Prevalence of superficial fungal infections in the rural areas of Bangladesh

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Background: Superficial fungal infections of skin are very common in rural areas of Bangladesh. The prevalence and characteristics of superficial fungal infections (SFIs) vary with age, sex, climatic conditions, lifestyle, and population migration patterns. There is no study in Bangladesh to determine the prevalence and pattern of superficial fungal infection. This study was undertaken to determine the characteristics of SFIs amongst rural patients visiting in the Dermatology outpatient Department of Community Based Medical College Hospital, Mymensingh, Bangladesh.

Methods: From January to December 2008, there were 3438 patients visited in Dermatology outpatient department.Out of them 601 patients are diagnosed as SFIs (310 males and 291 females), aged between at birth to 90 years were included in this study. The diagnosis of SFIs was based on clinical presentation mainly which were confirmed by laboratory direct microscopy and culture.

Results: Tinea Corporis (22.63%) was the most frequent infection followed by ptyriasis versicolor (12.81%), oral thrush (12.48%), tinea capitis (10.32%), tinea pedis (9.82%), tinea cruris (8.32%), candidal intertrigo (6.49%), onychomycosis (4.33%), chronic paronychia (3.49%), tinea fasciae (3%), tinea manuum and genital candidiasis (1.83%), tinea incognito (1.66%) and tinea barbae (1%). Among candidal infection, oral thrush (12.48%) most common followed by intertrigo (6.49%), chronic paronychia (3.49%), genital candidiasis (1.83%). Tinea capitis (11.85%) and oral thrush (13.96%) were most prevalent in children. Whereas tinea corporis was most common (17.40%) in adults. The prevalence of SFIs was greater in males than females. Children were most commonly affected by tinea capitis, oral thrush and tinea corporis, whereas adults are generally suffered from tinea corporis, ptyriasis versicolor and tinea cruris. The frequency of tinea corporis, tinea pedis and onychomycosis were much greater in elderly population.

Conclusion: This study clearly shows that SFIs are of concern in both genders and in all age groups. The prevalence of superficial fungal infections are increasing in day by day throughout the Bangladesh. The pattern and distribution of SFI in Bangladesh particularly in rural population seems to very high beyond our prediction.

Keywords: candidiasis, dermtophytosis, superficial fungal infection, tinea infection

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INTRODUCTION

Superficial fungal infections (SFIs) affect millions of people worldwide; with an estimated lifetime risk of 10–20% [1]. The pathogens responsible for SFIs include dermatophytes, and candida. Dermatophytes are the most frequently encountered causative agents of SFIs, leading to tinea infections, which are generally classified according to the body site affected. The geographic location, cultural background, and population migration patterns significantly affect the characteristics and prevalence of SFIs in particular regions. A significant variation in the pattern of mycotic infection in different countries is clearly evident from studies performed in different country like Algeria, South Africa, Mexico, Italy, Japan, USA, Canada, Brazil, India and Australia [2-11]. This heterogeneity in the prevalence of SFIs in different parts of the world has been attributed to factors such as climate (humidity, temperature), lifestyle (unhygienic), involvement in outdoor activities and the prevalence of underlying diseases (diabetes, malnutrition, liver and renal disease, immunosuppression, etc). Another factor is the reluctance of the patients to seek treatment because of the minor nature of the disease or due to embarrassment, unless the condition becomes sufficiently serious to affect the quality of life [12].

Studies aimed at determining the intensity and nature of SFIs in different regions of the world are important for the prevention and management of SFIs [1,13-16]. Although SFIs are quite common in rural areas, [17,18] very little attention has been paid to their characteristics and prevalence in this country. The aim of this study was to determine the prevalence of the SFIs and their association with age, gender, and body site in patients attending the Dermatology Department of the Community Based Medical College Hospital, Mymensingh, Bangladesh.

PATIENTS AND METHODS

The outpatients of the Department of Dermatology of Community Based Medical College were included in our study. A total of 3438 patients of rural community were examined in our hospital from January to December 2008. The suspected patients for SFI were taken to our laboratory for confirmation by microscopic examination and culture. The detected body parts were cleaned with alcohol; then, skin scraping, hair plucking with roots, and nail shaving were done with a scalpel and the specimens were aseptically placed on a glass slide with one drop of 20% KOH and examined under the microscope for fungal hyphae. Another portion of the sample was plated on Saboroud's dextrose agar media supplemented with 0.05mg/ml chloramphenicol and 0.5mg/ml cyclohexamide. The cultures were kept at 22°c-26°c and examined after 2 weeks for growth in culture media. Identification of fungi was made according to morphologic and microscopic growth of the colonies. Moreover, mycological examinations were performed to confirm the diagnosis of pityriasis versicolor. Specimens were taken with the help of a scotch tape. Oral and genital swabs were also taken with swab sticks for suspected candidal infection, and microscopic examination and culture were done accordingly. Patients receiving immunosuppressant therapy, diabetes, and immunocompromised individuals were excluded from our study. All data were tabulated for further analysis.

RESULTS

A total of 601 (17%) patients diagnosed with superficial fungal infection were included in our study. The patients comprised 310 (51.58%) males and 291 (48.42%) females aged from newborn to 90 years, 180 (30%) patients aged 0-14 years, 357 (59%) patients aged 15-64 years and 64 (11%) patients aged more than 64 years. Tineasis were the most common SFIs, followed by candidiasis, as shown in Table 1. In this population, tinea corporis (22.63%) was the most prevalent form of SFIs which generally presented with oval itchy localized ring lesions with central clearing and sometimes inflammatory red papules. Pityriasis versicolor (12.81%) was the second most common superficial fungal infection which presented with multiple hypopigmented patches with powdery scales involving the trunk and sometimes other sites; this lesion is erythematous and itching in the hot weather. Tinea capitis generally presented with one or more of the following scalp hair follicle abnormalities; hair loss with round or oval patches of alopecia, itchy scaly patches on the scalp and/or occipital area, scaly papules or plaques

Table 1. Pattern of superficial fungal infections in male, female and total patients

Name of Fungal Infections	Male n (%)	Female n (%)	Total (%)
Tinea corporis	80 (25.81)	56 (19.24)	136 (22.63)
Tinea cruris	38 (12.26)	12 (4.12)	50 (8.32)
Tinea pedis	22 (7.10)	37 (12.71)	59 (9.82)
Tinea capitis	33 (10.65)	29 (9.97)	62 (10.32)
Tinea fasciae	9 (2.90)	9 (3.09)	18 (3)
Tinea barbae	6 (1.94)	00 (00)	6 (1)
Tinea mannum	7 (2.26)	4 (1.37)	11 (1.83)
Pityriasis. versicolor	43 (13.87)	34 (11.68)	77 (12.81)
Onychomycosis	10 (3.23)	16 (5.50)	26 (4.33)
Tinea incognitio	3 (0.10)	7 (2.41)	10 (1.66)
Oral thrush	34 (10.97)	41 (14.09)	75 (12.48)
Chronic paronychia	7 (2.26)	14 (4.81)	21 (3.49)
Candidal intertrigo	12 (3.87)	27 (9.28)	39 (6.49)
Genital candidiasis	6 (1.94)	5 (1.72)	11 (1.83)
Total	**310 (51.58)**	**291 (48.42)**	**601**

accompanying inflammation, or non-inflammatory diffuse areas of scaling. Tinea pedis presented with maceration, erythema, desquamation, hyperkeratosis, pustules, and pruritus of the sole. Candidal intertrigo presented with interdigital lesions and a white soggy skin involving the digital clefts. Patients with tinea cruris presented with mild plaque, multiple scaly eruptions and erythematous patches with active margins. The least frequent SFI in this population was tinea barbae. Generally, onychomycosis presented clinically with different patterns of nail invasion, including distal and lateral subungual, proximal subungual, endonyx and total dystrophy of the nails. The most common form of onychomycosis observed in this study was distal and lateral subungual onychomycosis characterized by infection of the nail bed, causing hyperkeratosis, onycholysis, thickening of the nail plate, chalky white patches over the nail surfaces resulting in disfigurement, white yellow patches overtaking the lunula and nail plate, and sometimes total destruction or paronychia. The toenails were the most common affected site, followed by the fingernails and both. The segregation of patients with SFIs according to age group and gender revealed that tinea capitis (26.67%) was more prevalent in children aged 0–14 years, while tinea corporis (25.49%) was more common in adults aged 15–64 years.

Table 2 shows that of 601 patients, 180 (29.95%) children were affected by SIFs. Among children,

Table 2. Pattern of superficial fungal infections in children (0-14yr)

Name of Fungal Infections	Male n (%)	Female n (%)	Total (%)
Tinea corporis	18 (20)	06 (6.67)	24 (13.33)
Tinea cruris	01 (1.11)	00 (00)	01 (0.56)
Tinea pedis	04 (4.44)	10 (11.11)	14 (7.78)
Tinea capitis	23 (25.56)	25 (27.78)	48 (26.67)
Tinea fasciae	07 (7.78)	08 (8.89)	15 (8.33)
Tinea barbae	01 (1.11)	00 (00)	01 (0.56)
Tinea mannum	00 (00)	00 (00)	00 (00)
Pityriasis. versicolor	01 (1.11)	04 (4.44)	05 (2.78)
Onychomycosis	00 (00)	04 (4.44)	04 (2.22)
Tinea incognitio	01 (1.11)	01 (1.11)	02 (1.11)
Oral thrush	22 (24.44)	17 (18.89)	39 (21.67)
Chronic paronychia	01 (1.11)	01 (1.11)	02 (1.11)
Candidal intertrigo	10 (11.11)	12 (13.33)	22 (12.22)
Genital candidiasis	01 (1.11)	02 (2.22)	03 (1.67)
Total	**90 (50%)**	**90 (50%)**	**180 (29.95)**

maximum frequency was for tinea capitis (n=48, 26.67%) followed by oral thrush (n=39, 21.67%) and tinea corporis (n=24, 13.33%). Here, male and female children were equally affected as 25 (27.78%) female and 23 (25.56%) male children were affected by tinea capitis and 22 male (24.44%) and 17 female (18.89%) children were affected by oral thrush.

Table 3 shows that out of 601 patients, 357 (59.40%) adults were affected by SIFs. Among the adults, the highest frequency was for tinea corporis (n=91, 25.49%) followed by pityriasis versicolor (n=68, 19.05%) and tinea cruris (n=44, 12.32%). Regarding gender, 193 (54.06%) male and 164 (45.94%) female patients were affected; 54 (29.98%) male and 37 (22.56%) female patients were affected by tinea corporis, 39 male (20.21%) and 29 female (17.68%) patients were affected by pityriasis versicolor and 34 male (17.62%) and 10 female (6.10%) were affected by tinea cruris. Table 4 shows the distribution of superficial fungal infections in elderly patient (65 yr +).

DISCUSSION

In this study, tineasis were the most common SFIs, followed by candidal infection. tinea corporis, tinea capitis and pityriasis versicolor were the most common and tinea barbae was the least common. Children under 14 years of age appeared to be more susceptible to tinea capitis, which is similar to the results of other regions, including Italy [19,20], Croatia [21], and Austria [22]. The high incidence of tinea capitis in the younger population (under14 years) may be a result of the low level of fungistatic fatty acids in younger individuals [23]. Moreover, large families (four to eight children) are quite common in this region, which may possibly result in some neglect (in terms of hygiene standards) on the part of the mother, as she is busy with the

Table 3. Distribution of superficial fungal infections in adult population (15-64yr)

Name of Fungal Infections	Male n (%)	Female n (%)	Total (%)
Tinea corporis	54 (29.98)	37 (22.56)	91 (25.49)
Tinea cruris	34 (17.62)	10 (6.10)	44 (12.32)
Tinea pedis	11 (5.70)	20 (12.20)	31 (8.68)
Tinea capitis	09 (4.66)	04 (2.44)	13 (3.64)
Tinea fasciae	02 (1.04)	01 (0.61)	03 (0.84)
Tinea barbae	05 (2.59)	00 (00)	05 (1.40)
Tinea mannum	07 (3.63)	02 (1.22)	09 (2.52)
Pityriasis versicolor	39 (20.21)	29 (17.68)	68 (19.05)
Onychomycosis	07 (3.63)	07 (4.27)	14 (3.92)
Tinea incognitio	01 (0.52)	04 (2.44)	05 (1.40)
Oral thrush	11 (5.70)	21 (12.80)	32 (8.96)
Chronic paronychia	06 (3.11)	11 (6.71)	17 (4.75)
Candidal intertrigo	02 (1.04)	15 (9.15)	17 (4.75)
Genital candidiasis	05 (2.59)	03 (1.83)	08 (2.24)
Total	**193 (54.06)**	**164 (45.94)**	**357 (59.40)**

Table 4. Distribution of superficial fungal infections in elderly patient (65 yr +)

Name of Fungal Infections	Male n (%)	Female n (%)	Total (%)
Tinea corporis	08 (29.63)	13 (35.14)	21 (3.28)
Tinea cruris	03 (11.11)	02 (5.41)	05 (7.81)
Tinea pedis	07 (25.93)	07 (18.92)	14 (21.88)
Tinea capitis	01 (3.70)	00 (00)	01 (1.56)
Tinea mannum	00 (00)	02 (5.41)	02 (3.13)
Pityriasis versicolor	03 (11.11)	01 (2.70)	04 (6.25)
Onychomycosis	03 (11.11)	05 (13.51)	08 (12.50)
Tinea incognitio	01 (3.70)	02 (5.41)	03 (4.69)
Oral thrush	01 (3.70)	03 (8.11)	04 (6.25)
Chronic paronychia	00 (00)	02 (5.41)	02 (3.13)
Total	**27 (42.19)**	**37 (57.81)**	**64 (10.65)**

youngest children. The sharing of towels, clothing and hair accessories with infected individuals may lead to the spread of SFIs. The spread of infections may also be attributed to the use of unsterilized barbering instruments [23,24]. Tinea pedis is common in adults due to bare foot and excessive use of water. Humidity and temperature are well-known factors affecting fungal penetration through the stratum corneum of the skin [25]. Exposure to high temperature is common in rural areas because most of them are farmers who work in the hot weather. Frequent exposure to dirty water may affect the prevalence of tinea pedis infections. Earlier reports have shown that dogs and cats may play a significant role in spreading dermatophytes [26,27]. Our data also suggest that males were affected by different kinds of SFIs more than females and the prevalence was highest in adult males aged between 15 and 64 years. These results are in agreement with those of earlier investigators who also reported a higher prevalence of SFIs in males than females [1,14,16]. By contrast, some studies have reported a higher frequency of SFIs in females as compared to males [15,21,28,29]. Although some investigators have suggested that gender may influence the susceptibility to particular forms of infection [30,31], it should be emphasized that factors other than gender may play a major role in determining the prevalence of SFIs. The difference in the extent and severity of fungal infections in males and females in the rural areas may be attributable to the vast difference in daily work, lifestyle and propensity to micro-trauma [32]. In this region, the majority of women are confined to household activities, including child care, laundry, cooking, etc. Men are generally considered as the "breadwinners" and spend a significant time in their workplace. In patients with onychomycosis, the frequency of dermatophytes causing nail infections was quite low whereas non-dermatophyte molds were the most common causative agents. The greater susceptibility of adult females to onychomycosis infection in this study may be explained by their lifestyle and household responsibilities.

The prevalence of superficial fungal infections is constantly increasing throughout Bangladesh. The pattern and distribution of SFI in Bangladesh, particularly in the rural population, was very high beyond our prediction. Predominant infection sites may vary depending on the geographical area, and social, cultural, environmental, and occupational factors. Our data provided valuable information on which future efforts can be made to prevent superficial fungal infections in rural areas of the country.

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