

Treatment of *Candida albicans* Biofilms – Associated with Dry Socket or Denture Stomatitis by Propolis Paste

Ibrahim H. AL-Fahdawi* Abbas O. Farhan ** Sara I. Hajwal ***



*University Of Anbar - College of Dentistry
** University Of Anbar - College of Medicine
*** University Of Anbar - College of Science.

ARTICLE INFO

Received: 21 / 9 /2012
Accepted: 12 / 2 /2013
Available online: 30/11/2013
DOI: [10.37652/juaps.2013.83107](https://doi.org/10.37652/juaps.2013.83107)

Keywords:

Candida albicans,
denture stomatitis,
dental plaque,
antifungal drugs,
propolis.

ABSTRACT

Degradation of oral health is often assumed to progress with aging. However, significantly higher total counts and greater varieties of *Candida* species can be detected in wearers of removable dentures compared with non denture wearers. Poorly fitting or unhygienic dentures leads to the presence of yeast like fungi (*Candida albicans*) attached to it, and cause inflammation. Although candidiasis is highly resistant to antifungal agents, systemic drugs usage are necessary. But the systemic use of these drugs can cause side effects like liver toxicity, drug interactions etc. Using propolis as antifungal by local application, found that it suppresses the *Candida* associated dry socket and denture stomatitis. The Propolis past was used in the following manner. It was applied to the fitting surface of denture, twice a day for 2 weeks. The Propolis putty was putted in dry socket after complete removal of inflammatory tissues from it. The results showed pain, redness area and inflammation related stomatitis were disappear gradually after 48 hours until 2 weeks that the denture stomatitis is healing by using a Propolis past. Propolis putty treat the fungal inflammation of dry socket that gradual decreases of the pain and inflammation. After the treatment, all patients with denture stomatitis were subjected to examination of the palatal mucosa and socket and quantitative culture of *Candida* from the palatal mucosa and denture fitting surface and diagnosed by three method :Germ tube. Gram Stain. and Chrom Agar media.

Introduction

For many years, an association between denture wear and denture stomatitis (eg, denture sore mouth) has been recognized.[1] Most of the studies suggested that the etiology of the lesion was a yeast infection associated with *Candida albicans*. In the early 1980s, denture patients presenting with stomatitis (burning mucosa, erythema, and clinical leukoplakia) were evaluated in part by obtaining cultures of both the inflamed mucosa and the dentures.[2] Frequently, when the host defense system suffers because of any alterations, like immunodeficiency, *C. albicans* become virulent and generates candidiasis, that can be manifested through various clinical forms, involving one or more oral sites, up to affect the whole oral cavity and to disseminate into invasive forms.

Candida-associated denture stomatitis is a very common inflammatory process affecting about 60% of the subjects carrier of a prosthesis.[3] *Candida* has been recognized as a part of the normal oral flora without any harmful effects.[4] Changes in the oral environment effected by tooth loss or denture wearing can cause changes in oral microflora.[5] *Candida* is not harmful in healthy hosts, but may cause opportunistic infections in immunocompromised hosts, such as patients suffering from AIDS, leukemia, or head or neck cancer.[6] Oral candidiasis has been reported to be associated with candidiasis in the lung and deglutition pneumonia.[7] The amount of *Candida* has been found to increase in elderly individuals,[8] but most previous investigations focused solely on *Candida albicans*.[9] Denture sore mouth [Denture Stomatitis (D.S.)] is an inflammation of the denture bearing area with or without cracking and

* Corresponding author at: University Of Anbar - College of Dentistry;

E-mail address:

inflammation of the oral commissures. Though D.S. can be trauma induced, most of them are candida related. Candida fungi are opportunistic pathogens commonly found in the oral cavity of asymptomatic individuals. In health and in a normal local environment, the host defence system prevents overt infection.[10] Local and systemic factors can cause transformation of this commensal pathogenic organism. The most frequent cause of opportunistic infection by Candida is poorly fitting or uncleaned dentures which leads to presence of yeasts attached to it. Risk factors associated with oral candidiasis and D.S are wearing complete (in contrast to partial) dentures, wearing a maxillary (in contrast to a mandibular) removable denture, inadequate denture hygiene, nocturnal denture wear, poor denture quality, diabetes mellitus, antibiotic therapy, immune deficiencies, Vitamin A, folate and iron deficiencies, impaired salivary gland function, Xerogenic medication, tobacco use, decreased salivary secretion rate and gender.

The etiology of the candida-associated denture stomatitis is elaborate and multifactorial. It includes local and systemic factors related to the host and to them Candida capability to adhere and proliferate in the host epithelial tissues.[11] Candida-associated denture stomatitis is able to rise up when the conditions of the micro oral environment are favorable for the growth and the adhesion of the yeast and also when systemic factors of the host bring to a depression of the mechanisms of defence [12].

Systemic factors

These affections are frequent in individuals of advanced age. The repeated treatments with antibiotics and sulphonamides can be predisposing factors because of the microbial alterations that they provoke in the oral cavity.[13]

The saliva of diabetics favours the growth of *C. albicans* in vitro and it has been shown that on the denture surfaces of diabetic there are more elevated counts of colonies of the yeast by comparison with the non diabetic subjects.[14] Deficiency of nutritional factors Some authors report the sideropenic anaemia and high levels of cholesterol as causes of candidiasis.[15] Quantitative and qualitative alterations of the salivary flow in elderly patients is probably secondary to the assumption of drugs, above all the antihypertensive ones, rather than a primary functional

deficit. Such reduction has been shown to act as predisposing factor to the virulence of the *C.* species.[16]

Local factors

The role of the saliva in the colonization of *C. albicans* is still controversial. Some studies have shown that it reduces the adhesion of *C. albicans*. [17]

Nyquist considered trauma as the main liable to determine Candida-associated denture stomatitis with none association with the microbial communities and the presence of denture. Subsequently, Cawson showed that trauma and Candida infection are together responsible for the pathogenesis of the denture stomatitis. [18]

Initially, the adhesion of Candida depends on the microporosity present on the surface of the denture. Such irregularities of surface make possible the yeasts to nest and make difficult to eliminate bacteria by mechanics and chemical hygiene maneuvers; therefore, in presence of poor oral hygiene, Candida can penetrate, stick and aggregate with the bacterial communities, as *Streptococcus sanguis*. [11]

Low levels of pH can favour the adhesion and the proliferation of Candida yeast. In fact, a pH equal to 3 is optimal not only for the adhesion of the yeast like fungi (*Candida albicans*), but also for the enzymatic activity of the proteinases that, together with the lipases, are the most important factors of virulence of Candida because of their cytotoxic and cytolytic effects. Various microbiologic studies underlined that the plaque accumulated on the dentures during stomatitis has a complex composition, represented above all by Gram-positive bacteria. [2]

Unclean and poor hygiene are the major predisposing factors. The tissue surface of the dentures usually shows micro pits and microporosities, that harbour microorganisms, that are difficult to remove mechanically or by chemical cleaning. Denture sore mouth is rarely found under the mandibular denture. [19].

In clinical features the mucosa beneath the denture become red, swollen, smooth or granular and painful. Multiple pin point foci of hyperemia, frequently occur. A burning sensation is common. The redness of the mucosa is sharply outlined and restricted to the tissue actually in contact with the denture. [20]

Materials and Methods

Propolis is a natural black-green putty derived from honey dew was produced by bees, used to close gaps occur in honey comb and act as antifungal to prevent any contamination for it. The Propolis either putty used for dry socket (Fig. 1) or paste (putty dissolved in distilled water to produce creamy like mixture) used for denture stomatitis (Fig. 2). The Propolis paste was used in the following manner. It was applied to the fitting surface of denture, twice a day for 2 weeks. Before cream was applied, the surface of the prosthesis was carefully cleaned with tooth brush, soap and water to remove any depress from the preceding application.

After the treatment, all patients were subjected to examination of the palatal mucosa and socket and quantitative culture of *Candida* from the palatal mucosa, denture fitting surface and diagnosed by three methods :

- 1-Germ tube Fig.(3). [21,22,23]
- 2-Gram Stain Fig.(4). [24,25]
- 3-ChromAgar media Fig.(5). [23]



Figure 1: Propolse putty

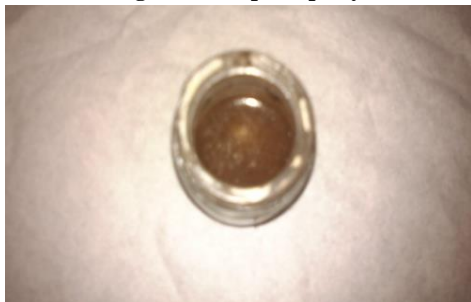


Figure 2: Propolse paste

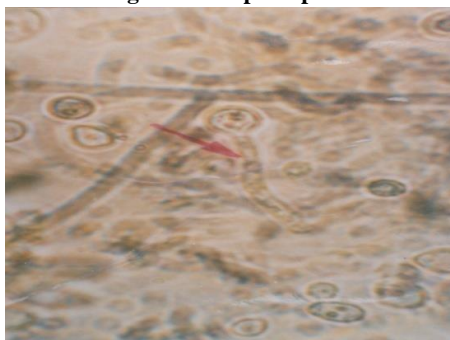


Figure 3: Germ tube of *C. albicans*.

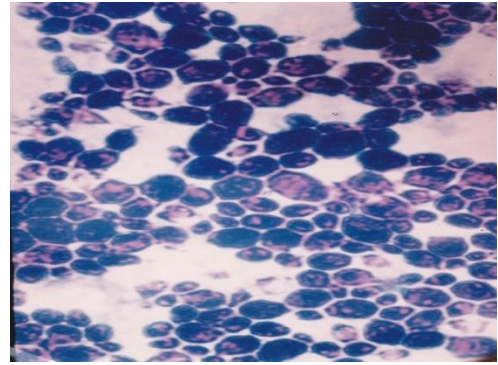


Figure 4: *C.albicans* stained with Gram stain.

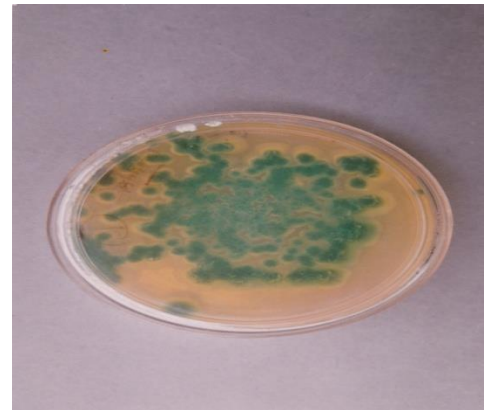


Figure 5: ChromAgar media

Result and Discussion

The results showed pain, redness area and inflammation related stomatitis were disappear gradually after 48 hours until 2 weeks that the denture stomatitis healing by using a Propolis past. Since the cause of the denture stomatitis are different, several treatment procedures are to be followed, like correction of ill-fitting dentures, plaque control and topical or systemic antifungal therapy. Rough areas on the tissue surface of the denture should be smoothened.

The result is in agreement with the following.

Nystatin tablets 500,000 units were allowed to dissolve in the mouth three times a day for 14 days. Bergendal and Isacson reported similar results by treating D.S with nystatin powder, placed on the fitting surface of the denture , three times a day for 14 days.[26] Nystatin is formulated for oral use as suspension or pastille.

A miconazole varnish or gel can be topically administrated in denture related stomatitis . A once daily application of the miconazole varnish or a thrice daily application of the miconazole gel for 15 days is sufficient.[27]

Propolis had been used to avoid the use of systemic antifungal agents in nystatin resistant cases.

propolis is used in the topical treatment of denture stomatitis and dry socket caused by candida albicans.

No experience exists with pregnancy and nursing. Therefore the use of the miconazole varnish should be avoided during pregnancy and lactation. Side effects such as itching and complications such as allergic contact dermatitis, had been reported. But Propolis paste used by the patient easily without side effect as allergy or itching and easy removed from denture surface Fig.(6).



Figure 6: sensitive of *Candida albicans* to Propolis paste

Conclusion

Denture stomatitis, an inflammatory lesion found in many people is due to trauma or candida related by the use of unhygienic denture. Though *Candida albicans* is a component of normal oral microflora, local and systemic factors can transform this to a pathogen.

Management of D.S depends on accurate diagnosis, identification and elimination of predisposing factors and often use of antifungal agents. Topical application of nystatin, amphoteresin, miconazole etc: are effective in many cases. Because the biofilm formation in candidiasis is highly resistant to antifungal agents, systemic ketoconazole, fluconazole, or itraconazole can be used. But these can cause drug interactions To avoid the use of systemic antifungal agents, propolis cream was tried in candida related denture stomatitis. Propolis in a past form applied two times daily to the fitting surface of the denture base, for 2 weeks was proved to be effective.

References

1. Lehner T. Symposium on denture sore mouth. 3. Immuno fluorescent investigation of *Candida*. Dent Pract Dent Rec. 1965;16:142-146.

2. Carmen Saleroni, Michelangle P, Maria C, Candida-associated denture stomatitis. Med Oral Cir Bucal. 2011 Mar 1;16 (2):e139-43.
3. Geerts GA, Stuhlinger ME, Basson NJ. Effect of an antifungal denture liner on the saliva yeast count in patients with denture stomatitis: a pilot study. J Oral Rehabil. 2008; 35:664-9.
4. Hiroyuki M, Emiko I, Kimiharu H, Itsuo C, Effect of Denture Wearing on Occurance of *Candida* Species in the Oral Cavity. The Journal of Applied Research Vol. 7, No. 3, 2007.
5. Sumi Y, Nagaosa S, Michiwaki Y, et al. Comparative study of denture and pharyngeal bacterial flora of dependent elderly. J J Gerodont. 2001; 16:171-178.
6. Zegarelli DJ. Fungal infections of the oral cavity. Otolaryngol Clin North Am. 1993;26:1069-1089.
7. Honda E, Mutoh T, Maeda N, et al. Study on oral microbial flora of elderly people(1)–Comparison of elderly people living in nursing homes and in their own homes. J J Gerodont. 2000;14:297-306.
8. Mutoh T, Honda E, Maeda N, et al. Oral microbial flora in institutionalized elderly people. J Dent Health. 2000;50:351-360.
9. Mathews MS, Samuel PR, Suresh M. Emergence of *Candida tropicalis* as the major cause of fungaemia in India. Mycoses. 2001;44:278-280.
10. J.D Shulman, F Rivera Hidalgo, M.M.Beach ;Risk factors associated with Denture stomatitis in the United States, J.Oral pathol Med(2005) 34:340-6
11. Ferreira MA, Pereira-Cenci T, Rodrigues de Vasconcelos LM, Rodrigues- Garcia RC, Del Bel Cury AA. Efficacy of denture cleansers on denture liners contaminated with *Candida* species. Clin Oral Investig. 2009;13:237-42.
12. Bilhan H, Sulun T, Erkoş G, Kurt H, Erturan Z, Kutay O, et al. The role of *Candida albicans* hyphae and *Lactobacillus* in denture-related stomatitis. Clin Oral Investig. 2009; 13:363-8.
13. Yuen HK, Wolf BJ, Bandyopadhyay D, Magruder KM, Salinas CF, London SD. Oral health knowledge and behavior among adults with diabetes. Diabetes Res Clin Pract. 2009;86:239-46.
14. Paillaud E, Merlier I, Dupeyron C, Scherman E, Poupon J, Bories PN. Oral candidiasis and nutritional deficiencies in elderly hospitalized patients. Br J Nutr. 2004;92:861-7.
15. Golecka M, Ołdakowska-Jedynak U, Mierzwińska-Nastalska E, Adamczyk-Sosińska E. Candida-

- associated denture stomatitis in patients after immunosuppression therapy. Transplant Proc. 2006; 38:155-6.
16. Campisi G, Panzarella V, Matranga D, Calvino F, Pizzo G, Lo Muzio L, et al. Risk factors of oral candidosis: a twofold approach of study by fuzzy logic and traditional statistic. Arch Oral Biol. 2008;53:388-97.
17. Baena-Monroy T, Moreno-Maldonado V, Franco-Martínez F, Aldape-Barrios B, Quindós G, Sánchez-Vargas LO. Candida albicans, Staphylococcus aureus and Streptococcus mutans colonization in patients wearing dental prosthesis. Med Oral Patol Oral Cir Bucal. 2005;10 Suppl 1:E27-39.
18. Emami E, de Grandmont P, Rompré PH, Barbeau J, Pan S, Feine JS. Favoring trauma as an etiological factor in denture stomatitis. J Dent Res. 2008;87:440-4.
19. Babu C, S. Sunil, Use of Amorolfine in Candida-Associated denture Stomatitis. Oral & Maxillofacial Pathology Journal [OMP] Vol 1 No, 1, Jan-Jun. 2010. ISSN 0976-1225.
20. William G. Shafer, Maynard. K.Hine, Barnet M.Levy; Physical and chemical injuries of the oral cavity, Text book of oral pathology; 11th Edn., Elsevier India 1997 : 528-593
- 21- Evans E. G. and Richarardson . 1989 . Medical Mycology a practical a proach . IRL Press ,U.K.
- 22- Ron J. Doyle . 1999 . Biofilms , Methoda in Enzymology . Vol. 310 . PP: 644-656.
- 23- James D. Bayers . 2000 . Biofilms II Process analysis and Applications, Wiley-liss ., New York, USA.
- 24- Philip D Marsh and Michael V. Martin . 2009 . Oral Microbiology., Churchill livingstone Elsever., London., U.K.
- 25- Odds F.C. 1979 . Candida and Candidosis .mLeicester University . UK
26. George. A.Zarb, Charles L. Bolender ;Sequelae caused by wearing complete dentures,12th Edn :Elsevier 2004 : 34-50
27. Lucio Milillo /Corenzo Lo Muzio, Paolo ; Candida related Denture Stomitis A pilot study of the efficacy of an amorolfine antifungalvarnish , Int.J. Prosthodont 18 : 55-59, 2005

معالجة الأغشية الحيوية للمبيضات البيضاء *Candida albicans* المصاحبة نزع السن أوفي سقف الفم عند المصابين بالالتهاب نتيجة لاستعمال طقوم الأسنان

ابراهيم حمد الفهداوي عباس عبيد فرحان ساره عماد هجول

الخلاصة

تشهد صحة الفم غالباً تدهوراً مع تقدم العمر علاوة على ذلك زيادة اعداد من انواع كثيرة مختلفة من مستعمرات المبيضات البيضاء مع الاشخاص الذين يستخدمون طقوم الاسنان المتحركة مقارنة مع الذين لا يستخدمونها. و المبيضات البيضاء (G+) قادرة على العيش كأحياء طبيعية في فم الاشخاص الاصحاء. عدم ثباتية الطقم او عدم نظافة الطقوم يؤدي الى وجود الفطريات *Candida albicans* والالتصاق بها وتؤدي الى الالتهابات الفموية. بالرغم من ان المبيضات البيضاء عالية المقاومة لمضادات الفطريات السطحية فان النظام الدوائي يكون ضروريا ولكنه يؤدي الى مضاعفات جانبية مثل تسمم الكبد والتداخل الدوائي والخ واستخدام البروبولس موضعيا كمضاد للفطريات لقمع المبيضات البيضاء المصاحبة (dry socket and stomatitis) . كما يلي : يوضع معجون البروبولس على السطح النسيجي للطقم مرتين في اليوم لمدة اسبوعين اما عجينة البروبولس فانها تستخدم في مكان قلع السن الملتهب بعد تنظيفه من الأنسجة الملتهبة. اظهرت النتائج اختفاء تدريجي للألم واحمرار المنطقة الملتهبة من سقف الفم ومكان قلع السن بعد يومين واختفائها نهائيا بعد اسبوعين من استخدام البروبولس. بعد العلاج تم فحص سقف الفم ومكان قلع السن واخذت عينات منها لفحصها مختبريا بثلاثة طرق وهي : Germ Germ tube . Gram stain and Chromo agar media .