Oral *Candida* spp. in Denture Wearers and Non-Denture Wearers

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Abstract

The purpose of this study was to record the occurrence of *Candida* spp. at selected oral sites, namely on the tongue, palate, buccal mucosa and in the saliva of denture-wearers, in comparison with non-denture wearers (control subjects). Samples from 15 denture-wearers and 15 non-denture wearers were taken using a cytobrush from the tongue, palate and buccal mucosa. A pea-sized sterile cotton ball was soaked at the floor of the mouth for 5 s to collect saliva samples. All samples then underwent serial dilution before being cultured on Brain-Heart Infusion (BHI) and Sabouraud Dextrose Agar (SDA) plates. After a 48 h incubation period, the plates were scored for colony-forming units (CFU). CFU counts on the BHI plates were taken as total counts while the counts on SDA plates represented fungal growth. The frequency of bacterial colonies was then determined by calculating the difference between total counts and fungal counts. The ratio of total microbial and candidal occurrences at the selected sites of denture-wearers to non-denture wearers was as follows – Overall: 6.4, 3.0; Saliva: 13.3, 7.6; Tongue: 8.2, 3.0; Palate: 11.7, 17.0; Buccal mucosa: 1.6, 1.4. In conclusion, there was a drastic increase in total microorganism and candidal occurrence at all sites, ranging from 30% to 1600% increase. The palate was the only site in which the increase in candidal occurrence was higher than the increase in bacterial occurrence.

Introduction

The oral ecosystem is composed of oral microorganisms and the oral cavity (Thellade, 1990). It supports a wide range of microorganisms, consisting of over 300 bacterial species, in addition to numerous yeasts, protozoa and mycoplasmas (Marcotte and Lavoie, 1998). Microorganisms can be found on the mucosal surfaces of the tongue, palate and cheek (Thellade, 1990) as well as in the saliva (Trudel et al., 1986). Oral candida is a normal part of the human oral microflora and approximately 25-50% of healthy individuals have *Candida* species colonising their oral cavity without any adverse effects (Odds, 1988). Candida is known as opportunistic yeast fungi that can cause oral and sometimes systemic infections (Madigan and Martinko, 2006). They become pathogenic only in certain situations, such as under conditions that allow them to increase their relative proportion to the local oral flora, or when the host immune system has been compromised (Ryan, 1994). Oral candidiasis is frequently prevalent in denture-wearers in the form of denture-induced stomatitis or denture sore mouth (Budtz-Jorgensen et al., 1975).

Objectives

The purpose of this study was to record the occurrence of *Candida* spp. at selected oral sites, namely on the tongue, palate, buccal mucosa and in the saliva of denture-wearers, in comparison to non-denture wearers.
Methods

Samples were taken from different sites in the oral cavity of 30 subjects, consisting of 15 healthy denture-wearers and 15 healthy individuals without dentures. Samples from the tongue, palate and buccal mucosa were taken by scraping the surface of the area with a cytobrush. Saliva samples were collected by soaking a pea-sized sterile cotton ball at the floor of the mouth for 5 s. The samples were stored in BHI broth transport medium before being brought to the laboratory. Serial dilution was carried out, in which 100 µL of each sample was pipetted into a tube containing 9.9 mL of sterile distilled water, shaken and then 1 mL was transferred from this tube into a new tube containing 9 mL of sterile distilled water. This step was repeated multiple times in order to produce several tubes containing \(10^{-2}, 10^{-3}, 10^{-4}\) and \(10^{-5}\) dilutions of the original sample. After that, 100 µL from each of the diluted tubes was cultured on Brain-Heart Infusion (BHI) and Sabaraoud Dextrose Agar (SDA) plates. Following a 48 h incubation period at 37°C, the plates were scored for colony-forming units (CFU). CFU counts on the BHI plates were taken as total counts while the counts on SDA plates represented fungal growth. The frequency of bacterial colonies was then determined by calculating the difference between total counts and fungal counts.

Results and Discussion

For each oral site, the average frequencies of total microorganism and candidal occurrence was calculated and the ratio of the average frequencies at the oral sites of denture-wearers to that of non-denture wearers were as follows:

<table>
<thead>
<tr>
<th>All Sites</th>
<th>Saliva</th>
<th>Tongue dorsum</th>
<th>Palate</th>
<th>Buccal mucosa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Candida</td>
<td>Total</td>
<td>Candida</td>
</tr>
<tr>
<td></td>
<td>6.4</td>
<td>3.0</td>
<td>13.3</td>
<td>7.6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>11.7</td>
<td>17.0</td>
</tr>
</tbody>
</table>

As can be seen that, the total microorganism occurrence at all sites of denture-wearers was six times as much as the occurrence in non-denture wearers, while candidal occurrence was three times as much. Microbial occurrence also-increased dramatically in the saliva and on the tongue of denture-wearers, with candidal colonisation only accounting for about half of the increase. The palate was the only site in which the increase of candidal occurrence in denture wearers was higher in comparison to the increase of total microorganism occurrence. Oral candida colonization has been shown to be much higher in denture-wearers (Budtz-Jorgensen et al., 1975), indicating that the presence of a denture may promote oral candidal colonization. This could explain why the palate, which has the greatest contact with dentures in the mouth, shows the highest increase of candidal colonization in denture-wearers compared to non-denture wearers. Meanwhile, the buccal mucosa was the least affected site, as there was only a slight increase of bacterial and candidal occurrence in denture wearers compared to non-denture wearers.

Conclusion

There is a higher occurrence of total microorganisms and candida at all the selected oral sites of denture-wearers compared to non-denture wearers, ranging from 30% to 1600% increase. The palate was the only site in which the increase in candidal occurrence was higher than the increase in bacterial occurrence.
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References


