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Association between Oral Mucosal Lesions and Hygiene Habits in a Population of Removable Prosthesis Wearers

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Abstract

Purpose: This prospective study evaluated the influence of self-reported prosthesis hygiene regimens and prosthesis usage habits on the presence of oral mucosal lesions (OMLs) in complete removable and/or partial removable dental (CRDP/PRDP) prosthesis wearers (PWs).

Materials and Methods: Between January 2009 and January 2011, the conventional oral mucosa of 400 consecutive PWs (252 women; 148 men), aged between 29 and 86 years, were examined clinically. Information was derived considering the type and age of the prosthesis, hygiene level, frequency and style of prosthesis cleaning, overnight prosthesis use, storage conditions, and systemic diseases. Non-prosthesis- and prosthesis-related OMLs were identified. The data were analyzed using univariate (Chi-square) and multivariate (logistic regression) tests to assess the development of OMLs as a function of the selected variables. Odds ratios (OR) were calculated at 95% confidence intervals (CI; $\alpha = 0.05$).

Results: Of the 400 PWs, 21.5% had CRDP, 52.5% PRDP, and 25.8% CRD/PRD prostheses. Thirty-two percent of the PWs cleaned their prosthesis once a day. Brushing the prosthesis with toothbrush and soap/toothpaste was the most commonly practiced cleaning regimen (85.8%). More than half (64.5%) of the PWs used their prosthesis overnight. Among all PWs, 37.8% had a prosthesis-related OML. Stomatitis Newton Type II (46%) and Type III (38%) were the most common OMLs. OML frequency was higher in PWs having CRDPs than those having PRDPs ($p < 0.05$). Overnight prosthesis use ($p = 0.003$, OR: 13.65; 95% CI: 1.7–109.3), denture age ≥11 years ($p = 0.017$, OR: 1.72; 95% CI: 1.1–2.7), and immersion in water and solution ($p = 0.023$, OR: 1.13; 95% CI: 0.02–1.02) affected the incidence of OML significantly. Hypertension was the most common systemic disease (31.5%).

Conclusion: Overnight use, denture age, and storage conditions of CRDP or PRDPs demonstrated a more significant impact on OML incidence than frequency of cleaning. Oral healthcare programs for removable PWs should specifically provide education on prosthesis usage instructions.

Life expectancy of the aged population (≥65 years) is increasing in developed countries. Consequently, improving general and dental health for better quality of life (QoL) becomes an important issue.[1-3] Epidemiological studies in various countries clearly indicate that oral health status has changed worldwide.[1,4-9] One of the major concerns in dentistry is to decrease edentulism worldwide and increase the population with natural dentition,[10] since completely edentulous patients seem to be more at risk for multiple systemic disorders.[11] Edentulism is a parameter of oral health that highly affects QoL.[12] Although the rate of edentulism has been decreasing in the past few decades, the presence of edentulism in younger age groups still remains a problem.[12,13]

In 1990, the prevalence of edentulism was reported to be 80% in those >65 years of age in Turkey.[14] In 2012, out of 75,627 removable dental prosthesis wearers (PWs), 5682 were >65 years old.[15] The rate of population growth was reported as 0.00112, and the median age increased from 29.7 in 2010 to 30.1 in 2012.[15] Thus, health problems of adults and the elderly may be critical in the near future.

A number of studies have reported that the incidence of oral mucosal lesions (OMLs) and especially prosthesis-related

OMLs is correlated with the use of removable prostheses.[13,16-18] According to these studies, the frequency of prosthesis-related OMLs seemed to be higher than that of other OML types. In clinical practice, the most frequently seen prosthesis-related OMLs are stomatitis, hyperplasia, angular cheilitis, and traumatic ulcers.[13,16-18] Many studies have reported higher prevalence of prosthesis stomatitis, in complete removable denture wearers[9,13,16,17,19-23] than in partial removable denture wearers.[24] This is due to predisposing factors such as *Candida* infection, mechanical issues, and long-term prosthesis wearing as well as the larger area of oral mucosa covered by a complete removable denture.[7] In addition, premalignancies and malignancies were also reported to increase as the population ages.[25]

Earlier studies showed varying prevalence of OMLs in adult and elderly populations.[2,4,5,8,9,24,26-32] Yet, the data on the presence of OMLs as a function of prosthesis age and prosthesis use in such populations are limited.[16,18,33] Thus, information is needed to assess the requirements of the PW population. In that regard, epidemiological studies play an important role in evaluating the frequencies of OMLs and comparison of regional findings so that global trends can be identified. Furthermore, studies regarding the status of the oral mucosa provide useful information on associated factors and treatment needs of PWs.

The primary objectives of this study, therefore, were to evaluate the prevalence of OMLs observed in PWs, and to assess the relationship between self-reported hygiene and usage habits of complete and/or partial removable dental prostheses.

Materials and methods

Patient population and documentation

Between January 2009 and January 2011, after taking a general medical and dental history, the conventional oral mucosa of 400 consecutive PWs (252 women; 148 men), aged between 29 and 86 years (mean age: 58 ± 11), was examined clinically. One oral medicine practitioner made examinations at the Marmara University, Faculty of Dentistry, Outpatient Clinic of Oral Diagnosis and Radiology. After initial screening by one clinician, only the patients seeking prosthetic treatment were included and were examined by one specialist for detailed anamnesis. Oral examinations were made as an integral part of triage made for every patient seeking prosthodontic treatment. This was performed under incandescent operatory light, and the provisional clinical diagnosis was recorded. Radiological examinations were performed when needed for other routine restorative or surgical treatments.

This was a prospective study. The information studied by the authors was structured so that individual patients were not identifiable to the investigators. Until 2011, for noninvasive investigations, IRB approval was not necessary.

During systemic history taking, health status and use of prescribed medications were obtained from the official medical report when the patient's self-report was inaccurate. Age, gender, smoking history, alcohol consumption habits, and chief dental complaints of all patients and their last visit to the dentist were recorded at the time of the examination.

Each patient was asked the duration of removable prosthesis use, denture hygiene habits, and educational status. Prosthesis hygiene level was assessed using the Budzt-Jorgensen and Bertram method[34] and ranked as good (no plaque or calculus), fair (plaque or calculus covering less than one-third of the prosthesis), or poor (plaque and calculus covering one-third or more of the prosthesis).

Prosthesis types were evaluated with reference to previous studies[2,30] and classified as complete removable dental prosthesis (CRDP) or partial removable dental prosthesis (PRDP) in the maxilla and/or mandible, and single- or multiple-unit fixed dental prosthesis (FDP) in the maxilla and/or mandible.

The duration of prosthesis use was classified in three groups, namely <5 years, 6–10 years, and ≥11 years. Diagnoses of the OMLs were made based on patient history, according to World Health Organization guidelines.[35] If needed, sampling for exfoliative cytology and histopathology was performed following the clinical examination, and a definitive diagnosis was made for other routine clinical procedures. After clinical diagnosis and planning of the required dental treatments, patients were referred to other departments for treatment.

Statistical analysis

Data were analyzed using SPSS software v.15.0 for Windows (SPSS Inc., Chicago, IL). Data were presented as frequencies (n) and percentages (%) in relation to the overall population. The univariate (Chi-square) test was used to evaluate differences among groups. Selected variables that showed significant differences were included in a backward stepwise multivariate (logistic regression) analysis to establish the strength of their effects on the development of non-prosthesis- and prosthesis-related OMLs. Odds ratios (OR) were calculated with 95% confidence intervals (CI). *P*values less than 0.05 were considered to be statistically significant in all tests.

Results

Demographic characteristics

The mean age of the PWs was 57.5 ± 10.5 years. The percentages of female and male PWs were 63% and 37%, respectively. Of the PWs, 21.8% were <50 years old, and 16.3% >70 years old. The majority of the PWs were nonsmokers (72.3%) and nonalcoholic (93%; Table 1). More than half of the PWs (62.8%) had at least one systemic disease. The most frequent systemic disease was hypertension (31.5%) followed by diabetes mellitus (12.3%), gastrointestinal (GI) disorders (11.8%), cardiovascular diseases (10.8%), and hyperlipidemia (8.8%; Table 2). The patients reported their last visit to the dentist varied between 6 months to 15 years.

Prosthesis type and hygiene practice

The majority of the PWs had PRDP both in the mandible and maxilla (39.5%) followed by CRDP/PRDP (24%) and CRDP in both jaws (21.5%; Table 3). Twenty-seven percent of the PWs reported using their removable prosthesis for ≥11 years; 41.3% had used them for <5 years. In only 23% of the PWs, hygiene of the CRDP/PRDP was poor. Usually, PWs cleaned their prosthesis once to three times a day. Brushing the prosthesis with toothbrush and soap/toothpaste was the most commonly practiced cleaning regimen (85.8%). More than half (64.5%) of

Table 1 Distribution of demographic data of the prosthesis wearers

	n	%
Gender		
Female	252	63
Male	148	37
Age		
<50	87	21.8
50–59	157	39.3
60–69	91	22.8
70 and over	65	16.3
Smoker		
Yes	111	27.8
No	289	72.3
Alcoholic		
Yes	28	7
No	372	93

Table 2 General health problems of the prosthesis wearers as reported in their medical history

	n	%
Any systemic disease		
Yes	251	62.8
No	149	37.3
Systemic diseases		
Hepatic diseases	4	1
Hypertension	126	31.5
Diabetes mellitus	49	12.3
Gastrointestinal disorders	47	11.8
Thyroid dysfunction	29	7.3
Depression	9	2.3
Hyperlipidemia	35	8.8
Autoimmune diseases	6	1.5
Respiratory diseases	25	6.3
Kidney diseases	5	1.3
Neoplastic diseases	2	0.5
Allergies	4	1
Bone/joint disorders	19	4.8
Cardiovascular diseases	43	10.8
Neurological diseases	11	2.8
Blood disorders	8	2

Table 3 Distribution of data on prosthesis type in the maxilla/mandible, age, and usage habits of removable prosthesis PRDP; CRDP; FDP

	n	%
Type of prosthesis		
PRDP/PRDP	158	39.5
CRDP/CRDP	86	21.5
CRDP/PRDP	96	24
PRDP/FDP	28	7
FDP/PRDP	27	6.8
CRDP/PRDP	5	1.3
Age of removable prosthesis		
≤5 years	165	41.3
6–10 years	127	31.8
≥11 years	108	27
Hygiene of removable prosthesis		
Poor	92	23
Fair	140	35
Good	168	42
Frequency of removable prosthesis cleaning		
Sometimes	30	7.5
Once a day	129	32.3
Twice a day	123	30.8
Three times a day	118	29.5
Style of cleaning the removable prosthesis		
Brushing alone	38	9.5
Brushing with toothpaste/soap	343	85.8
Washing alone	19	4.8
Overnight removable prosthesis use and storage		
Overnight use	258	64.5
Immersed in water	111	27.8
Left dry	18	4.5
Immersed in water + chemical solution	13	3.3

the PWs used their prosthesis overnight. Only 3.3% of PWs regularly immersed their prosthesis in chemical products.

Evaluation of oral mucosa

Of the PWs, 75% of the women and 70.9% of the men presented no OML. Among all PWs, 37.8% had prosthesis-related OMLs. Stomatitis Newton Type I (12%), II (11.5%), and III (9.5%) were the most frequent OML (Table 4).

The overall prevalence of prosthesis-related OMLs in women (40.5%) was not significantly different than that of men (31.1%; $p = 0.142$). On the other hand, among non-prosthesis-related OMLs, leukoplakia (4%) was more frequently observed, followed by angular cheilitis (3.5%), fissured tongue (3.5%), and sublingual varicosis (3.5%; Table 5). One male patient had squamous cell carcinoma on the lateral border of the tongue.

OML frequency was higher in PWs having CRDPs than those having PRDPs ($p < 0.05$). Overnight prosthesis use ($p = 0.003$, OR: 13.65; 95% CI: 1.7–109.3), prosthesis age ≥11 years ($p = 0.017$, OR: 1.72; 95% CI: 1.1–2.7), and immersion in water and chemical solution affected the incidence of OML significantly ($p = 0.023$, OR: 1.13; 95% CI: 0.02–1.02; Table 6). These parameters were evaluated in a backward stepwise logistic regression analysis (Negelkerke $r^2 = 0.121$). The explanatory factor model (66.8%) was at a good level. When the healthy and diseased oral mucosa of PWs was evaluated regarding age, gender, smoking, and systemic diseases, no significant differences ($p > 0.05$) were observed.

The effects of parameters such as prosthesis type, be it CRDP or PRDP, overnight use, and nightly storage (immersion in water) were found to be significant and accordingly remained in the model (multivariate analysis). CRDPs increased the prevalence of prosthesis-related OMLs (OR: 2.1; 95% CI: 1.14–3.8). Also, overnight use of CRDPs increased the prevalence of prosthesis-related OMLs (OR: 13.65; 95% CI: 1.71–109.26). Immersing the dentures in water increased the prevalence of prosthesis-related OML by 8.214 times compared to those who did not present OMLs (OR: 8.2; 95% CI: 1.0–67.3). Leaving the

Table 4 Prosthesis-related oral mucosal lesions according to type of the prosthesis

Prosthesis-related mucosal lesions	Prosthesis type			
	Partial/partial (n = 210)	Complete/complete (n = 87)	Complete/partial (n = 103)	Total (N = 400)
	n (%)	n (%)	n (%)	n (%)
Newton type I stomatitis	1 (0.5)	4 (4.6)	7 (6.8)	12 (3)
Newton type II stomatitis	42 (20)	1 (1.1)	3 (2.9)	46 (11.5)
Newton type III stomatitis	7 (3.3)	20 (23)	11 (10.7)	38 (9.5)
Angular cheilitis	3 (1.4)	8 (9.2)	0 (0)	11 (2.8)
Denture hyperplasia	1 (0.5)	22 (25.3)	11 (10.7)	34 (8.5)
Flabby ridge	1 (0.5)	8 (9.2)	8 (7.8)	17 (4,3)
Irritation of suction cup	0 (0)	5 (5.7)	3 (2.9)	8 (2)
Irritation fibroplasia	4 (1.9)	5 (5.7)	3 (2.9)	12 (3)
Denture sore	2 (1)	10 (11.5)	5 (4.9)	17 (4.3)
Hyperkeratosis	1 (0.5)	0 (0)	1 (1)	2 (0.5)

Table 5 Distribution of non-prosthesis-related oral mucosal lesions according to gender

Non-prosthesis-related oral mucosal lesions	Female (n = 252)	Male (n = 148)	Total (N = 400)
	n (%)	n (%)	N (%)
Healthy	189 (75)	105 (70.9)	294 (73.5)
Aphthous ulcer	4 (1.6)	1 (0.7)	5 (1.25)
Amalgam tattoo	3 (1.2)	0 (0)	3 (0.75)
Angular cheilitis	10 (4)	4 (2.7)	14 (3.5)
Atrophic glossitis	5 (2)	1 (0.7)	6 (1.5)
Geographic tongue	2 (0.8)	1 (0.7)	3 (0.75)
Fissured tongue	6 (2.4)	8 (5.4)	14 (3.5)
Foliate papillitis	1 (0.4)	0 (0)	1 (0.25)
Fordyce spots	0 (0)	1 (0.7)	1 (0.25)
Irritation fibroplasia	2 (0.8)	2 (1.4)	4 (1)
Candidiasis	1 (0.4)	0 (0)	1 (0.25)
Lichen planus	10 (4)	2 (1.4)	12 (3)
Leukoedema	4 (1.6)	0 (0)	4 (1)
Leukoplakia	5 (2)	11 (7.4)	16 (4)
Melanin pigmentation	1 (0.4)	1 (0.7)	2 (0.5)
Mucocele	0 (0)	1 (0.7)	1 (0.25)
Pemphigus vulgaris	1 (0.4)	0 (0)	1 (0.25)
Reparative giant cell granuloma	0 (0)	2 (1.4)	2 (0.5)
Squamous cell carcinoma	0 (0)	1 (0,7)	1 (0,25)
Smokers melanosis	1 (0.4)	0 (0)	1 (0.25)
Subingual varicosis	7 (2.8)	7 (4,7)	14 (3.5)

prosthesis dry had no significant effect; however, it increased the prevalence of OMLs (OR: 6.25; 95% CI: 0.59–66.44).

Discussion

Several studies conducted in different populations have reported data on oral hygiene habits and prevalence of OMLs in adults and the elderly.[1,2,7,17,21,27,29,30,36] Those studies revealed the poor hygiene habits of PWs and showed the need for attention to oral health. The number of studies on the oral and general health of the PW population is limited. Thus, this study evaluated the general health characteristics and the prevalence of non-prosthesis- and prosthesis-related OMLs in first-visit attendees in a dental school. In addition, their daily hygiene habits were determined to assess their potential harm to oral health. The evaluation procedures included a short questionnaire and a conventional oral examination by one specialist in the Department of Oral Diagnosis and Radiology.

Table 6 Univariate and multivariate analysis of factors on the prevalence of prosthesis-related oral mucosal lesions

	Univariate (chi-square)			Multivariate (logistic regression)		
	p	OR	%95 CI	p	OR	%95 CI
Prosthesis type						
Partial/partial	0.001**	0.435	0.29–0.66	0.027*	0.564	0.34–0.94
Complete/complete	0.001**	2.836	1.74–4.61	0.016*	2.078	1.14–3.78
Complete/partial	0.617	1.124	0.71–1.78			
Prosthesis age						
0–5 years	0.082	0.692	0.46–1.05			
6–10 years	0.667	0.909	0.59–1.41			
≥11 years	0.017*	1.718	1.1–2.69			
Overnight prosthesis use	0.003**	1.926	1.24–2.99	0.014*	13.648	1.71–109.26
Overnight storage						
Immersion in water	0.112	0.687	0.43–1.09	0.049*	8.214	1.00–67.31
Left dry	0.164	0.457	0.15–1.41	0.129	6.251	0.59–66.44
Immersion in water + chemical solution	0.023*	0.132	0.02–1.02			

OR: odds ratio; CI: confidence interval.

In this study, hypertension and diabetes mellitus were the most frequent medical problems, followed by GI and cardiovascular problems. Hypercholesterolemia, hyper- or hypothyroidism, respiratory, and orthopedic problems were other systemic diseases. Despite the fact that the frequencies were not as high as expected, they were in accordance with trends reported previously.[8,30,37,38]

Prosthesis hygiene was recorded as "poor" in 23% and "fair" in 35% of our population. Since PWs in this study were younger (mean age: 58 ± 11) than in previous reports performed in the same country, these frequencies seem to be lower than those of previous studies where 25.1% of the population showed poor and 24% fair prosthesis hygiene.[8] In recent studies, within the ≥65-year-old group living in residential homes, 55.8% to 57.5% had poor and 28.1% to 28.8% had moderate prosthesis/dental hygiene.[9,39] Only one experienced specialist rated the hygiene level of the prosthesis, which could be considered as a limitation of this study.

The average duration of prosthesis wearing was another parameter evaluated in this study. Dundar and Ilhan Kal reported that 59% of PWs had used their prosthesis for 6 to 10 years.[8] Akar and Ergül[28] showed that the duration of PRDP use was 7.45 years, whereas PWs used their CRDPs for a mean period of 11.88 years. In another study, Ozkan et al reported that the percentage of ≥8 year use of CRDP was 26%.[38] In our study, 27% of the PWs used their CRDP for ≥11 years and 31.8% for 6 to 10 years in relation to the overall number of patients. In this study, 29.5% of the PWs cleaned their removable prosthesis three times, 30.8% twice, and 32.3% once a day. They also indicated that they cleaned their removable prosthesis by brushing alone (9.5%), brushing with toothpaste or soap (30.8%), or water alone (4.8%), which is similar to other reports.[8,9,21,38,40,41]

Interestingly, no significant impact of cleaning regimen was found on oral mucosal health. Brushing the removable prosthesis was the most preferred daily cleaning method even though brushing is considered ineffective to disinfect the removable prosthesis.[42] Thus, the use of chemical agents and silicone polymers containing a cleanser has been suggested to provide a protective barrier on the prosthesis surface.[42] Yet, such disinfection regimens may degrade polymethylmethacrylate, eventually yielding to easier adhesion of *Candida* organisms.[43,44] According to the evidence-based guidelines for the care and maintenance of CRDPs,[11] it is advised that they should be cleaned daily by soaking and brushing with an effective, nonabrasive cleanser and that CRDPs should be immersed in water after cleaning, when not replaced in the oral cavity, in order to avoid warping. These latest guidelines should be implemented in the instructions given to the PW. Interestingly, leaving them to dry overnight did not have a significant effect on the development of OMLs. This aspect may require a closer look from a material research point of view.

Overnight use of a removable prosthesis was recorded as a frequent habit by 64.5% of PWs. This finding is in agreement with that of Evren et al[9] (68.1%), but higher than those of other reports.[19,29] Some studies have shown that as the duration of removable prosthesis use increases, the frequency of OMLs also increases.[45,46] Moskona and Kaplan[45] reported that older patients are more reluctant to replace old removable prostheses and that the duration of prosthesis use increases with age. In our study, duration of removable prosthesis use and an overnight wearing habit were significant parameters affecting the health of the oral mucosa, and a correlation between duration of prosthesis use and OML was observed; ≥11 year removable prosthesis use was associated with an unhealthy oral mucosa among 47.2% of PWs ($p = 0.049$). It has been previously indicated that wearing a removable prosthesis during sleep is an initiator of the development of some OMLs, such as prosthesis-related stomatitis.[13,46] As shown in our study, wearing removable prostheses overnight was the preferred method, and wearing them overnight was significantly associated with the incidence of OMLs, which is in agreement with other reports.[8,9,20,29,30,38,39] Overnight wearing of a removable prosthesis may diminish the protective functions of the saliva and, thus, the resistance of the oral mucosa to destructive factors. Regular night care of

removable prostheses is significantly correlated with a healthy oral mucosa.[23]

Few studies have investigated the correlation between removable prosthesis hygiene and OMLs.[8,21,23,29] The type of removable prosthesis is related to the health state of the oral mucosa. We found a significant difference between CRDP/PRDP use and mucosal conditions. CRDP use increased the frequency of OMLs by 2.836 times compared to PRDP use, and PRDP use by 0.435 times compared to the frequency of healthy mucosa.

Coelho et al[7] stated that hormonal and age-related factors might explain why female denture wearers are more affected by chronic irritation caused by removable prostheses. On the contrary, in this study, age and gender were not significantly associated with developing OMLs. Dundar and Ilhan Kal[8] documented 36.4% prevalence of OMLs in a sample population (N = 700) >60 years old. The frequency of non-prosthesis-related OMLs was 16.5% in our study population, and as a total, the frequency of all OMLs was 54.3%, which was within the range of previous studies (12% to 60%).[8,17,27] Previous studies have reported that the prevalence of lesions is higher among CRDP wearers.[7,30] A CRDP covers a large area of the oral mucosa, which can result in lesion development due to plaque, *Candida* spp., and mechanical irritation. The majority of PRDPs are made of chrome-cobalt-based alloys. Stable chrome-cobalt-based PRDPs reduce the trauma to the mucosa and provide consistent biting force vectors, but ongoing traumatic occlusal contact may increase the rate of stomatitis.[47] Alloy type was not distinguished systematically, which can be considered as another limitation of this study. Thus, a general statement cannot be made regarding the alloy type and consequences on the findings.

The frequency of prosthesis-related stomatitis has been reported to range between 11% and 67%, and has been positively correlated with prosthesis hygiene.[7,13,19,21,30,48] In contrast to previous studies, we evaluated prosthesis-related stomatitis within subgroups (Newton classification) and found a total frequency of 63.49%. While prosthesis-related stomatitis Newton Type II was predominantly in PRDP wearers (23%), Newton Type III was seen mostly CRDP wearers (20%). Previously, prosthesis-related stomatitis has been identified as localized and generalized at an overall rate of 42.3%.[9] That study also showed a positive correlation between prosthesis-related stomatitis and lack of prosthesis hygiene.[9] Often, elderly populations presented a higher prevalence of prosthesis-related stomatitis. Most probably, because our prosthesis-wearing population was younger, we found a significant difference between the prosthesis hygiene and prosthesis-related stomatitis subgroups. Although no significant correlation was found among age groups regarding the frequency of OMLs, 34.5% of OMLs were seen in those <50 years old.

Many OML types have been reported in PWs.[2,8,30,45,49-52] It should be noted that the methodology used in previous studies to evaluate the prevalence of OMLs varied in terms of patient selection, age, percentage of PWs, and the criteria for OML diagnosis. In a long-term screening program with 4098 participants, Pentenero et al[52] evaluated existing OMLs and concluded that PWs had a higher prevalence of OMLs and in particular candidiasis and traumatic and frictional lesions. The results of our study support this finding. In another study, Jainkittivong et al[2] evaluated the oral mucosal conditions of 500 Thais who were >60 years old and showed that varices (59.6%), fissured tongue (28%), and traumatic ulcers (15.6%) were the most common OMLs. The younger population in this study was the reason for the low prevalence of sublingual varicosis, seen in 3.5% of the population. In contrast to previous reports,[1,2,5,27] fissured tongue (3.5%) and traumatic ulcers (4.3%) were seen considerably less frequently. Leukoplakia, fissured tongue, and sublingual varicosis were observed mostly in men, whereas angular cheilitis and lichen planus were found in women. These findings are in line with those of Pentenero et al.[52]

According to our findings, premalignant lesions were uncommon. The incidence of leukoplakia, on the other hand, was 4%, compared to 3.2% in Swedish,[36] 2.5% in Danish,[19] 3% in Brazilian,[17] 4.8% in Thai,[2] and 2.3% in Turkish studies.[8]

The risk of developing oral cancer increases with increasing age, use of tobacco, and heavy alcohol consumption.[25,53,54] Therefore, several measures should be taken to monitor adults and particularly the elderly with such habits. Early detection of premalignancies and malignancies, primarily squamous cell carcinoma, is essential to increase patient survival.[54] The repetitive process of basal cell destruction and regeneration due to chronic irritation might facilitate creation of a neoplastic clone evolving into dysplasia and oral squamous cell carcinoma.[55-57] However, with only one case and no clinical basis, it was not possible to correlate squamous cell carcinoma of the tongue with the prosthesis in this study. Nevertheless, all factors should be considered when examining the oral mucosa of PWs. Both life expectancy and medical technologies are increasing worldwide; however, attendance at dental services by the adult and elderly has not increased where this study was conducted.[58] The variation between the outcomes of the studies may thus highly depend on the health care systems and habits of adult and elderly PWs. Yet, some of the findings demonstrate similar worldwide trends.

Conclusion

From this study, the following could be concluded:

1. Denture age and storage conditions of complete or partial removable prostheses demonstrated a more significant impact on the incidence of OML than frequency of prosthesis cleaning.
2. Overnight use of removable prostheses had a direct influence on the occurrence of OMLs and interestingly, leaving them to dry overnight did not have a significant effect on the development of OMLs.

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