Short communication

Oral prosthesis and Diabetes: Circumventing the opportunistic fungal infections during SARS-CoV-2 pandemic

Comment [U1]:

Abstract

Diabetes is one of the most common systemic disease affecting the world and India accounts for the 2nd highest burden. Diabetes and oral health have a bidirectional relationship. Oral health issues are common among the diabetics, with higher incidence of xerostomia, caries, periodontal pathologies and tooth loss reported among them in comparison to the non-diabetics. The population wearing dentures and reported with denture associated stomatitis are also higher. The current SARS-CoV-2 pandemic has devastating effects on diabetic patients with post Covid complications including fungal infections such as mucormycosis being reported high in this group. Oral fungal infections are common among diabetes patients especially among the denture wearers. Palate is one of the common site of involvement by oral candidiasis and mucormycosis. It is time to educate denture wearing diabetic patients on the importance of oral and denture hygiene.

Comment [U2]: Re frame the abstract

Key Words

Diabetes, Denture, Oral Candidiasis, Fungal infections, Mucormycosis, SARS-CoV-2, Oral Hygiene

Introduction

Oral cavity is hub of abundant normal commensals. Candida is one of the most common normal commensal in the oral cavity including gastrointestinal tract. Candida albicans are the most frequent oral candidal species, with others being Candida parapsilosis, Candida krusei, Candida stellatoidea, Candida tropicalis, Candida glabrata, Candida guilliermondii, and Candida dubliniensis. They are seen in all the age groups including newborn infants, children, pregnant women, adults, middle aged persons and old aged, with varying percentages. They are found in both men and women [1,2]. Mucorals are the normal commensals too especially of the nasal cavity. Mucormycoses can be cultured from the swab obtained from the nasal cavity, oral cavity, throat, and stools of healthy individuals [2,3]. Under suitable conditions these normal commensals can become pathogenic.

Oral candidiasis is one of the most common oppurtunistic fungal infection of the oral cavity. It is one of the most common infection among the immunocompramised. Conditions such as HIV, tuberculosis, diabetes mellitus, nutritional disorders, endocrinopathies, medications such as high steroid intake, antibiotics, anti-cancers, immunosuppressives, anti-cholinergic drugs, smoking, immunosuppressive conditions and malignances increase the susceptibility to oral candidiasis. Mucormycosis is a rare angioinvasive fungal infection caused by fungi like Rhizopus, Mucor, Rhizomucor or Apophysomyces [2]. Rhizopus is the chief pathogenic mycotic organism in cases with rhinocerebral mucormycosis. Mucormycosis primarily affects immunocompromised, individuals with malignancies, organ transplants, poorly controlled diabetics, persons on long term corticosteroid, immunosuppressive therapy and AIDS [2,3].

Oral prosthesis are used to replace the missing teeth or missing portion of the oral cavity, majorly palate, maxilla and mandible. Due to increased incidence of tooth loss with the age, oral prosthesis are commonly worn among middle aged and geriatric age groups. These prosthesis if not maintained hygienically can harbor numerous microorganisms. Dentures are the prosthetic devices made of acrylic, used to replace missing teeth. The dentures are either partial or full dentures which are supported by the surrounding soft and hard tissues of the oral cavity. The prevalence of edentulism in India varies from 60% to 69% among age group of 25 years and

above [4]. It is stated that by 2025, India may have highest elderly population, resulting in edentulism being a rampant problem, with diabetes contributing the major portion [5].

Dentures are the reservoirs of microorganisms, induce constant friction of mucosa and they provide a microenvironment conducive to fungal growth. They produce proteinases and phospholipases in higher quantity, which is capable of increasing the infection [6]. The irregularities in the denture and the acidic and anaerobic environment in the tissue surface of the denture favour the growth of the microorganisms and induce their growth [2,6]. Several studies suggest that denture stomatitis can affect as many as 10-75% of individuals who wear dentures [7-10]. Denture covered area, especially palate can be one of the common site of involvement of mucormycosis [2,3].

SARS-CoV-2 pandemic that began in December 2019, has spread all over the world and is affecting the mankind greatly. Research has shown ACE 2 receptors in oral epithelial cells to be responsible for SARS-CoV-2 entry and pathogenicity [6,11]. This disease is reported to produce plethora of symptoms mainly related to respiratory system. However, the recent reports suggest an increasing evidence of fungal infections including mucormycosis, candidiasis and aspergillosis. As the immunity is low in Covid 19 positives, the normal commensals can become pathogenic. Post covid mucormycosis cases are on rise, especially among the diabetics. In oral cavity, palate is the most common site of involvement of this lesion, where it manifests as necrotic lesion. Maxillary necrosis is one of the commonest outcomes in covid 19 positive diabetic cases with mucormycosis [11].

Diabetes is an immunocompramised condition with a bidirectional pathogenesis of oral infections leading to tooth loss and also for increased susceptibility to fungal infections. Conditions conducive for opportunistic infections including diseases such as diabetes are common among the geriatric age. Dentures act as a fomite for infectious microbes including Candidia, Mucorales and Corona virus [6]. It is time to educate the diabetics and the geriatric age, especially the denture wearers regarding the susceptibility to opportunistic fungal infections such as oral candidiasis and mucormycosis. A recent study has suggested the possible links between oral hygiene and the severity of Covid infections. It suggests that since poor oral hygiene increases the risk of systemic inflammation, it may further predispose to aggravating

infections [12]. It is of immense importance is to provide optimal guidelines to these vulnerable group to maintain good oral and denture hygiene.

Mouth care during covid 19 pandemic

The aim of oral hygiene for patients in hospital is to maintain oral cleanliness, prevent additional infection and reduce the likelihood of developing bacterial pneumonia.

- The teeth, oral cavity, tongue, and dentures must be cleaned daily. Oral hydration is of prime importance hence soft tooth brush moistened with chlorhexidine would be preferable to maintain oral hygiene and facilliate hydration in denture wearing patients.
- Patients with dentures require maintenance in the form of regular brushing the dentures with non abrasive paste or a efferscent denture cleanser. This eliminates the denture bio film present on the denture and in the oral cavity which would circumvent denture induced stomatitis.
- The denture hygiene should be paralleled with oral hygiene with regular brushing of the edentulous ridges which would prevent re infection.
- Soaking the retired dentures when not in mouth in water is of prime importance to prevent warpage of dentures.
- Patients are strictly encouraged to discontinue wearing dentures at night and facilitating oral hygiene and tissue rest. Nocturnal wearing is strictly avoided which would worsen the condition.

Care for full dentures

- Dentures should be cleaned daily.
- Take your dentures out of your mouth to clean them.
- Clean your denture over a basin /sink of cold water or over a folded towel to avoid damage if they are dropped.
- Soap/denture cleaning paste can be used to clean dentures with a denture brush
- Clean tongue and roof of mouth with a soft toothbrush.
- Always put dentures in cold water when they are out of mouth to prevent warping. Partial dentures should be removed after eating and rinsed with cold water. If partial denture has a metal clasp, do not use any cleaning agents which contain bleach.

- When cleaning partial dentures, remember also to clean and floss teeth and gums using a toothbrush with soft/medium bristles and fluoride toothpaste.
- Floss remaining teeth daily.

It is highly essential that all disbetics, denture wearers and SARS-CoV-2 positive geriatric patients should maintain their oral hygiene, using appropriate aids. Hospitalized patients should undergo a through oral examination, if denture wearer, mechanical cleansing of the denture is should be done. Post recovery to covid 19 visit to oral health professional is advised. A thorough clinical examination of the oral mucosa and denture surface is recommended. As such the dental team need to reaffirm denture hygiene practices.

References

1. Dangi YS, Soni ML, Namdeo KP. (2010). Oral Candidiasis: A Review. Int J Pharm Pharm Sci, 2: 36-41.
2. Santosh ABR, Muddana K, Bakki SR. (2012). Fungal Infections of Oral Cavity: Diagnosis, Management, and Association with COVID-19. SN Comprehensive Clinical Medicine, 3: 1373–1384.
3. Pauli MA, Pereira LM, Monteiro ML, de Camargo AR, Rabelo GD. (2021). Painful palatal lesion in a patient with COVID-19. Oral Surg Oral Med Oral Pathol Oral Radiol, 131: 620-625.
4. Shah N, Pandey RM, Duggal R, Mattur IP, Rajan K. (2007). Oral health in India: a report of the multicentre study ministry of health, Gov. of India. WHO.
5. Dubey RK, Gupta DK, ShettyP. (2013). Current status of Edentulousness in India: Systematic Review. Chhattisgarh Journal of Health Sciences, 1(1).
6. Jeronimo LS, Lima RPE, Suzuki TYU, Discacciati JAC, Bhering CLB. Oral Candidiasis and COVID-19 in Users of Removable Dentures: Is Special Oral Care Needed?. Gerontology DOI: 10.1159/000515214.
7. Ikebe K, Morii K, Matsuda K, Hata K, Nokubi T. (2006). Association of candidal activity with denture use and salivary flow in symptom-free adults over 60 years. Journal of Oral Rehabilitation, 33: 36–42.
8. Liu X, Hua H. (2007). Oral Manifestation of Chronic Mucocutaneous Candidiasis: Seven Case Reports. J oral Pathol Med, 36: 528-32.
9. Pereira-cenci T, Del belcury AA, Crielaard W, Tencate JM. (2008). Development of Candida-associated Denture Stomatitis: NewInsights. J Appl Oral Sci, 16: 86-945.
10. Williams D, Lewis M. (2011). Pathogenesis and treatment of oral candidosis. Journal of Oral Microbiology, 3.
11. Moorthy A, Gaikwad R, Krishna S, Hegde R, Tripathi KK, Kale PG et al,. SARS-CoV-2, Uncontrolled Diabetes and Corticosteroids—An Unholy Trinity in Invasive Fungal Infections of the Maxillofacial Region? A Retrospective, Multi-centric Analysis. J. Maxillofac. Oral Surg. https://doi.org/10.1007/s12663-021-01532-1.

12. Sampson V, Kamona N, Sampson A. (2020). Could there be a link between oral hygiene and the severity of SARS-CoV-2 infections?. British Dent Journal, 12: 971-5.