Prevalence of Dermatophytosis in Badaun, Uttar Pradesh, India

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Authors’ contributions

This work was carried out in collaboration between both authors. Author PS designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Author ND managed the analyses of the study and also managed the literature searches. Both authors read and approved the final manuscript.

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ABSTRACT

Dermatophytoses is a superficial fungal infection of tissues having keratin. The responsible fungus are dermatophytes. The infection is usually designated as ring worm or “tinea”. It is observed worldwide with higher prevalence in tropical countries and areas due to high rates of humidity, moisture and high sweating in summer. Recurrent dermatophytosis is a challenge for dermatologists in India and constituted 9.3% of all patients of dermatophytosis. The present study is conducted to reveal the prevalence of dermatophytosis in patients attended in the Maheshwari Hospital and Diagnostic Centre in Badaun. A survey was done for a period of one and half year. The samples were obtained from Maheshwari Hospital and Diagnostic Centre, Badaun, Uttar Pradesh. A total of 300 patients were included in the study. Physical observation, KOH test, Microscopy and culture tests were performed for screening and confirmation of various fungal infections. Clinically the prevalence of dermatophytosis was 60% that was observed more in males. Patients with age group 16–30 and 31–40 years were more affected.

Keywords: Dermatophytosis; fungal infection; Pityriasis versicolor; Candidiasis; Tinea corporis; Tinea cruris.

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1. INTRODUCTION

Fungal infections are very common because it affects a significant number of people. The word ‘superficial mycoses’ means the skin infection. It affects more than 20–25% population globally [1]. It is mainly caused by Trichophyton, Epidermophyton and Microsporum which are the keratinophilic mycelia fungi known as dermatophytes. These dermatophytes invade the stratum corneum of the keratinized tissues [2,3].

The Dermatophytosis presents high morbidity and several psychological effects. It decreases average working days of patient. Dermatophytosis is favoured by poor hygiene and, hot and humid conditions. It is common in tropical and temperate countries [4]. These pathogenic fungi invade the keratinized tissues like nails, skin and hair. This superficial infection is known as Dermatophytosis which is present in humans and in animals also [5]. Dermatophytes are classified into three genera Microsporum, Trichophyton and Epidermophyton. The most common fungal infections are those that infects the skin and produce non-life threatening skin rashes. Similar infections may also be caused by few Candida and non-dermatophytic molds viz. genera Fusarium, Aspergillus and Scopulariopsis [6]. Topical therapy with creams or lotions is more commonly used to treat these type of infections. Indiscriminate use of antibiotics, geographic area, climate, immunocompromised condition, overcrowding, hygiene culture and socioeconomic status are the factors can effect the prevalence of fungal infections.

The identification of fungi was based on the combination of microscopic, cultural characteristics, morphological characteristics and biochemical study. The specimen were inoculated on Sabouraud Dextrose Agar and incubated at 30°C for two weeks. Colonies were identified on the basis of microscopic & cultural characteristics, pigment formation and lacto phenol cotton blue staining [7].

2. MATERIALS AND METHODS

2.1 Sample Collection and Processing

A total of 300 clinical samples were collected from patients of Maheshwari Hospital and Diagnostic Centre, Badaun, Uttar Pradesh, India. Information such as gender, age of patient, nature of infection, symptoms, previous history, clothing and condition of personal hygiene were also recorded. The samples were taken from skin, hair and nail clippings from the patients, depending on the clinical condition of the patients and the suspected site of infection. The infected area was wiped with 70% ethanol, allowed to dry after that the samples were collected. Sample is divided into two parts, one half for KOH preparation and other half for culture on Sabouraud’s Dextrose Agar (SDA) media (TM Media, Delhi, India).

2.2 KOH Preparation

A portion of the sample was taken on a grease-free slide for microscopy. The specimen was then subjected to potassium hydroxide (KOH) wet preparation of various concentrations (10%, 20% and 40%) depending upon the type of clinical specimen for the presence of fungal elements. The prepared slides were later observed under low power (10X) and high power (40X) magnification of a compound light microscope for the presence of fungal elements.

2.3 Culture on SDA Media

Other half part of specimen is inoculated on the slants of Sabouraud’s Dextrose Agar (SDA) prepared with 50 mg/l cycloheximide and 500 mg/l chloramphenicol (Sigma, Missouri, US). Innoculated culture tubes were incubated at 28°C for 3-4 weeks. Fungal elements were identified by macroscopic and microscopic examination. Macroscopic examination included growth time, surface morphology and production of pigments while in microscopic observation, lacto phenol cotton blue dye (LCB) staining was performed followed by examination under the compound light microscope at 10X and 40X power of objective lens to examine the microcondia and macroconidia.

3. RESULTS AND DISCUSSION

Out of 300 patients of dermatomycosis, 150 cases of dermatophytosis (50%), 100 cases of pityriasis versicolor (33.3%) and 50 cases of candidiasis (16.6%) were identified on the basis of preliminary examination (Table 1). Among the 150 clinical samples dermatophytosis, 130 were KOH positive out of them 90 samples (60%) were culture positive (Table 2). Dermatophytosis was the commonest superficial fungal infection in 90 culture positive cases (60%) followed by Pityriasis versicolor 50 (50%) and candidiasis in 20 (40%) cases (Table 2).
The diagnosis of different clinical types of dermatophytosis in Badaun was presented in Table 3. The results indicated that dermatophytosis was a common skin infection in Badaun. Out of 150 cases of various types of dermatophytosis, 75 cases of *Tinea corporis* were reported and 73 (97%) were positive for KOH test and 58 (77%) were confirmed in SDA culture (Table 3). The predominant clinical manifestation type of dermatophytosis was *Tinea cruris* and *Tinea corporis* was the second most common dermatophytic infection among all the clinical types of dermatophytosis out of 30 cases, 27 (90%) were KOH-positive and 15 (50%) patients were observed positive in culture. Similar The present study is coincides with earlier research. Balakumar et al. and Rassai et al. have reported the similar results [8,9]. After *Tinea cruris*, *Tinea capitis* was the third in the prevalence of dermatophytic infections as shown in Table 3 for KOH-positive and culture-positive percentage. Incidence of *Tinea capitis* was observed comparatively low in our study which similar in a study by Jain et al. [10]. Age group 0-15 years appeared to be prone for *Tinea capitis*. Low amount of fungistatic fatty acids, sharing of towels, low hygienic levels at this age are responsible factors for this [11]. The role of altering pattern of hormones and inhibitory fatty acids are responsible for tolerance for *Tinea capitis* with increasing age [12,13]. *Tinea pedis* was the fourth most common type of clinical fungal infection among all dermatophytic infections. For *Tinea pedis*, 40% culture-positive cases were reported. Most of the patients were from economically low background as they have to work bare hand and footed. At different places the incidence of occurrence of *Tinea pedis* also varies [14,15]. Our findings are similar to the findings of earlier researchers [10]. Other types of dermatophytosis such as *Tinea faciei*, *Tinea manuum* and *Tinea barbae* were found less frequent (Table 3).

Table 1. Different types (on the basis of preliminary examination) of Dermatomycosis included in the study (n=300)

| Mycosis         | Total no of samples | % of cases |
|-----------------|---------------------|------------|
| Dermatophytosis | 150                 | 50%        |
| Pityriasis versicolor | 100            | 33.3%      |
| Candidiasis     | 50                  | 16.6%      |

Table 2. KOH-positive and culture positive cases of each type of Dermatomycosis from respective total cases

| Mycosis             | Total no of samples | KOH +ve | % KOH +ve | Culture +ve | % culture +ve |
|---------------------|---------------------|---------|-----------|-------------|---------------|
| Dermatophytosis      | 150                 | 130     | 86%       | 90          | 60%           |
| Pityriasis versicolor| 100                 | 50      | 50%       | 50          | 50%           |
| Candidiasis          | 50                  | 40      | 80%       | 20          | 40%           |
| Total               | 300                 | 220     | 73.3%     | 160         | 53.3%         |

Table 3. KOH-positive and culture-positive cases of different types of Dermatophytosis from respective total cases

| Clinical types     | Total no. of samples | No. of KOH +ve cases | % KOH +ve cases | No. of culture +ve cases | % of culture +ve cases |
|--------------------|----------------------|----------------------|-----------------|--------------------------|------------------------|
| *Tinea corporis*   | 75                   | 73                   | 97%             | 58                       | 77%                    |
| *Tinea cruris*     | 30                   | 27                   | 90%             | 15                       | 50%                    |
| *Tinea capitis*    | 20                   | 15                   | 75%             | 9                        | 45%                    |
| *Tinea pedis*      | 15                   | 10                   | 66%             | 6                        | 40%                    |
| *Tinea manuum*     | 5                    | 3                    | 60%             | 1                        | 20%                    |
| *Tinea faciei*     | 3                    | 2                    | 66%             | 1                        | 33%                    |
| *Tinea barbae*     | 2                    | 1                    | 50%             | 0                        | 0%                     |
| Total              | 150                  | 130                  | 86%             | 90                       | 60%                    |
Out of 90 culture positive cases of dermatophytosis, 73 (81%) were males and 17 (18.9%) were female. In all age groups, percentage of infection was observed more in males than females. In the age groups of 0-15 years, the percentage of males were 10 (11.1%) and females were 2 (2.2%). In 16-30 years age group, again prevalence was higher in males. The number and percentage of male were 33 (36.6%) females were 10 (11.1%). In 31-40 years age group, males were 22 (24.4%) as compared to females 5 (5.5%). In age group of 41-50, 51-60 and beyond 60 years again same prevalence was reported. Dermatophytosis occurred in all age groups but age group 16–30 and 31–64 were observed more susceptible most probably because it is physically more active age group, which is supported by other studies also [16,17]. Males were observed to be more susceptible for dermatophytosis (Table 4), which have been supported in few earlier studies also [18,19]. Non-reporting by females due to hazitation in rural areas may also be one of the reason of their lower prevalence rate [20,21]. Sweat retention due to many reasons such as tight uniform, closed footwears for long time and sharing of daily use stuffs facilitate dermatophytosis in males [20,21].

Dermatophytosis is one of the most common communicable disease. It infect humans and animals as well globally although some of the infections are present with higher prevalence in tropical countries [22,23]. Many factors are responsible for their higher prevalence such as humid and hot environment in and around Badaun. Poor hygiene and illiteracy also responsible for higher incidence of dermatophytosis.

Table 4: Distribution of culture positive Dermatophytosis cases according to age group and sex (with respect to total culture positive Dermatophytosis cases i.e. 90)

| Clinical type | Gender | 0-15 | 16-30 | 31-40 | 41-50 | 51-60 | >60 | Total |
|---------------|--------|------|-------|-------|-------|-------|-----|-------|
| Tinea corporis| M      | 3(3.3%) | 20(22.2%) | 18(20%) | 5(5.5%) | 2(2.2%) | 1(1.1%) | 49(54.4%) |
|              | F      | 6(6.6%) | 3(3.3%) | -     | -     | -     | -   | 9(10%) |
| Tinea cruris  | M      | 1(1.1%) | 7(7.7%) | 3(3.3%) | -     | -     | -   | 11(12.2%) |
|              | F      | 2(2.2%) | 2(2.2%) | -     | -     | -     | -   | 4(4.4%) |
| Tinea capitis | M      | 5(5.5%) | 1(1.1%) | -     | -     | -     | -   | 6(6.6%) |
|              | F      | 2(2.2%) | 1(1.1%) | -     | -     | -     | -   | 3(3.3%) |
| Tinea pedis   | M      | 5(5.5%) | 1(1.1%) | -     | -     | -     | -   | 5(5.5%) |
|              | F      | 1(1.1%) | -     | -     | -     | -     | -   | 1(1.1%) |
| Tinea manuum  | M      | -     | -     | 1(1.1%) | -     | -     | -   | 1(1.1%) |
|              | F      | -     | -     | -     | -     | -     | -   | -     |
| Tinea faciei  | M      | 1(1.1%) | -     | -     | -     | -     | -   | 1(1.1%) |
|              | F      | -     | -     | -     | -     | -     | -   | -     |
| Tinea barbae  | M      | -     | -     | -     | -     | -     | -   | -     |
|              | F      | -     | -     | -     | -     | -     | -   | -     |
| Total         | M      | 10(11.1%) | 33(36.6%) | 22(24.4%) | 5(5.5%) | 2(2.2%) | 1(1.1%) | 73(81%) |
|              | F      | 2(2.2%) | 10(11.1%) | 5(5.5%) | -     | -     | -   | 17(18.9%) |

Fig. 1. Tinea capitis  
Fig. 2. Tinea manuum  
Fig. 3. Tinea pedis
4. CONCLUSION

It can be concluded that dermatophytosis was the commonest superficial fungal infection in patients of Badaun. *Tinea corporis* was the most common clinical manifestation of dermatophytosis. Males are more susceptible than females especially at the age group of 16-30 years.

CONSENT

As per international standard or university standard, patients' and parental written consent has been collected and preserved by the author(s).

ETHICAL APPROVAL

The approval for data collection was obtained from Maheshwari Hospital and diagnostic centre from April 2016 to October 2017 for this enroll no JVRI-I/15/6026.

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COMPETING INTERESTS

Authors have declared that no competing interests exist.

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