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Original Article

Prevalence of Risk Factors for Denture Stomatitis in Complete Denture Wearers

Laura Lourenço Morel[1], Anna Paula da Rosa Possebon[2], Fernanda Faot[1], Luciana de Rezende Pinto[1,*]

[1] Department of Restorative Dentistry, School of Dentistry, Federal University of Pelotas, Pelotas, RS, Brazil.

[2] Graduate Program in Dentistry, School of Dentistry, Federal University of Pelotas, Pelotas, RS, Brazil.

Corresponding author:
Luciana de Rezende Pinto
Department of Restorative Dentistry, School of Dentistry, Federal University of Pelotas, GonçalvesChaves St 457, Center, Pelotas 96015560, RS, Brazil.
Fax: +55 53 32256741.
E-mail address: lucianaderezende@yahoo.com.br

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Aim: The prevalence of denture stomatitis and the relationship with its risk factors was evaluated via secondary data from 62 complete denture (CD) wearers, between 2015 and 2017. **Methods:** The data was stored in an Excel database and was analyzed using the statistics software STATA/SE 12.0. A descriptive analysis was performed taking into account a categorization of the clinical variables according to risk factor in 4 domains: CD usage, systemic health, hygiene habits, and usage habits. The association amongst the denture stomatitis and risk factors variables was tested by the Chi-square test and the results were statistically significant at p-values <0.05. **Results:** The CD wearers participants were composed by a majority of elderly (80.64%) and women (72.78%); with 45.16% having been using the current denture for more than 10 years and another 74.19% related a continuous usage. Diabetes and hypertension were related by 83.87% and 67.74%, respectively, with 87.10% using medication. Although 75.80% reported cleaning their dentures 3 times per day or more, and 59.68% considered their oral hygiene very good, 50% of the complete dentures showed dirtiness and clinical signs of Denture Stomatitis were present in 30.64% of the patients. Despite of the evaluated sample shows many risk factors for the development of the disease, an association between the variables was not observed. **Conclusion:** Considering the high prevalence of the disease in the studied sample, preventive and educational measures on denture usage and hygiene must be reinforced in order to maintain the oral health of the edentulous patients.

Keywords: Denture, complete. Stomatitis, denture. Risk factors.

Introduction

In Brazil, there is a high prevalence of dental loss and edentulism, especially on elderly people, when compared to other age groups[1]. Nearly 62.6% of the elderly population in Brazil wears the upper complete denture (CD) and 40.3% still shows a need to use the CD[2]. Complete denture pair promotes the huge positive impact of the CD wearers, mainly in elders, is well-documented, mainly because stable and retentive CD improve masticatory function, phonation, muscular and articular comfort, aesthetics, socialization, and self-esteem[3].

Around 70% of the CD wearers develop Chronic Erythematous Candidiasis, also known as "Denture Stomatitis"[4]. This pathology is characterized by a fungal infection that triggers a chronic inflammation on the mucous membrane that covers the hard palate, caused by the pathological growth of the *Candida albicans*. Findings from Bianchi et al.[5] (2016), showed that 83.3% of the CD wearers show *C. albicans* in their saliva samples. One well known contribution to this scenario is the fact that CD bases are fabricated using polymethylmethacrylate still present problems related to their technical processing mainly related to finishing and polishing. As result, their surfaces are microporous, which favors the adhesion of microorganisms that colonize the surface and the interior of the acrylic[6]. Thus, the presence of fungi from the *Candida sp* associated to other microorganisms that form the denture biofilm, is one of the main risk factors in order to develop Denture Stomatitis. In addition, long periods of usage or the continual use of the CD, associated to trauma and faulty oral and denture hygiene, predispose the development of the disease. Besides that, factors related to the individuals, such as the systemic health condition, presence of chronical diseases, diet, hormonal oscillations, immunodeficiency, saliva quality and quantity, have a direct influence on the risks of Denture Stomatitis[7].

In order to prevent the disease, CD wearers must be oriented to make a constant evaluation of the oral cavity and the CD status, as well as being always attentive to the adaptation of the CD to the oral tissues, and also their usage habits and care[8]. It is also indispensable that the cleaning methods are followed correctly by the patients. The combination of mechanical and chemical cleaning methods shows efficiency, as long as the CD wearer knows how to proceed a correct disinfection[9]. The regular hygiene of the CD guarantees the efficient removal of the formed biofilm, as well as a significant variation of the dentures microbiota through the different types of materials of the dentures hygiene[10].

The objective of this study is to evaluate the prevalence of Denture Stomatitis in CD wearers and to investigate the association with risk factors as time of upper complete denture usage, hypertension and diabetes presence, use of medications, hygiene habits and usage habits. The tested null hypothesis indicates that there is no relationship between the risk factors of the Denture Stomatitis and the development of this pathology.

Materials and Methods

The prevalence of the risk factors for Denture Stomatitis was evaluated through secondary data from the medical records of 62 patients, superior CD wearers, treated

at the Complete Denture Clinic of Dentistry School - Federal University of Pelotas, from 2015 to 2017. Individuals who agreed to participate, signed a written informed consent based on the Declaration of Helsinki. Data referring to age, time of denture usage, systemic health, hygiene habits, and denture use was collected. Information on the presence of signals for denture stomatitis, and visible dirt at the internal surface of the denture were also evaluated. The attendants were classified according to the presence of Denture Stomatitis and its severity according to the classification from Newton[11] (1962). Clinically, the Denture Stomatitis can be classified according to the gravity of its clinical signs: type I (punctate hyperemia): characterized by the hyperemia of the ducts of the minor palatine salivary glands; which confers a erythematous punctate aspect, and can occupy disperse areas or small ones localized on the palate; type II (diffuse): shows a smooth and atrophic mucosa, with an erythematous aspect on all of the area below the denture; type III (granular): is frequently associated to the suction chamber, ailing the central region of the palate with a nodular and rough clinical appearance of the mucosa[11].

The variables related to the risk factors for the development of Denture Stomatitis collected from the anamnesis questionnaire were grouped in domains: CD usage (age, gender, time of upper complete denture usage), systemic health (hypertension and diabetes presence, use of medications), hygiene habits (frequency of the CD and oral cavity cleaning and the products used for it, self-perception on the CD and oral cavity cleaning, presence of dirt at the internal surface of the upper CD, usage habits (continuous usage of the denture and frequency of continual usage). The data collected were stored in an Excel (Microsoft Office 2007) database. The variables were analyzed using the STATA/SE 12.0 statistical software and described according to the distribution of the frequency. The association amongst the variables "presence of denture stomatitis" and "risk factors" was tested by the Chi-square test. Values of p lower than 0.05 were considered statistically significant.

RESULTS

The "CD usage" domain, composed by the characterization of the sample according to the distribution through gender, age and time of upper CD usage showed a majority of women (72.78%) and elderly above 60 years of age (80.64%). Twenty-eight patients (45.16%) used the same upper CD for more than 10 years (Table 1). The "systemic health" domain showed medication usage by 87.10% of the sample, diabetes for 16.13% and hypertension for 32,26% (Table 2).

From the 62 evaluated patients, 19 (30.65%) showed clinical signs of Denture Stomatitis, with 14 (22.58%) classified as Type I, 4 (6.5%) as Type II, and 1 (1.61%) as Type III. In relation to the "hygiene habits" domain, 75.80% and 64.51% of the patients answered that they cleaned their CD and oral cavity three times per day or more, respectively. The most used products for the denture hygiene were the hard toothbrush (38.71%) and neutral dental paste (93.55%). The use of sodium hypochlorite diluted in water and sodium bicarbonate was reported by 35.48% and 22.58% of the sample, respectively. Although 59.68% of the evaluated patients considered their oral and denture hygiene as very good, it was possible to note the presence of visible biofilm at the internal portion of the upper complete dentures in 50% of the evaluations (Table 3). On

Table 1. Distribution of the sample according to the upper complete denture usage domain.

Upper Complete Denture Usage		*n*	%
Age	*< 60 years old*	12	19.36%
	> 60 years old	50	80.64%
Gender	*Woman*	45	72.78%
	Man	17	27.22%
Time of use	*< 10 years of use*	34	54.83%
	> 10 years of use	28	45.16%

Table 2. Distribution of the sample according to the systemic health domain.

Systemic Health		n	%
Hypertension	*Yes*	20	32.26%
	No	42	67.74%
Diabetes	*Yes*	10	16.13%
	No	52	83.87%
Medication use	*Yes*	54	87.10%
	No	8	12.90%

Table 3. Distribution of the sample according to the hygiene habits domain.

Hygiene Habits		*n*	%
Daily frequency of denture cleaning	*1 time*	2	3.23%
	2 times	13	20.97%
	3 times or more	47	75.80%
	Does not do	5	8.06%
Daily frequency of oral cavity hygiene	*1 time*	7	11.29%
	2 times	10	16.13%
	3 times or more	40	64.51%
	Does not do	5	8.06%
Products used for hygienization	*Hard bristle toothbrush*	24	38.71%
	Neutral dental paste	58	93.55%
	Sodium Hypochlorite diluted in water	22	35.48%
	Sodium Bicarbonate	14	22.58%
Self-perception of the denture hygiene	*Very good*	5	8.06%
	Good	37	59.68%
	Average or bad	20	32.25%
Visible dirt at the denture	*Yes*	31	50%
	No	31	50%

the "usage habits" domain, 74.19% uses the denture continuously; with 66.13% using it at all times (Table 4). The association test did not verified a significant statistical difference amongst the presence of clinical signs of Denture Stomatitis and the vari-

Table 4. Distribution of the sample according to the upper complete denture usage habits.

Usage Habits		n	%
Continuous use	*Yes*	46	74.19%
	No	16	25.81%
Frequency of continuous use	*1 to 2 times per week*	2	3.,22%
	3 to 4 times per week	3	4.84%
	5 to 6 times per week	41	66.13%

ables of each of the tested domains (complete denture usage, systemic health, usage and hygiene habits), thus, the null hypothesis of the study was accepted.

DISCUSSION

According to data from the *National Oral Health Research* from 2010, Brazil presents up to 54% of fully edentulous people[2]. Cardoso et al.[12] (2016) , predicts an increase in edentulism in the next few years for people between 65 and 74 years old, that, according to Azevedo et al.[3] (2015), is considered a natural consequence of aging. Besides that, a study by Peres et al.[1] (2013) showed that the prevalence of edentulism was associated with low income and schooling. In spite of that, there is no statistical association between aging and the presence of Denture Stomatitis[13]. The present study agrees with the findings from Tay et al.[13] (2014), on the absence of correlation, and also on the prevalence of a sample above 60 years old.

From a literature revision that focuses on the use of CD in Brazil, it was observed that women present a higher prevalence of edentulism and use of upper CD[1]. It is also important to highlight that women seek dental health care with a higher frequency than men, for self-care reasons which are more frequent on their gender[14]. The results of the present study agree with those ones, pointing a prevalence of over than 70% of women that are users of complete denture.

On the prevalence of the Denture Stomatitis, female gender is still the majority, although the difference is not significant when compared to their male counterparts, with 58.3% and 41.3%, respectively[13]. Many systemic diseases, such as leukemia, AIDS, autoimmune diseases, may directly interfere on the oral cavity[5]. On the systemic health and its association with the presence of Denture Stomatitis, a well-defined relationship may be observed between the hyposalivation from the diabetes and the clinical signs of the disease[15], however, the association between the diabetes and the development of Denture Stomatitis was not found in the study by Peric et al.[16] (2018). According to those authors, that result is justified due to the reduced number of people on the studied sample, which does not count as being representative for the whole population. Chopde et al.[17] (2012), points out a relationship between hypertension, the use of medications, and diabetes with the development of Denture Stomatitis. In the sample of the present work, almost 90% of the patients made a systemic use of medications, and more than 30% suffered from hypertension. A total of 16.13% presented diabetes.

For the hygiene habits of the patients with upper CD, poor cleaning of the mouth and the denture is the predisposing local factor for the disease[18]. Besides that, the

patients present a limited knowledge on oral and denture hygiene[19]. It is indispensable that the cleaning methods are made correctly by the CD wearer. The denture brushing is the mechanical method that shows success on the dislocation of the biofilm, although the usage of chemical products for denture immersion is still extremely important for an efficient reduction of the *Candida albicans* growth[20]. The regular hygiene of the dentures is needed in order to ensure an efficient removal of the formed biofilm, as well as a significant variation of the dentures microbiota by the different types of materials of the denture hygiene[10]. Souza et al.[21](2017) points out that the brushing of the palate may influence in the reduction of the inflammation, without the need for antifungals. Less than 50% of the sample of the present study cleans their CD at least 3 times a day. Furthermore, visible dirt could be perceived in half of the total internal surfaces of the upper complete dentures, which can be related to the unfamiliarity with methods and materials indicated for hygiene, as well as with the frequency with which they should do it. Difficulties related to advanced age, such as impaired vision and motor limitations also contribute for a poor hygiene of the dentures. Instructions in order to adopting a daily routine for denture hygiene, both mechanical and the immersion in chemical products, is essential in order to secure the biofilm the oral and denture biofilm[22].

The CD usage habits may influence the development of the Denture Stomatitis, as well as its type according to the Newton classification. Its highest prevalence, with 70%, was found in CD with 10 years of usage[13]. In contrast, the study by Naik and Pai et al.[18] (2011) considers that the age of the denture is no significantly responsible by the intensity of the palate inflammation, as well as the CD infection, although older upper CD show a greater quantity of *Candida albicans* for patients with Denture Stomatitis. According to Coelho et al.[23] (2004), a big part of the patients with CD uses the same on for more than 20 years. In addition, Peracini et al.[19] (2010) highlighted that approximately 25% of the patients use the same upper CD for an even longer time period. The present study verified that more than 45.16% of the patients use the same upper CD for more than 10 years. It should be pointed out that older dentures are harder to clean due to a tendency for porosity in their bases, which can contribute for the emergence of the disease[16].

The results of the present study also agree with Aoun and Bereberi[24] (2017) and Gual-Váques et al.[25] (2017) on the absence of association between the presence of Denture Stomatitis and the age of the denture users. Bianchi et al.[5] (2016) also found the absence of association between diabetes and Denture Stomatitis. Although no association was found between hygiene habits and the presence of the studied disease, the specialized literature is unanimous avouching it. Some studies point out different results from this one, confirming an association between the presence of Denture Stomatitis and its risk factors, but only with more numerous samples[5,24,26]. The sample in the present study is composed by only 62 individuals and can be considered a limiting factor, even though it shows that 30.65% of the CD wearers have clinical signs of Denture Stomatitis. It is also possible that the lack of a microbiologic analysis in order to diagnose the disease influenced the results of this work, since it is known that the presence of the *Candida spp* fungus, especially the *Candida albicans* is considered a main etiological factor for that pathology[4].

In conclusion, the prevalence of Denture Stomatitis in the studied fully edentulous participants is high and although no association with its risk factors was found. Preventive and educational measures for oral health in elderly, stimulating the correct hygiene of the denture and the oral cavity, should be a routine among professionals. Patients that use dentures must do maintenance of their dentures in order to preserve oral health.

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