Predisposing Factors associated with Denture Induced Stomatitis in Complete Denture Wearers

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ABSTRACT

Statement of Problem: The most common oral fungal infection, denture induced stomatitis (DIS), is caused by the yeast candida, which is a normal flora of the digestive and vaginal tracts. Various predisposing factors have been associated with denture related stomatitis caused by candida albicans.

Purpose: This study aimed to determine the prevalence of DIS and its predisposing factors in a sample of Iranian population admitted to Dental School of Tehran University.

Materials and Methods: In this descriptive, analytical, and cross-sectional case series study 141 clinically healthy complete denture wearer patients attending dental school were enrolled through history taking and examination. Data about age, sex, denture age, dental hygiene habits, smoking habits and wearing at night were collected. Data analysis was undertaken on a computer, using SPSS 11.5; Phi test and crammers V test statistical methods were used.

Results: In a total number of 141 patients, 38.3% showed DIS. There were 40.8% male and 35.7% female. There was no statistical relationship between age (p =0.117), sex (p = 0.531), denture age (p =0.166), denture hygiene habits (p =0.144), and smoking habits (p =0.126) and the presence of DIS, but an association between wearing at night and presence of DIS was demonstrated (p =0.006).

Conclusion: It is believed that wearing complete denture at night can increase the prevalence of DIS. Therefore, it is recommend that denture wearers be informed about the effect of dentures on the occurrence of denture induced stomatitis.

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Introduction

The most common form of oral candidiasis is candida associated denture stomatitis [1]. The prevalence of denture related stomatitis in edentulous patients has been reported 62%, 39% and 23%, respectively by different researchers [2-4]. Denture

Induced Stomatitis (DIS) causes certain clinical changes in the oral mucosa of the denture bearing tissues [5]. The most popular methods of classification of DIS are derived from Newton's original method that scores according to the severity of the erythema [6]. These changes are characterized by flat or granular erythematic area and are found under complete or partial denture in both jaws, but more frequently in the maxilla [5, 7].

The etiology and predisposing factors of DIS included systemic and local predisposing factors such as microbial factors, denture cleaning methods, wearing dentures (especially through the night), ill fitting denture, denture integrity (fracture, crack, hole…), poor oral and denture hygiene, xerostomia, smoking, quality and quantity of saliva, occlusion, parafunctional habits and carbohydrate rich diets, denture age and possibly a defect in the host's defense mechanism [8]. Common belief suggests that interplay of most of these factors is the pathogenesis of the disease. The extend of the interplay of these factors is still a controversy. Lack of denture cleaning and presence of the plaque forming on the tissue fitting surfaces of dentures are considered to be the most important factor involved in the etiology of DIS [1, 5].

It is interesting that a similar study about the etiology and predisposing factors associated with DIS in Iranian population has never been done, although it has recently been done in other countries [3, 5, 9]. So, this study was designed aiming to investigate the prevalence of DIS and its relationnship to age, sex, denture age, denture hygiene habits, smoking habits and wearing at night as local predisposing factors in a sample of Iranian patients admitted to Dental School of Tehran University.

Materials and Methods
This descriptive, analytical, and cross-sectional case series study included 141 clinically healthy complete denture wearer patients attending dental school

through history taking and examination.

Taking medical and dental history, oral and head and neck examination, required laboratory tests (CBC, FBS, BUN) were done by an oral medicine specialist. These patients were classified as denture wearers if they had worn the denture in the previous 3 months. Taking medicine, including antibiotics, antifungal and steroids, or any known debilitating systemic disease (based on the findings of medical history and laboratory tests) were considered as exclusion criteria.

The questionnaire comprised topics relevant to the study including age, sex, denture age, denture hygiene habits, smoking habits (smoking more than one cigarette per day) and wearing at night. Based on other studies (such as Markovic, Valentina, Shulman), diagnosis of DIS was based on oral mucosal examination (without microbiology) by oral medicine specialist [6, 10-13]. The three rankings for clinical classification of DIS [2, 4] were included in our study. Oral examination was also done immediately after the interview to confirm the presence or absence of DIS. Data analysis was undertaken on a computer, using SPSS 11.5 for windows; Phi test and crammers V test statistical methods were also performed.

Results
In this study, the prevalence of DIS was 38.3% (40.8 % male, 35.7% female). There was no significant relationship between age (p =0.117), sex (p =0.531), denture age (p =0.166), denture hygiene habit (p =0.144), smoking habit (p =0.126), and the presence of DIS (Table 1-3); however, there was a significant statistical relationship between wearing the denture at night and the presence of DIS (p =0.006)

Discussion
The prevalence of 38.3% for DIS is within the range found by other researchers. Shulman [6] reported

Table 1 Relationship between age and the presence of DIS

Age	Stomatitis				Total	
	no		Yes			
	%	Number	%	Number	%	Number
Under 44	100	7	0	0	100	7
45 to 54	58.6	17	41.4	12	100	29
55 to 64	53.5	23	46.5	20	100	43
Over 65	64.5	40	35.5	22	100	62
Total	61.7	87	38.3	54	100	141

Table 2 Relationship between denture hygiene habit and the presence of DIS

Hygiene habit	Stomatitis				Total	
	no		Yes			
	%	Number	%	Number	%	Number
Water rinse	33.3	2	66.7	4	100	6
Brush	63.3	85	37.0	50	100	135
Total	61.7	87	38.3	54	100	141

Table 3 Relationship between denture smoking habit and the presence of DIS

Smoking habit	Stomatitis				Total	
	No		Yes			
	%	Number	%	Number	%	Number
No	63.8	81	36.2	46	100	127
Yes	42.9	6	57.1	8	100	14
Total	61.7	87	38.3	54	100	141

26.8% out of 210 patients and Dwairi [11], 38% out of 137 patients. Although numerous factors for the development of DIS have been considered, the opinions on its main cause have not been agreed upon and are often contradictory [1, 4, 13]. In our study, there was no significant relationship between DIS and denture age, denture hygiene habit, smoking habit. But there was a significant relationship between wearing the denture at night and DIS.

Jay evaluated the DIS prevalence in the USA population and found that DIS is associated with the amount of tissue covered by dentures and constant denture wearing which is in agreement with our study [14]. Also, Daniluk concluded that denture hygiene status is a significant factor in promoting

bacterial colonization in 57 removable denture wearers. He found that although DIS is usually caused by poor denture hygiene, it may be worsened by immunosuppression. So, denture hygiene is the obvious method for ensuring that the denture remains clean [10].

Jean reassessed the presence of Candida albicans in DIS on 42 subjects. Other reasons stated were the age of the dentures (25.5%), instability (12.8%), broken appliance (8.5%), and others (6.4%). Among the risk factors that show a relationship with stomatitis, their evaluation indicated that wearing dentures at night (in agreement with our study) was associated with extensive inflammation in DIS [15].

In the relationship between smoking habit and DIS, no statistically significant findings were obtained, and these findings are in agreement with Markovi and Shulman's studies [6, 13].

The presence of DIS in relation to denture hygiene habit was not statistically approved in this study. This finding is in agreement with earlier studies done by Cleick [12] and Markovic [13], but our findings were in disagreement with those of Jeganathan [5]. So, further investigation is required to be done. The importance of clean dentures in DIS patients should not be underestimated because dentures containing debris, tartar and stain cause irritation and subsequent tissue response. Food particles located between the denture and the gingiva or between the denture and the palate allow multiplication of Candida and bacteria which can cause DIS [16-17]. However, we know that DIS is the result of the interaction of several factors (such as the quality of denture and saliva, …) which are more important for the development of inflammation than only denture hygiene [8, 13, 15].

Old dentures are thought to be a predisposing factor in DIS [5], but we did not find a statistically significant relationship between old dentures and DIS and it's the same as Jeganathan [5] and Bihan [16] and Markovic's [13] reports. Denture age is

thought to be a predisposing factor for the development of denture stomatitis, mainly due to the poor possible fitting of the denture, roughness of its surface, impossibility of adequate cleaning and accumulation of plaque and microbial pathogens [4-5]. However, other researchers, who demonstrated that denture age is not crucial in the incidence and development of inflammatory changes, do not agree. Namely, all the subjects of Markovic's study [49], both those with DIS and the control group, had equally old dentures. However, in the subjects with DIS, older dentures were more infected, which agrees with our study and the reports of the authors who pointed out that the quality of the denture is more important for the development of inflammation than its age [13]. Different smoking habits, denture wearing habits, denture hygiene habits, denture cleaners and oral hygiene instructions had no significant effect on the degree of DIS in complete denture users ($p > 0.005$).

The integrity of the mucosa is not necessarily threatened by age but its changes may be accelerated by stress, trauma or disease as well as by drugs used in the treatment of the disease [5]. General disorders, particularly of a nutritional and metabolic nature, and side-effects caused by pharmacotherapy weaken the resistance of the mucosa, making it susceptible to the action of various microbial pathogens, bacteria and fungi and to infection [14, 17]. It seems that DIS which develops frequently in older people's mouths is the result of interaction of several factors, although merely wearing a removable denture cannot be considered as its cause if appropriate oral and general health conditions are present [13]. The presence of a denture on the oral mucosa by itself alters the local environmental conditions due to the inaccessibility of the saliva and lack of mechanical cleaning by the tongue [2, 10]. During night, the whole volume of the saliva decreases. Hence, dentures act as reservoirs that harbor Candida within a mixed species of bacterial biofilm. So, patients that wear denture at night increase the development of DIS [7, 10, 17].

Among the evaluated factors, the use of denture at night showed positive association to DIS, and this confirms the findings of other studies, so continuous wearing of the denture by holding plaque masses in contact with the oral mucosa for an extended period of time can predispose patients to DIS. Therefore, by not using the denture over night, we can eliminate this factor and let the saliva with its containing agents such as IgA, Enzyme, PH and mechanical effects fight against the organisms [2, 10, 16].

Conclusion

Since a positive association was demonstrated between the complete denture and prevalence of DIS in this study, we recommend that the denture wearers be informed via multi-media to avoid using denture during night time. Other local and systemic predisposing factors such as xerostomy, carbohydrate usage, and nutrient habits that affect DIS need to be evaluated.

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