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REVIEW ARTICLE

A REVIEW ON ORAL CANDIDAL INFECTION

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ABSTRACT:
There has been an increased incidence of fungal infection especially those caused by candida albicans. Oral candidiasis is one of the commonly occurring fungal infections of oral cavity. There are evidences about its pathogenecity through biofilm formation and release of hydrolytic enzymes. Candida albicans was the 4th most common nosocomial infection with the mortality rate of 39% in the year 1995. In ICUs it became the 3rd most common nosocomial infection with the mortality rate of 47%. Various predisposing factors are thought to be responsible for the pathogenic conversion of this commensal organism. In the present article we will be reviewing about oral candidiasis with the special emphasis on its pathogenesis, causative organisms and various treatment modalities available.

Keywords – Biofilm, Candida albicans, Commensal, Nosocomial

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INTRODUCTION

Oral candidiasis is one of the most frequently caused treatable opportunistic fungal infections seen in patients suffering from AIDS or any other immunocompromised states.[1] It is known by many names like oral thrush, oral candidosis, muguet and candidal stomatitis. The most common presenting signs and symptoms are loss of taste, discomfort in wearing denture due to pain, aversion to food. It is caused by candida albicans, which is a non pathogenic fungus normally present in oral cavity but during favourable conditions, it changes to its pathogenic hyphal form. It resides as a commensal in 30-50% of the population.[2] Xerostomia, use of broad spectrum antibiotics, denture users, and presence of HIV or use of immunosuppresants drugs predisposes to candidal infection. Candida albicans was the 4th most common nosocomial infection with the mortality rate of 39% in the year 1995. In ICUs it became the 3rd most common nosocomial infection with the mortality rate of 47%.[3]

In the present article we will be reviewing about oral candidiasis with the special emphasis on its pathogenesis, causative organisms and various treatment modalities available.

CAUSATIVE ORGANISM AND PATHOGENESIS

Candida species

The most common fungal species responsible for invasive infections was found to be candida species. Oral candidiasis caused by candida albicans accounts for 50% of all the cases and together with candida tropacalis, candida glabrata they account for 80% of all the caes. Candida albicans releases various virulence factors that are responsible for its pathogenecity. These virulence factors play an important role in switching between yeast and hyphal form. It also regulates its ability to form biofilm to attach to surface. It releases various hydrolytic enzymes like proteinase and phospholipase that further contribute to virulence. These enzymes favour its adherence and tissue penetration and hence contribute towards host invasiveness.[4-8] Approximately 95% of the blood stream infections associated with candida are caused by C. albicans, Candida glabrata, Candida parapsilosis, Candida tropicalis and Candida krusei.[9-11]

Aspergillus species

Invasive aspergillosis is also seen commonly in immunocompromised patients, patients affected with haematological malignancies or patients who have received haematopoietic stem cell transplantation.[12-15] Inhalation of aspergillus candida is a common route of spread of infection. Sinues, brain, lung and bloodstream are the commonly affected sites. The mortality rate associated with invasive aspergillosis is approximately 50%.

Other fungi
Rhizopus, Absidia and Cunninghamella genera belonging to zygomycetes family are able to cause diseases by vascular invasion leading to necrosis of tissue and thrombosis.[16,17] Patients receiving voriconazole or caspofungin prophylaxis are commonly affected by these as they do not have any activity against zygomycetes.

PREDISPOSING FACTORS

Candida species are present as commensals in normal healthy people. They begin to colonize in the mucosa of gastrointestinal tract, upper respiratory tract, pharynx, larynx and mouth soon after birth. The growth of candida species affect the general condition of the patient, therefore prompt recognition is necessary and every step should be taken to prevent the disease by recognizing the risk factors. Certain factors that predispose to the condition are :

Decreased digestive secretions
Pancreatic juices aid in maintain the integrity of mucosa of small intestine and protect it from parasites and microorganisms. They also degrade the immunocomplexes.[18,19] Intake of medicines that affect the integrity of gastrointestinal mucosa like antacids and antiulcer agents highly affects its secretion. Therefore in patients with chronic candidiasis it is highly recommended to restore the normal hydrochloric acid, pancreatic enzyme levels to prevent development of candidiasis.

Diet and nutrition
A diet with balance of micro and macronutrients is necessary for optimum growth of the body. Foods like cheese, alcohol beverages etc that contain high content of yeast favour the growth of candida. Deficiency of zinc, folic acid, magnesium, vitamin B6 and essential fatty acids have also been found in patients of chronic candidiasis.[20-22]

Immunocompromised states
Any disease that makes the body's immune response weak makes it more vulnerable to infections. Prescription of immunosuppresants drugs in conditions like cancer, diabetes and hypothyroidism debilitate the immune responses.[23-25] AIDS, dibetes, leukemia, cancer and thyroid disorders are commonly associated with superinfection with candida.

Prosthodontic appliances and xerostomia
Patients wearing removable prosthesis and maintain poor oral hygiene are an important risk factors for oral candidiasis. The mucosa covered by denture provides an environment devoid of oxygen leading to moist and anaerobic environment which is a favourable factor for growth of bacteria. Qualitative or quantitative change in salivary flow or composition also favours the growth of candida species.

CLINICAL PRESENTATIONS

There are varied clinical presentations of candidal infections. They are broadly classified into acute and chronic forms by Lehner in 1960.[2]
Acute form
Pseudomembranous form- also known as thrush and is the most common clinically seen form accounting 35% of oral candidiasis cases. Generally affects the mucosa, palate, tongue or pharynx.
Erythmatous form- it appears as red, raw looking area which is tender. Commonly affected areas include tongue, palate and gingival. The classic presentation on tongue includes loss of papilaa imparting an erythmatous smooth surface.
Chronic form of Hyperplastic candidiasis- it resembles leukoplakia and hence also known as candidal leukoplakia. They appear as white patch that are non scrap able. These are very rare accounting for 5% of cases.

Other forms
Angular cheilitis- it is not seen alone but in combination with other forms. There is crackling or ulcerations seen around the corners of mouth. Generally seen in edentulous patients who have decreased vertical dimension and hence furrows are formed at the corner of the mouth which remain moist and hence sites favouring candidal growth.

Median rhomboid glossitis- It appears as a depapillated or erythmatous area on the dorsum of the tongue just in front of the circumvalate papilla.

Chronic mucocutaneous candidiasis- It is characterized by candidal lesions on mouth, skin and other mucus membranes. Approximately 90% of the patients suffering from chronic mucocutaneous candidiasis exhibit oral candidiasis.[26]

TREATMENT

Oral candidiasis is easy to treat and shows a great improvement on application of topical medications. Treatment is generally based on four basic principles.[27] First is making a prompt diagnosis, and then is correction of risk factors or underlying etiology. It then involves establishing the type of candidal infection and use of appropriate antifungal therapy by balancing its efficacy and toxicity. Maintaining good and proper oral hygiene with regular oral examinations prevent the development of the disease. Chlorhexidiene mouth rinses also aid in prevention of candidal infection. Patients wearing dentures should remove the dentures during night and soak them in chlorhexidine solution overnight. Antifungal therapy should be continued for 2 weeks period. If topical therapy shows no improvement then systemic therapy should be initiated. Regular follow up visits after every 3-7 days is necessary. The list of various topical antifungal agents with their doses is given below:

- Miconazole cream 2%

- Clotrimazole cream 1%
- Ketoconazole cream 2%
- Nystatin ointment 100,000 units/gram
- Nystatin topical powder 100,000 units/gram
- Nystatin oral suspension 100,000 units/gram
- Betamethasone dipropionate clotrimazolcream
- Clotrimazole troches 10 mg
- Amphotericin B 100 mg/ml

Amongst these the drugs which are included as a primary line of treatment are Nystatin(lozenges or liquid suspension), Amphotericin B (lozenges) and Clotrimazole(creams or lozenges).
The second line of treatment used against immunocompromised patients or patients suffering from severe condition include Ketoconazole (200-400 mg tab), Fluconazole (50-100 mg cap) and Itraconazole (100mg cap).

Recent treatment options
Drugs like Voriconazole and Posaconazole which inhibit the Cytochrome P450 mediated conversion of clonasterol to ergosterol.[27] They can be given by both oral and parentral routes. These drugs do not affect patients with renal problems and can be given safely in patients with dialysis.[28,29]
Echinocandins which include caspofungin, micafungin and anidulafungin interfere with the cell wall synthesis and lead to osmotic instability leading to death of the cell. The doses of Caspofungin are 75 mg loading followed by 50 mg/day and anidulafungin is 200mg loaing followed by 100mg/day.[30]

CONCLUSION
As it is said 'prevention is better than cure', every effort should be made to prevent the pathogenic conversion of this commensal organism in oral cavity. Care should be taken to prevent the formation of favourable environment for the growth of species by control of risk factors. Efficient oral hygiene should be maintained and regular oral examinations should be carried out.

REFRENCES

1. Greenspan D. Treatment of oral candidiasis in HIV infection. Oral Surg Oral Med Oral Pathol 1994;78:211-5.
2. L. Lekshmi, M. R. Anithalekshmi1, Linku Abraham1, Mohana.M.Nair1, Neema Aniyan1, Nikhila.M.Nair1, Rinu Varghese1, Shajan Abraham1ORAL CANDIDIASIS – REVIEW. International Journal of Research in Pharmaceutical and Nano Sciences. 4(6), 2015, 409 - 417.
3. Anurag Malani, Jareer Hmoud, Loretta Chiu, Peggy L. Carver, Andrew Bielaczyc, and Carol A. Kauffman. Candida glabrata Fungemia: Experience in a Tertiary Care Center. CID, (2005) 41(1), 975-981.
4. Jagdish Chander. Textbook of Medical Mycology. 3rd ed.
5. Schaller M, Borelli C, Korting HC, Hube B. Hydrolytic enzymes as virulence factors of Candida albicans. Mycoses. (2005), 48, 365-377.
6. Fidel PL Jr, Vazquez JA, Sobel JD. Candida glabrata: review of epidemiology, pathogenesis and clinical disease with comparison to C. albicans. Clin Microbiol Rev. (1999), 12, 80-96.
7. Koelsch G, Tang J, Loy JA, Monod M, Jackson K, Foundling SI, Lin X. Enzymic characteristic of secreted aspartic proteases of Candida albicans. Biochem Biophys Acta (2000), 1480, 117-131.
8. Dan M, Poch F, Levin D. High rate of vaginal infection caused by non-C.albicans Candida species among asymptomatic women. Med Mycol. (2002), 40, 383-386.
9. Hajjeh RA, Sofair AN, Harrison LH, et al. Incidence of bloodstream infections due to Candida species and in vitro susceptibilities of isolates collected from 1998 to 2000 in a population-based active surveillance program. J Clin Microbiol 2004;42:1519–27.
10. Tortorano AM, Kibbler C, Peman J, Bernhardt H, Klingspor L, Grillot R. Candidaemia in Europe: epidemiology and resistance. Int J Antimicrob Agents 2006;27:359–66
11. Pfaller MA, Diekema DJ. Rare and emerging opportunistic fungal pathogens: concern for resistance beyond Candida albicans and Aspergillus fumigatus. J Clin Microbiol 2004;42:4419–31.
12. Marr KA, Carter RA, Crippa F, Wald A, Corey L. Epidemiology and outcome of mould infections in hematopoietic stem cell transplant recipients. Clin Infect Dis 2002; 34:909–17.
13. Patterson TF. Advances and challenges in management of invasive mycoses. Lancet 2005;366:1013–25.
14. Baddley JW, Stroud TP, Salzman D, Pappas PG. Invasive mold infections in allogeneic bone marrow transplant recipients. Clin Infect Dis 2001; 32:1319–24.
15. Patterson TF, Kirkpatrick WR, White M, et al. Invasive aspergillosis: disease spectrum, treatment practices, and outcomes. I3 Aspergillus Study Group. Medicine (Baltimore) 2000; 79:250–60
16. Roden MM, Zaoutis T, Buchanan WL, et al. Epidemiology and outcome of zygomycosis: a review of 929 reported cases. Clin Infect Dis 2005;41:634–53.
17. Spellberg B, Edwards Jr J, Ibrahim A. Novel perspectives on mucormycosis: pathophysiology, presentation, and management. Clin Microbiol Rev 2005;18:556–69
18. Murray MT, Pizzorno J. Enciclopedia de Medicina Natural. 2a Edicion. Domingo J, editor. Espanha: Ediciones Tutor S.A.; 1998. p. 638 p.
19. Rubinstein E, Mark Z, Haspel J, Ben-Ari G, Dreznik Z, Mirelman D, et al. Antibacterial activity of the pancreatic fluid. Gastroenterology. 1989;88:927–32.
20. Balch JF, Stengler M. Prescription for Natural Cures. John Wiley & Sons I, editor. New Jersey; 2004. p. 724 p.
21. Pizzorno Jr. JE, Murray MT, Joiner-Bey H. Manual de Medicina Natural: Toma de decisiones en la clinica. 2nd Editio. Elsevier, editor. Barcelona - Espanha: Churchill Livingstone; 2009. p. 824 p.
22. Balch PA. Prescription for Nutritional Healing. Fourth Edi. Avery, editor. London, England: Penguin Group; 2006. p. 869 p.
23. Develoux M, Bretagne S. Candidoses et levuroses diverses. EMC - Mal. Infect. [Internet]. 2005 [cited 2013 Aug 6];2:119–39.
24. Vázquez-González D, Perusquía-Ortiz AM, Hundeiker M, Bonifaz A. Opportunistic yeast infections: candidiasis, cryptococcosis, trichosporonosis and geotrichosis. J. Ger. Soc. Dermatology [Internet]. 2013 [cited 2013 May 27];11:381–94.
25. Li SY, Yang YL, Chen KW, Cheng HH, Chiou CS, Wang TH, et al. Molecular epidemiology of long-term colonization of Candida albicans strains from HIV-infected patients. Epidemiol. Infect. [Internet]. 2006 [cited 2013 May 27];134:265–9.

26. Prasannakumar R. 'Oral Candidiasis- A Review, Scholarly. J.Med, 2(2), 2012, 26-30.
27. Aguirre Urizar JM. Oral Candidiasis. Rev Iberoam Micol. 2002;19:17-21. Manavathu EK, Cutright JL, Chandrasekar PH. Organismdependent fungicidal activities of azoles. Antimicrob Agents Chemother 1998; 42: 3018–21
28. Leveque D, Niviox Y, Jehl F, Herbrecht R. Clinical pharmacokinetics of voriconazole. Int J Antimicrob Agents 2006;27:274–84.
29. Torres HA, Hachem RY, Chemaly RF, Kantoyiannis DP, Raad I. Posaconazole: a broad-spectrum triazole antifungal. Lancet Infect Dis 2005;5:775–85
30. Vazquez JA, Sobel JD. Anidulafungin: a novel echinocandin. Clin Infect Dis 2006;43:215–22., Denning DW. Echinocandin antifungal drugs. Lancet 2003;362: 1142–5

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