

## RESEARCH ARTICLE

# ASSESSMENT OF ORAL STATUS AND ORO-PHARYNGEAL CANDIDOSIS IN ELDERLY IN SHORT-TERM HOSPITAL CARE

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### Abstract

**Objectives:** to evaluate prevalence of oral candidosis and predisposing conditions in hospitalized elderly patients.

**Design:** we examined 104 elder patients recently hospitalized in two geriatric hospitals for short-term hospital care.

**Methods:** information was collected on patients' sex, age, mental and physical disabilities, smoking habits, medical prescriptions, oral pathologies, denture wearing, oral hygiene habits and oral hygiene level. Quality of existing dentures was evaluated. Oral mucosae were examined for clinical signs suggesting oral candidosis. Semiquantitative cultures of *Candida* were carried out to confirm the clinical diagnosis.

**Results:** the diagnosis oral candidosis was confirmed in 18/54 patients showing clinical signs of oral candidosis. Confirmed oral candidosis was associated with the presence of other infections, proteo-caloric denutrition, ongoing antibiotic therapy, and denture wearing. Dentures in patients with confirmed oral candidosis at poorer technical quality of the acrylic surface in contact with the underlying mucosa.

**Conclusion:** the wearing of removable dentures is a major predisposing factor for oropharyngeal candidosis of elderly patients in short-term hospital care. Appropriate oral and denture hygiene measures as well as denture wearing habits should be introduced or maintained to prevent this infection.

**Keywords:** oral candidosis, older people, short-term hospitalization, denture wearing

### Introduction

Candidosis, i.e. infection by various members of the genus *Candida*, has been reported as the "disease of the diseased host" as the infection may be the sign of an underlying pathology [1]. Among the predisposing conditions for this infection are malnutrition, dehydration, polypathologies, polymedications, poor oral hygiene and the presence of removable dentures [2-7]. Concerning the prevalence of oropharyngeal candidosis in geriatric settings the results seem to vary according to the length of the stay in the institution (short-, medium- or long-term) [5,8,9]. The differences may partly be due to the fact that the level of oral hygiene and the denture wearing habits have more impact on the oral health status of patients living in long-term care than in those living in short-term care. In this context, the impact of the denture quality on the prevalence and severity of oral candidosis is not well established.

It was the purpose of the present study to put in evidence the predisposing conditions including prosthetic factors for oro-pharyngeal candidosis among elderly patients in short-term hospitalization.

### Material and methods

This study on the prevalence of oral candidosis was realized in the South of France (Montpellier, Marseille) on a representative and equal sample of patients hospitalized in two short-term geriatric hospital centers. The criteria of exclusion were that the patients refused to participate or that their health status did not allow a clinical examination. Of 146 patients who were addressed, 104 were included in the study. Data collection was carried out during the period November 2001 until June 2002.

### Collection of data

At each geriatric hospital center the patients were examined both by a medical doctor and a dentist attached to the center.

The medical doctor collected informations concerning sex, age, prior site of hospitalization, mental and physical disabilities, smoking habits, denture wearing and oral hygiene habits, the oral hygiene level, oral pathologies and medical prescriptions. In patients with clinical signs of oral candidosis an oral swab was performed to isolate *Candida*. The dentist collected the following variables: the dental status; presence or removable dentures; type of denture; retention, stability and occlusion of the dentures including estimation of the vertical dimension of occlusion; age of the dentures; technical quality of the denture surface and denture hygiene. Denture retention was evaluated using a gnathometer assessing the force necessary to loosen the dentures during a closing movement, i.e. incision. Retention was scored as poor when a force of  $\leq 1.5$  kg exerted during incision produced a loosening of the denture.

The clinical diagnosis of oro-pharyngeal candidosis was made when at least one of four clinical signs was present: a tongue depapillated and red; denture stomatitis; oral thrush; angular cheilitis (perlèche).

In patients with a clinical diagnosis suggesting oral candidosis, the oral swab was obtained for quantification and cultural identification of yeasts. The swab included material sampled from three sites of the oral cavity: the lateral, anterior borders of the tongue, the posterior part of the dorsum of the tongue and the palate. The swab was transported, placed in a humid environment, and immediately inoculated on Sabouraud agar containing chloramphenicol to suppress bacterial growth. After incubation for 2 days at 37°C, growth was assessed semiquantitatively according to the scale: no growth; < 10 colonies; 10-30 colonies; many colonies. A yeast score of  $\geq 10$  colonies was used to distinguish between subjects likely to be carriers and subjects likely to be infected (reference). The identification of the yeast species was made using the API 20 *Candida*® system (Bio Mérieux).

### Statistical analysis

The data were analysed statistically using a Systat 8.0 and Epi Info® software. The Wilcoxon, Kruskal-Wallis and Anova tests were used to analyse the quantitative variables. The Chi-square test (Yate's correction) was used to analyse the qualitative variables. The level of significance was set at  $p < 0.05$ .

### Results

The average age of the patients was 82 years, range 60-94 years, and 65% were women. There was clinical signs suggesting oral candidosis in 52%. There was no difference with respect to age and weight when comparing subjects with or without clinical signs of oral candidosis.

Of the patients, 73% were totally or partially physically independent whereas 27% were totally dependent. Regarding the cognitive capacity, 32% had unimpaired and 34% moderately impaired capacity whereas 34% were demented. A proteo-caloric denutrition was observed in 22%, 13% suffered from infection, 10% from diabetes mellitus, 8 had progressive cancer or leukemia, 5% were dehydrated and 4% had lymphocytic leukemia ( $< 1200/\mu\text{l}$ ).

Concerning ongoing medication, 45% received psychoactive drugs, 20% antibiotics, 6% corticostereoids and 1% chemotherapy. Only 8% were regular smokers.

Of the patients, 58% were wearing at least one removable denture (Fig. 1), 42% were edentulous in one or both jaws wearing complete dentures, and 11% were completely edentulous not wearing any denture. Concerning oral hygiene, 65% of the patients did not receive any care whereas 26% and 9%, respectively, received oral hygiene care once or twice per day. For denture cleaning, 58% of the denture wearers were assisted in this procedure.

### Signs and symptoms from the oral cavity

Of the 54 (52%) patients showing clinical signs of oral candidosis, 11 (20%) suffered from oral dryness, 6 (11%) had burning or itching sensations from the oral mucosa whereas the remaining 37 (69%) had no symptoms from the oral mucosa.

The mycologic cultures confirmed an oral *Candida* infection in 18 (33%) of those with a tentative clinical diagnosis of oral candidosis. Of these, 8 patients were affected by glossitis and 10 showed thrush of the oral mucosae. The yeast species isolated were *C. albicans* (77%), *C. tropicalis* (17%), *C. krusei* (6%).

### Prosthetic status

Of the patients, 54 were wearing a removable denture in the maxilla and 44 in the mandible. Concerning the stability, it was poor in 61% of the maxillary and 70% of the mandibular dentures. With respect to the retention, it was poor in 63% of the maxillary and 75% of the mandibular dentures. The fitting denture surface showed micro-porosities and

	Without candidosis N = 86 (%)	With candidosis N = 18 (%)	P
Physical status			
Independent	22 (26)	6 (33)	
Semi-dependent	43 (50)	7 (39)	NS
Dependent	21 (24)	5 (28)	
Cognitive status			
Unimpaired	27 (31)	6 (33)	
Moderately impaired	28 (33)	7 (39)	NS
Demented	31 (36)	5 (28)	
Underlying diseases			
Diabetes	9 (10)	1(6)	NS
Infections	8 (9)	6 (33)	0.02
Undernutrition	16 (19)	8 (44)	0.03
Progressive cancer or leukemia	8 (9)	0	NS
Leukemia	4 (5)	0	NS
Ongoing medication			
Antibiotics	14 (16)	7 (39)	0.03
Corticosteroids	3 (3)	3 (17)	NS
Psychotropes	41 (48)	6 (33)	NS
Denture wearers	43 (50)	14 (78)	0.05
Poor oral hygiene	24 (28)	4 (22)	NS
No oral hygiene care	29 (34)	6(33)	NS

**Table 1. Distribution of patients with and without confirmed oral candidosis according to various clinical variables**

	Without candidosis N = 86 (%)	With candidosis N = 18 (%)	P
Physical status			
Independent	22 (26)	6 (33)	
Semi-dependent	43 (50)	7 (39)	NS
Dependent	21 (24)	5 (28)	
Cognitive status			
Unimpaired	27 (31)	6 (33)	
Moderately impaired	28 (33)	7 (39)	NS
Demented	31 (36)	5 (28)	
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Poor oral hygiene	24 (28)	4 (22)	NS
No oral hygiene care	29 (34)	6(33)	NS

**Table 2. Clinical characteristics of dentures in 54 subjects wearing a complete maxillary denture and 44 subjects wearing a mandibular denture according to whether oral candidosis was confirmed by culture or not.**

irregularities in 56% of the maxillary and 57% of the mandibular dentures.

**Bivariate analysis**

The 18 patients with confirmed oral candidosis were compared according to clinical variables with the group of patients without confirmed candidosis, i.e. subjects with clinically healthy oral mucosae (N = 50) and patients with clinical changes suggesting oral candidosis

(N=36)(Table1). Confirmed oral candidosis was associated with the presence of other infections, proteo-caloric denutrition, ongoing antibiotic treatment and denture wearing. Of the patients with confirmed oral candidosis, 12 were wearing a maxillary denture and 10 a mandibular denture. Compared with the denture wearers without confirmed candidosis, the dentures of the patients with oral candidosis had poorer technical quality of the

fitting denture surface (Table 2). There was no difference between denture wearers with candidosis and those without candidosis with respect to stability and retention of the dentures, level of denture hygiene or level of denture hygiene care, or whether the vertical dimension of occlusion was reduced or not (Tables 2 and 3).

### Discussion

The purpose of this study was to establish the predisposing factors for oropharyngeal candidosis of elderly patients in short-term hospital care and to which extent the quality of removable dentures might predispose for an oral *Candida* infection.

The prevalence of confirmed oral candidosis was 18% in this study, a figure which corresponds well to the 24% observed in a large multicentric French study involving 8230 patients in short-term geriatric hospital care [10]. However, this figure was lower than recent findings on the occurrence of oral candidosis in long-term care facilities showing figures of about 50% [7,8,11,12]. These variations are far too important to be explained by demographic variations or socioeconomic dissimilarities alone, but may be linked, in part, to differences in denture usage and hygienic habits as well as to underlying systemic predisposing factors [13,14]. Concerning the predisposing conditions, this study has confirmed that ongoing infections, undernutrition and ongoing antibiotic therapy are significant predisposing conditions [10,15-17]. The finding that a large proportion of the patients had clinical changes of the oral mucosae suggesting oral candidosis which was not confirmed by the mycologic examination was an unexpected finding. This has also been observed in other studies carried out in patients during short-term hospitalization [5,10] which indicates that antimycotic treatment should not be instituted merely on the basis of clinical observations, but that the diagnosis should be confirmed by a mycological examination.

The introduction of a denture into the oral cavity results in profound alterations of the wearing habits should be introduced or maintained to prevent this infection

environmental conditions as the prosthesis and the underlying mucosa become colonized with oral microorganisms, including *Candida* spp. [18]. Thus, dentures are a major predisposing condition for oral candidosis which was also confirmed in the present study. Concerning the quality of the dentures, factors such as poor retention, poor stability or reduced vertical dimension of occlusion were not related to the presence of oral candidosis. This is not an unexpected observation considering that these aspects of denture quality do not influence the colonization of the oral cavity by *Candida*. However, mechanical irritation by poorly-functioning dentures may reduce the barrier function of the epithelial cells, hence, the penetration by microbial antigens may become enhanced [19].

The present study showed that a poor technical quality of the denture surface, i.e. presence of surface irregularities and microporosities, was associated with confirmed oral candidosis. Transmission and scanning electron microscopic studies of denture plaque have shown that bacteria predominated the microflora of denture wearers both with and without denture stomatitis but that yeasts are found only in stomatitis-associated plaque [20,21]. In fact, the dentures serve as reservoir of *Candida*. Thus, there exists a correlation between the plaque score of the fitting denture surface, and the degree of colonization of the mucosa by *Candida* [7,8]. It is noteworthy that denture wearers with glossitis showed increased yeast counts, not only from the oral mucosa but also from the fitting denture surface, compared with patients without glossitis [7]. Thus, the infection of the tissues underlying the denture is essentially due to a colonization of an uneven and porous fitting denture surface by *Candida* that tend to spread to involve other mucosal sites.

In conclusion, the wearing of a removable denture is a major predisposing factor for oropharyngeal candidosis of elderly patients in short-term hospital care. Appropriate oral and denture hygiene measures as well as denture wearing habits should be introduced or maintained to prevent infection.

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