Original Research Paper

Volume - 13 | Issue - 07 | July - 2023 | PRINT ISSN No. 2249 - 555X | DOI : 10.36106/ijar

Medical Microbiology

# A STUDY ON PREVALENCE OF SUPERFICIAL MYCOSES, THEIR ISOLATION AND IDENTIFICATION IN DIABETIC PATIENTS IN GOVERNMENT MEDICAL COLLEGE & HOSPITAL, KOTA

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**ABSTRACT** **Introduction :** Diabetes mellitus is a chronic metabolic dysregulation of glucose. It is a world-wide problem of increasing importance. Fungal infections are the commonest cutaneous infection in diabetic patients. Fungal disease is classified into three broad groups: superficial mycosis, subcutaneous mycosis, and systemic mycosis. Superficial and cutaneous fungal infections are the most common dermatological diseases worldwide, with a high prevalence mostly caused by dermatophytes, yeast, and to a lesser extent, non-dermatophyte filamentous fungi. This study aims to analyse the prevalence of superficial mycoses, their isolation and identification in diabetic patients. **Material and Methods:** The study was approved by Institutional Ethics Committee of Government Medical College and Attached Hospitals, Kota, Rajasthan. 100 diabetic patients attending medicine, surgery and dermatology OPD and those admitted with fungal infections of skin, hair and nail. **Result:** We found that majority 51% patients were from age group 46-65 years while 36% patients were from 25-45 years. The 14% patients were of Type 1 DM and 86% patients were of T2DM. Out of 100 samples 58% sample from nail and 42% samples from skin. We found that majority 52% samples were of NG while 20% samples were of T.menta followed by 8% samples of C.albicans, T.rubrum respectively. Out of 8 C.albicans samples GT formation was seen in all 8 samples and out of 8 C.albicans samples corn meal agar was seen in all 8 samples. We found that out of 8 C. albicans samples 8 sample showed fermentation of glucose, maltose, fructose and trehalose respectively. **Conclusion:** Diabetes is increasing worldwide and the mortality due it is also on the rise. Superficial mycoses account the common cutaneous manifestation and especially onychomycosis which can act as a chronic reservoir. Both culture and direct microscopy were equally important for the diagnosis of mycoses as culture can determine infection in an active state, whereas KOH wet-mount is rapid and effective in screening for fungal infections from various sites of the body. Hence, both tests are required to be done simultaneously to diagnose fungal infection.

**KEYWORDS :** Diabetes Mellitus, Superficial Mycoses, Prevalence

## INTRODUCTION

Diabetes mellitus is a chronic metabolic dysregulation of glucose. It is a world-wide problem of increasing importance. All over the world, the number of diabetic patients is dramatically increasing, with a global prevalence nearly doubling since 1980, rising from 4.7 to 8.5% in adults. About three million diabetic patients have been estimated, especially by 2025.[1] In Asia where two thirds of the world's diabetic live, the type 2 DM accounts for 90% of the cases. Superficial and cutaneous fungal infections are the most common dermatological diseases worldwide, with a high prevalence mostly caused by dermatophytes, yeast, and to a lesser extent, non-dermatophyte filamentous fungi (NDFF).[4] Superficial infections are the most common fungal infections and are prevalent mostly in countries with tropical, subtropical, and temperate climates.[5]

The major causes of superficial mycosis are Trichophyton, Microsporum, Epidermophyton species which collectively are referred to as dermatophytes, then Malassezia furfur and Candida species. Other fungi that can cause an opportunistic mycosis (Cryptococcus spp., Aspergillus spp., Geotrichum spp., Trichosporon spp.) several genera belonging to the class Zygomycetes can, albeit rarely, cause primary or secondary skin and nail infection.[8] The cause for this increase in prevalence of skin mycoses may be found in the socioeconomic status of the general public, life-style, type of population, migration of people and climatic conditions.[9]

Hence early detection of superficial mycoses especially tinea pedis and onychomycosis of toe nails which are not commonly noticed by the patient and timely adequate dosage of antifungal agents with good glycaemic control can save the limb. Skin and nail infections are more common in diabetes[13]. Candida species constitute 28% of cutaneous infection and its incidence is high in diabetes because of the decrease in the β globulin ,an anti candidal factor.[14] Several Candida species are involved in human infections. Among these, Candida albicans is the most common species. However during the past decade, there is an emergence of non albicans Candida species especially among the diabetic patients due to immunosuppression.[15]

The diagnosis of SFI is usually based on using conventional methods as microscopic and macroscopic examination. Nowadays, the prevalence of fungal causative agents that causes SFI is changing and mostly depends on the geographical, ecological, and socio-economic conditions. Although SFI are not life-threatening diseases, they can significantly affect the quality of a patient's life.[17] This study aims to analyses the prevalence of superficial mycoses, their isolation and identification in diabetic patients.

## MATERIAL AND METHODS

The study was approved by Institutional Ethics Committee of Government Medical College and Attached Hospitals, Kota, Rajasthan. 100 diabetic patients attending medicine, surgery and dermatology OPD and those admitted with fungal infections of skin, hair and nail.

### Inclusion Criteria

1. All diabetic patients (type 1 and 2) presenting with clinical features like intense itching, inflammation, cosmetically poor appearance or other features diagnosed as superficial mycoses.

### Exclusion Criteria

1. Patients on immunosuppressive drugs.
2. Patients who have received treatment with either systemic or topical antifungals in the last 6 months.

Samples were collected from all diabetic patients who gave history of skin, scalp or nail lesions clinically diagnosed as superficial fungal infections. The samples were collected in a sterile piece of black cardboard (six inches square, folded to form an envelope) which were clipped together, labelled and transported. Interdigital space lesions were cleaned with sterile saline and to be collected in sterile swabs and inoculated immediately in culture media. Antifungal susceptibility of Candida spp. was carried out by testing various antifungal drugs like Amphotericin B, Fluconazole etc. All data and parameters were entered in a Microsoft Excel spreadsheet. Statistical test was used for data analysis: Chi-square test.

## OBSERVATION AND RESULT

We found that majority 51% patients were from age group 46-65 years while 36% patients were from 25-45 years. The mean age for study group was 50.7 years. In our study 52% patients were male and 48%

patients were female. In the present study, 67% patients were form OPD and 33% patients were form IPD.

**Table No.1 Distribution Of Patients According To DM Type.**

| DM type | No. of patients | Percentage |
|---|---|---|
| Type 1 | 14 | 14 |
| Type 2 | 86 | 86 |
| Total | 100 | 100 |

We found that 14% patients were of Type 1 DM and 86% patients were of T2DM. Out of 100 samples 58% sample from nail and 42% samples from skin.

**Table No. 2 Distribution Of Patients According To Lesion.**

| Lesion | No. of patients | Percentage |
|---|---|---|
| DLSO | 38 | 38 |
| PSO | 3 | 3 |
| T. corporis | 26 | 26 |
| T. cruris | 9 | 9 |
| T.barbae | 2 | 2 |
| T.pedis | 2 | 2 |
| TDO | 5 | 5 |
| Web space | 3 | 3 |
| WSO | 12 | 12 |
| Total | 100 | 100 |

In table 2, we found that DLSO was seen in 38% while T.corporis was seen in 26% patients.

**Table No.3 Distribution Of Patients According To KOH.**

| KOH | No. of patients | Percentage |
|---|---|---|
| Positive | 44 | 44 |
| Negative | 56 | 56 |
| Total | 100 | 100 |

In table 3 and 4, out of 100 patients 44% patients were KOH positive while 47% patients were culture positive.

**Table No.4 Distribution Of Patients According To Culture.**

| Culture | No. of patients | Percentage |
|---|---|---|
| Positive | 47 | 47 |
| Negative | 53 | 53 |
| Total | 100 | 100 |

**Table No.5 Distribution Of Patients According To LPCB/gram.**

| LPCB/gram | No. of patients | Percentage |
|---|---|---|
| A.fumigatus | 1 | 1 |
| A.niger | 1 | 1 |
| C. albicans | 8 | 8 |
| C. parapsilosis | 1 | 1 |
| C.tropicalis | 3 | 3 |
| Fusarium | 1 | 1 |
| NG | 52 | 52 |
| Rhizopus | 2 | 2 |
| T.menta | 20 | 20 |
| T.rubrum | 8 | 8 |
| T.verruco | 3 | 3 |
| Total | 100 | 100 |

In the present study we found that majority 52% samples were of NG while 20% samples were of T.menta followed by 8% samples of C.albicans, T.rubrum respectively.

We found that C.albicans and C. tropioalis had colony characteristics of convex, shiny and creamy while C.parapsilosis had wrinkled. Morphologically we found that C.albicans had Branched hyphae seen with clusters of blastospores along its course and thick walled chlamydospores while C.tropicalis had Long thin, mycelium with scattered blastospores.

**Table No-6 Correlation Of Age With DM Type.**

| Age distribution | DM Type | | | | P-value |
|---|---|---|---|---|---|
| | Type 1 | | Type 2 | | |
| | No. of patients | Percentage | No. of patients | Percentage | |
| 25-50 | 11 | 78.57 | 48 | 55.81 | 0.11 |
| 51-75 | 2 | 14.29 | 34 | 39.53 | 0.06 |
| >75 | 1 | 7.14 | 4 | 4.65 | 0.69 |
| Total | 14 | 100.00 | 86 | 100.00 | |

In figure 6, we correlated age with DM type. We found that 78.5% type 1 DM patients and 55.8% T2DM patients were in age group 25-50 years. Only 7.14% T1DM patients and 4.65% patients in T2DM patients were of >75 years.

In the present study we found the prominent pathogen isolated from skin and nail was dermatophytes followed by candida species. Non-dermatophyte moulds were isolated from nail lesions.

In our study we found that out of 8 C. albicans samples 8 sample showed fermentation of glucose, sucrose, maltose, galactose, xylose and trehalose respectively. In 3 C.tropicalis samples fermentation of glucose, sucrose, maltose, galactose, xylose and trehalose was seen.

In the present study we found that C. albicans was 100%, 75%, 87.5%, 10% and 62.5% sensitive to amphotericin-B, itraconazole, clotrimazole, nystatin and fluconazole respectively. While C. tropicalis was 100%, 66.7%, 100%, 100% and 66.7% sensitive to amphotericin-B, itraconazole, clotrimazole, nystatin and fluconazole respectively.

## DISCUSSION

Undoubtedly diabetes is a significant risk factor for skin and nail disorders.[63] Onychomycoses are common in critically ill patients. Consequently, fungal pathogens must be monitored for possible related health complications. For non-diabetic patients, nail infection problems are only correlatable to aesthetic issues. Otherwise, diabetic patients could undergo severe complications due to a nail infection, especially when misdiagnosed or recognized late.

In our study we found that majority 51% patients were from age group 46-65 years while 36% patients were from 25-45 years. The mean age for study group was 50.7 years. In this study 52% patients were male and 48% patients were female. A Khodadadi H et al[54] found that 811 (44.9%) men and 996 (55.1%) women, with a mean age of 33.25 (1–92) years included in their study. Saud B et al[55] found that Female participants were higher in number as compared with male participants.

In this study we found that 14% patients were of Type 1 DM and 86% patients were of T2DM. We correlated age with DM type. Sheeba et al[57] found that the DM type II 132(88%) were more affected than DM type I 18(12%) patients. similar to Eckhard et al (2007).[77]

In this study we found 58% sample from nail and 42% samples from skin. Sheeba et al[57] found that the samples collected were skin scrapings 63(42% )and nail clippings 87(58%). Uthansingh K et al [58] found that the commonly affected sites were axillaries (19 cases), hand (15 cases), feet (4), and face (3).

In this study we found that DLSO was seen in 38% while T.corporis was seen in 26% patients. Sheeba et al[57] found that the predominant skin lesion was Tinea corporis 40[63%] followed by Tinea cruris 14(22%).In the nail lesions the predominant was DLSO 58[66%] followed by WSO 21(24%). Some studies showed that tinea capitis,[81] tinea corporis,[82] tinea pedis,[83] and tinea cruris[84] were the predominant clinical forms of dermatophytosis. Although tinea unguium is not a life-threatening condition, it is associated with difficulties in performing hand activities and is a cosmetic problem that affects the quality of life.

The majority 52% samples were of NG while 20% samples were of T.menta followed by 8% samples of C.albicans, T.rubrum respectively. A Khodadadi H et al[54] found that etiological agents of dermatophytes were 20 (7.6%) T. mentagrophytes, 11 (4.2%) T. rubrum, 5 (1.9%) Epidermophyton floccosum, 15 (6.6%) Microsporum canis, 3 (1.27%) T. verrucosum, 2 (0.84%) T. violaseum, and 2 (0.84%) M. gypseum. They identified 53 (20.3%) Trichophyton spp., 22 (5.1%) Microsporum spp., and 129 (49.4%) unknown dermatophytes. Sheeba et al[57] found that in skin scrapings, dermatophyte 33 (84%) was the major pathogen isolated followed by Candida species 6(15%).

In our study the prominent pathogen isolated from skin and nail was dermatophytes followed by candida species. Non-dermatophyte moulds were isolated from nail lesions. Sheeba et al[57] found that in skin lesions, dermatophyte was the major pathogen isolated which

accounted for 33(84%) out of culture positive cases followed by Candida species 6(15%) as shown by Lugo. Somolinos et al 15% of isolates in DM were candida.[70]

In the present study we found that C. albicans was 100%, 75%, 87.5%, 10% and 62.5% sensitive to amphotericin-B, itraconazole, clotrimazole, nystatin and fluconazole respectively. While C. tropicalis was 100%, 66.7%, 100%, 100% and 66.7% sensitive to amphotericin-B, itraconazole, clotrimazole, nystatin and fluconazole respectively. Saud B et al[55] found that the out of the total isolates, Candida species were isolated in 75 samples and were subjected to antibiotic sensitivity test. Under standard in vitro conditions, 36.8%[93] isolates were resistant to fluconazole and 28.9% were resistant to ketoconazole, while 10.5%[94] were resistant to miconazole.

## CONCLUSION

Diabetes is increasing worldwide and the mortality due it is also on the rise. Superficial mycoses account the common cutaneous manifestation and especially onychomycosis which can act as a chronic reservoir. Due to associated complications like neurovasculopathy, obesity and hyperglycaemia, the tissues are further damaged before the patient can recognise the lesion. The chronicity and tissue disruption can lead to secondary bacterial infection. Both culture and direct microscopy were equally important for the diagnosis of mycoses as culture can determine infection in an active state, whereas KOH wet-mount is rapid and effective in screening for fungal infections from various sites of the body. Hence, both tests are required to be done simultaneously to diagnose fungal infection.

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