Original Article

Prevalence of Dermatophytic Infection and Detection of Dermatophytes by Microscopic and Culture Methods

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Abstract

***Background**: Dermatophytosis is considered as one of the major public health problems in the world and is the most commonly diagnosed skin disease in Bangladesh. The prevalence and characteristics of dermatophytic infections vary with climatic conditions, age, lifestyle and population migration patterns. **Objective**: To determine the prevalence of dermatophytic infection and sensitivity of different diagnostic procedures among the patients visiting dermatology outpatient department of Tairunnessa Memorial Medical College & Hospital, Gazipur, Bangladesh (TMMCH). **Materials and Methods**: This cross-sectional study was done during a period of 12 months from July 2015 to June 2016. Total 80 specimens were collected based on clinical presentations irrespective of age and sex. The diagnosis was confirmed by microscopic examination using 20% potassium hydroxide (KOH) and culture on Sabouraud's dextrose agor medium. **Results**: Out of 80 samples, 31(38.75%) were found positive by culture and 21 (26.25%) were found positive by microscopic method which were also found positive by culture. This study found that most (51.62%) of the dermatophyte-infected cases were in the age group of 21−40 years followed by 41−60 years (29.03%) with male and female distribution 58.06% and 41.94% respectively The maximum number of infections was reported from groin followed by hands/legs and feet. **Conclusion**: The result of this study shows higher prevalence of dermatophytosis in both genders in this area. An accurate diagnosis can help in proper and effective treatment of dermatophytosis.*

***Key words**: Dermatophytic infection; TMMCH; Microscopy; Culture*

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Introduction

Dermatophytosis is a common skin disease, affecting millions of people worldwide.[1] These infections occur in both healthy and immunocompromised patients. Dermatophytes are responsible for most cutaneous fungal infections and the estimated lifetime risk of acquiring dermatophytic infection is between 10–20%.[2,3]

Dermatophytes are a group of closely related keratinophilic fungi that can invade keratinized tissues of humans and animals such as skin, hair and nails causing dermatophytosis.[4] Dermatophytosis includes several distinct clinical manifestations. The severity of the disease depends on strain or species of infecting fungus, the sensitivity of the host and the site of infection.[5] Dermatophytes consist of three genera−

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Trichophyton, Microsporum, and Epidermophyton.[6] Worldwide the most common cause of tinea pedis, tinea unguium (onychomycosis), tinea cruris, tinea mannum, tinea corporis, and tinea faciei is Trichophyton rubrum.[2] Other frequently implicated agents include Trichophyton mentagrophytes, Microsporum canis, Microsporum gypseum and Epidermophyton floccosum.[7]

The laboratory diagnosis of dermatophytosis routinely involves direct microscopic examination of clinical specimen followed by in vitro culture techniques. Microscopic identification of fungal elements directly from clinical specimen is a rapid diagnostic method, but it lacks specificity and sensitivity, with false negative results in up to 15% cases.[8] In vitro culture is a specific diagnostic test, but it is a slow technique.[9] The advent of molecular technology has enabled the development of techniques like polymerase chain reaction which is a highly sensitive and specific test and can be used for diagnosis of fungal infections.

The prevalence of disease varies in different geographical areas. Many studies have investigated the prevalence of dermatophytosis in different regions of the world including Bangladesh.[10-13] The aim of this study was to determine the prevalence of dermatophytic infections and diagnosis by microscopy and culture methods in Gazipur, Bangladesh.

Materials and Methods

This cross-sectional study was done over a period of 12 months from July 2015 to June 2016 in Tairunnessa Memorial Medical College Hospital (TMMCH), Gazipur, Bangladesh. Total 80 samples were collected from clinically suspected dermatophytosis patients who visited Dermatology Outpatient Department.

Specimen collection and processing: Skin samples were collected carefully by scraping, after disinfection with 70% alcohol solution using a sterile scalpel. Specimens from clinically abnormal nails were collected by clipping of the distal portion of nail, the underside area, and the nail bed. The scrapings were collected on a piece of sterile brown paper and then folded, labelled and brought to the laboratory for further processing. Confirmation of the clinical diagnosis was based on microscopic examination and culture. All necessary precautions were taken to avoid any contamination during collection, transport, and identification of pathogens.[14]

Isolation of dermatophytes: The collected specimens were divided into two portions. The first portion of the specimens was examined microscopically using 20% potassium hydroxide (KOH) for the presence of filamentous, septate, branched hyphae with or without arthrospores.[15] The second portion was cultured on Sabouraud's dextrose agar medium with antibiotics (Oxoid, UK) and incubated at 25°C for 2−3 weeks. Identification of fungi was made on the basis of phenotypic characteristics of the colonies and microscopic examination.[15]

Data analysis: Data were analyzed using Microsoft Excel 2007 and comparisons were performed using chi-square test.

Results

Out of total 80 specimens 31(38.75%) showed positive growth of dermatophytes. Among the 75 skin specimens 29 (38.67%) were positive and among the 5 nail specimens 2 (40%) were positive (Table I).

This study found that most (51.62%) of the dermatophyte-infected cases were in the age group of 21−40 years followed by 41−60 years (29.03%) with male and female distribution 58.06% and 41.94% respectively (Table II).

In this study, out of 80 specimens, 31(38.75%) were found positive by culture and among the 31 culture positive specimens 21 (26.25%) were found positive

Table I: Isolation rate of dermatophytes from skin and nail samples (n=80)

Types of specimens	Number (%)	Positive growth n (%)	No growth n (%)
Skin	75 (93.75)	29 (38.67)	46 (61.33)
Nail	5 (6.25)	2 (40)	3 (60)
Total	80 (100.00)	31 (38.75)	49 (61.25)

Table II: Age and sex distribution of dermatophyte-positive cases (n=31)

Age group in years	Male n (%)	Female n (%)	Total n (%)
≤ 20	3 (9.68)	1 (3.23)	4 (12.91)
21−40	10 (32.26)	6 (19.36)	16 (51.62)
41−60	4 (12.90)	5 (16.13)	9 (29.03)
≥ 60	1 (3.22)	1 (3.22)	2 (6.44)
Total	18 (58.06)	13 (41.94)	31 (100.00)

Table III: Detection rate of dermatophytes by culture and microscopy

Methods	Positive n (%)	Negative n (%)	Total n (%)
Culture	31 (38.75)	49 (61.25)	80 (100.00)
Microscopy	21 (26.25)	59 (73.75)	80 (100.00)

Table IV: Comparison between microscopic examination and culture method for detection of dermatophytes

Microscopic method	Culture method		Total
	Positive	Negative	
Positive	21	0	21
Negative	10	49	59
Total	31	49	80

by microscopic method (Table III). After comparing between microscopy and culture methods we found that the sensitivity of microscopic method was 67.74% and specificity was 100% (Table IV).

Discussion

Dermatophytosis is one of the most common cutaneous infections all over the world and is cosmopolitan in distribution, but previously most dermatophyte strains had relatively restricted geographical distribution.[16] Dermatophytosis cannot be easily diagnosed on the basis of clinical manifestations as a number of other conditions mimic the clinical presentation. The differential diagnoses of dermatophytosis includes seborrhoeic dermatitis, atopic dermatitis, contact dermatitis, psoriasis, eczema etc.[16] Further it is more difficult to diagnose dermatophytosis in immunocompromised patients as clinical presentation is often atypical.[17]

In the present study, the prevalence of dermatophytic infection was 38.75% which correlates with the findings of another study that found 29.64% positive.[18] A study carried out in India reported 84% positive dermatophytic infection, which is higher than findings in our study.[19] The discrepancy of the findings of different studies may be due to the variation of prevalence with time as well as from country to country, city to city and even hospital to hospital in same city.

In our study, dermatophytosis was more prevalent in men (58.06%) than in women (41.94%). This is similar with the studies of other researchers from India, Bangladesh and Iraq.[19-21] Most of the patients in the present study were in the age group of 21−40 years (51.62%) followed by 41−50 years (29.03%). This finding is in accordance with the results of other researchers.[20,22] But the disease occurs in all ages and is common in young adults of both sexes. Overall, many factors such as weather conditions, occupation, social class, living environment and frequency of travel are implicated in dermatophytic infections.[22] The lower incidence in females in present study may be also due to underreporting of the female patients to the hospitals as in Bangladeshi community.

Fungi are the causative agents of various types of

dermatophytosis such as *tinea capitis, tinea cruris, tinea corporis and tinea pedis*. Previous studies done in India and Iraq reported maximum number of infections from groin (30−32.67%) followed by hands/legs (18−21.33%) which correlates with our study.[19,21] Although some other researchers found that most common fungal infection was *tenia corporis* in their study.[18,20]

The results of the present study showed that 31 (38.75%) specimens were positive in both direct microscopic examination and culture while 10 (12.5%) specimens were negative for direct microscopic examination and positive in culture. This is relatively in agreement with studies of other researchers who found 5.3%, 8.9% and 13% false negative results in direct microscopic examination.[19,23,24] The negative results of direct microscopic examination may be associated with an inadequate amount and preparation of specimens, skill of observer, a non-suitable temperature and storage in wet containers which result in growth of saprophytic fungi leading to contamination of the specimens. After comparing between microscopy and culture method we found that the sensitivity of microscopic method was 67.74% and specificity was 100%. However, in another study it was found that culture method was more sensitive than microscopic method, which disagrees with our findings.[25]

The problem of dermatophytic infection is increasing day by day as demonstrated by various studies. From analysis of data it is evident that sensitivity of detection of fungus by microscopic examination is lower compared to culture method. So, culture can be used as a definitive procedure for screening and diagnosis of dermatophytic infection. Polymerase chain reaction is a highly sensitive and specific test and can be used for diagnosis of various fungal pathogens. It is essential that good laboratory methods should be available for rapid and precise identification of the dermatophytes, not only for accurate diagnosis but also for post-therapeutic strategies.

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