Tanzania Journal of Health Research
Volume 25, Issue 4, October 2024
https://dx.doi.org/10.4314/thrb.v25i4.21

Oral Prosthesis Cleaning Practice and Oral Health Status of Removable Oral Prosthesis Wearers who attended Kilimanjaro Christian Medical Centre, Moshi, Tanzania

*[2]Esther Shimba, [3]Florida Muro, [4]Deogratias Rwakatema, [1]Ruchius Philbert**

[1]Muhimbili National Hospital, Department of Paediatrics and Child Health, Dar es salaam, Tanzania
[2]Muhimbili National Hospital, Clinical Research, Training and Consultancy Unit, Dar es salaam, Tanzania
[3]Kilimanjaro Christian Medical University College, Department Public Health, Kilimanjaro, Tanzania
[4]Kilimanjaro Christian Medical Center, Dental department, Kilimanjaro, Tanzania,

Abstract

Background: Maintaining good oral health and extending the lifespan of prostheses require effective and routine cleaning procedures for complete and partially removable appliances. Removable oral prostheses should be cleaned daily to remove bacterial plaque and prevent infections, such as Candida albicans and denture stomatitis. Patients with affected prostheses must practice good oral hygiene for the rest of their lives. This study aims to assess the Oral prosthesis cleaning practice and oral health status of Removable Oral Prosthesis Wearers who attended Kilimanjaro Christian Medical Centre, Moshi, Tanzania.

Materials and methods: The sample size was calculated using the formula for cross-sectional studies developed by Kish and Leslie (1965), and convenience sampling was employed. This hospital-based descriptive cross-sectional study involved 200 patients who attended the Kilimanjaro Christian Medical Centre dental clinic in Moshi, Tanzania. A closed-ended tool and a self-administered questionnaire were used to assess the oral prosthesis cleaning practices and oral health status of removable oral prosthesis wearers. Descriptive and logistic regression analyses were then conducted using STATA software version 15.0. A p-value of less than 5% was considered statistically significant.

Results: The average age of the participants was 57 years, with 56% female. This study revealed that the majority, 44%, had good denture hygiene. It also found that 49.5% of patients over 60 had poor hygiene habits. Additionally, 64.0% of the participants did not sleep with their dentures, and 27.0% cleaned them more than twice daily. Only 9.5% of the participants received annual examinations for their dentures, and 25.95% had inflammation on the denture's fit surface. The independent predictors of good oral hygiene were age, frequency of denture check-ups, frequency of denture cleaning, and palatal erythema.

Conclusions: The study found that the hygiene practices for removable dentures were unfavourable. Most patients sleep with dentures in place; the preferred cleaning method is water and toothpaste. Therefore, dentists should instruct patients on proper denture care to prevent oral cavity infections.

Keywords: Prosthesis hygiene, denture cleaning frequency, oral mucosa lesion

* **Corresponding author:** Ruchius Philbert, Department of Pediatrics and child health, Muhimbili National Hospital, Dar es salaam, Tanzania; E-mail: ruchiusphilbert@yahoo.com

https://dx.doi.org/10.4314/thrb.v25i4.21

Introduction

Removable oral prostheses, such as full and partial dentures, are vital for individuals who have lost a few or all their natural teeth. These prostheses help restore essential functions such as mastication, speech, and aesthetics, significantly improving the quality of life for wearers. However, maintaining oral hygiene while using these devices is important, as improper care can lead to various oral health issues, including mucosal infections, plaque accumulation, and even systemic diseases (Coulthwaite & Verran, 2007).

Proper cleaning practices for removable oral prostheses are essential to prevent the growth of harmful microorganisms that can cause conditions like denture stomatitis, halitosis, and periodontal diseases (Szalewski, 2017). Appropriate cleaning methods and solutions can help remove food debris, plaque, and stains, reducing oral infection risk. Despite the importance of these practices, many wearers of removable oral prostheses often lack sufficient knowledge about proper hygiene techniques, leading to suboptimal oral health outcomes.

Studies have shown considerable variation in the oral hygiene practices and health status of removable prosthesis wearers worldwide. Factors such as age, socioeconomic status, educational background, and access to dental care play significant roles in influencing these practices (Mushtaq et al., 2019; Shankar et al., 2017). Specifically, in developing countries, limited access to dental healthcare services and education on proper prosthesis care often exacerbate oral health issues among wearers.

In Tanzania, where oral health awareness and access to dental care can be limited, there is a pressing need to understand the current practices and oral health status of individuals wearing removable oral prostheses. Kilimanjaro Christian Medical Centre (KCMC) in Moshi is a healthcare institution that provides dental services to a diverse population. While there is a growing awareness of the importance of oral health, there is still a knowledge gap concerning the specific practices adopted by prosthesis wearers and their impact on oral health, such as access to dental care and follow-up, limited awareness of appropriate cleaning products, variability in cleaning practices, and inadequate patient education.

This study aims to discover the cleaning practices and health status of removable oral prosthesis wearers attending KCMC. By assessing the current practices and identifying any associated oral health issues, this research seeks to contribute valuable insights that could guide patient education and improve oral health outcomes for this population. Understanding these dynamics is crucial for developing targeted interventions and recommendations that can enhance the quality of life for oral prosthesis wearers in the community.

Methodology

This was a hospital-based cross-sectional study involving removable oral prosthesis wearers aged 18 years and above who attended the Dental clinic at KCMC Hospital between February and June 2022 (88 Males and 112 Females). The subjects had worn a single or full denture for at least seven days prior to the commencement of the study. The subjects were examined for oral tissue conditions after completing a questionnaire. A convenient sampling technique used a minimum of 200 subjects, calculated using the Kish and Leslie formula to select oral prosthesis wearers who attended the Dental clinic at KCMC Hospital and met inclusion criteria.

A closed-ended tool and a self-administered questionnaire were used to assess the Oral prosthesis cleaning practice and oral health status of Removable Oral Prosthesis Wearers. The questionnaire variables were adopted from different authors (Shankar *et al*., 2017; Auon & Gerges, 2017; Ogunride & Opeodu, 2015; Shigli *et al.,* 2015; Turgut Cancaya *et al.,* 2020 and

https://dx.doi.org/10.4314/thrb.v25i4.21

Nair *et al*., 2016). The questionnaire collected information such as the patient's age, sex, sleeping with the dentures, denture checkups, information on dentist instruction, denture use duration and rinsing a denture after every meal. The degree of palatal erythema was scored using Budtz-Jorgensen criteria (Budtz & Bertram, 1970), which describes the inflammation seen on the palatal mucosa. Palatal erythema was scored using the following clinical index.
0=No inflammation.
1=Inflammation present

The oral prosthesis hygiene was examined using the denture cleanliness index (Mylonas et al., 2016). This index grades the severity of denture cleanliness according to the amount of staining on the surface of the oral prosthesis fitting. The dental personnel applied a liquid plaque-disclosing dye, E102 Tartrazine, in combination with E 133 Brilliant blue FCF, to the fitting surface of the oral prosthesis to disclose the plaque.
0= Clean denture; no plaque is visibly seen, no staining, no plaque detectable.
1=Denture is visibly clean. Little staining (<25% staining of fit surface).
2= Denture has visible plaque and/or debris. Moderate staining of fit surface (25-50% staining of the fit surface).
3=Denture has visible plaque and/or debris. Severe staining of fit surface (>50% staining of the fit surface).
4=Denture has visible calculus deposit(s) on any surface

However, in this study, the oral prosthesis hygiene level was classified as clean/good denture (0 and 1), Moderate (2), and Poor denture (3 to 4). This was adopted from Mylonas et al. (2016; Syatirah et al., 2021; Turgut Cankaya Z, 2020). Furthermore, data were collected, organized, managed, and stored in a computer, secured, backed up, and preserved. Data were checked and cleaned. Variables were labelled and coded for easy interpretation.

Categorical variables with levels were identified and coded efficiently as per their levels. In some variables, categorization was based on previous literature studies. Quality of data was observed throughout in order not to lose its meaning and have wrong results. Data entry was done using Excel. Descriptive and logistic regression analyses were then conducted using STATA software version 15.0. A p-value <5% was used to determine statistical significance.

Ethical consideration

Ethical approval was sought from Kilimanjaro Christian Medical University College (KCMUCo) and the Research Ethics Review Committee, with clearance number PG 02/2022. Permission to carry out the study was obtained from the relevant authorities at the KCMC. Confidentiality and anonymity were maintained and observed at every step, from data management to analysis and presentation, and participant codes were used instead of names.

Results

Socio-demographic characteristics of the participants

There were 200 participants, of whom 112 (56%) were women. Among them, 76 participants (38%) had completed their primary education. Additionally, 116 participants (58%) were married or partnered, and 145 (72.5%) were self-employed. The average age of the participants was 57 years, with a standard deviation of ±17.4 years. Most participants were aged 60 or older. The socio-demographic characteristics of the participants are summarized in Table 1.

https://dx.doi.org/10.4314/thrb.v25i4.21

Table 1: Socio-demographic characteristics of the study participants (N=200)

Characteristics	n (%)
Sex	
Male	88(44)
Female	112(56)
Age(years)	
18-40	40(20)
41-60	61(30.5)
60+	99(49.5)
Education level	
Never	8(4)
Primary	76(38)
Secondary	53(26.5)
University	63(31.5)
Employment status	
Employed	44(22)
Self-employment	147(73)
Student	9(4.5)

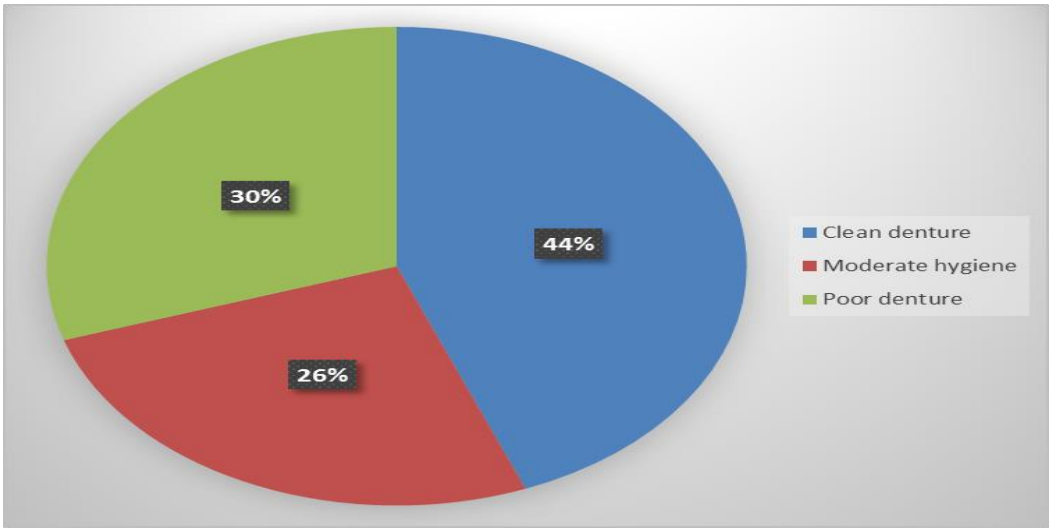

Figure 1: Summarized hygiene levels among study participants at KCMC dental clinic

Non-cleaning habits of the participant's denture

Table 2 displays non-cleaning practices. Of the 200 participants, 81 (40.5%) had new dentures, and 128 (64%) did not sleep with their dentures. After receiving their dentures from a dentist, 143 participants (71.5%) received instructions, and more than half of the participants 118 (59%) had used them for less than a year.

https://dx.doi.org/10.4314/thrb.v25i4.21

Table 2: Non-cleaning habits of the participant's denture (N=200)

Characteristics	n (%)
Denture checkups	
Every 3 to 6 months	15(7.5)
Once a year	19(9.5)
Not applicable/new	81(40.5)
Never	85(42.5)
Sleep with denture	
No	128(64)
Yes	72(36)
Dentist instruction on how to clean dentures	
Yes	143(71.5)
No	57(28.5)
Denture duration	
Less than one year	118(59)
More than one year	82(41)

Cleaning habits of the participant's denture (N=200)

More than two-thirds of the participants, 148 (74%), soaked their dentures in a solution when not using them. Specifically, 138 participants (69%) soaked their dentures in cold water overnight, and 142 (71%) rinsed them after every meal. Additionally, 89 participants (44.5%) reported cleaning their dentures at least twice daily. Most participants cleaned their dentures with a toothbrush (193, or 96%), and 146 participants (73%) used toothpaste and water. However, 126 participants (63%) were using dentures for the first time.

Table 3: Cleaning habits of the participant's dentures (N=200)

Characteristics	n(%)
Soak a denture in any substance when not wearing a denture.	
Yes	148(74)
No	52(26)
Substance to soak a denture	
Cold water	138(69)
Others specify	62(31)
Rinse a denture every after-meal	
Yes	142(71)
No	58(29)
How often to clean denture	
Once a day	57(28.5)
Twice a day	89(44.5)
More than twice a day	54(27)
Using a denture brush/toothbrush to clean dentures	
Toothbrush	193(96.5)
Others	7(3.5)
What do you use to clean a denture?	
Toothpaste and water	146(73)
Others specify	54(27)

https://dx.doi.org/10.4314/thrb.v25i4.21

Hygiene level by socio-demographic and cleaning habits characteristics

In the adjusted analysis shown in Table 4, older patients aged 60 years and above had three times higher odds of having moderate or poor denture condition compared to those aged 18-40 years with clean dentures (COR 3.46; 95% CI: 1.17-10.16; P-value = 0.024). Those who slept with their dentures had three times higher odds of having moderate or poor denture conditions compared to those who did not sleep with their dentures (COR 3.34; 95% CI: 1.32-8.4; P-value = 0.006).

Individuals who went for regular denture checkups once a year and those who were new denture wearers had 0.12- and 0.23-times lower odds, respectively, of having moderate or poor denture conditions compared to those who had checkups every 3-6 months (COR 0.12; 95% CI: 0.02-0.82; P-value = 0.031) and (COR 0.23; 95% CI: 0.06-0.90; P-value = 0.042).

In terms of denture hygiene, those who cleaned their dentures more than twice a day had 0.32 times lower odds of having moderate or poor denture conditions compared to those who cleaned their dentures once a day (COR 0.32; 95% CI: 0.11-0.97; P-value = 0.045). Slight inflammation of the palate was associated with twice the odds of having moderate or poor denture conditions compared to a non-inflamed palate (COR 2.43; 95% CI: 1.05-5.9; P-value = 0.038)

Table 4: Adjusted Logistic regression by socio-demographic and cleaning habits characteristics

Characteristics	COR(95%CI)	P-value	AOR(95%CI)	P-value
Sex				
Male	1			
Female	0.871(0.52-1.46)	0.603		
Age				
18-40	1			
41-60	1.583(0.74-3.40)	0.240	1.232(0.39-3.88)	0.721
60+	3.165(1.54-6.49)	0.002	3.457(1.17-10.16)	**0.024**
Sleeping with denture				
No	1			
Yes	5.67(2.87-11.22)	<0.001	3.34(1.32-8.4)	**0.006**
Smoking				
Yes	1			
No	0.858(0.30-2.39)	0.769		
Denture checkup				
Every3-6month	1			
Once a year	1.549(0.43-5.57)	0.502	0.117(0.07-0.82)	**0.031**
New	0.239(0.83-0.69)	0.008	0.232(0.06-0.95)	**0.042**
Never	3.316(1.21-9.08)	0.020	0.859(0.19-3.93)	0.845
Frequency of cleaning denture				
Once a day	1			
Twice a day	0.656(0.35-1.22)	0.180	0.628(0.22-1.83)	0.393
ore than twice a day	0.357(1.17-0.73)	0.005	0.323(0.11-0.97)	**0.045**
Palatal erythema				
No inflammation	1			
Inflammation present	2.300(1.16-4.58)	0.018	2.425(1.05-5.9)	**0.038**

Footnote: *COR-Crude odds ratio: * AOR-Adjusted odds ratio, *Bolded p-value indicates statistical significance (P-value<0.05), *Adjusted for Age, sleep with denture, denture check-up, denture cleaning, denture duration and palatal erythema.

https://dx.doi.org/10.4314/thrb.v25i4.21

Oral health status information of the study participants

The study's findings reveal that 178 participants (89%) had never noticed an unpleasant odour while wearing their dentures, and 141 participants (70.5%) had never experienced a burning sensation. Additionally, 156 participants (78%) had never observed a reddish lesion when removing their dentures. Among the subjects who used only upper dentures, palatal erythema was clinically evaluated. None of the 117 participants (74.05%) who underwent examinations reported irritation. (Shown in Table 5).

Table 5: Summarized self-reported and clinical examination of oral health status conditions of the study participants (N=200)

Characteristics	n (%)
Bad smell with denture	
Yes	22(11)
No	178(89)
Burning sensation while wearing denture	
Yes	59(29.5)
No	141(70.5)
White or reddish lesion after denture insertion	
Yes	44(22)
No	156(78)
Degree of palatal erythema (maxillary upper denture) (N=158)	
No inflammation	117(74.05)
Inflammation present	41(25.95)

Discussion

This study assessed oral prosthesis cleaning practices and health status among removable oral prosthesis wearers who attended K.C.M.C Dental Clinic from February 2022 to June 2022. The findings showed that 44% of participants had clean dentures, 26% had moderate or fair denture hygiene, and 30% had poor denture hygiene. This differs from a study in Nigeria where most participants (78.7%) had good denture hygiene, with fair and poor hygiene levels at around 15% each (Ogunride & Opeodu, 2015). Similarly, a Malaysian study reported that 68% had clean dentures, 26% had moderate hygiene, and 6% had poor hygiene. The discrepancy between these studies and ours may be attributed to differences in the age groups studied; the other studies mainly included middle-aged participants who are more likely to have the dexterity needed for proper denture cleaning, while our study primarily involved elderly participants who seldom had denture checkups and often wore complete dentures.

Among participants over 60 years in our study, 35.5% had clean dentures, 23.2% had moderate hygiene, and 41.4% had poor hygiene. Additionally, 32.32% of those over 60 cleaned their dentures once daily, differing from an Indian study where 28.2% of participants above 60 cleaned their dentures daily (Apatrim *et al.*, 2013). Research indicates that more frequent denture cleaning helps control plaque accumulation. For instance, two studies (Ogunride & Opeodu, 2015; Syatirah *et al.*, 2021) found that cleaning dentures twice daily resulted in 80% and 43% oral hygiene levels, respectively. The lower levels of adequate denture hygiene among older adults may be due to physical limitations or forgetfulness, highlighting the need for dental practices to provide personalized care plans and support, such as reminders and assistance with denture cleaning.

The study also found that 36% of participants slept with their dentures in their mouths. This percentage is lower than those reported in Brazil (88%) and Iran (55.1%) (Apratim *et al.*, 2013;

https://dx.doi.org/10.4314/thrb.v25i4.21

Syatirah et al., 2021), but higher than those reported in India (13.2%) (Mushtaq *et al*., 2019) and Nigeria (20.2%) (Aoun & Gerges, 2017). Reasons for this could include the presence of partners, poor knowledge, and beliefs that removing dentures may cause facial muscles to shrink. However, wearing dentures day and night can increase the risk of infections and oral health problems, such as denture stomatitis and gum sores. Dentures should be removed at night to maintain good dental and overall health. Public education on the risks of prolonged denture use and the benefits of nighttime removal can help prevent complications and promote better oral hygiene.

Regarding denture cleaning frequency, 27.5% of participants in our study cleaned their dentures more than twice a day. This result aligns with a Lebanese study (26.5%) (Aoun & Gerges, 2017), but is lower than the 73.58% reported in Brazil (Peracin *et al*., 2010). The difficulty in cleaning certain areas, such as the flange's intramural labial and buccal sides, inside surfaces, and spaces between the teeth, may necessitate more frequent cleaning. However, participants in our study were motivated by a desire to improve personal oral hygiene and prevent stains and bad odors. We recommend cleaning dentures at least once daily, with twice a day ideal—once in the morning and once before bed.

The study highlights that only 9.5% of participants visited the dentist annually for routine examinations. This percentage is like that in Nigeria (10.1%), where patients often visit the dentist for treatment or denture adjustments. However, it is higher than the 13% reported in Malaysia (Syatirah *et al*., 2021). The long-term use of dentures and the failure to attend follow-up visits may explain this, as participants tended to seek dental care only when experiencing issues with their dentures, such as breakage or poor fit. Regular dental checkups are crucial for monitoring oral health, adjusting dentures, and detecting potential issues early. Encouraging the community to schedule regular dental visits can improve oral health management and ensure timely interventions.

After the clinical examination in this study, 25.95% of participants showed signs of oral mucosal inflammation, such as denture stomatitis. This differs from a report in India by 50% (Bhat *et al.,* 2003). Possible causes include poorly fitting dentures that cause trauma to the oral mucosa, excessive plaque formation, overextended denture flanges, and nocturnal wearing. Dental professionals should prioritize ensuring proper denture fit and regular adjustments to enhance comfort and prevent oral trauma, ultimately improving the quality of life for denture wearers.

Conclusion

This study highlights several key aspects of denture hygiene and oral health status among removable oral prosthesis wearers at KCMC Dental Clinic from February to June 2022. The findings reveal that a significant portion of participants had inadequate denture hygiene, with only 44% maintaining clean dentures. This is notably lower than the hygiene levels reported in studies from Nigeria and Malaysia, possibly due to differences in age demographics and associated dexterity.

The data shows that elderly participants, particularly those over 60, struggled with maintaining proper denture hygiene. The study emphasizes the need for regular denture cleaning, as more regular cleaning has been associated with better oral hygiene. However, challenges such as physical limitations and forgetfulness among older adults highlight the importance of providing personalized care plans and support from dental professionals.

Furthermore, the study observed a concerning trend of participants sleeping with their dentures in place, which can increase the risk of oral infections and conditions like denture stomatitis. Public education on the benefits of removing dentures at night is essential to diminish these risks.

Furthermore, the low rate of annual dental visits among participants underscores the need for regular checkups to monitor and maintain oral health. Such visits are crucial for detecting potential issues early and ensuring the proper fit of dentures, which can prevent trauma to the oral mucosa.

https://dx.doi.org/10.4314/thrb.v25i4.21

This study suggests increased attention to education, personalized care, and regular dental checkups can significantly improve denture wearers' oral health and quality of life. Addressing these factors is vital in promoting better denture hygiene practices and reducing the incidence of associated oral health problems.

Recommendations

The results from this study recommend that an oral health education program to improve denture hygiene practices among removable denture wearers be designed to reduce the risk of acquiring denture-induced oral diseases. It is also crucial that dental professionals advise people who wear dentures to adhere to the best practices advised during insertion. These include frequent examinations of their appliances, rinsing them after every meal, and storing them in a dry place covered in water while not in use. Lastly, ensuring durable denture hygiene and good oral health maintenance is important.

Conflict of interest

None.

Author contributions

All authors made equal contributions.

Data sharing statement

To be provided upon request.

Reference

Apratim A, Shah SS, Abubakkar A et al Denture Hygiene Habits among Elderly Patients Wearing Complete Dentures. 2013;14(December):1161–4.

Aoun G, Gerges E. Assessment of Hygiene Habits in Acrylic Denture Wearers : a Cross-sectional Study. 2017;29(August):216–8.

Baba Y, Sato Y, Minakuchi S. et al. Effectiveness of a combination denture-cleaning method versus a mechanical method: comparison of denture cleanliness, patient satisfaction, and oral health-related quality of life. J Prosthodont Res. 2018;62(3):353–8.

Budtz-Jørgensen, E. and Bertram, U. (1970) Denture Stomatitis I. The Etiology in Relation to Trauma and Infection, Acta Odontologica Scandinavica, 28 (1), pp. 71–92. DOI:10.3109/00016357009033133.

Bhat V, Sharma SM, Shenoy SM, et al. Prevalence of Candida Associated Denture Stomatitis (Cads) and Speciation of Candida Among Complete Denture Wearers of South West Coastal Region of Karnataka. J Heal Allied Sci NU. 2013;03(03):059–63.

Coulthwaite L, Verran J. Potential pathogenic aspects of denture plaque. Br J Biomed Sci. 2007;64(4):180–9.

David C Dugdale. Aging changes in teeth and gums: MedlinePlus Medical Encyclopedia. Natl Libr Med [Internet]. 2022; Available from: https://medlineplus.gov/ency/patientinstructions/000951.htm

Hobdell M, Petersen PE, Johnson N. et al Global goals for oral health 2020. Int Dent J. 2003;53 (5):285–8.

Lauritano D, Moreo G, Lucchese A, et al. Oral Health Status and Need for Oral Care in an Aging Population : A Systematic Review. 2019.

McHugh ML. Lessons in biostatistics interrater reliability : the kappa statistic. Biochem Medica [Internet]. 2012; 22(3):276–82. Available from: https://hrcak.srce.hr/89395

Mushtaq MA, Altaf J, Shah AA et al . Assessment of Knowledge and Practices about Denture Hygiene among Complete Denture Wearers in Lahore City. J Pakistan Dent Assoc. 2019;28 (.0):187–91.

Natto ZS, Aladmawy M, Papas A. et al Factors contributing to tooth loss among the elderly : A cross sectional study. Singapore Dent J [Internet]. 2014; 35:17–22. Available from: http://dx.doi.org/10.1016/j.sdj.2014.11.002

Nair VV, Karibasappa GN, Prashanth VK.et al Microbial contamination of removable dental prosthesis at different interval of usage: An in vitro study. J Indian Prosthodont Soc. 2016;16 (4):346–51.

Ogunrinde TJ, Opeodu OI. Denture care practice among patients attending the prosthetic clinic in a Nigerian teaching hospital. 2015; 56(3):199–203.

Peracini A, de Andrade IM, de Souza RF. et al. Behaviors and hygiene habits of complete denture wearers. Braz Dent J. 2010; 21(3):247–52.

Shankar T, Gowd S, Suresan V, 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.

Shigli K, Hebbal M, Agrawal N.et al The knowledge , attitude and practice of edentulous patients attending a dental institute in India regarding care of their dental prostheses. 2015; 294–9.

Syatirah N, Noor M, Husein A. et al The Significance of Knowledge , Instructions , Habits and Denture Hygiene Practice in Relation to the Maintenance of Denture Hygiene at Hospital USM ' s Dental Clinic. 2021;16(1):49–55.

Szalewski L. Oral hygiene in patients using removable dentures. 2017; 127(1):28–31.

Takamiya AS, Monteiro DR, Compagnoni MA, et al. Complete denture hygiene and nocturnal wearing habits among patients attending the Prosthodontic Department in a Dental University in Brazil. 2011; 91–6.

Torabi Parizi et al. Evaluation of denture hygiene among removable denture wearers referred to clinics of Kerman, Iran. JOHOE/ Winter & Spring. 2013;2 (1):44–8.

Turgut Cankaya Z, Yurdakos A, Gokalp Kalabay P. 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

World Health Organization. The World Oral Health Report 2003. Community Dent Oral Epidemiol. 2003;31 Suppl 1:3–2