

Fungal infections from the diabetic foot ulcers in AL-Samawah city

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Abstract

A total of 150 samples from diabetic foot ulcers at many ages for both genders (86 male and 64 female) were collected from patients suffering from diabetic wounds infections who attending the Samawah Hospital of AL-Muthanna province during the period from June 2015 to May 2016.

The fungal infections of diabetic foot were caused by *Candida* species. *Candida albicans* was the most common causative agent 46\103(44.66%) , followed by *C. tropicalis*, *C. dublinensis*, *C. krusei*, *C.parapsilosis* and *C. guilliermondi* were 23 (22.33%), 15(14.56%), 9(8.73%), 6(5.82%) and 4(3.88%) respectively. The highest incidence was *Aspergillus* spp 23\47 (48.93%) . The other molds isolated were *Penicillium marneffeii* 14(29.78 %), *Fusarium solani* 8 (17.02 %), and *Basidiobolus ranarum* 2 (4.25 %).

Key words: Fungal isolations ; diabetics; *Candida* sp; foot ulcers.

Introduction

Diabetes mellitus is a chronic metabolic disease having relative or complete insulin deficiency, leading to gross defects in glucose, fat and protein metabolism (1,2). Diabetes is an important predisposing factor for fungal infections and causes significant morbidity and mortality. The greater frequency of infections in diabetic patients is caused by hyperglycemic environment which attributes to defect in both cell-mediated immunity and humoral immunity (3,4). Fluctuating blood sugar and hypoxia from poor circulation may impair the ability of white blood cells to destroy pathogenic bacteria and fungi increasing infection risk (5). Patients with diabetes represent a

unique group of individuals who appear more prone to develop infections than others. Several mechanisms have been proposed to explain the association between diabetes and infections. However, few conclusive studies exist and a considerable debate is going on regarding the evidence for this predisposition. Diabetes mellitus is a chronic disorder that affects a large segment of the human population and is a major public health problem. Diabetes and foot problems are almost synchronous (6,7).

Diabetic foot infections frequently result in morbidity, hospitalization and amputations (8,9,10).

Aims and Objectives

1. To study the prevalence of fungal infection in diabetic foot ulcers.

2. To study the spectrum of fungal strains isolated from the wounds.

3. To compare our findings with those of previous studies.

Materials and methods

Collection of samples

The samples were collected from the Samawah Hospital during the period from June 2015 to May 2016. The total number of cases studied were 150 from diabetic wound patients. The isolates were taken from skin foot infections of the different ages for both gender.

Tissue specimens were obtained from the depth of the wound (taking aseptic precautions) after debridement. Samples were transferred to the laboratory within an hour in sterile containers.

Culture of samples

The sample was collected from the depth of the wound. Direct microscopic examination was carried out using 10% potassium hydroxide (KOH) (11). For the isolation of both moulds and yeasts, the sample was inoculated on two sets of Sabouraud's dextrose agar slants with chloramphenicol. One slant was incubated at room temperature and other at 37C for one month (12). The media were observed for growth daily for the first week and

twice a week for the subsequent period. Further the culture was identified by macroscopic and microscopic morphology such as lactophenol cotton blue, slide culture. Further for isolation of *Candida*, growth from Sabouraud's dextrose agar inoculated onto corn-meal agar and identified by germ tube formation, urease test, sugar fermentation Chromagar *Candida* and Api *Candida* used in the diagnosis of *Candida* species (13).

Results and Discussion

In this study, a total of 150 wound swabs specimens were collected and examined from patients who suffered from diabetic infections. The total wound swabs with diabetic according to the gender groups were (65.4% and 34.6%) for male and female respectively. The majority for

male (Table 1).Which is similar to the results of a study by (14,15). This indicates males with diabetes are more prone to develop foot ulcer and infection than females and it may be attributed to more outdoor activities, poor foot care, and differences in lifestyle.

(Table 1) :Numbers of diabetic patients according to gender.

Samples	Diabetic patients	%
Male	86	65.4
Female	64	34.6
Total	150	100

The fungal infections of diabetic foot infections were caused by *Candida* species . *Candida albicans* was the most common causative agent 46\103(44.66%) , followed by *C. tropicalis*, *C. dublinensis*, *C. krusei*, *C.parapsilosis* and *C. guillermondi* were 23 (22.33%), 15(14.56%), 9(8.73%), 6(5.82%) and 4(3.88 respectively (table 2).

The study conducted by (16) showed the presence of various fungal pathogens in diabetic foot ulcer tissues, among which

(Table 2): *Candida* species isolated from diabetic foot infections.

<i>Candida</i> species	Number	%
<i>Candida albicans</i>	46	44.66
<i>Candida tropicalis</i>	23	22.33
<i>Candida dublinensis</i>	15	14.56
<i>Candida krusei</i>	9	8.73
<i>Candida parapsilosis</i>	6	5.82
<i>Candida guillermondi</i>	4	3.88
Total	103	100

The mold species were identified on the basis of their microscopic and macroscopic appearance as described by (18) . The highest incidence was

Candida species preponderated. (17) has also reported the association of *Candida* spp with protracted ulceration in diabetic feet which improved the following systemic antifungal therapy. This is in agreement with the findings of the present study showing that among the fungal pathogens isolated from deep tissues were *Candida* spp. The investigators could also identify *Candida* species like *C. parapsilosis*, *C. albicans*, *C. tropicalis* and *C. glabrata* from the infected tissues.

Aspergillus spp 23\47 (48.93%) . The other molds isolated were *Penicillium marneffeii* 14(29.78 %), *Fusarium solani* 8 (17.02 %), and *Basidiobolus ranarum* 2

(4.25 %). *P. marneffe* was unique due to its dimorphic nature at different temperatures and also its rare occurrence.

The presence of *Aspergillus* spp and *F. solani* has been reported by some workers on diabetic foot ulcer (19) . In our study, among other mold species we also isolated *Aspergillus* spp and *F. solani* from the infected foot. In other study (18) have reported a case of simultaneous aspergillosis and mucormycosis complicating diabetic foot gangrene *P. marneffe* has been rarely reported in India. *P. marneffe* infections have been documented in HIV-infected individuals

(Table 3): Mold species isolated from diabetic foot infections.

Mold species	No.	%
<i>Aspergillus</i> spp	23	48.93
<i>Penicillium marneffe</i>	14	29.78
<i>Fusarium solani</i>	8	17.02
<i>Basidiobolus ranarum</i>	2	4.25
Total	47	100

from the northeastern part of India (19) . This infection has been predominantly reported from Southeast Asia ,where it has been found to be the third most common illness that specifies the Acquired Immuno Deficiency Syndrome (AIDS) (20). *P. marneffe* is pathogenic particularly in patients with AIDS and its isolation from blood is considered an HIV marker in endemic areas (11). The present study signifies the need of a mycological evaluation of non-healing diabetic foot and prudent antifungal treatment based on the culture results rather than depending on broad spectrum antifungal for cure.

Conclusion

Due to hyperglycemic environment and suppressed immunity, diabetic patients are more prone to infections. Fungal

infections in diabetic patients if not treated in time leads to the fatal complications such as foot amputation.

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