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Factors Influencing the Occurrence of Oral Mucosal Lesions in Complete Denture Wearers in A Tertiary Care Dental Hospital

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ABSTRACT

Background

Denture needs proper maintenance for its longevity. Oral mucosal lesions are prevalent among denture wearers and significantly compromise oral health and quality of life. The objective of this study is to determine the factors influencing the occurrence of oral mucosal lesions (OMLs) in complete denture wearers.

Methods

A cross-sectional study was conducted among 184 complete denture wearing patients after insertion of 6 months to 35 years from October 2024 to February 2025. Questionnaire that collected information on gender, age, education status, number of dentures, length of denture usage, hygiene, night time use of denture, broken denture base/teeth if any and use of denture adhesives was completed and patients' oral cavity was examined by the prosthodontist.

Results

Oral mucosal lesions were identified in 58 participants (31.5%). The most common lesion was traumatic ulcer, observed in 38 participants (20.7%), followed by flabby ridge in 19 participants (10.3%). No statistically significant association was found between the presence of oral mucosal lesions and variables such as age, sex, educational status, number of dentures, duration of denture use, denture hygiene practices, nighttime denture use, fractured denture base, or use of denture adhesives (p-value >0.05).

Conclusions

No significant differences were observed in the occurrence of oral mucosal lesions with respect to age, gender, educational level, hygiene status, or denture features. The most common lesions among complete denture wearers were traumatic ulcers, followed by flabby ridges, influenced by factors such as gender, number of dentures, and nighttime denture use.

Keywords: cross-sectional study; complete denture; oral mucosal lesions.

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INTRODUCTION

Today, the elderly population is constantly increasing. Oral health problems can influence people in different ways, affecting their well-being and quality of life.[1] Although the incidence of tooth loss has declined and use of fixed implant-supported restorations have risen, considerable number of edentulous patients are managed with removable prostheses.[2] Use of complete dentures demand strict oral hygiene practices and appropriate maintenance care.[3] Denture-related mucosal lesions include traumatic ulcer, allergic reaction denture stomatitis, angular cheilitis, inflammatory hyperplasia and flabby ridge.[4] Risk of oral lesions tends to increase with age and is influenced by quality, integrity, and hygiene of prosthesis.[5] Prevalence of denture stomatitis is higher among female denture wearers.[6] Wearing dentures overnight have been identified as independent risk factor for the development of oral lesions. Additionally, fractures of the denture base and subsequent repairs are associated with increased risk of traumatic ulcers.[3] The aim of this study is to determine the frequency of the oral lesions in relation to gender, age, the length of time of denture usage, education level, hygiene of the denture, and night time use of denture.

METHODS

This analytical cross-sectional study was conducted among complete denture wearing patients aged between 45-75 years after insertion of 6 months to 35 years visiting the Department of Prosthodontics, Dhulikhel Hospital, Kathmandu University School of Medical Sciences (KUSMS) from October 2024 to February 2025. Ethical clearance was obtained from Institutional Review Committee of KUSMS after submission of research proposal (IRC No: 185/24). Convenience sampling method was used and the sample size (n) was calculated by using the formula:

$$n=[deff*Np(1-p)]/[(d^2/z^2_{1-\alpha/2}*(N-1)+p^{(1-p)}]$$

where, population size (for finite population correlation factor or fp c(N):1000000, Hypothesized % frequency of outcome factor in the population(p):86.1%±5, Confidence limits as % of 100 (absolute ±%) (d): 5 %, Design effect (for cluster surveys- deff): 1. And total sample size of 184 was taken for the study. They were enrolled in the research only after obtaining their informed consent. A questionnaire for identifying the details of the patient's status, evaluation of the oral cavity and the dentures they are using was developed.[5] Prosthodontists with the help of patients completed the questionnaire that collected information on gender, age, education status, number of dentures, length of denture usage, hygiene, night time use of denture, broken denture base/teeth if any and use of denture adhesives. Based on following factors, patients were categorized into subgroups: Age was analysed in two subgroups, 45-60 and 61-75. Educational status was analysed in two subgroups which were Illiterate and Literate. Number of dentures used in three subgroups: 1,2 and ≥3. Time of denture usage in three subgroups: <1 year, 1-5 year and >5 years. Hygiene of dentures in three subgroups: good, fair and poor. Evaluation of complete denture hygiene was carried out by examining for bacterial plaque and tartar deposits.[7]

The dentures that the patients were currently wearing were fabricated in the Dhulikhel Hospital by the prosthodontists team. After completing the patient's questionnaire, each subject underwent a comprehensive dental examination by the prosthodontist. Mandibular buccal, labial and lingual mucosa and maxillary buccal, labial mucosa, hard palate and posterior palatal seal area were examined and classified as healthy or unhealthy. Denture stomatitis, angular cheilitis, flabby ridge, traumatic ulcers, and denture-induced fibrous inflammatory hyperplasia (FIH) were assessed. The collected data were entered in an MS-Excel and statistical analysis was performed using SPSS (version 16) using frequencies, the chi-square test, and Fisher's exact test. A p-value<0.05 was considered statistically significant.

RESULTS

A total of 184 participants were included in the study. The majority 151 (82.1%) were aged between 61-75 years, and most of them 118 (64.1%) were males. More than half 109 (59.2%) of the participants were illiterate. Nearly half of the participants 87(47.3%)

wore a single denture. Regarding the duration of denture use, 109 (59.2%) had used their dentures for less than one year, whereas few 26 (14.1%) had used their dentures for more than five years. Most participants 94 (51.1%) maintained fair denture hygiene. The majority 160 (87.0%) did not use their dentures at night, and 155 (84.2%) did not have broken denture bases. Only 4 (2.2%) reported the use of denture adhesives (Table 1).

Table 1. Socio-demographic and denture characteristics of study participants. (n = 184)

Variables	Frequency (%)
Age (years)	
45-60	33(17.9)
61-75	151(82.1)
Sex	
Male	118(64.1)
Female	66(35.9)
Educational status	
Illiterate	109(59.2)
Literate	75(40.8)
Number of dentures	
1	87(47.3)
2	79(42.9)
≥3	18(9.8)
Time of denture use	
<1 year	109(59.2)
1-5 years	49(26.6)
>5 years	26(14.1)
Hygiene of denture	
Good	54(29.3)
Fair	94(51.1)
Poor	36(19.6)
Night time use of denture	
Yes	24(13.0)
No	160(87.0)
Broken denture base	
Yes	29(15.8)
No	155(84.2)
Use of denture adhesives	
Yes	4(2.2)
No	180(97.8)

On intraoral examinations, most mucosal sites were healthy. Healthy conditions were observed in more than or equal to 94% of the mandibular and maxillary mucosal regions. However, all participants exhibited healthy changes in the posterior palatal seal area and the hard palate (Figure 1).

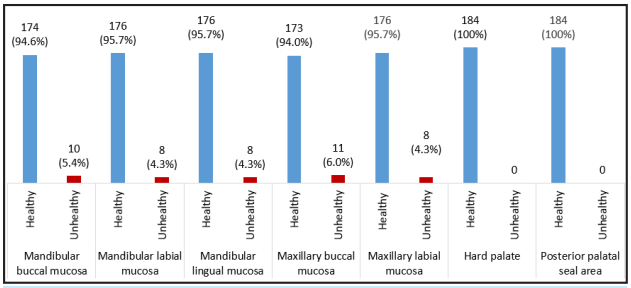

Figure 1. Distribution of study participants according to intra-oral examination findings. (n = 184)

Oral mucosal lesions were observed in 58 (31.5%) of the participants (Figure 2).

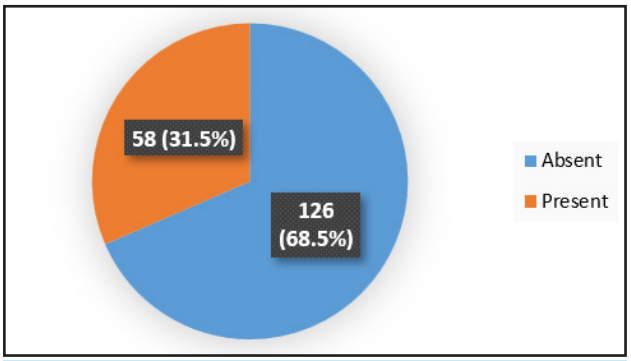

Figure 2. Distribution of study participants according to presence of oral mucosal lesions. (n = 184).

Traumatic ulcers were the most common lesion, present in 38(20.7%) of the study population, followed by flabby ridge in 19 (10.3%), fibrous inflammatory hyperplasia in 3 (1.6%), and denture stomatitis in 2 (1.1%). Angular cheilitis was not found in any of the participants (Figure 3).

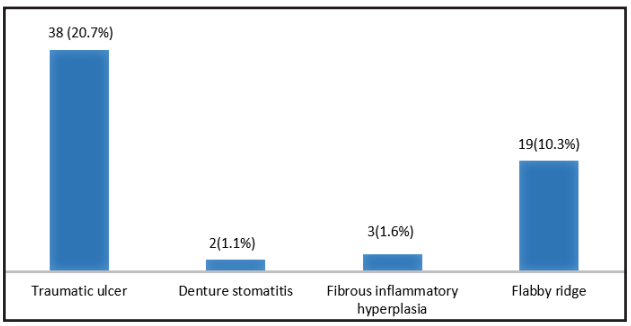

Figure 3. Distribution different oral mucosal lesions among study participants. (n = 184)

When assessing the association between various independent variables and the presence of oral mucosal lesions, no statistically significant relationships were observed with age, sex, educational status, number

of dentures, time of denture use, denture hygiene, nighttime denture use, broken denture base, and use of denture adhesives (p-value > 0.05, Table 2).

Table 2. Association of various independent variables with oral mucosal lesions. (n = 184)

Variables	Oral mucosal lesions		p-value
	Absent n(%)	Present n(%)	
Age (years)			
45-60	27(81.8)	6(18.2)	0.069*
61-75	99(65.6)	52(34.4)	
Sex			
Male	75(63.6)	43(36.4)	0.055*
Female	51(77.3)	15(22.7)	
Educational status			
Illiterate	74(67.9)	35(32.1)	0.873*
Literate	52(69.3)	23(30.7)	
Number of dentures			
1	59(67.8)	28(32.2)	0.399*
2	57(72.2)	22(27.8)	
≥3	10(55.6)	8(44.4)	
Time of denture use			
<1year	76(69.7)	33(30.3)	0.446*
1-5 years	35(71.4)	14(28.6)	
>5 years	15(57.7)	11(42.3)	
Hygiene of denture			
Good	38(70.4)	16(29.6)	0.578*
Fair	66(70.2)	28(29.8)	
Poor	22(61.1)	14(38.9)	
Nighttime use of denture			
Yes	13(54.2)	11(45.8)	0.106*
No	113(70.6)	47(29.4)	
Broken denture base			
Yes	17(58.6)	12(41.4)	0.213*
No	109(70.3)	46(29.7)	
Use of denture adhesives			
Yes	1(25.0)	3(75.0)	0.093[a]
No	125(69.4)	55(30.6)	

**Chi square test, [a]Fisher's exact test*

For traumatic ulcers, a significant association was found with the number of dentures (p-value= 0.011). Participants with three or more dentures had a higher prevalence of traumatic ulcers compared to those with one or two dentures. No significant associations were noted with other variables, including age, sex, educational status, duration of denture use, denture hygiene, nighttime use, or broken denture base (Table 3).

Table 3. Association of various independent variables with traumatic ulcers. (n = 184)

Variables	Oral mucosal lesions		p-value
	Absent n(%)	Present n(%)	
Age in years			
45-60	29(87.9)	4(12.1)	0.181
61-75	117(77.5)	34(22.5)	
Sex			
Male	92(78.0)	26(22.0)	0.536
Female	54(81.8)	12(18.2)	
Educational status			
Illiterate	85(78.0)	24(22.0)	0.581*
Literate	61(81.3)	14(18.7)	
Number of dentures			
1	75(86.2)	12(13.8)	**0.011***
2	61(77.2)	18(22.8)	
≥3	10(55.6)	8(44.4)	
Time of denture use			
<1year	87(79.8)	22(20.2)	0.947*
1-5 years	39(79.6)	10(20.4)	
>5 years	20(76.9)	6(23.1)	
Hygiene of denture			
Good	42(77.8)	12(22.2)	0.797*
Fair	74(78.7)	20(21.3)	
Poor	30(83.3)	6(16.7)	
Nighttime use of denture			
Yes	20(83.3)	4(16.7)	0.789[a]
No	126(78.8)	34(21.3)	
Broken denture base			
Yes	21(72.4)	8(27.6)	0.315*
No	125(80.6)	30(19.4)	
Use of denture adhesives			
Yes	3(75.0)	1(25.0)	<0.99 [a]
No	143 (79.4)	37 (20.6)	

For flabby ridge, statistically significant associations were observed with sex (p-value = 0.015), number of dentures (p-value = 0.013), and nighttime use of dentures (p-value = 0.022). Males, individuals with a single denture, and those who used dentures at night showed a higher prevalence of flabby ridge. No significant associations were found with age, education, time of denture use, hygiene, broken denture base, or use of denture adhesives (Table 4).

Table 4. Association of various independent variables with flabby ridge. (n = 184)			
Variables	Oral mucosal lesions		p-value
	Absent n(%)	Present n(%)	
Age in years			
45-60	31(93.9)	2(6.1)	0.374*
61-75	134(88.7)	17(11.3)	
Sex			
Male	101(85.6)	17(14.4)	**0.015***
Female	64(97.0)	2(3.0)	
Educational status			
Illiterate	99(90.8)	10(9.2)	0.536*
Literate	66(88.0)	9(12.0)	
Number of dentures			
1	72(82.8)	15(17.2)	**0.013[a]**
2	75(94.9)	4(5.1)	
≥3	18(100)	-	
Time of denture use			
<1year	99(90.8)	10(9.2)	0.268*
1-5 years	45(91.8)	4(8.2)	
>5 years	21(80.8)	5(19.2)	
Hygiene of denture			
Good	50(92.6)	4(7.4)	0.060*
Fair	87(92.6)	7(7.4)	
Poor	28(77.8)	8(22.2)	
Nighttime use of denture			
Yes	18(75.0)	6(25.0)	**0.022[a]**
No	147(91.9)	13(8.1)	
Broken denture base			
Yes	25(86.2)	4(13.8)	0.508[a]
No	140(90.3)	15(9.7)	
Use of denture adhesives			
Yes	3(75.0)	1(25.0)	0.356[a]
No	162(90.0)	18(10.0)	

DISCUSSION

Oral lesions in complete denture wearers can arise from tissue changes, ill-fitting prostheses, and microbial activity, resulting in diverse clinical presentations and possible complications.[8] Considering the complex functional dynamics of the oral environment and the mechanical loading of the mucosal tissues, it is evident that dentures themselves may play a direct role in producing these alterations.[9]

In this study, among 184 participants, majority 151(82.1%) were aged between 61–75 years, and most of the participants were male118(64.1%). The participants' age range of 45 to 75 years reflects a diverse cohort, predominantly representing middle-aged to elderly individuals, who are generally more prone to denture use. This is in support of previous study by Herald J Sherlin[9] and Ritu priya.[10] In this study, oral lesion relation with age was non- significant which is in agreement with Martori[11], Fatah[12] and Herald J Sherlin[9] study.

Oral mucosal lesions (OMLs) were identified in 58 participants (31.5%). Among these, traumatic ulcers were the most frequently observed, affecting 20.7% of the study population, followed by flabby ridge (10.3%) and fibrous inflammatory hyperplasia (1.6%). Notably, angular cheilitis was not detected in any participant. These findings are consistent with those reported by Jainkittivong (19.5%)[13], Tunde and Olalekan (78.57%)[14], and Mandali (92.2%)[5], where traumatic ulcer emerged as the most prevalent lesion. A statistically significant association was observed between the number of dentures used and the occurrence of traumatic ulcers. In our study, 44.4% of patients were using more than three dentures. A higher prevalence of traumatic ulcers was also noted among individuals wearing dentures with broken bases or teeth, as well as those experiencing mechanical trauma due to prolonged use of ill-fitting dentures. In contrast, Priya et al.[10] observed a higher overall prevalence of OMLs (72.2%), with denture stomatitis (33.3%) being the most common, followed by traumatic ulcer (22.2%). Similarly, Baran[15] reported denture stomatitis in 35.8% and traumatic ulcer in 29% of participants. The predominance of these lesions has also been confirmed in studies by Budtz-Jorgensen[4] and Freitas[7]. The high prevalence of denture stomatitis may be attributed to systemic conditions, xerostomia, allergic reactions to denture base acrylic, or inadequate oral hygiene. However, Martori[11] documented a 54% prevalence of OMLs, with angular cheilitis (34%) as the most common presentation. Martori suggested that angular cheilitis (AC) could be related to increasing age, colonization by oral Candida, and a reduction in occlusal vertical dimension (OVD).

In the present study, second most common oral mucosal lesion identified was flabby ridge, which showed an association with male gender, number of dentures used, and nighttime denture wearing. Desjardins and Tolman[16] emphasized that the etiology of flabby ridge remains complex and speculative, potentially involving factors such as age, nutritional deficiencies, systemic disease, toxin exposure, and mechanical pressure. Findings from the present study, particularly the association with multiple dentures and nocturnal denture use, partly support their observations. In comparison, Mandali[5] reported a prevalence of flabby ridge in 61.4% of cases, whereas Coelho[17] observed it in only 5.1% of 524 patients.

In our study, the sample consisted of 118 males (64.1%) and 66 females (35.9%). This distribution is consistent with the findings of Fatah[12], but contrasts with those of Tunde and Olalekan[14], as well as Arigbede and Taiwo[18], who reported a higher proportion of female participants. The predominance of females in those studies has been attributed to their greater concern for esthetics, leading them to seek dental replacement more readily to enhance appearance. In the present study, the association between oral mucosal lesions and gender was not statistically significant, which aligns with the findings of Martori[11] and Fatah.[18] However, Da Silva HF[19] reported a higher prevalence of oral lesions among women. This variation may be explained by differences in sample composition; in our study, 64% of participants were male, a factor that could be linked to habits such as smoking and poor oral hygiene, which are more common among men.

Based on educational status, 75 participants (40.8%) were literate. A higher prevalence of oral mucosal lesions (32.1%) was observed among illiterate individuals. In the study by Fatah[12], although the association was not statistically significant, a greater prevalence of oral mucosal lesions was reported among participants with primary school education compared to illiterate individuals, but lower than those who had attended secondary school. This finding may reflect the larger proportion of participants with primary-level education in that study. In contrast, Baran[15] reported a statistically significant association between lower educational level and oral mucosal lesions, whereas Mandali[5] found no such relationship. In this study, 44.4% of participants were using more than three dentures. The use of multiple dentures may increase pressure on the oral tissues and reduce mucosal ventilation. This could be attributed to factors such as patient awareness regarding ill-fitting dentures, loss of vertical dimension, alveolar ridge resorption from prolonged denture use, or long-term edentulism. In our study, a higher prevalence of oral mucosal lesions (42.3%) was observed in participants who had been wearing dentures for more than five years. This may be attributed to the gradual deterioration of dentures over time, which can increase the risk of mucosal trauma and lesion formation. These findings feature the potential long-term effects of prolonged denture use on oral health. Our results are consistent with studies by Mandali[5], Miller[20], Coelho[21], and Ritu Priya.[10] Additionally, Sebnem and Mutlu[22] reported that denture use for ≥11 years was significantly associated with the incidence of oral mucosal lesions highlighting the importance of regular denture evaluation and timely replacement.

Oral mucosal lesions were more common in participants with poor oral hygiene (38.9%). This is consistent with studies by Ritu Priya[10], Baran[15], and Martori[11], which reported a significant correlation between oral hygiene practices and the presence of lesions. Poor oral and denture hygiene has also been identified as a key factor in denture-related lesions, including Candida-associated denture stomatitis, as noted by Fatah et al.[12] and Budtz-Zorgensen.[4] These findings emphasize the importance of maintaining proper oral hygiene to prevent mucosal lesions in denture wearers.

In our study, 24 participants (13%) wore dentures at night, with a higher prevalence of oral mucosal lesions (45.8%) observed in this group. These findings align with Fatah et al.[12], who reported a highly significant association between night-time denture use and denture-induced stomatitis. In contrast, Tunde and Olalekan[14] found no significant relationship, while Yalcinkaya[22] noted that wearing dentures at night had a greater impact on lesion incidence than denture

cleaning frequency.

In the present study, 15.8% of participants had broken denture bases or teeth, with 41.4% of these individuals presenting with oral mucosal lesions. This finding aligns with Brantes[3], who reported an association between traumatic ulceration and fractured denture bases.

In this study, none of the participants used denture adhesive, possibly due to adequate denture retention, comfort, and post-insertion instructions. In contrast, Tosun[23] reported that 25.4% of participants used denture adhesive, which can compensate for prosthesis incompatibility but may also promote microbial growth.

Limitations

The study has several limitations. Potential confounding factors such as diet, general health, and oral hygiene habits could not be fully controlled. Being conducted at a single university center may limit the generalizability of the findings. Only patients with complete dentures were included, excluding variables like the number and location of missing teeth. Although all dentures were fabricated by our team, detailed information on denture dimensions, delivery instructions, follow-up, and specific treatments was not available. Future multicenter studies with larger sample sizes and better control of confounding factors-including diet, health status, oral hygiene, and denture-related issues-are recommended.

CONCLUSIONS

Within the limits of this study, no significant differences were observed in the occurrence of oral mucosal lesions with respect to age, gender, educational level, hygiene status, or denture features. The most common lesions among complete denture wearers were traumatic ulcers, followed by flabby ridges, influenced by factors such as gender, number of dentures, and nighttime denture use.

Clinical implications: Comprehensive treatment planning for denture fabrication, along with patient education and awareness that emphasize proper denture hygiene and regular dental visits, can significantly improve oral health and enhance patients' quality of life.

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