

# Oral Hygiene Status among Denture and Non-denture Wearers in a Tertiary Health Care Centre: An Analytical Cross-sectional Study

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## ABSTRACT

**Introduction:** Establishing good oral hygiene has been essential in achieving and maintaining overall physical and emotional well-being throughout life. With the use of dentures, it is believed to worsen the health of the oral cavity if not properly maintained.

**Objective:** To compare the oral hygiene status among denture wearers and non-denture wearers.

**Methods:** An analytical cross-sectional study was conducted from September to October 2023 in the outpatient department of the Dental Department in Dhulikhel. Convenience sampling method was used. A sample of 120 patients was divided into two groups: denture wearers and non-denture wearers. Data were collected and entered into the Microsoft excel and further analysis was done in the SPSS v20. Oral hygiene status, halitosis, and tongue coating were evaluated and compared between the groups.

**Results:** The Simplified Oral Hygiene Index (OHI-S) scores were comparatively higher among denture wearers ( $3.09 \pm 0.92$ ) as compared to non-denture wearers ( $2.47 \pm 0.82$ ). The majority of the denture wearers 26 (43.3%) had poor oral hygiene status. Tongue Coating Index (TCI) scores were almost similar among both groups. The organoleptic score was higher among denture-wearer participants ( $1.35 \pm 0.51$ ) as compared to the non-denture wearers ( $1.15 \pm 0.44$ ).

**Conclusions:** Wearing a denture has an impact on the oral hygiene status and halitosis of an individual. Post-denture delivery instructions and regular follow-ups are recommended to maintain proper oral health.

**Keywords:** Denture wearers; halitosis; oral hygiene status; tongue coating.

## INTRODUCTION

Dentures allow patients to perform many functions like speech, mastication, and maintaining facial aesthetics. Studies have shown that bacterial growth starts on dentures within a few hours of insertion.<sup>1</sup> Dentures comprise of metallic components and acrylic resins, both of which are plaque retentive

and help in qualitative and quantitative changes in plaque.<sup>2</sup> This bacterial and fungal growth leads to halitosis among denture patients. Research has shown that halitosis is fairly high (29%) in developed and low-income countries (39.8%).<sup>3</sup> Regular oral and denture hygiene procedures play a major role in the maintenance of oral health and the long-term success of removable prosthodontic treatment.<sup>4</sup> It is reported that the quality of the denture fitting surface, occlusal relations, denture age, and hygiene are important factors contributing to the prevalence of oral mucosal lesions associated with denture use.<sup>5</sup> The awareness and motivation of Removable Partial Denture (RPD) wearers to maintain high oral cleanliness is very important for periodontal health. Thus, there is a need to investigate the effect of partial dentures on standing teeth.<sup>6</sup>

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Since there is limited data present on this topic in Nepal, the present study aimed to compare the Oral hygiene status, halitosis scores, and tongue coating among denture wearers and non-denture wearers.

## METHODS

The present analytical cross-sectional study was conducted from September to October 2023 in the outpatient department (OPD) of the Department of Dentistry of Dhulikhel Hospital, Kathmandu University, School of Medical Sciences (KUSMS), Dhulikhel, Kavrepalanchok, Nepal. Ethical approval was obtained from the Institutional Review Committee - KUSMS (Ref. 149/23). Convenience sampling technique was used.

Sample size was calculated based on the formula of mean difference:

$$N_1 = (\sigma_1^2 + \sigma_2^2 / K) (Z_{1-\alpha/2} + Z_{1-\beta/2})^2 / \Delta^2$$

$$N_2 = (K \times \sigma_1^2 + \sigma_2^2) (Z_{1-\alpha/2} + Z_{1-\beta/2})^2 / \Delta^2$$

The notation for the formulae is:

$n_1$  = sample size of Group 1

$n_2$  = sample size of Group 2

$\sigma_1$  = standard deviation of Group 1

$\sigma_2$  = standard deviation of Group 2

$\Delta$  = difference in group means,  $\kappa$  = ratio =  $n_2/n_1$

$Z_{1-\alpha/2}$  = two-sided Z value (eg. Z=1.96 for 95% confidence interval).

$Z_{1-\beta}$  = power

Sample size calculated at 80% power. Mean±SD, Group 1- 44.5±3.22, Group 2: 42.24±3.59. The mean difference was taken as 2.26 as per the mean plaque accumulation values reported by Costacurta et al.<sup>2</sup> Ratio of sample size was set at 1:1. The minimum sample size obtained was 36 per group which was rounded off to 60 per group. Hence, final sample size taken was 120 at 95% CI. Participants were informed about the study and written consent was obtained before the oral examination of the participants.

Denture-wearing patients and other patients visiting the dental OPD who provided written consent were included in the study. Patients suffering from systemic conditions like Diabetes, Anaemia, and Hypertension, and those taking medications such as antihistamines, anti-depressants, long-term muscle relaxants which could lead to dryness of mouth, and increased plaque accumulation were excluded from the study. Various indices were used to check the oral health status. Oral Hygiene Index- Simplified (OHI-S, Greene and Vermilion 1964)<sup>7</sup> was used for the assessment of oral hygiene status. Tongue Coating Index (TCI, Miyazaki et al. 1995)<sup>8</sup> was used to evaluate the amount of tongue coating among study participants. Oral malodour was assessed using Organoleptic Intensity Scale (OLS Scale, Rosenberg et al.).<sup>9</sup>

The primary investigator was pre-trained on the indices by subject experts. Intra-examiner reliability was tested. The scoring for the indices was done as described by the respective authors. Data were collected and entered in Microsoft Excel sheet. The Statistical software (IBM SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, N.Y., USA) was used for the analysis of the data. Descriptive statistics and unpaired t-test were used for the comparison of mean values among denture wearers and non-denture wearers. Chi-square test was used for the comparison of categorical variables. Statistical significance was set at P <0.05.

## RESULTS

The study was conducted among 120 participants visiting Dhulikhel Hospital, Department of Dentistry where denture and non-denture wearers were divided equally into 60 (50%) per group. Males comprised 64 (53.3%) of the study population and 56 (47.7%) were females. It was observed that the majority (26, 46.6%) of the denture wearers had significantly poorer oral hygiene as compared to non-denture-wearing patients eight (13.3%). Fair oral hygiene status was observed among 46 (76.7%) non-denture-wearing patients and 33 (55%) in the denture wearing group. These differences were found to be statistically significant (P <0.05) (Table 1).

**Table 1: Oral hygiene status among study participants.**

Denture wearing status	Oral hygiene status, n (%)			P value
	Good	Fair	Poor	
Denture wearers	1 (1.7)	33 (55)	26 (43.3)	<0.01
Non-denture wearers	6 (10)	46 (76.7)	8 (13.3)	

Chi-square test.

**Table 2: OHI-S, TCI, and OLS scale measurements among denture vs non-denture patients.**

	Denture wearing status (Mean±SD)		P value
	Non-denture wearers	Denture wearers	
OHI-S	2.47±0.82	3.09±0.92	<0.01
TCI	1.80±0.68	1.73±0.82	0.63
OLS	1.15±0.44	1.35±0.51	0.025

Unpaired t-test.

Denture wearers scored statistically significantly higher OHI-S scores (3.09±0.92) than non-denture wearers (2.47±0.82, P <0.05). On the measurement of halitosis, it was observed that denture wearers scored significantly higher (1.35±0.51) in the OLS scale scoring as compared to non-denture wearers (1.15±0.44). Tongue coating was almost similar among both groups as demonstrated by TCI scores. Although the non-denture wearers scored marginally higher scores (1.8±0.68) than denture wearers (1.73±0.82) the differences were not statistically significant (Table 2).

**DISCUSSION**

The present study was conducted to assess denture-wearing status and oral hygiene. It was observed that denture wearers had significantly poorer oral hygiene status as compared to non-denture wearers. Research has shown that wearing dentures leads to increased plaque accumulation which in turn leads to poorer oral hygiene status.<sup>1</sup> The current findings are in accordance with the findings of Oremosu and Soroye.<sup>6</sup>

To reduce plaque accumulation and improve oral health, regular examinations must be done, and reinstructions and timely reinforcement should be done.<sup>10</sup>

Higher plaque retention was observed in the present study among denture wearers (3.09±0.9) as compared to non-denture wearers (2.47±0.82) with higher oral hygiene index scores which measure

debris and calculus. Similar results were found by Ryniewicz et al.<sup>1</sup>

Studies have shown that regardless of patients' education levels and profession, they do not know the maintenance of oral hygiene while wearing dentures.<sup>11</sup> Along with this, the proper construction of dentures is important since they consist of both acrylic and metallic components which act as plaque-retentive elements.<sup>12</sup>

The present study showed that halitosis was significantly higher among denture wearers (1.35±0.51) as compared to non-denture wearers (1.15±0.44). These findings are consistent with the studies done by Costacurta et al., and Nalaci and Baran.<sup>2,14</sup> Wearing of dentures can lead to food stagnation and in turn lead to halitosis. This causes an increased gram-positive bacterial β-galactosidases activity that synergically works with gram-negative volatile sulfur compound production.<sup>12</sup>

Increased halitosis and poorer oral hygiene may also be linked to the increased surface area of the dentures. The resin part of the dentures acts as a harbour for bacteria and fungi which could lead to halitosis.

**CONCLUSIONS**

The presence of removable dentures leads to increased debris and calculus accumulation levels. This in turn led to increased OHI-S scores. Among the denture wearers, the majority fell in the fair and

poor categories as compared to non-denture wearers. Halitosis levels were also greater among denture-wearing individuals. This study showed that post-denture delivery instructions and regular follow-up are important in the maintenance of oral hygiene and in preventing bacterial accumulation in the oral

cavity. The limited geographical reach of the study limits the generalisability of the results. The duration of denture wearing has not been assessed which may have had some influence on the results.

**Conflict of interest:** None.

## REFERENCES

1. Ryniewicz J, Orczykowska M, Gronkiewicz K, Pihut M. Assessment of oral hygiene in patients using fixed and removable dentures treated at the university dental clinic in Krakow. *Int J Environ Res Public Health*. 2021;18(22):11986.
2. Costacurta M, Petrini M, Biferi V, Arcuri C, Spoto G, Docimo R. The correlation between different techniques for the evaluation of oral malodour in children with and without orthodontic treatment. *Eur J Paediatr Dent*. 2019;20(3):233-6.
3. Silva MF, Leite FRM, Ferreira LB. Estimated prevalence of halitosis: A systematic review and meta-regression analysis. *Clin Oral Investig*. 2018;22(1):47-55.
4. Douglass CW, Gammon MD, Atwood DA. Need and effective demand for prosthodontic treatment. *J Prosthet Dent*. 1988;59(1):94-9.
5. Patel IB, Madan G, Patel B, Solanki K, Chavda R. Behaviours and hygiene habits of a sample population of complete denture wearers in Ahmedabad. *J Int Oral Health*. 2012;4(2):29-38.
6. Oremosu OA, Soroye MO. Denture characteristics, oral hygiene practice and periodontal changes of partial denture wearers and non-denture wearers in a teaching hospital - A comparative study. *World Journal of Advanced Research and Reviews*. 2022;13(01):77-85.
7. Greene JC, Vermillion JR. The simplified oral hygiene index. *J Am Dent Assoc*. 1964;68:7-13.
8. Miyazaki H, Sakao S, Katoh Y, Takehara T. Correlation between volatile sulphur compounds and certain oral health measurements in the general population. *J Periodontol*. 1995;66(8):679-84.
9. Greenman J, Duffield J, Spencer P, Rosenberg M, Corry D, Saad S, et al. Study on the organoleptic intensity scale for measuring oral malodor. *J Dent Res*. 2004;83(1):81-5.
10. Bergman B, Hugoson A, Olsson CO. A 25-year longitudinal study of patients treated with removable partial dentures. *J Oral Rehabil*. 1995;22(8):595-9.
11. Shankar T, Gowd S, Suresan V, Mantri S, Saxena 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.
12. Murakami M, Nishi Y, Seto K, Kamashita Y, Nagaoka E. Dry mouth and denture plaque microflora in complete denture and palatal obturator prosthesis wearers. *Gerodontology*. 2015;32(3):188-94.
13. Tanabe S, Grenier D. Characterization of volatile sulfur compound production by *Solobacterium moorei*. *Arch Oral Biol* 2012;57(12):1639-43.
14. Nalcaci R, Baran I. Oral malodor and removable complete dentures in the elderly. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod*. 2008;105(6):e5-9.