



## THE RELATION BETWEEN REMOVABLE PROSTHESIS AND SYSTEMIC DISEASES - A REVIEW

L. Harsha\* & Dr. Anand\*\*

\* BDS Student, Saveetha Dental College and Hospitals, Chennai, Tamilnadu

\*\* Associate Professor, Department of Prosthodontics, Saveetha Dental College and Hospitals, Chennai, Tamilnadu

**Cite This Article:** L. Harsha & Dr. Anand, "The Relation Between Removable Prosthesis and Systemic Diseases - A Review", International Journal of Multidisciplinary Research and Modern Education, Volume 3, Issue 1, Page Number 297-300, 2017.

**Copy Right:** © IJMRME, R&D Modern Research Publication, 2017 (All Rights Reserved). This is an Open Access Article distributed under the Creative Commons Attribution License, which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.

### Abstract:

**Aim:** The aim of the article is to review on the relation between removable prosthesis and systemic diseases.

**Objective:** The objective of this study is to discuss the impact of removable prosthesis to the health status in patients with systemic diseases.

**Back Ground:** Denture plaque is a dense microbial layer composed of microorganism and its metabolites. In order to maintain better health and prevent complications, it is essential that these medically compromised patients have a better knowledge regarding the same. Candida, is the most common species found in the flora of denture plaque, and is associated to cause denture induced stomatitis, periodontitis and root caries. In addition to this there are certain other epithelial changes as a result of the use of removable prosthesis. Therefore, attention to oral hygiene and professional care in these patients is indicated.

**Reason:** The purpose of this review is to know what can be the possible complications encountered in these patients as a result of the use of removable prosthesis.

**Key Words:** Denture Plaque, Candida, Removable Prosthesis, Diabetes & Oral Hygiene

### Introduction:

Knowledge about Denture plaque and the associated prosthetic microbial community is mandatory in order to maintain oral hygiene in medically compromised patients [1, 2, 3]. Denture plaque is nothing but a microbial layer composed of micro-organisms and its metabolites [4]. The structure of this prosthetic plaque is similar to that of the normal dental plaque, which contains about  $10^{11}$  organ-isms per gram [5, 6]. Usually there is an increased number of candida species. This results in a change in the oral microbiota [7]. These candida species can result in denture stomatitis, root caries and periodontitis [8-10]. It can also enter into the blood stream, if the oral mucosa is weekend, in such a situation, there is breaking of the epithelial barrier which could result in its entry into the bloodstream [11]. The aim of this review was to establish a relation between removable prosthesis and systemic diseases. The review is done to understand the risks, medically compromised patients are prone to due to use of removable prosthesis. The present article aims at relating removable prosthesis with six medical conditions,

- ✓ HIV
- ✓ diabetes mellitus
- ✓ pulmonary diseases
- ✓ carcinoma
- ✓ cardio vascular diseases
- ✓ infections causes by helicobacter pylori in the GI tract

### Materials and Methods:

Literature search was done using pub med search engine. All articles published until 2016 were reviewed. the terms "removable prosthesis", "systemic diseases", "candida species", "denture plaque" were used to obtain apt references for the review.

### Inclusion Criteria:

- ✓ All articles published until 2016.
- ✓ All articles written in english
- ✓ Articles which met the required criteria

### Exclusion Criteria:

- ✓ Articles written in languages other than english
- ✓ Case reports

### Removable Prosthesis and HIV Infected Patients:

HIV infected individuals are immune compromised and hence are at a greater risk for candidal colonisation. Due to irregularities on the surface of removable prosthesis, the degree of colonisation of candida is increased 2 folds. Hence, these patients are prone to candidal infection and the major cell involved to play an important role are the CD4 helper cells [12, 13].

#### **Removable Prosthesis and Diabetes Mellitus:**

Due to changes in the current lifestyle modalities, there is an increase in the incidence of diabetes mellitus. Type II is more common in occurrence and is usually left undiagnosed until it reaches a severe form. Diabetes has a strong link to chronic periodontitis, which when left untreated would result in edentulousness. In a patient unaware of his health condition, loss of tooth without any etiologic factor is a major indication of him/her being diabetic. Denture stomatitis is more commonly seen in patients with type II diabetes [14-20]. The pathogenic agent for denture stomatitis in these patients are *Candida albicans*. *Candida glabrata* is also seen related to denture stomatitis and is usually isolated in these patients [21-25]. Increased blood glucose levels, increase the risk for candidal infection, resulting in oral candidiasis. This can be positively seen in patients with uncontrolled blood sugar levels. It has also been noticed that, patients under hypoglycaemic therapies had a reduced candidal colonisation in the oral cavity, thus reducing the risk for denture stomatitis and candidiasis. Keeping the following in mind it is necessary to educate patients on maintenance of prosthetic hygiene and also the importance of controlling the blood sugar levels, thus leading to reduced risk for candidal infections [26,27].

#### **Removable Prosthesis and Pulmonary Diseases:**

Lung infections also enable the colonisation of bacteria in the oral cavity. Lack of knowledge about maintenance of oral hygiene especially in denture wearers could also result in pulmonary complications like pneumonia. It has also been stated that, use of dentures during sleep is associated with inflammation and increased microbial colonisation. The respiratory pathogens could colonise in the denture bearing areas due to poor oral hygiene maintenance. In cases of chronic obstructive lung disease, the bacteria is colonised in the lower airway and these patients are more prone to denture stomatitis than normal individuals. There can also be further colonisation of candidal species leading to oral candidiasis. In order to prevent these infections in denture wearers it is important to educate the patient regarding oral hygiene maintenance [28-38].

#### **Removable Prosthesis and Carcinoma:**

Carcinomas of the oral cavity and the upper respiratory tract are most common. These patients are immune compromised and are hence at a greater risk for bacterial and candidal colonisation. *Candida* species are frequently seen in patients under antibiotic therapies and also in those undergoing radiotherapy and chemotherapy. Usually carcinomas result after an inflammatory condition but can also later lead to severe inflammation. Hence maintenance of oral hygiene is highly essential [26, 28, 39-44].

#### **Removable Prosthesis and Cardio Vascular Diseases:**

Cardiovascular diseases like coronary artery diseases, myocardial infarction, hyperlipidemia, atherosclerosis, hypertension, diabetes etc, are at a greater risk for bacterial colonisation. Entry of oral pathogens into the circulatory system, results in the adherence of these pathogens to the valves, and hence can result in sub acute endocarditis. Hence oral hygiene maintenance as well as proper maintenance of prosthesis is essential to prevent further colonisation of bacteria [45-52].

#### **Removable Prosthesis and Infections Caused By H.Pylori in the Gi Tract:**

Gastric inflammation also results in the inflammation of the oral cavity, frequently in denture stomatitis and in cases of hyperplasia. Preventing its colonisation in the oral cavity is difficult when compared to its prevention in the stomach. Proper oral hygiene practices are required to prevent its colonisation thus reducing inflammation [53-56].

#### **Discussion:**

The highlights of the current review are, maintenance of oral hygiene as well as maintenance of the prosthesis is important, in order to prevent colonisation of candidal species. In immune compromised patients, special care has to be taken as they are more prone to infections. Diabetic patients should also be instructed to take appropriate care as well as maintain their blood sugar levels to normal. Diabetic patients with uncontrolled blood sugar should be started off on hypoglycaemic drugs as these have been proven to reduce the bacterial and candidal colonisation in the oral cavity. In case of denture stomatitis or oral candidiasis, there are chances that the pathogen enters into the circulation and thus leads to chronic infective endocarditis. Hence proper care has to be taken in patients with cardiovascular diseases. Initial adherence of the bacteria to the surface free areas, contact areas and surface irregularities should be prevented to prevent further progression and its growth in the oral cavity. There have also been studies that state that complete removal of the biofilm is more effective than antibiotic and anti fungal therapy. Diet also influences the initiation and progression of denture plaque formation. In order to prevent the above, it is important to educate the patient to maintain their oral hygiene.

#### **Conclusion:**

Denture stomatitis or oral candidiasis is the most common change or infection that occurs in denture wearers. Systemic diseases is one factor which allows colonisation of these microbes in the oral cavity. Hence, it is mandatory to educate people about maintenance of oral health and hygiene in these cases.

#### **References:**

1. Le Bars P, Kouadio AA, N'goran JK, Badran Z, Soueidan A. Relationship between removable prosthesis and some systemic disorders. *J Indian Prosthodont Soc* 2015; 15:292-9.

2. Yang Y, Zhang H, Chai Z, Chen J, Zhang S. Multiple logistic regression analysis of risk factors associated with denture plaque and staining in Chinese removable denture wearers over 40 years old in Xi'an – A cross-sectional study. *PLoS One* 2014; 9:e87749.
3. Preshaw PM, Walls AW, Jakubovics NS, Moynihan PJ, Jepson NJ, Loewy Z. Association of removable partial denture use with oral and systemic health. *J Dent* 2011; 39:711-9.
4. Nikawa H, Hamada T, Yamamoto T. Denture plaque – Past and recent concerns. *J Dent* 1998; 26:299-304.
5. Budtz-Jørgensen E. Oral mucosal lesions associated with the wearing of removable dentures. *J Oral Pathol* 1981; 10:65-80.
6. Walter B, Frank RM. Ultrastructural relationship of denture surfaces, plaque and oral mucosa in denture stomatitis. *J Biol Buccale* 1985; 13:145-66.
7. Cho T, Nagao J, Imayoshi R, Tanaka Y. Importance of diversity in the oral microbiota including *Candida* species revealed by high-throughput technologies. *Int J Dent* 2014; 2014: 454391.
8. Gimenez T, Braga MM, Raggio DP, Deery C, Ricketts DN, Mendes FM. Fluorescence-based methods for detecting caries lesions: Systematic review, meta-analysis and sources of heterogeneity. *PLoS One* 2013; 8:e60421.
9. Liu L, Zhang Y, Wu W, Cheng M, Li Y, Cheng R. Prevalence and correlates of dental caries in an elderly population in northeast China. *PLoS One* 2013; 8: e78723.
10. Ge X, Rodriguez R, Trinh M, Gunsolley J, Xu P. Oral microbiome of deep and shallow dental pockets in chronic periodontitis. *PLoS One* 2013; 8:e65520.
11. Coulthwaite L, Verran J. Potential pathogenic aspects of denture plaque. *Br J Biomed Sci* 2007; 64:180-9.
12. Perezous LF, Flaitz CM, Goldschmidt ME, Engelmeier RL. Colonization of *Candida* species in denture wearers with emphasis on HIV infection: A literature review. *J Prosthet Dent* 2005; 93:288-93.
13. Witzel AL, Pires Mde F, de Carli ML, Rabelo GD, Nunes TB, da Silveira FR. *Candida albicans* isolation from buccal mucosa of patients with HIV wearing removable dental prostheses. *Int J Prosthodont* 2012; 25:127-31.
14. Shaw JE, Sicree RA, Zimmet PZ. Global estimates of the prevalence of diabetes for 2010 and 2030. *Diabetes Res Clin Pract* 2010; 87:4-14.
15. Moore PA, Zgibor JC, Dasanayake AP. Diabetes: A growing epidemic of all ages. *J Am Dent Assoc* 2003; 134:11S-5S.
16. 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.
17. Felton DA. Edentulism and comorbid factors. *J Prosthodont* 2009; 18:88-96.
18. Phelan JA, Levin SM. A prevalence study of denture stomatitis in subjects with diabetes mellitus or elevated plasma glucose levels. *Oral Surg Oral Med Oral Pathol* 1986; 62:303-5.
19. Farag YM, Gaballa MR. Diabetes: An overview of a rising epidemic. *Nephrol Dial Transplant* 2011; 26:28-35.
20. Dorocka-Bobkowska B, Budtz-Jørgensen E, Wloch S. Non-insulin-dependent diabetes mellitus as a risk factor for denture stomatitis. *J Oral Pathol Med* 1996; 25:411-5.
21. Pereira-Cenci T, Del Bel Cury AA, Crielaard W, Ten Cate JM. Development of *Candida*-associated denture stomatitis: New insights. *J Appl Oral Sci* 2008; 16:86-94.
22. Webb BC, Thomas CJ, Whittle T. A 2-year study of *Candida*-associated denture stomatitis treatment in aged care subjects. *Gerodontology* 2005; 22:168-76.
23. Dorocka-Bobkowska B, Konopka K. Susceptibility of *Candida* isolates from denture-related stomatitis to antifungal agents in vitro. *Int J Prosthodont* 2007; 20:504-6.
24. Saudek CD, Herman WH, Sacks DB, Bergenstal RM, Edelman D, Davidson MB. A new look at screening and diagnosing diabetes mellitus. *J Clin Endocrinol Metab* 2008; 93:2447-53.
25. Li L, Redding S, Dongari-Bagtzoglou A. *Candida glabrata*, an emerging oral opportunistic pathogen. *Crit Rev Oral Biol Med* 2007; 86:204-15.
26. Daniluk T, Fiedoruk K, Sciepek M, Zaremba ML, Rozkiewicz D, Cylwik-Rokicka D, et al. Aerobic bacteria in the oral cavity of patients with removable dentures. *Adv Med Sci* 2006; 51 Suppl 1:86-90.
27. Ganapathy DM, Joseph S, Ariga P, Selvaraj A. Evaluation of the influence of blood glucose level on oral candidal colonization in complete denture wearers with Type-II diabetes mellitus: An in vivo Study. *Dent Res J (Isfahan)* 2013; 10:87-92.
28. Green SL. Anaerobic pleuro-pulmonary infections. *Postgrad Med* 1979; 65:62-6, 68-9, 72-4.
29. Martin BJ, Corlew MM, Wood H, Olson D, Golopol LA, Wingo M, et al. The association of swallowing dysfunction and aspiration pneumonia. *Dysphagia* 1994; 9:1-6.

30. Sumi Y, Miura H, Sunakawa M, Michiwaki Y, Sakagami N. Colonization of denture plaque by respiratory pathogens in dependent elderly. *Gerodontology* 2002; 19:25-9.
31. Iinuma T, Arai Y, Abe Y, Takayama M, Fukumoto M, Fukui Y, et al. Denture wearing during sleep doubles the risk of pneumonia in the very elderly. *J Dent Res* 2015; 94 3 Suppl: 28S-36S.
32. Yoneyama T, Yoshida M, Ohrui T, Mukaiyama H, Okamoto H, Hoshiba K, et al. Oral care reduces pneumonia in older patients in nursing homes. *J Am Geriatr Soc* 2002; 50:430-3.
33. El-Solh AA. Association between pneumonia and oral care in nursing home residents. *Lung* 2011; 189:173-80.
34. Scannapieco FA. Pneumonia in nonambulatory patients. The role of oral bacteria and oral hygiene. *J Am Dent Assoc* 2006; 137 Suppl: 21S-5S. 52.
35. Sumi Y, Ozawa N, Michiwaki Y, Washimi Y, Toba K. Oral conditions and oral management approaches in mild dementia patients. *Nihon Ronen Igakkai Zasshi* 2012; 49:90-8.
36. Przybylowska D, Mierzwinska-Nastalska E, Rubinsztajn R, Chazan R, Rolski D, Swoboda-Kopec E. Influence of denture plaque biofilm on oral mucosal membrane in patients with chronic obstructive pulmonary disease. *Adv Exp Med Biol* 2015; 839:25-30.
37. Gümrü B, Kadir T, Uygün-Can B, Ozbayrak S. Distribution and phospholipase activity of *Candida* species in different denture stomatitis types. *Mycopathologia* 2006; 162:389-94.
38. Gasparoto TH, de Oliveira CE, Vieira NA, Porto VC, Cunha FQ, Garlet GP, et al. Activation pattern of neutrophils from blood of elderly individuals with *Candida*-related denture stomatitis. *Eur J Clin Microbiol Infect Dis* 2012; 31:1271-7.
39. Mantovani A, Allavena P, Sica A, Balkwill F. Cancer-related inflammation. *Nature* 2008; 454:436-44.
40. Allavena P, Garlanda C, Borrello MG, Sica A, Mantovani A. Pathways connecting inflammation and cancer. *Curr Opin Genet Dev* 2008; 18:3-10.
41. Samaranyake LP, Hughes A, Weetman DA, MacFarlane TW. Growth and acid production of *Candida* species in human saliva supplemented with glucose. *J Oral Pathol* 1986; 15:251-4.
42. Del Prete A, Allavena P, Santoro G, Fumarulo R, Corsi MM, Mantovani A. Molecular pathways in cancer-related inflammation. *Biochem Med (Zagreb)* 2011; 21:264-75.
43. Lawrence M, Aleid W, McKechnie A. Access to dental services for head and neck cancer patients. *Br J Oral Maxillofac Surg* 2013; 51:404-7.
44. Meurman JH, Grönroos L. Oral and dental health care of oral cancer patients: Hyposalivation, caries and infections. *Oral Oncol* 2010; 46:464-7.
45. Janket SJ, Surakka M, Jones JA, Lam A, Schnell RA, Rose LM, et al. Removable dental prostheses and cardiovascular survival: A 15-year follow-up study. *J Dent* 2013; 41:740-6.
46. Ercalik-Yalcinkaya S, Özcan M. Association between oral mucosal lesions and hygiene habits in a population of removable prosthesis wearers. *J Prosthodont* 2015; 24:271-8.
47. Gendreau L, Loewy ZG. Epidemiology and etiology of denture stomatitis. *J Prosthodont* 2011; 20:251-60.
48. Scannapieco FA, Genco RJ. Association of periodontal infections with atherosclerotic and pulmonary diseases. *J Periodontol* 1999; 34:340-5.
49. Demmer RT, Desvarieux M. Periodontal infections and cardiovascular disease: The heart of the matter. *J Am Dent Assoc* 2006; 137 Suppl: 14S-20S.
50. Offenbacher S, Barros SP, Altarawneh S, Beck JD, Loewy ZG. Impact of tooth loss on oral and systemic health. *Gen Dent* 2012; 60:494-500.
51. Li X, Kolltveit KM, Tronstad L, Olsen I. Systemic diseases caused by oral infection. *Clin Microbiol Rev* 2000; 13:547-58.
52. Corsalini M, Rapone B, Grassi FR, Di Venere D. A study on oral rehabilitation in stroke patients: Analysis of a group of 33 patients. *Gerodontology* 2010; 27:178-82.
53. Loster BW, Majewski SW, Czesnikiewicz-Guzik M, Bielanski W, Pierzchalski P, Konturek SJ. The relationship between the presence of *Helicobacter pylori* in the oral cavity and gastric in the stomach. *J Physiol Pharmacol* 2006; 57 Suppl 3:91-100.
54. Namiot DB, Namiot Z, Kemona A, Bucki R, Gotebiewska M. Oral health status and oral hygiene practices of patients with peptic ulcer and how these affect *Helicobacter pylori* eradication from the stomach. *Helicobacter* 2007; 12:63-7.
55. Jia CL, Jiang GS, Li CH, Li CR. Effect of dental plaque control on infection of *Helicobacter pylori* in gastric mucosa. *Tex Dent J* 2012; 129:1069-73.
56. Berroteran A, Perrone M, Correnti M, Cavazza ME, Tombazzi C, Goncalvez R, et al. Detection of *Helicobacter pylori* DNA in the oral cavity and gastroduodenal system of a Venezuelan population. *J Med Microbiol* 2002; 51:764-70.