

International Journal of Dental Science and Innovative Research (IJDSIR)

IJDSIR : Dental Publication Service

Available Online at:www.ijdsir.com

Volume - 7, Issue - 4, July-2024, Page No. : 179 - 188

Knowledge, Attitude and Perception Regarding Disinfection of Healing Abutment

¹Dr. Snehal Chougala, Postgraduate Student, Department of Prosthodontics, AECS Maruthi College of Dental Sciences, Bangalore

²Dr. Harshitha Alva, Reader, Department of Prosthodontics, Dayanand Sagar College of Dental Sciences, (Current Affiliation), Bangalore

³Dr.Subash M, Prof and HOD, Department of Prosthodontics, AECS Maruthi College of Dental Sciences, Bangalore

⁴Dr. Prathamesh Goankar, Postgraduate student, Department of Prosthodontics, AECS Maruthi College of Dental Sciences, Bangalore

Corresponding Author: Dr. Harshitha Alva, Reader, Department of Prosthodontics, Dayanand Sagar College f Dental Sciences, (Current Affiliation), Bangalore

Citation of this Article: Dr. Snehal Chougala, Dr. Harshitha Alva, Dr.Subash M,Dr. Prathamesh Goankar, "Knowledge, Attitude and Perception Regarding Disinfection of Healing Abutment", IJDSIR- July– 2024, Volume –7, Issue - 4, P. No.179–188.

Copyright: © 2024, Dr. Harshitha Alva, et al. This is an open access journal and article distributed under the terms of the creative common's attribution non-commercial License. Which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given, and the new creations are licensed under the identical terms.

Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

Aim: The aim of the study is to determine the most common reason for reuse and method of disinfection of healing abutments

Material and Methods: An online data collection was carried out through a questionnaire developed in Google Forms. The questionnaire was applied to BDS, BDS with fellowship/certificate course, postgraduate students and MDS. The questionnaire consisted of reasons for reuse of healing abutments and the various methods of sterilization

Results: The reuse of healing abutments is a practice adopted by (66.6%) of respondents, while only (33.33%) do not reuse. Reusing countless times is a routine adopted by 49.27%, while only 13.04% reuse only once.

When asked the main reason for reusing, 58.82% answered that it was cost, while 20.58% answered to difficulty in availability. When asked about sterilization of healing abutments 97.14% uses autoclave and 2.85% uses other sterilization procedure.

Conclusion: The reuse of healing abutments is a practice adopted by (66.6%) of respondents, while only (33.33%) do not reuse.

 The disinfection of the components consists of enzymatic detergent and an ultrasonic bath (36.23%),
 24.63% use only an ultrasonic bath.

Keywords:Disinfection, Healing abutment, Sterilization Introduction

In implant dentistry, the shape and health of the periimplant environment are crucial to determine the success

of the restorative treatment. Healing abutments are used to re-establish the anatomic features and health state conditions of soft tissues. Such abutments can be placed after implant placement over the osseointegration period, allowing proper formation of junctional epithelium and connective tissues. Manufacturers recommend new and single-use implant healing abutments for each patient in order to prevent the transference of pathogenic species and biofilm residues. However, a large number of clinicians reuse healing abutments to decrease treatment costs although that can promote infection due to the presence of remnant biofilm biomass. The whole surgical process and the health status of the patient may be compromised by cross-transmission of microorganisms.¹

The concept of resterilization is "the repeated application of a terminal process designed to destroy all viable forms of microbial life, including bacterial spores, to an acceptable sterility assurance level.²

Residual contaminants can cause inflammation in the tissues surrounding the implant and jeopardize the healing process because an effective mechanical and chemical cleaning cannot be performed on the surface of the healing abutments. Contamination on the surface of the healing abutments is caused by factors such as saliva, epithelial cells, food residues, and blood, and the intensity of this contamination depends on the oral hygiene, eating habits, and daily habits of the patients².

Biofilm consists of a well-organized microbial community embedded in an extracellular polymeric matrix composed of polysaccharides, nucleic acids, proteins, and water, that has a strong adhesion to oral tissues and restorative dental materials. The oral cavity is an optimal environment for microbial colonization and consequent biofilm formation due to a vast number of different micro-regions, for example, on the tongue,

teeth, restorative materials, and gingival margin. Retentive sites at dental restorative margins and prosthetic micro-gaps are the most susceptible areas for the formation of oral biofilms with the accumulation of corrosive substances. Lactic-acid-producing bacteria, like Streptococcus mutans, can grow on teeth and prosthetic surfaces. promoting their corrosion. Furthermore, the co-aggregation among early (e.g., Streptococcus) and late bacterial colonizers is often found in mature biofilms including pathogenic species such as Prevotella intermedia, Fusobacterium nucleatum, and Porphyromonas gingivalis.¹

In order for the healing abutments to properly exercise their purpose, a decontamination process of this component must be carried out, which consists of the complete removal of organic matter and sterilization, completely eliminating all forms of viral, bacterial and fungal activity. Several decontamination methods are used, however, studies point to the presence of residual organic matter and even the presence of viable bacterial activity.³

Sterilization by autoclaving is a physical process by using a combination of adequate heating and pressure to remove or destroy all viable forms of microorganisms including bacterial spores.¹

Therefore, due to the great possibility of failures in the cleaning and sterilization process, risk of bacterial contamination and structural changes of healing abutments, knowledge about the routine of professionals in handling these components is necessary. Likewise, it is extremely important to understand their perception of the limitations and risks inherent in the reuse of these healing abutments. Thus, the objective of the present study was to estimate the prevalence of reuse of healing abutments, the most used methods for

decontamination and sterilization of these devices and to analyze the reasons.³

Materials and Methods

Data collection began in May 2023 and was carried out through an online questionnaire sent by WhatsApp. The professional who did not show any return after 10 days received the questionnaire again, totaling a maximum of two submissions. The questionnaire was made available via Google Forms.

The questionnaire started with

- 1. Gender
- 2. Age
- 3. Qualification,
- 4. Mostly worked for implant placement or implant placement and prosthesis,
- 5. Place of work like private practice, institution and both private practice and institution,
- 6. How often do you use healing abutment,
- 7. Do you Reuse healing abutment?
- 8. How often do you reuse the healing abutments?
- 9. Main reason for reusing the healing abutment?
- 10. Do you tell the patients about reusing of healing abutment?
- 11. What according to you are the limitations associated with reuse of healing abutments?
- 12. How do you disinfect the healing abutment?
- 13. How do you sterilize healing abutments?

Results

Table 1: Gender distribution of the study participants.

[n = 172]

Gender	Frequencies	Percentages
Male	22	30.55
Female	150	69.44
Total	172	100





Table 2: Age Group-wise distribution of the study participants. [n = 172]

Age group	Frequencies	Percentages
<25 years	15	20.83
25-35 years	137	51.38
36-50 years	13	18.05
>50 years	7	9.75
Total	172	100





Table 3: Qualifications of the study participants. [n =

172]

Qualifications	Frequencies	Percentages
BDS graduate	14	19.44
Postgraduate Students	133	45.83
BDS with fellowship/	8	11.11
certificate course		
MDS	17	23.61
Total	72	100

age 1.

Graph 3: Qualifications



Table 4: Place of work of the	study participants.	[n = 70]
-------------------------------	---------------------	----------

Place of work	Frequencies	Percentages
Institution	142	60.00
Private practice	12	17.14
Private practice	16	22.85
and institution		
Total	170	100

Graph 4: Place of Work



Table 5: Type of work. [n = 167]

You work mostly on	Frequencies	Percentages
Implant placement and	140	59.70
prosthesis		
Implant placement	27	40.29
Total	167	100

Graph 5: Type of work



Table 6: Frequency of Use of healing abutment. [n = 171]

How often do you use	Frequencies	Percentages
healing abutment?		
All cases	138	53.52
It depends on the case	27	38.02
Never	06	8.45
Total	171	100

Graph 6: Frequency of use of healing abutment



Table 7: Reuse of Healing Abutments. [n = 169]

Do	you	reuse	Frequencies	Percentages
healin	ig abutn	nents?		
Yes			146	66.66
No			23	33.33
Total			169	100

 $-\frac{1}{2}$

.....

Graph 7: Reuse of Healing Abutments



Table 8: Frequency of F	Reuse of Healing	g Abutments. [n =
169]		

How often do you reuse	Frequencies	Percentages
healing abutments?		
Once	09	13.04
Twice	12	17.39
No Count	134	49.27
Never	14	20.08
Total	169	100

Graph 8: Frequency of Reuse of Healing Abutments.





Reason for reusing	Frequencies	Percentages
healing abutments		
Cost	140	58.82
Difficult to procure	14	20.58
Others	14	20.58
Total	168	100

Graph 9: Reason for reusing healing abutments.



Table 10: Informing the patients about reuse of healing abutments. [n = 69]

Do you tell patients about	Frequencies	Percentages
the reuse of healing		
abutments?		
Yes	25	36.23
No	144	63.76
Total	169	100

Graph 10: Informing the patients about reuse of healing abutments.



Table 11: Limitations associated with the reuse of healing abutments. [n = 170]

What, according to you, are the limitations associated with the reuse of healing abutments?	Frequencies	Percentages	
Increase in roughness and	83	47.14	Č

corrosion of component		
surface		
Cross infection	81	44.28
Residual organic matter	05	7.14
None	01	1.42
Total	170	100

Graph 11: Limitations associated with the reuse of

healing abutments.



Table 12: Disinfection of the healing abutment. [n = 169]

How do you disinfect the	Frequencies	Percentages
healing abutment?		
Enzymatic detergent and	60	36.23
ultrasonic bath		
Blasting with sodium	57	34.78
bicarbonate and		
autoclave		
Ultrasonic bath	49	24.63
Washing with water and	03	4.34
detergent		
Total	169	100

Graph 12: Disinfection of the healing abutment.



Table 13: Sterilization of healing abutments. [n = 170]

How do you sterilise	Frequencies	Percentages
healing abutments?		
Autoclave	168	97.14
Others	02	2.85
Total	70	100

Graph 13: Sterilization of healing abutments.



A total of 172 responses were obtained, consisting of 30.55% men and 69.44% women. Most respondents were between 25 and 65 years old. Regarding the qualification of study participants, most respondents are postgraduate students(45.83%), undergraduate BDS with fellowship/certificate students(19.44%), course (11.11%), MDS(23.61%). Place of work for Institution (60.00%), Private practice (17.14%), while Private practice (22.85%). for and institution Implantology professionals work mostly (59.70%) both in the surgical area and in the area of prosthesis on

 $r_{age}184$

implants. The reuse of healing abutments is a practice adopted by (66.6%) of respondents, while only (33.33%) do not reuse. Reusing countless times is a routine adopted by 49.27%, while only 13.04% reuse only once. When asked about communicating to the patient about the reuse of components, 63.76% of implantologists do not communicate, and only 36.23% reported informing. When asked the main reason for reusing, 58.82% answered that it was cost, while 20.58% answered to difficulty in availability.

Most of the procedures used in the disinfection of the components consists of enzymatic detergent and an ultrasonic bath (36.23%), 24.63% use only an ultrasonic bath. When asked about the limitations associated with the reuse of healing abutments, 1.42% of the respondents did not see limitations, while 47.14% associated it with increased roughness and corrosion of the surface of the component, 7.14% with the presence of remaining organic matter and 44.28% with cross infection. When asked about sterilization of healing abutments 97.14% uses autoclave and 2.85% uses other sterilization procedure.

Discussion

Reusing titanium healing abutments has environmental and economic merits. However, patient protection in terms of preventing cross-infection and facilitating healing must be prioritized. The findings of this study concur with those of a recent study: Used healing abutments after sterilization by autoclaving are not sufficiently decontaminated for reuse. The current study also found that more than half of the surface area may remain contaminated. The additional decontamination methods significantly reduced residual contamination, with NaOCl being significantly more effective than chlorohexidine on all surfaces. While considering sterilization and decontamination of used healing abutments, the potential effects these procedures might have on the titanium surface characteristics must also be considered. The titanium oxide layer on healing abutments offers biocompatibility while surface roughness contributes to its wettability, which regulate adhesion of epithelial cells and fibroblasts required for healing of the peri-implant mucosa³.

The surface energy and wettability of titanium-based materials promote a physical bonding with glycoproteins which are also receptors for bacteria adhesion. It means that the titanium surfaces have a significant chemical reactivity to the surrounding medium what can promote a benefit for tissue formation or a disadvantage concerning bacteria adhesion. An organic conditioning layer formed on retrieved healing abutments can disturb the fibroblast adhesion while support the bacterial adhesion. In this way, decontaminated abutment surfaces have higher surface energy when compared to abutment surfaces coated with oral fluids, organic debris, or biofilms. Organic products deposited on titanium surfaces such as proteins and polysaccharides are quite hard to be detached by using clinical procedures. Thus, the relationship between the peri-implant environment and the soft tissues healing is dependent on the degree of contamination of the titanium-soft tissue interface. It should be highlighted that cleaning and disinfection guidelines should be reviewed concerning the multiple factors related to the enduring of oral biofilms and their components¹.

One concern specific to finding proteins and peptide remnants on the surface of the used, clean and sterile healing abutments is the potential transmission of some biological elements that are not destroyed during normal sterilization processes. The prion protein core which is highly resistant to proteolytic enzymes, is a small molecule that is filterable, can survive dry heat at 200°C

for 1 to 2 hours, and when fixed by desiccation or chemicals may retain infectivity for years. The clinical significance of the transmission of pathogenic prions that remain viable following commonly practiced dental sterilization also needs to be carefully weighed against the minor economic benefits of the re-use of healing abutments between patients⁷.

Conclusion

Within the limitations, the study concluded that :

- The reuse of healing abutments is a practice adopted by (66.6%) of respondents, while only (33.33%) do not reuse.
- The disinfection of the components consists of enzymatic detergent and an ultrasonic bath (36.23%), 24.63% use only an ultrasonic bath.

References

- Barreiros P, Braga J, Faria-Almeida R, Coelho C, Teughels W, Souza JCM. Remnant oral biofilm and microorganisms after autoclaving sterilization of retrieved healing abutments. J Periodontal Res. 2021 Apr;56(2):415-422. doi: 10.1111/jre.12834. Epub 2020 Dec 24. PMID: 33368278.
- Sahin SC, Dere KA. Evaluation of residual contamination on reused healing abutments. Clin Oral Investig. 2021 Oct;25(10):5889-5895. doi: 10.1007/s00784-021-03894-9. Epub 2021 Mar 25. PMID: 33763713.
- Chew M, Tompkins G, Tawse-Smith A, Waddell JN, Ma S. Reusing Titanium Healing Abutments: Comparison of Two Decontamination Methods. Int J Prosthodont. 2018 November/December;31(6):613– 618. doi: 10.11607/ijp.5881. Epub 2018 Jul 30. PMID: 30339159.
- Kyaw TT, Nakata H, Takayuki M, Kuroda S, Kasugai S. Evaluation of residual contamination on healing abutments after cleaning with a protein-

- denaturing agent and detergent. Quintessence Int. 2020;51(6):474-485. doi: 10.3290/j.qi.a44546. PMID: 32424376.
- Kyaw, T.T., Hanawa, T. & Kasugai, S. Investigation of different electrochemical cleaning methods on contaminated healing abutments in vitro: an approach for metal surface decontamination. Int J Implant Dent 6, 64 (2020).
- Cakan U, Delilbasi C, Er S, Kivanc M. Is it safe to reuse dental implant healing abutments sterilized and serviced by dealers of dental implant manufacturers? An in vitro sterility analysis. Implant Dent. 2015 Apr;24(2):174-9. doi: 10.1097/ ID.000000000000198. PMID: 25706262.
- Wadhwani C, Schonnenbaum TR, Audia F, Chung KH. In-Vitro Study of the Contamination Remaining on Used Healing Abutments after Cleaning and Sterilizing in Dental Practice. Clin Implant Dent RelatRes. 2016 Dec;18(6):1069-1074. doi: 10.1111/cid.12385. Epub 2015 Dec 7. PMID: 26640198.
- Bidra AS, Kejriwal S, Bhuse K. Should Healing Abutments and Cover Screws for Dental Implants be Reused? A Systematic Review. J Prosthodont. 2020 Jan;29(1):42-48. doi: 10.1111/jopr.13106. Epub 2019 Sep 16. PMID: 31453645.
- Drago L, Bortolin M, Taschieri S, De Vecchi E, Agrappi S, Del Fabbro M, Francetti L, Mattina R. Erythritol/chlorhexidine combination reduces microbial biofilm and prevents its formation on titanium surfaces in vitro. J Oral Pathol Med. 2017 Sep;46(8):625-631. doi: 10.1111/jop.12536. Epub 2017 Jan 22. PMID: 27935124.
- Almehmadi AH. An In Vitro Analysis of Sodium Hypochlorite Decontamination for the Reuse of Implant Healing Abutments. J Oral Implantol. 2021

Page

- Aug 1;47(4):271-279. doi: 10.1563/aaid-joi-D-19-00273. PMID: 32780861.
- Stacchi C, Berton F, Porrelli D, Lombardi T. Reuse of Implant Healing Abutments: Comparative Evaluation of the Efficacy of Two Cleaning Procedures. Int J Prosthodont. 2018 Mar/Apr;31(2):161-162. doi: 10.11607/ijp.5552. PMID: 29518810.
- Sánchez-Garcés MA, Jorba M, Ciurana J, Vinas M, Vinuesa MT. Is the re-use of sterilized implant abutments safe enough? (Implant abutment safety). Med Oral Patol Oral Cir Bucal. 2019 Sep 1;24(5):e583-e587. doi: 10.4317/medoral.22967. PMID: 31433387; PMCID: PMC6764709.
- Jain SS, Siddiqui DA, Wheelis SE, Palmer KL, Wilson TG Jr, Rodrigues DC. Mammalian cell response and bacterial adhesion on titanium healing abutments: effect of multiple implantation and sterilization cycles. Clin Oral Investig. 2021 May;25(5):2633-2644. doi: 10.1007/s00784-020-03574-0. Epub 2020 Sep 18. PMID: 32944837; PMCID: PMC7969472.
- 14. Wheelis SE, Wilson TG Jr, Valderrama P, Rodrigues DC. Surface characterization of titanium implant healing abutments before and after placement. Clin Implant Dent RelatRes. 2018 Apr;20(2):180-190. doi: 10.1111/cid.12566. Epub 2017 Dec 6. PMID: 29214721.
- Browne V, Flewelling M, Wierenga M, Wilson A, Aprecio R, Richardson P, Angelov N, Johnson N. Sterilization analysis of contaminated healing abutments and impression copings. J Calif Dent Assoc. 2012 May;40(5):419-21. PMID: 22685949.
- 16. Lashkarizadeh N, Foroudisefat M, Abyari S, Mohammadi M, Lashkarizadeh L. Is It Safe to Reuse Healing Abutments? An Experimental Study on IL-

©2024 IJDSIR, All Rights Reserved

1β and TNF-α Cytokine Levels in Peri-Implant
Crevicular Fluid. J Prosthodont. 2022 Jun;31(5):399404. doi: 10.1111/jopr.13474. Epub 2022 Feb 19.
PMID: 34962679.

- 17. Wawrzyk A, Rahnama M, Rybitwa D, Wilczyński S, Machoy M, Łobacz M. Effective microbiological decontamination of dental healing abutments colonised with Rothiaaeria by a diode laser as a helpful step towards successful implantoprosthetic therapy. Lasers Med Sci. 2021 Jun;36(4):875-887. doi: 10.1007/s10103-020-03151-7. Epub 2020 Sep 26. PMID: 32979136.
- Paganotto G, Zimmer R, Klein-Junior CA, Rivaldo EG. Reuse of healing abutments: Ethical, biological and professional training implications. J Clin Exp Dent. 2022 Oct 1;14(10):e822-e826. doi: 10.4317/jced.59831. PMID: 36320674; PMCID: PMC9617269.
- Canullo L, Micarelli C, Lembo-Fazio L, Iannello G, Clementini M. Microscopical and microbiologic characterization of customized titanium abutments after different cleaning procedures. Clin Oral Implants Res. 2014 Mar;25(3):328-336. doi: 10.1111/clr.12089. Epub 2012 Dec 5. PMID: 23210704.
- Canullo L, Penarrocha-Oltra D, Marchionni S, Bagán L, Peñarrocha-Diago MA, Micarelli C. Soft tissue cell adhesion to titanium abutments after different cleaning procedures: preliminary results of a randomized clinical trial. Med Oral Patol Oral Cir Bucal. 2014 Mar 1;19(2):e177-83. doi: 10.4317/medoral.19329. PMID: 24121917; PMCID: PMC4015045.
- Narvekar A, ValverdeEstepa A, Naqvi A, Nares S.
 Used dental implant healing abutments elicit immune responses: A comparative analysis of

- detoxification strategies. Clin Implant Dent Relat Res. 2020 Dec; 22(6):730-738. doi: 10.1111/cid.12956. Epub 2020 Oct 15. PMID: 33063441.
- Brookes ZLS, Bescos R, Belfield LA, Ali K, Roberts A. Current uses of chlorhexidine for management of oral disease: a narrative review. J Dent. 2020 Dec; 103:103497. doi: 10.1016/j.jdent.2020.103497. Epub 2020 Oct 17. PMID: 33075450; PMCID: PMC7567658.