ORIGINAL ARTICLE

Denture hygiene awareness, practices, and instructional guidance among patients presenting to public and private dental hospitals of Punjab, Pakistan: a cross-sectional survey

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Biomedica - Official Journal of University of Health Sciences, Lahore, Pakistan
Volume 40(1):37-42
https://doi.org/10.24911/BioMedica/5-1018

ABSTRACT

Background and Objective: Dentures require regular cleaning and without proper guidance on how to clean and care for their dentures, patients may experience discomfort, bad breath, and an increased risk of oral diseases. This study aimed to explore the level of awareness, hygiene practices, and guidance received regarding denture care among denture-wearing patients presenting to public and private dental hospitals in Punjab.

Methods: This survey was conducted using systematic sampling from November 2021 to August 2022 using an interviewer-administered questionnaire developed by the authors, validated through expert review, and administered through interviews. The questions were asked in English language and in Urdu to those who did not understand English language. The survey instrument had 18 items targeting demographics, denture hygiene awareness, and practices amongst patients presenting to the private and public dental hospitals of Punjab. Data were analyzed using statistical software and a *p*-value <0.05 was taken as significant.

Results: There was a statistically significant difference between private and public dental hospitals regarding instructions given to them for denture hygiene awareness ($p = 0.03$). Most respondents received verbal instructions (83.3%), followed by practical demonstration (20%) and written instructions (9.3%). The majority agreed that unclean dentures have an association with oral (56%) and systemic (70.7%) health issues and may act as a source of infection (57.3%). A total of 56% of the respondents cleaned their dentures once daily while 16.7% reported halitosis. A significant proportion of the patients had the habit of wearing dentures overnight.

Conclusion: Awareness regarding optimal denture hygiene and the implications of wearing unclean dentures was observed in almost half of the patients. The majority of them received verbal instructions while written instructions from the dentists were received by only a few. Poor practices related to wearing dentures at night and their cleaning by using standard guidelines were, however, reported by most of the patients.

Keywords: Denture, hygiene, habits, awareness, instructions, hospitals.

Received: 08 September 2023 **Revised date:** 10 December 2023 **Accepted:** 22 February 2024
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Introduction

Oral health relies on the maintenance of good dental hygiene, which lowers the chances of gum diseases as well as tooth decay. An acrylic denture is the most commonly used prosthesis when it comes to the replacement of lost dentition. Surface roughness and micropores on the surface of the denture can harbor microorganisms (bio-film) if not cleaned properly and regularly.[1,2]

Methods reported in the literature to clean acrylic denture prosthesis include mechanical, chemical, or a combination of both. However, the most commonly practiced method reported worldwide was mechanical, which includes specially designed brushes. Chemical methods involve vinegar, soaps, antifungal solutions, mouthwashes, and commercial products containing oxidizing, effervescent and chelating agents. A

combination of chemical and mechanical disinfection yields effective results and improves denture hygiene.[3,4]

According to the literature, the combined application of different hygiene interventions, such as brushing or ultrasound vibration along with chemical agents, leads to more effective outcomes in reducing denture biofilm and microorganisms.[2] Another review focused on the relationship between denture hygiene and denture stomatitis, an inflammatory condition of the tissues under a denture which concluded that lack of proper hygiene practices contributes significantly to the development of denture stomatitis.[5] A study conducted among dental practitioners in Jabalpur city, India, suggested that there is a gap in the knowledge regarding denture cleansing materials and the importance of denture hygiene, highlighting the need for better education and training for dental professionals.[6] A similar study that evaluated denture cleanliness among patients in a regional dental hospital reported that after providing patients with tailored educational interventions, including denture hygiene instructions and care packs, significant improvements in denture hygiene were observed at a 1-month follow-up.[7]

Microbes linked to unclean dentures might potentially cause systemic diseases such as endocarditis and other infections.[7] Moreover, according to previous studies, wearing dentures continuously, with poor cleanliness, can lead to denture stomatitis, which reportedly affects 15% to 70% of denture wearers.[8,9] Unhygienic dentures can cause halitosis, discoloration of the prosthesis, tissue irritation, calculus, candida, or other infections of the oral cavity.[3,10]

Major causes behind poor denture hygiene reported are older age, neurological issues, lack of advice from dentists, disability, and chronic illnesses. Hence, maintaining proper denture hygiene throughout life is essential for both the function and esthetics of the prosthesis as well as the periodontal health of the wearer.[11,12]

This study aimed to identify denture hygiene awareness, practices, and the guidance received regarding denture care among patients presenting at the public and private dental hospitals of Punjab.

Methods

This survey was conducted at the Department of Prosthodontics of two private medical colleges including the University College of Medicine and Dentistry, Lahore, and the Institute of Dentistry, Combined Military Hospital Medical and Dental College Lahore, and two public dental institutes in Punjab comprising of Dental Section, Faisalabad Medical University, Faisalabad and De 'Montmorency College of Dentistry, Lahore. The study was conducted after approval of the Institutional Review Board of the University College of Dentistry, Lahore, Pakistan. A sample size of *N* = 268 was estimated using the following parameters: 90% power of research, 95% confidence, a desired significance level of 5%, and a previous prevalence of 77.5%[13]. The sample size was raised to *N* = 315 for better representation and generalizability. A systematic sampling technique was used to enroll every third patient who reported to the Department of Prosthodontics from November 2021 to August 2022 and who met the inclusion criteria.

Patients with removable complete denture prosthesis, partial denture prosthesis, and those who completed the consent form were included in this study whereas patients with mental illness or disability and those who refused to give consent were excluded from the current study.

The interviewer-administered survey instrument with 14 close-ended items was designed by the authors and was later validated (face and construct validity) by a panel of two research experts. The questionnaire was translated into Urdu and back-translated into English by a linguist and underwent several revisions before it was finalized. The consent and confidentiality statements were mentioned in the survey. The first section of the questionnaire included demographics, duration of wearing dentures, habits, and instructions as well as mode of instructions received regarding denture hygiene. The second part of the questionnaire consisted of items about denture hygiene awareness and practices.

Statistical analysis

The responses collected were entered and statistically analyzed using Statistical Package for the Social Sciences version 24.0. Descriptive statistics were employed to compute the frequencies and percentages. The chi-square test was employed to compare the categorical variables, i.e., the private and public dental institutes. A *p*-value of ≤0.05 was taken as significant.

Results

In the present study, a total of *N* = 315 patients were approached, and out of them, 300 responded therefore, the response rate was 95% (*N* = 300). The demographics, including gender, location, denture type, and duration of wear, have been expressed in Table 1.

The comparison of whether denture hygiene instructions were given to the patients as well as the modes of instructions used between private and public dental hospitals while delivering dentures, have been expressed in Table 2. There was a statistically significant difference ($p = 0.03$) between private and public dental hospitals regarding denture hygiene instructions given to the patients. Patients from public hospitals received denture hygiene instructions more frequently (90.9%) than private ones. The majority of the

respondents received instructions verbally (83.3%), followed by practical demonstration (20%) and written instructions (9.3%) (Table 2).

The current study shows that nearly one-half (56%) of the patients agreed that denture hygiene is associated with systemic health; however, around one-third (28.7%) were unaware. Around two-thirds (70.7%) of the respondents believe that denture hygiene is associated with their oral health. More than half of the respondents (57.3%) agreed that unhygienic dentures could be a source of infection; however, around one-third (32%) of the respondents were oblivious that unhygienic dentures could serve as a source of infection (Table 3).

When asked about different denture cleaning methods or practices employed, the top three responses were "using water only," (47.3%) followed by "brushing with soap and water" (27.3%), and "brushing with dentifrices" (20.7%). Moreover, 8.7% of the respondents were not cleaning their dentures (Figure 1).

The frequency of cleaning dentures, wearing dentures overnight, halitosis, and their association with the duration of wear have been illustrated in Table 4. There was no statistically significant difference between the duration of use and frequency of cleaning dentures, wearing dentures overnight, and halitosis. Around one-half (56%) of the respondents cleaned their dentures once a day. One-third (33.3%) of the respondents were "sometimes" wearing their

Table 1. *Demographical data of the study population (N = 300).*

Demographics		Frequency (*n*)	Percentage (%)
Gender	Male	168	56.0
	Female	132	44.0
Location	Private Hospital	146	48.7
	Public Hospital	154	51.3
Denture type	Complete denture	196	65.3
	Partial denture	104	34.7
Duration	Less than 3 years	106	35.3
	3-5 years	104	34.7
	More than 5 years	90	30.0

Table 2. *Denture hygiene instructions, mode of instructions, and their comparison between private and public dental hospitals (n = 300).*

	Total *n* (%)	Private *n* (%)	Public *n* (%)	X^2	*p*-value*
Denture hygiene instructions received					
Yes	260 (86.6)	120 (82.1)	140 (90.9)	6.89	0.03
No	40 (13.4)	26 (17.8)	14 (9)		
Mode of instructions					
Written	28 (9.3)	12 (8.2)	16 (10.3)	0.20	0.43
Verbal	250 (83.3)	130 (89)	120 (77.9)	3.33	0.04
Practical demonstrations	60 (20)	36 (24.6)	24 (15.5)	1.92	0.11

n = Frequency.
**p* values were calculated by using the chi-square test.

Table 3. *Awareness of patients regarding denture hygiene and its association with oral and systemic health (N = 300).*

Sr.#	Statements	Frequency (*n*)	Percentage (%)
1.	Denture hygiene is associated with your systemic/general health		
	Yes	168	56.0
	No	46	15.3
	Unaware	86	28.7
2.	Denture hygiene is associated with your oral health		
	Yes	212	70.7
	No	20	6.7
	Unaware	68	22.7
3.	Unhygienic dentures can be a source of infection		
	Yes	172	57.3
	No	32	10.7
	Unaware	96	32.0

dentures overnight. Furthermore, 16.7% of the participants reported halitosis while wearing dentures, while one-fourth (25.3%) of the respondents occasionally experienced halitosis while wearing their dentures (Table 4).

Discussion

Denture cleaning and maintenance are critical for oral and systemic health. Adequate cleaning habits reduce bio-film formation, similar to natural dentition if regular brushing and oral hygiene are maintained.[14]

Recent studies have shown that patients are not adequately instructed regarding cleaning or maintaining dentures and follow-up dental appointments. Previous studies have revealed that around 10%-55% of the time patients are not instructed about denture hygiene and maintenance. The major mode of instruction reported in previous literature was verbal.[2,3,14] However, the majority of the patients (86.6%) in the current study did receive instructions regarding denture cleaning, with verbal instructions being the most common mode.

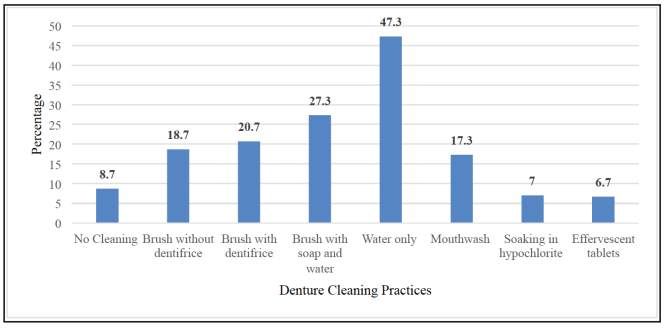

Figure 1. *Denture cleaning practices among patients (N = 300).*

Removal of bio-film is typically done mechanically or chemically, or a combination of the two. Dentifrices and toothpowder may cause surface roughness and damage acrylic dentures.[15] Despite the fact that mechanical cleaning is the most popular and efficient way, chemical cleansers such as soap, tablets, and mouthwashes are also employed as a supplement. Brushing with soap and water has been reported as an effective and convenient way to clean acrylic dentures. However, specific denture cleansers have reported the highest efficacy in the literature.[16] Previous studies have reported that 6 to 7 out of every 10 patients use water as a primary source for cleaning and washing their dentures, whereas only 2 to 10 out of every 10 patients use mouthwash or denture cleansing tablets. The other most commonly reported methods in literature were "water," "brushing with water," "brushing with soap," and "denture cleanser solution."[2,3,17,18] Similar results were obtained in the present study which showed that the majority of the patients used only water to clean their dentures followed by cleansing with soap and water.

Previous data has shown that patients, especially from developing countries, had limited knowledge about denture hygiene and its consequences. Poor denture hygiene can lead to many problems such as denture stomatitis, gingivitis, halitosis, blisters, and ulcers. Moreover, unclean dentures may act as a reservoir for microorganisms, causing complications in patients with systemic diseases or weaker immunity.[17,18] Most of the

Table 4. *Frequency of denture cleansing, wearing dentures overnight, bad breath, and its association with the duration of wear in the study population (N = 300).*

Sr. #	Variables	Frequency *n* (%)	< 3 years *n* (%)	3-5 years *n* (%)	>5 years *n* (%)	X^2	*p*-value*
1.	Frequency of cleaning dentures						
	Once a day	168 (56.0)	60 (63.6)	58 (60.3)	50 (55.5)	6.73	0.346
	Twice a day	116 (38.7)	38 (40.2)	46 (47.8)	32 (35.5)		
	Thrice a day	2 (0.7)	2 (2.1)	0 (0)	0 (0)		
	More than that	14 (4.7)	6 (6.3)	0(0)	8(8.8)		
2.	Wearing dentures overnight						
	Always	76 (25.3)	20 (21.2)	28 (29.1)	28 (31.1)	5.40	0.493
	Sometimes	100 (33.3)	32 (33.9)	34 (35.3)	34 (37.7)		
	Rarely	26 (8.7)	10 (10.6)	12 (12.4)	4 (4.4)		
	Never	98 (32.7)	44 (46.6)	30 (31.2)	24 (26.6)		
3.	Bad breath while wearing dentures						
	Yes	50 (16.7)	24 (25.4)	16 (16.6)	10 (11.1)	3.48	0.480
	No	174 (58.0)	52 (55.1)	64 (66.5)	58 (64.4)		
	Sometimes	76 (25.3)	48 (50.8)	17 (17.6)	11 (12.2)		

**p*-values were calculated using the chi-square test.

respondents in the present study were well aware of the consequences of poor denture hygiene. However, a significant proportion (51%) was still unaware of the oral and systemic concerns of unclean dentures. Only a small proportion (16.7%) of the respondents reported halitosis while wearing dentures.

American College of Prosthodontists recommends daily cleaning of dentures, like real teeth, to eliminate bio-film and to keep them safe from staining.[19] Denture stomatitis, gum inflammation, an increased risk of pneumonia, and faster bone resorption are all detrimental effects of sleeping while wearing dentures. Furthermore, accidentally swallowing a denture while sleeping may cause choking and more severe complications.[3,2,20-22] In the present study, around 25.3% of the respondents revealed the habit of wearing dentures while sleeping. Patients should be trained not just on denture hygiene but also on how to wear and maintain their dentures. Moreover, dentists, especially prosthodontists, should be advocated to educate patients about denture hygiene, its maintenance, recall visits, and precautions.

Conclusion

Around one-half of the patients were aware of optimal denture hygiene and the consequences of wearing unclean dentures, despite the higher instruction dissemination rate. A significant disparity was observed between private and public dental hospitals, where patients from public hospitals reported receiving denture hygiene instructions more frequently. Most participants relied on simple methods of denture cleansing, such as water only or brushing with soap and water. These findings underscore the need for a comprehensive approach to patient education on denture hygiene. While verbal instructions are prevalent, the effectiveness of education could be enhanced by incorporating practical demonstrations and written materials, tailored to cater to diverse patient learning preferences.

Limitations of the study

The primary limitation of the current study is its cross-sectional nature, which allows for the observation of associations between variables at a single point in time but does not permit us to infer causality. Moreover, the present study relies on self-reported data, including participants' recollections of denture hygiene practices and instructions received. Despite measures to minimize recall bias, such as structuring questionnaires to aid memory, the possibility of inaccuracies in recall cannot be entirely eliminated.

Conflict of interest

None to declare.

Grant support and financial disclosure

None to disclose.

Ethical approval

Ethical approval was granted by the Institutional Ethics Committee of University, College of Dentistry, Lahore, vide Letter No. UCD/ERCA/21/11 dated 21-10-2021.

Authors' contributions

AR: Conception and drafting of manuscript, Critical revision of the article for important intellectual content
KN, HH, MAR, AW: Acquisition, analysis and interpretation of data
AE: Critical revision of the article for important intellectual content.
ALL AUTHORS: Approval of the final version of the manuscript to be published.

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References

1. Aoun G, Gerges E. Assessment of hygiene habits in acrylic denture wearers: a cross-sectional study. Mater Sociomed. 2017;29(3):216–8. http://doi.org/10.5455/msm.2017.29.216-218
2. Saxena S, Gowd S, Shankar T, Suresan V, Mantri S, Mishra P, et al. Denture hygiene knowledge and practices among complete denture wearers attending a Postgraduate Dental Institute. J Contemp Dent Pract. 2017;18(8):714–21. http://doi.org/10.5005/jp-journals-10024-2113
3. Namrata M, Ganapathy D. Awareness about denture hygiene: a survey among patients wearing complete dentures and removable partial dentures. Int J Orofacial Biol. 2017;1(2):59–65. http://doi.org/10.4103/ijofb.ijofb_17_17
4. Mushtaq M, Altaf J, Sheikh A, Khan U, Shah A. Assessment of knowledge and practices about denture hygiene among complete denture wearers in Lahore city. J Pak Dent Assoc. 2019;28(04):187–91. http://doi.org/10.25301/jpda.284.187
5. Galvan R, McBride M, Korioth TV, Garcia-Godoy F. Denture hygiene as it relates to denture stomatitis: a review. Compend Contin Educ Dent. 2021;42(4):1–4.
6. Suresan V, Mantri S, Deogade S, Sumathi K, Panday P, Galav A, et al. Denture hygiene knowledge, attitudes, and practices toward patient education in denture care among dental practitioners of Jabalpur city, Madhya Pradesh, India. J Indian Prosthodont Soc. 2016;16(1):30–5. http://doi.org/10.4103/0972-4052.175714

7. Dwivedi H, Paul N, Banerjee KL, Singh S, Jain R, Kumar S. Denture hygiene awareness, attitude and practice among complete denture wearers during COVID-19 lockdown pandemic: a questionnaire-based survey. J Pharm Bioallied Sci. 2021;13(2):S1119–23. http://doi.org/10.4103/jpbs.jpbs_272_21
8. Kaypetch R, Anuwongnukroh N, Dechkunakorn S, Wichai W, Tua-Ngam P, Tantivitayakul P, et al. Novel vinegar solution for denture-cleansing agent. J Oral Sci. 2023;65(2):117–20. http://doi.org/10.2334/josnusd.22-0385
9. Cankaya T, Yurdakos Z, Kalabay G. The association between denture care and oral hygiene habits, oral hygiene knowledge, and periodontal status of geriatric patients wearing removable partial dentures. Eur Oral Res. 2020;54(1):9–15. https://doi.org/10.26650/eor.20200048
10. Dakka A, Nazir Z, Shamim H, Jean M, Umair M, Muddaloor P, et al. Ill effects and complications associated to removable dentures with improper use and poor oral hygiene: a systematic review. Cureus. 2022;14(8):28144–57. http://doi.org/10.7759/cureus.28144
11. Turgut H, Turgut S. Effect of edentulism and oral quality of life on sexual functions in men: a cohort prospective study. Sex Med. 2021;9(2):100305–8. http://doi.org/10.1016/j.esxm.2020.100305
12. Lamfon H. Denture biofilm and denture-associated stomatitis, a literature review. Egypt Dent J. 2021;67(1):775–87. http://doi.org/10.21608/edj.2021.53923.1413
13. Cinquanta L, Varoni EM, Barbieri C, Sardella A. Patient attitude and habits regarding removable denture home hygiene and correlation with prosthesis cleanliness: a cross-sectional study of elderly Italians. J Prosthet Dent. 2021;125(5):772–7. http://doi.org/10.1016/j.prosdent.2021.01.024
14. Parvez K, Parvez K, Sultan R, Muhammad Aliuddin A. Oral complaints of complete denture wearing elderly patients and their relation with age & gender. J Pak Dent Assoc. 2020;29(03):140–3. http://doi.org/10.25301/jpda.293.140
15. Chang YH, Lee CY, Hsu MS, Du JK, Chen KK, Wu JH. Effect of toothbrush/dentifrice abrasion on weight variation, surface roughness, surface morphology and hardness of conventional and CAD/CAM denture base materials. Dent Mater J. 2021;40(1):220–7. http://doi.org/10.4012/dmj.2019-226
16. Valentini-Mioso F, Maske TT, Cenci MS, Boscato N, Pereira-Cenci T. Chemical hygiene protocols for complete dentures: a crossover randomized clinical trial. J Prosthet Dent. 2019;121(1):83–9. http://doi.org/10.1016/j.prosdent.2017.12.022
17. Kusama T, Aida J, Yamamoto T, Kondo K, Osaka K. Infrequent denture cleaning increased the risk of pneumonia among community-dwelling older adults: a population-based cross-sectional study. Sci Rep. 2019;9(1):13734–40. http://doi.org/10.1038/s41598-019-50129-9
18. Derafshi R, Bazargani A, Ghapanchi J, Izadi Y, Khorshidi H. Isolation and identification of nonoral pathogenic bacteria in the oral cavity of patients with removable dentures. J Int Soc Prev Community Dent. 2017;7(4):197–201. http://doi.org/10.4103/jispcd.JISPCD_90_17
19. Denture Care and Maintenance [Internet]. Ada.org. [Last cited on 2023 Jun 14]. Available from: https://www.ada.org/resources/research/science-and-research-institute/oral-health-topics/dentures
20. Vila-Nova TEL, de Luna Gomes JM, do Egito Vasconcelos BC, Pellizzer EP, Moraes SLD. The influence of nocturnal use of complete dentures on cardiorespiratory parameters of patients with obstructive sleep apnea: a systematic review and meta-analysis. Clin Oral Investig. 2022;26(7):4675–86. http://doi.org/10.1007/s00784-022-04517-7
21. Mousa MA, Lynch E, Kielbassa AM. Erratum: denture-related stomatitis in new complete denture wearers and its association with *Candida* species colonization: a prospective case-series. Quintessence Int. 2020;51(8):554–65. http://doi.org/10.3290/j.qi.a45038
22. Hassan H, Rafique A. Post-insertion complaints associated with complete denture prosthesis in a tertiary care hospital. Rawal Med J. 2023;48(1):200–15.