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Intraoral Lesions Associated with Complete Denture Use among Edentulous Patients in Jordan

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Abstract: ***Geriatric patients wearing complete denture may have a variety of intraoral lesions. These lesions can cause discomforts which interfere with mastication, swallowing, speech, and daily social activities. These oral findings in patients wearing removable prosthesis can be found as an acute or chronic reaction to a mechanical injury, microbial infection (mostly Candida), or denture base material irritation. These injuries could be denture stomatitis, traumatic ulcer and fibrous hyperplasia. The aim of this article is to determine the most common type of oral lesions in patients attending royal medical service hospitals in Jordan. Then the final results will be correlated to patient age, gender, and length of time of denture usage. Oral health is essential in the quality of life of edentulous patients. For this reason, it is important to know the most common intraoral lesion, to determine its main risk factor, and to decide the best treatment option.***

Keywords: Complete denture, Denture stomatitis, Traumatic ulcers, Fibrous hyperplasia

1. Introduction

Despite rapid improvements in dental care, around one out of four above 60 years old persons reported using dentures in both developed and developing countries [1]. However, this relatively high denture use among the elderly population is expected to drop in the coming years with the advancement in dental implant procedures [2]. Meanwhile, edentulous patients could suffer from serious oral complications with denture use [3], [4]. Dentures could have several cosmetic and health benefits with proper use [5]. Proper use of dentures includes regular brushing, daily removal at night with plunging in a denture cleaning liquid, replacement every two years, and follow-up with a specialist when the denture breaks or when it causes any oral irritation [6]. Unfortunately, many of the elderly people failed to comply with these maintenance and oral hygiene recommendations [6]. Therefore, it is not surprising to have reports of dental lesions ranging between 50% to 75% between denture users [6].

2. Literature Survey

The most common reported denture complications are oral lesions and periodontal illnesses [3]. It is very frequent to find denture users suffering from denture stomatitis, traumatic ulcer and/or angular cheilitis [3]. These oral lesions can cause discomfort which could interfere with mastication, swallowing, speech, and daily social activities [6]. Several risk factors were reported to be associated with denture-induced oral lesions such as the age of the user, denture age, overnight or during sleep usage of dentures, female gender, especially after menopause, poor denture function or mechanical damage to the denture, and chronic illness such as diabetes mellitus or other diseases that affect patients' immunity [1], [7], [8].

Even though there is high reported prevalence of denture oral complication, it was observed that denture publications have been dropping over the last three decades [2]. Perhaps low interest in dentures have led to low awareness between young dentists and that was reflected as less educational messages for this important population group [2].

3. Problem Definition

The aim of this study is to assess the prevalence of denture stomatitis, traumatic ulcer and fibrous hyperplasia among denture users at the dental clinics of the Royal Medical Services of Jordan. It aims also to assess associated factors with dental lesions.
To the best of our knowledge, this was the first study to examine the prevalence of oral lesions among denture users in Jordan and in the Middle East region. Oral health is essential in the quality of life of edentulous patients [6], [9], [10]. For this reason, it is important to know the most common intraoral lesion, to determine its main risk factor, and to decide the best treatment options.

4. Methods

This cross-sectional study was approved by the Royal Medical Services of Jordan research committee. A verbal consent form was collected from all study participants. The study was according to the Declaration of Helsinki ethical principles. A convenient sample was select from dental clinics at the Royal Medical Services hospital. Inclusion criteria were subjects above 35 years old, regular or irregular complete denture user, and denture aged one year or more and less than 5 years. After explaining the study to the patients and getting their consent, a questionnaire was filled by a certified Prosthodontists at the Royal Medical Services. The questionnaire included demographic data, denture age, and oral examination findings. Denture stomatitis was defined as erythematous lesions in areas in contact with the denture. Denture stomatitis, also commonly known as 'atrophic candidiasis', was diagnosed by an oral examination [11]. Traumatic ulcer was defined as any

open sore in the oral cavity that results from denture trauma and it was also diagnosed by an oral examination [12]. Fibrous hyperplasia was defined as a white, yellowish or mucosal colored, smooth-surfaced, asymptomatic, soft nodule that results from denture trauma [13]. Study data were collected between January 2016 and February 2020. Study results were analyzed using IBM Statistical Package for Social Science (SPSS) version 26.0 (SPSS incorporation, Chicago, Illinois, USA). The study data were entered in Microsoft Excel spreadsheet (Microsoft Office Excel). Data cleaning was done in Microsoft Excel. Missing data, typos and other data entry errors were fixed by performing a cross-check against the paper forms. The data were then imported and coded into an SPSS spreadsheet. Complete descriptive data analyses were performed. Chi-square ($\chi 2$) test was used to calculate if there were differences in the proportion of oral lesions. For all statistical tests in this research, the level of significance was set at p-value < 0.05.

5. Results and Discussion

Out of the 1,397 participants in this cross-sectional study, 688 (49.2%) were males and 710 (50.8%) were females. The participants were almost equally distributed between ≤ 50 years, 51 to 60 and > 60 years age groups. Using the complete denture for more than a year and less than 3 years was reported by 469 (33.5%) of the participants, using it for 3 years to less than 5 years was reported by 521 (37.3%) of the participants, and using it for 5 years was reported by 408 (29.2%) of the participants. Table I summarizes the demographics and denture age of the study participants.

Table I: Description of participants

		No. (%)	p-value
Gender	Male	688 (49.2%)	0.556 (No significant difference in the percentage of the genders)
	Female	710 (50.8%)	
Age	≤ 50 years old	439 (31.4%)	0.061 (No significant difference in the percentage of the age groups)
	51 – 60 years old	452 (32.3%)	
	>60 years old	507 (36.3%)	
Denture usage duration	1 – 2 years	469 (33.5%)	0.001 (There is a statistically significant difference in the numbers of participants according to their denture usage duration)
	3 – 4 years	521 (37.3%)	
	5 years	408 (29.2%)	

Denture stomatitis was identified in 740 (52.9%) of the participants. Traumatic ulcer was identified in 208 (14.9%) of the participants, while 280 (20.0%) of the participants were diagnosed with fibrous hyperplasia. Table II demonstrates the prevalence of intraoral lesions between the study participants.

Table II: Distribution of participants based on intraoral lesion findings

Intraoral lesion	n	%
Denture stomatitis	740	52.9
Traumatic ulcer	208	14.9
Fibrous hyperplasia	280	20.0

On bivariate analysis, a statistically significant association between gender and denture stomatitis was detected (p =0.017): 56.1% of female patients were diagnosed with denture stomatitis compared to 49.7% of male patients. The same significant association was detected between denture age and denture stomatitis (p <0.001): patients who used the denture for 3 or 4 years had the highest prevalence of denture stomatitis (66.0%), followed by those who used it for 5 years (60.3%) and the lowest prevalence of denture stomatitis was between patients who used it for 1 or 2 years (32.0%). On the other hand, the association between denture stomatitis and patients' age was not statistically significant (p =0.707). Similarly, the traumatic ulcer was associated with patients' gender and it was statistically significant (p < 0.001): 21.4% of male patients were diagnosed with a traumatic ulcer, while only 8.6% of female patients were diagnosed with it. Also, the association between denture age and the traumatic ulcer was statistically significant (p < 0.000). The highest prevalence of traumatic ulcer (31.3%) was between the group that used the complete denture for 1 or 2 years followed by those who used it for 5 years (12.3%) and the lowest prevalence was between denture users for 3 or 4 years (2.1%). The association between traumatic ulcers and patients' age was not statistically significant (p = 0.829).

Likewise, fibrous hyperplasia was associated with patients' gender. This association was statistically significant (p < 0.001): 15.4% of male patients had fibrous hyperplasia while 24.5% of female patients had it. Also, the association between denture age and fibrous hyperplasia was statistically significant (p < 0.000). The highest prevalence of fibrous hyperplasia (23.2%) was between the group who used the complete denture for 3 or 4 years followed by those who used it for 1 or 2 years (22.4%) and the lowest prevalence was between denture users for 5 years (13.2%). The association between fibrous hyperplasia and patients' age was not statistically

significant (p = 0.801). Table III summarizes the results of the bivariate analysis.

Finally, multivariate analysis revealed that gender remained significantly associated with denture stomatitis after adjusting for the other variables. Female patients were 1.3 times more likely to have denture stomatitis compare to male patients (95% C. I. = 1.04 – 1.6). This was statistically significant as the 95% confidence interval did not include unity.

Patients who used dentures for 3 or 4 years were 4.1 times more likely to have denture stomatitis compared to patients who used it for 1 or 2 years (95% C. I. = 3.1 – 5.4), and patients who used dentures for 5 years were 3.3 times more likely to have denture stomatitis compared to patients who used it for 1 or 2 years (95% C. I. = 2.5 – 4.4). This was statistically significant, as the 95% confidence intervals did not include unity. On the other hand, the association between denture stomatitis and age group remained statistically not significant.

In addition, multivariate analysis revealed that gender was significantly associated with a traumatic ulcer after adjusting for the other variables. Female patients were less likely to have a traumatic ulcer than male patients (95% C. I. = 0.2 – 0.4). Also, patients who used dentures for 3, 4 or 5 years were less likely to have a traumatic ulcer compared to patients who used it for 1 or 2 years and this was statistically significant associated after controlling for other variables.

The last regression module was to analyze the factors that were associated with fibrous hyperplasia. Gender was significantly associated with fibrous hyperplasia after adjusting for the other variables. Female patients were 1.7 times more likely to have fibrous hyperplasia compared to male patients (95% C. I. = 1.3 – 2.3). All other factors were not statistically significant associated with fibrous hyperplasia. Table IV includes the results of three regression modules that were used in the multivariate analysis of factors associated with intraoral lesions.

Table III: Bivariate analysis of factors associated with intraoral lesions

Variable		Denture stomatitis N (%)	P-value
Gender	Male	342 (49.7%)	0.017
	Female	398 (56.1%)	
Age	≤ 50 years old	235 (53.5%)	0.707
	51 – 60 years old	244 (54.0%)	
	>60 years old	261 (51.5%)	
Denture usage duration	1 – 2 years	150 (32.0%)	< 0.001
	3 – 4 years	344 (66.0%)	
	5 years	246 (60.3%)	
Variable		Traumatic ulcer N (%)	P-value
Gender	Male	147 (21.4%)	< 0.001
	Female	61 (8.6%)	
Age	≤ 50 years old	63 (14.4%)	0.829
	51 – 60 years old	71 (15.7%)	
	>60 years old	74 (14.6%)	
Denture usage duration	1 – 2 years	147 (31.3%)	< 0.001
	3 – 4 years	11 (2.1%)	
	5 years	50 (12.3%)	
Variable		Fibrous hyperplasia N (%)	P-value
Gender	Male	106 (15.4%)	< 0.001
	Female	174 (24.5%)	
Age	≤ 50 years old	91 (20.7%)	0.801
	51 – 60 years old	86 (19.0%)	
	>60 years old	103 (20.3%)	
Denture usage duration	1 – 2 years	105 (22.4%)	< 0.001
	3 – 4 years	121 (23.2%)	
	5 years	54 (13.2%)	

Table IV: Adjusted Effect of Study Variables on intraoral lesions

Regression module 1 - Adjusted effect of study variables on denture stomatitis		
Variable		OR (95% C.I.)
Gender	Male	Reference
	Female	1.3 (1.04 – 1.6)
Age	≤ 50 years old	Reference
	51 – 60 years old	1.0 (0.8 – 1.3)
	>60 years old	0.9 (0.7 – 1.2)
Denture usage duration	1 – 2 years	Reference
	3 – 4 years	4.1 (3.1 – 5.4)
	5 years	3.3 (2.5 – 4.4)
Regression module 2 - Adjusted effect of study variables on a traumatic ulcer		
Variable		OR (95% C.I.)
Gender	Male	Reference

	Female	0.3 (0.2 – 0.4)
Age	≤ 50 years old	Reference
	51 – 60 years old	1.1 (0.8 – 1.7)
	>60 years old	1.0 (0.7 – 1.5)
Denture usage duration	1 – 2 years	Reference
	3 – 4 years	0.05 (0.02 – 0.09)
	5 years	0.3 (0.2 – 0.4)
Regression module 3 - Adjusted effect of study variables on fibrous hyperplasia		
Variable		OR (95% C.I.)
Gender	Male	Reference
	Female	1.7 (1.3 – 2.3)
Age	≤ 50 years old	Reference
	51 – 60 years old	0.9 (0.6 – 1.3)
	>60 years old	1.0 (0.7 – 1.4)
Denture usage duration	1 – 2 years	Reference
	3 – 4 years	1.0 (0.8 – 1.4)
	5 years	0.5 (0.4 – 0.8)

To the best of our knowledge, this study was the largest study on edentulous patients in Jordan and in the Middle East region. The etiology of denture stomatitis is still not fully understood [14]. However, several epidemiological studies have shown that it is prevalent among denture users [6], [14]–[16]. Brantes et al. reported a 63% prevalence of denture stomatitis. That was slightly higher than the current study prevalence of 53%. The average duration of denture use at the Brantes et al. study was longer than the current study, and this could explain the slight difference in denture stomatitis prevalence [6]. The reported prevalence range of denture stomatitis was between 15% and 70% [14]. On the other hand, traumatic ulcer prevalence (15%) was in line with Martori et al. study on Spanish patients. Similarly, the findings of a recently published Brazilian study revealed a 19% prevalence of fibrous hyperplasia among denture users, and this was almost the same prevalence of this study (20%) [6].

Several factors are associated with intraoral lesions among complete denture users. The most commonly reported factors were related to patients' comorbidities, poor hygiene practices such as accumulation of denture plaque, candida infection, poor fitting of the denture, female gender, overnight use of the denture, and longer denture age [1], [3], [6], [17]. This study showed that denture stomatitis and fibrous hyperplasia were indeed more common between female users of complete denture. Perhaps for cosmetic reasons, female patients tend to use the denture for a longer duration or overnight and this could expose them to a higher risk for intraoral lesions or for candida growth [1], [17]. However, it was surprising to find that female users had less traumatic ulcers than male users and that longer duration of denture use was associated with less traumatic ulcers in these study participants. One of the possible explanations for this surprising finding could be that those female patients would report painful ulcers earlier than male users and those new users could have a higher risk of a poorly fitting denture.

6. Conclusion

Complete dentures have several benefits to patient's wellbeing and functionality [5]. Having a high prevalence of intraoral lesions between denture users raises an alarm to provide them with proper oral health education and dental follow-up to prevent and manage these complications. Several low cost and evidence-based interventions are available to prevent these lesions [11], [18]–[20]. Modern dentistry has the trend to focus on cosmetic implants, yet removable denture is still used and will continue to be used by many of our senior patients, and they deserve better management for their oral health and wellbeing [2], [5], [21].

7. Future Scope

Although this study has a large sample size, it is not without limitations. The study sample was a convenient sample, and this limits the generalization of its findings. Also, it is a cross-sectional study so it cannot prove the causality of the outcomes. In addition, the focus of this study was on the general intraoral lesions and it did not assess the types of each lesion, such as the types of denture stomatitis. Screening for intraoral lesions between denture users is recommended to be a routine part of their oral care and further longitudinal research is needed to identify the best management methods for these lesions.

Author Profile

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