:// doi.org/10.26477/jbcd.v35i4.3513

[8]Khalaf, B.S., Abass, S.M., Al-Khafaji, A.M. and Issa, M.I. Antimicrobial Efficiency of Hypochlorous Acid and Its Effect on Some Properties of Alginate Impression Material. International Journal of Dentistry , 2023(1), p.8584875. https://doi: 10.1155/2023/8584875

[9] Al-Azawi RA, Al-Naqash WA. The Effect of Silver-Zinc Zeolite Incorporation on Some Properties of Condensation Silicone Impression Material. .Journal of Baghdad College of Dentistry. 2016 Dec;325(3955):1-6. https://doi:10.12816/0033206

[10] Shanef AI, Farhan FA. Effect of Immersion Time of a Hydrogen Peroxide and Vinegar Mixture Solution on the roughness of Heat-cured and CAD/CAM Polymethyl Methacrylate Resin. (Humanities, social and applied sciences) Misan Journal of Academic Studies. 2024 Oct 5;23(51):112_123-. DOI:10.54633/2333-023-051-010

[11] Martin N, Martin MV, Jedynakiewicz NM. The dimensional stability of dental impression materials following immersion in disinfecting solutions. Dental materials. 2007 Jun 1;23(6):760-8. https://doi.org/10.1016/j.dental.2007.01.004

[12] Abdulaali NF, Abass SM. Effect of propolis on the mechanophysical properties of addition silicon dental impression material. F1000Research. 2024 Mar 20;13:195. https://doi.org/10.12688/f1000research.144351.1

[13] Ghaib AJ, Ali MA. The comparison of tear strength for different impression material. International Journal of Medical Toxicology & Legal Medicine. 2023;26(1and2):25-9. https://doi : 10.5958/0974-4614.2023.00005.0

[14]Tullner JB, Commette JA, Moon PC. Linear dimensional changes in dental impressions after immersion in disinfectant solutions. The Journal of Prosthetic Dentistry. 1988 Dec 1;60(6):725-8. https://doi.org/10.5005/jp-journals-10024-1043

[15] Stoeva, V., Bozhkova, T., Atanasowski, A. and Kondeva, V. Study of Knowledge of Hand Disinfection and Dental Impressions in Everyday Practice among Dental Students during a Pandemic by Coronavirus Disease 2019. OAMJMS.2021;*9*(D), pp.138-142. https://doi: https://doi.org/10.3889/oamjms.2021.6697

[16] Blair, F.M. and Wassell, R.W.. A survey of the methods of disinfection of dental impressions used in dental hospitals in the United Kingdom. Br Dent J.1998;*180*(10), pp.369-375. https://doi: 10.1038/sj.bdj.4809092

[17] Ghasemi E, Badrian H, Hosseini N, Khalighinejad N. The effect of three different disinfectant materials on polyether impressions by spray method. World Journal of Dentistry. 2013 Dec 1;3(3):229-33. https://doi: 10.1038/sj.bdj.4809092

[18] Kotsiomiti E, Tzialla A, Hatjivasiliou K. Accuracy and stability of impression materials subjected to chemical disinfection–a literature review. Journal of Oral Rehabilitation. 2008 Apr;35(4):291-9. https://doi: 10.1111/j.1365-2842.2007.01771.

[19]Hardan L, Bourgi R, Cuevas-Suárez CE, Lukomska-Szymanska M, Cornejo-Ríos E, Tosco V, etal., Disinfection procedures and their effect on the microorganism colonization of dental impression materials: a systematic review and meta-analysis of in vitro studies. Bioengineering. 2022 Mar 16;9(3):123. https://doi.org/10.3390/bioengineering9030123

[20] Naumovski B, Kapushevska B. Dimensional stability and accuracy of silicone–based impression materials using different impression techniques–a literature review. Prilozi. 2017 Sep 1;38(2):131-8. https://doi: 10.1515/prilozi-2017-0031

[21] Imbery TA, Nehring J, Janus C, Moon PC. Accuracy and dimensional stability of extended-pour and conventional alginate impression materials. The Journal of the American Dental Association. 2010 Jan 1;141(1):32-9. https://doi.org/10.14219/jada.archive.2010.0018

[22]Myers GE, Peyton FA. Physical properties of the zinc oxide-eugenol impression pastes. Journal of Dental Research. 1961 Jan;40(1):39-48. https://doi.org/10.1177/00220345610400012201

[23]Chandak AH, Deshmukh SP, Radke UM, Banerjee RS, Mowade TK, Rathi A. An in vitro study to evaluate and compare the flow property of different commercially available zinc oxide eugenol impression materials. Contemporary Clinical Dentistry. 2018 Jun 1;9(Supp 1):S137-41. https://doi: 10.4103/ccd.ccd_155_18

[24]Hanif A, Khan J, Bangash MF. Impression techniques and materials used for fabrication of complete denture. a survey. Pakistan Oral and Dental Journal. 2014 Mar 31;34(1). https://api.semanticscholar.org/CorpusID:33497676

[25] Anusavice KJ, Shen C, Rawls HR, editors. Phillips' science of dental materials. Elsevier Health Sciences; 2012 Sep 27. https://api.semanticscholar.org/CorpusID:137225317

[26] Hummudi I. Influence of disinfecting solutions on the surface roughness of zinc-oxide eugenol impression material. Indian journal of Forensic Medicine & Toxicology. 2019 Oct 1;13:1480-3. https://doi:10.5958/0973-9130.2019.00511.5

[27]Abdel-Hamid MA, Abbas D, Elokda EE, El-Gwaily MS. ADVERSE HEALTH EFFECTS OF GLUTARALDEHYDE AND ITS RELATION TO WORKPLACE SAFETY MEASURES AND WORK PRACTICES OF HEALTH CARE WORKERS. Egyptian Journal of Occupational Medicine. 2019;43(2):297-312. https://doi: 10.21608/ejom.2019.31412

[28]Shetty S, Kamat G, Shetty R. Wettability changes in polyether impression materials subjected to immersion disinfection. Dental Research Journal. 2013 Jul;10(4):539. https://doi:10.4103/1735-3327.118484

[29]Basmacı F, Kılıçarslan MA, Şenel FÇ. Recommendations for infection control in dental laboratories during COVID-19 pandemic and normalization period. Journal of Basic and Clinical Health Sciences. 2021 May 1;5(2):176-81. https://doi.org/10.30621/jbachs.862910

[30]Mikaeel JM, Namuq MK. Evaluation of some properties of elastomeric dental impression materials after disinfection. Erbil Dental Journal (EDJ). 2019 Jun 6;2(1):187-96. https://doi:10.15218/edj.2019.09

[31]Farooqui R, Aras MA, Chitre V. An in vitro study to compare the surface roughness of two polyvinylsiloxane impression materials following ultraviolet irradiation or chemical disinfection. International Journal of Experimental Dental Science. 2020 Dec 1;9(2):52-5. https://doi:10.5005/jp-journals-10029-1215

[32] Ismail HA, Mahross HZ, Shikho S. Evaluation of dimensional accuracy for different complete edentulous impressions immersed in different disinfectant solutions. European journal of dentistry. 2017 Apr;11(02):242-9. https:// doi:10.4103/ejd.ejd_268_16

[33]Al AlSheikh H, AlZain S, Warsy A, AlMukaynizi F, AlThomali A. Mandibular residual ridge height in relation to age, gender and duration of edentulism in a Saudi population: A clinical and radiographic study. The Saudi dental journal. 2019 Apr 1;31(2):258-64. https://doi: 10.1016/j.sdentj.2018.12.006

[34]Al Kheraif AA. Surface roughness of polyvinyl siloxane impression materials following chemical disinfection, autoclave and microwave sterilization. The journal of contemporary dental practice. 2013 May 1;14(3):483. https://doi: 10.5005/jp-journals-10024-1349

[35]Noori ZS, Al-Khafaji AM, Dabaghi F. Effect of tea tree oil on candida adherence and surface roughness of heat cure acrylic resin. Journal of Baghdad College of Dentistry. 2023 Dec 15;35(4):46-54. https://doi:10.26477/jbcd.v35i4.3513

[36] Ramanna L, Rawat I, Zerrouki D, Bux F. A novel organic dye-based approach to increase photon flux density for enhanced microalgal pigment production. Journal of cleaner production. 2018 Oct 10;198:187-94. https://doi.org/10.1016/j.jclepro.2018.07.016

[37]GPT9. The glossary of prosthodontic terms., The Journal of Prosthetic Dentistry;117,2017. https://doi.org/10.1016/j.jclepro.2018.07.016

[38] Mohammed MJ, Abass SM. Influence of Hypochlorous acid on Surface Roughness and Wettability of Addition Silicon Impression Material. The Egyptian Journal of Hospital Medicine. 2023 Jan 1;90(2):3630-5. https://doi:10.21608/ejhm.2023.292764

[39] Abuzar MA, Bellur S, Duong N, Kim BB, Lu P, Palfreyman N, Surendran D, Tran VT. Evaluating surface roughness of a polyamide denture base material in comparison with poly (methyl methacrylate). Journal of oral science. 2010;52(4):577-81. https://doi: 10.2334/josnusd.52.577

[40]Kuhar M, Funduk N. Effects of polishing techniques on the surface roughness of acrylic denture base resins. The Journal of prosthetic dentistry. 2005 Jan 1;93(1):76-85. https://doi: 10.1016/j.prosdent.2004.10.002

Conflicts of Interest Statement…no conflicts of interest

Manuscript title:

EFFECT OF HYPOCHLOROUS ACID ON SURFACE ROUGHNESS AND WETTABILITY OF ZINC OXIDE EUOGENOL IMPRESSION PASTE

The authors whose names are listed immediately below certify that they have NO affiliations with or involvement in any organization or entity with any financial interest (such as honoraria; educational grants; participation in speakers' bureaus; membership, employment, consultancies, stock ownership, or other equity interest; and expert testimony or patent-licensing arrangements), or non-financial interest (such as personal or professional relationships, affiliations, knowledge or beliefs) in the subject matter or materials discussed in this manuscript**.**

Author names:

1. Israa J.Taha

2. Shorouq M. Abass

The authors whose names are listed immediately below report the following details of affiliation or involvement in an organization or entity with a financial or non-financial interest in the subject matter or materials discussed in this manuscript. Please specify the nature of the conflict on a separate sheet of paper if the space below is inadequate.

Author names:

This statement is signed by all the authors to indicate agreement that the above information is true and correct (a photocopy of this form may be used if there are more than 10 authors):

Author's name (typed)	Author's signature	**Date**
Israa J.Taha		**12-2-2025**
Shorouq M. Abass		**12-2-2025**