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Prevalence of Superficial Mycosis in Breast Cancer Patients: A Cross-Sectional Study

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ABSTRACT

Mycoses remain a significant cause of morbidity, as the number of immunosuppressed individual's increases worldwide; breast cancer patients receiving chemotherapy might develop superficial mycosis. A cross-sectional study was conducted on 28 breast cancer patients, with fungal superficial mycosis suspicion, the samples collected from each patient were nail scraping or ear swabs, all were examined under microscope and inoculated into Sabouraud's tube media.

Fungal identification was based on physical features of the colonies and biochemical tests (Auxacolor©). Out of the 28 breast cancers patients, 8 women had aural skin mycosis and skin appendage mycosis, so prevalence rate of superficial mycosis was 28,6%. 87,5% of positive patient are employed and 12,5% are housewives. A correlation was found between superficial mycosis and the patients aged above 50 years old (p=0,03). 87,5% of positive cases had otomycosis and 25% onychomycosis.

Fungal isolates were Candida albicans, Candida parapsilosis, Candida zeylanoides, Trichosporon sp, Aspergillus niger, and Aspergillus flavus. Superficial mycoses are typically opportunists; the incidence of mycosis among these patients is expected to rise, significant challenge remain with regard to the prevention.

Keywords

Mycoses, Breast cancer, Fungal infections, Immunology.

Introduction

Mycoses remain a significant cause of morbidity, as the number of immunosuppressed individuals increases worldwide. Moreover, major advances in anticancer treatment have contributed to an increased frequency of severe fungal infections in patients with neoplastic diseases [1].

Furthermore, breast cancer patients receiving chemotherapy or radiotherapy might develop superficial mycosis like otomycoses and onychomycosis [2,3].

Onychomycosis in described in immunosuppressed children receiving chemotherapy [4], and an immunocompromised host is more susceptible to otomycosis [5].

Most fungal infections are caused by the commonly recognized opportunistic fungi *Candida sp, Aspergillus sp, Cryptococcus*

neoformans and the pathogenic fungi *Histoplasma capsulatum, Coccidiodes immitis,* and less often by *Blastomyces dermatitidis* [1]. The adherence capacity of Candida and its ability to form biofilms may be important fungal virulence factors to all Candida species and especially for *Candida parapsilosis* [6].

In the recent years; opportunistic fungal infections are gaining greater importance in human medicine as result of possibly huge of immunocompromised patients [7,3], our study was designed to assess the prevalence of superficial mycoses among breast cancer patients with fungal mycosis suspicion, and the identification of the fungal species involved in this pathology.

Material and methods

A cross-sectional study was conducted on 28 breast cancer patients, with fungal mycosis suspicion.

Before collecting samples, a questionnaire was performed among breast cancer patients, including socio-economical features (age, residence), clinical fungal suspicion (onyxis, otitis), management of cancer (surgery, radiotherapy, chemotherapy, palliative care, or more than one treatment modality).

The samples collected from each patient were nail scraping or ear swabs, all were examined under microscope and inoculated into Sabouraud's Dextrose Agar tube media, and incubated at 25°C for a minimum of 6 weeks.

Culture tubes were examined for presence of growth every 3-4 days. Fungal identification was based on physical features of the colonies and biochemical Auxacolor© tests were used to identify yeasts that failed to produce filaments in serum (Figure 1). Data were managed and analysed using statistical software SPSS 17.0. Rates were compared by the Chi-square test.

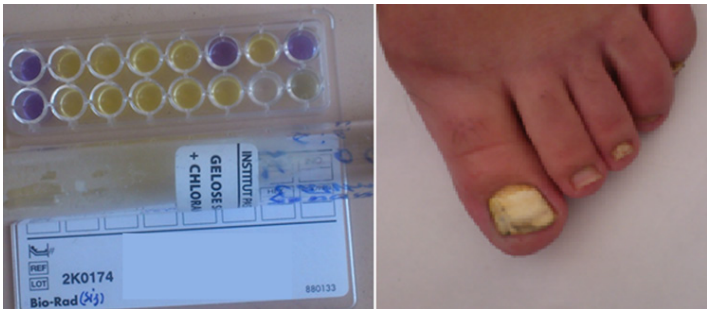

Figure 1: Clinic features, culture and auxanogramme of *Candida parapsilosis* onychomycosis.

Results

Out of the 28 breast cancers patients, 8 women had skin mycosis and skin appendage mycosis, so prevalence rate of superficial mycosis in breast cancer patients was 28,6%. A correlation was found between superficial mycosis and the patients aged above 50 years old (p=0,03). 87,5% of positives patient are employed and 12,5% are housewives. 87,5% of positive cases had otomycosis and 25% onychomycosis (Figure 2)

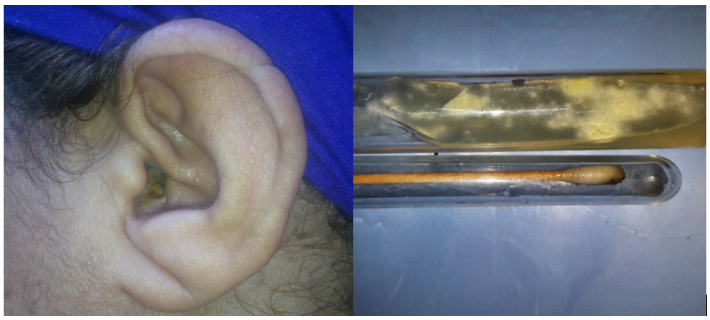

Figure 2: *Aspergillus niger* otomycosis in a breast cancer patient after chemotherapy.

Fungal isolates were *Candida albicans, Candida parapsilosis, Candida zeylanoides, Trichosporon sp, Aspergillus niger,* and *Aspergillus flavus*, the clinical presentations are depicted in table 1.

Table 1: Distribution of fungal isolates and their clinical presentation in breast cancer patients.

Fungi	Onychomycosis	Otomycosis
Candida albicans	0	1
Trichosporon sp	1	0
Candida parapsilosis	1	0
Candida zeylanoides	0	1
Aspergillus flavus	0	1
Aspergillus niger	0	1
Total	2	6

Discussion

Fungal infections in cancer patients can be further divided into five groups: superficial dermatophyte infections with little potential for dissemination; superficial candidiasis; opportunistic fungal skin infections with distinct potential for dissemination [2]. Underlying comorbidities, such as cancer [8,9] and immunodeficiency [4] can increase susceptibility to onychomycosis, patients who are human immunodeficiency virus (HIV) positive are also predisposed to the development of infections including onychomycosis and tinea pedis [10].

We found 4 cases of otomycosis (Figure 2), this affection is seen more frequently in immunocompromised patients as compared to immunocompetent persons [3], but on the other hand, there is no evidence to support the view that mycosis is more common in patients with cancers [11].

There are no known abnormal clinic features of these infections in cancer patients [11], onychomycosis cases in our breast cancer patients had usual clinical features (figure 2), necrotizing cutaneous breast fungal infection were described [12], Truppman et al. [13] reported a case series of fungi-associated breast infections after 700 augmentation mammoplasties over a nine-year period.

We have found just 2 cases of onychomycosis, this superficial mycosis has been shown to have a higher incidence in cancer

patients [11], but the study was based on a community sample defined using photographs of potential lesions.

Data in superficial mycosis patients with underlying comorbidities are limited, in some cases because of exclusion criteria within clinical trial programs [11], or because of the relatively small number of patients, especially in our sample.

Aging is the most common risk factor for onychomycosis in our sample, most likely due to poor peripheral circulation, longer exposure to pathogenic fungi, repeated nail trauma, suboptimal immune function, and slower nail growth [14]. In addition, various medical conditions more common in the elderly increase the risk of comorbid onychomycosis.

In the study of Ouf et al. [15] tinea capitis followed by tinea pedis were observed in 9.29% and 6.43% among patients suffering from cancer. The relatively high ratio of tinea capitis among cancer patient may be due to the use of radioactive irradiation for cancer treatment which lead to shedding of scalp hairs rendering the cuticle vulnerable and susceptible to penetration by fungi deep within hair follicle below the level of mature cuticle [15].

Most fungal infections are caused by the commonly recognized opportunistic fungi *Candida sp Aspergillus sp, Cryptococcus neoformans,* and the pathogenic fungi *Histoplasma capsulatum, Coccidiodes immitis*, and less often by *Blastomyces dermatitidis* [1], moreover, *Candida albicans, Candida parapsilosis, Candida tropicalis, Candida glabrata* species are potential pathogens that can result in local or systemic infections in immunocompromised patients with cancer [16].

Usually, the most common causes of fungal affections in cancer patients are *Candida sp, Aspergillus sp*, and *Fusarium sp* [2], which is in accordance with our results. Contrary to our findings, Ouf et al. [15], has reported dermatophytes in cancer patients; such difference in results can be attributed to the small size of our sample. Candidiasis is one of the commonest complications seen in immunosuppressed cancer patients or those receiving head and neck irradiation.

We identified Trichosporon, these species may be superficial involving hair shafts, skin or disseminated, and they have been reported as a cause of fungemia, especially in patients who have neutropenia and cancer [17], moreover, there is an increase of Candida parapsilosis in candidemia in cancer patients [18].

Overview of literature shows that among the fungi isolates, *Aspergillus* and *Candida* were the most common species causing otomycosis [5], which is in agreement with our results, *Candida zeylanoides* is emerging yeast isolated from nails and blood [19]. Previous studies have shown that Candida species was mainly responsible for otomycoses in immunocompromised hosts, and otomycosis attributed to Candida is often identified by cultural data [3,5], and the majority of cases in immunocompomised patients are caused by *Candida albicans*.

In addition, Aspergillus has the propensity to invade arterial walls in immunocompromised patients. Cancer comorbidities and associated polypharmacy make some patients ineligible for oral antifungals [20], hence, the necessity of identification and management of superficial mycosis.

Conclusion

Superficial mycoses are typically opportunists; the incidence of mycosis among cancer patients is expected to rise, significant challenge remain with regard to the prevention.

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