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Full Length Research Paper

Evaluation of the incidences of dermatophillic infection in Rajastahan: Case studies from Rajasthan, India

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Dermatophytosis accounts for the majority of fungal skin diseases. Sixty (60) case studies (45 males and 16 females) of dermatophyte infection were carried out. Out of the 60 cases, 13% cases were healthy and 87% cases were found infected with one or more fungi. In 95% of cases, the fungal species recovered were from the infected symptomatic area like inflammatory lesions redness, dry patches itching, flaky rings, and 6.7% of cases from pain. The pattern of distribution of site of infection was recorded maximum at internal parts (54%) followed by hand (15%), neck (12%) and leg (6%). The incidence of *Aspergillus niger* (19%), *Cladosporium* sp. (14%), *Aspergillus flavus* (13%), *Trichophyton* sp. (13%) and *Microsporum* sp. (5%) was high and *Fusarium* sp., *Curvularia* sp., *Penicillium* sp., *Trichothecium roseum, Epidermetaphyton* sp., *Drechslera* sp. and *Alternaria* sp. was low.

Key words: Evaluation, incidence, dermatophillic infection, clinical isolates.

INTRODUCTION

Dermatophytes cause infections of the skin, hair and nails because of their ability to obtain nutrients from keratinized material. These organisms colonize the keratin tissues and in response to their metabolic by products host experiences, and inflammatory reactions results in the penetration and establishment of the fungi in epidermal and subepidermal tissue. They are usually restricted to the non-living cornified layer of the epidermis because of their inability to penetrate viable tissue of an immunocompetent host. Acid proteinases, elastase, keratinases, and other proteinases reportedly act as virulence factors. Dermatophytes are: (i) anamorphic (asexual or imperfect fungi) with three genera that is, *Microsporum*, *Epidermophyton* and *Trichophyton*; (ii) telomorphic (sexually reproducing) and (iii) Arthroderma, of the ascomycota. Diagnosis of these mycoses is made from mycologic studies, direct examination, stains, isolation, and identification of the fungi. Treatment includes systemic antifungals, topical antifungals, and keratolytics (Bonifaz et al., 2010).

Tinea infections are among the most common dermatologic conditions throughout the world. To avoid a misdiagnosis, identification of dermatophyte infections requires both a fungal culture on Sabouraud's agar media, and a light microscopic mycologic examination from skin scrapings. Preventative measures of tinea infections include practicing good personal hygiene, keeping the skin dry and cool at all times and avoiding sharing towels, clothing, or hair accessories with infected individuals (Gupta et al., 2003). The National Skin Centre is a tertiary referral centre for dermatological diseases in Singapore and observed more than 2,500

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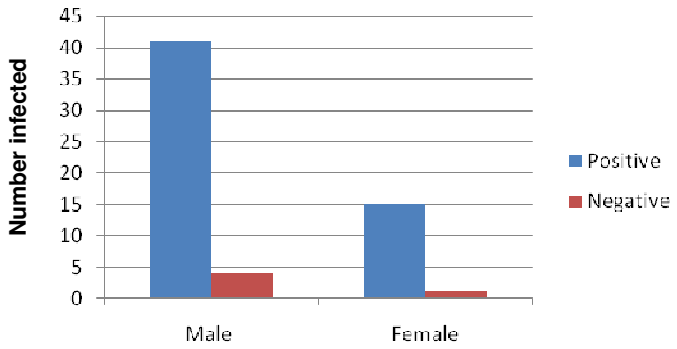

Figure 1. Histogram showing results of KOH test in the cases suceptible to dermatophytic infection.

cases of superficial fungal infections annually.

Trichophyton rubrum was the most prevalent fungal pathogen isolated from all cases of superficial fungal infections of the skin, except for Tinea pedis, in which *Trichophyton interdigitale* was the most frequently isolated organism (*T. ruburum* is the most common isolate in the superficial fungal infection whereas in Tinea pedis that is, infection in feet, *T. interdigitale* is the most common isolate). Dermatophytes remain the most commonly isolated fungal pathogens isolated in toenail onychomycosis, whilst *Candida* species accounted for the majority of isolates in fingernail onychomycosis (Tan, 2005). This is now a common infection among Rajasthan, although the climatic conditions are not favorable for the fungal 0growth during most of the time of the year (2009 to 2010). Due to some injuries and inappropriate approach for the treatment of trauma situations in rural population, the incidences of dermatophillic infections are increasing. The present work aims at evaluation of the rate of incidences of dermatophytic infections (group wise) and the associated symptoms.

MATERIALS AND METHODS

Sample selection

A detailed record of dermatophytic patients visiting Dr. Rishi Bhargav Girdhar Hospital, Malviya Nagar, Jaipur and Dr. B. Lal. Clinical Laboratory, Malviya Nagar, Jaipur for treatment or clinical diagnosis were taken as case study on the basis of their susceptibility for dermatophytic infection. Patient proforma is filled during the collection of sample to obtain information on duration of the lesion, clinical picture, prior therapy as well as demographic data such as age, sex, nationality and family status of the respondents. 60 cases were finally selected, consisting of 45 males and 16 females.

Sample collection

Two sample collection methods were used in this study. On one method, samples consisting of epidermal scales and infected hairs were scraped from the scalp/rim of lesions using a sterile scalpel blade (using the blunt side, care was taken so that it did not rupture the tissue) following cleaning of the affected sites with 70 v/v isopropyl alcohol. The scrapings were collected on a piece of sterile brown paper Griffin (1960) (sterile brown paper is used for the transportation of clinical scrapping from the site of collection to the centre for microbiological analysis as per the reference or it was transported in the culture bottle containing sterile SDA slant. Sterile petriplate was not used). Moist cotton swabs were used to collect pus from inflammatory lesions. The samples were divided into two portions: one for microscopic examination and one for culture. The collected samples were transported to the laboratory within 2 h for microscopic and cultural analysis.

Sample processing

Direct microscopic examination

Direct microscopic examination of the scrapping placed on a microscope slide with one or two drop of 20% potassium hydroxide (KOH) and a cover slip was performed. The sample was warmed for 5 min over a flame as described by Hainer (2003). Each treated slide was then carefully examined under low (×10) and high (×40) power objective for the presence of hyphae and/or arthroconidia.

Fungal culture

Each scraping was cultured into Sabouraud dextrose chloramphenicol actidione agar (Ajello et al., 1966). A duplicate inoculation of the specimen was also cultured on sabouraud's dextrose cycloheximide agar. The plates were incubated at 28°C for up to 4 weeks and examined at 2 to 3 days interval for fungal growth. Fungal isolates were subcultured onto plates of sabouraud's agar and potato glucose agar. The isolates were examined visually and microscopically for morphology of fungi using lactophenol cotton blue stain by slide culture technique (as per the standard protocol). The dermatophytes species were identified by gross and microscopic morphology and by *in vitro* culture (cultured in laboratory). Evaluation of the relative percent occurrence (RPO) of the fungi and sensitivity of KOH test was done. Different fungi alone and in combination were observed. The clinical isolates were further maintained in Sabouraud's dextrose cycloheximide agar slants.

RESULTS

Sixty (60) case studies (45 males and 16 females) of dermatophyte infection were carried out under the guidance of Dr. B. Lal Gupta and Dr Rishi bhargava. Out of 60 cases, 13% cases were with no traces of fungal infection as per confirmation by KOH test and culture test whereas 87% cases were found to be infected with one or more fungi. On the basis of KOH test, positive reactions were seen in 93.3% cases and negative reactions were found in 8.3% cases (Figure 1). In 95% of cases, the fungal species recovered were from the infected symptomatic area like inflammatory lesions redness, dry patches itching, flaky rings and 6.7% of cases from pain (Figure 2). Figure 3 shows maximum infection in internal part (54%) followed by hand (15%), neck (12%), leg (6%), back, eyes, face, hair, head, nail and thighs. Culture of the scrapings after 7 days of incubation yielded different

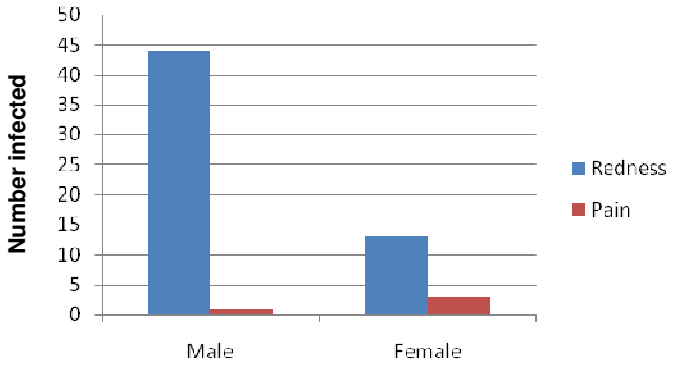

Figure 2. Histogram showing symptoms associated with the dermatophytic infection.

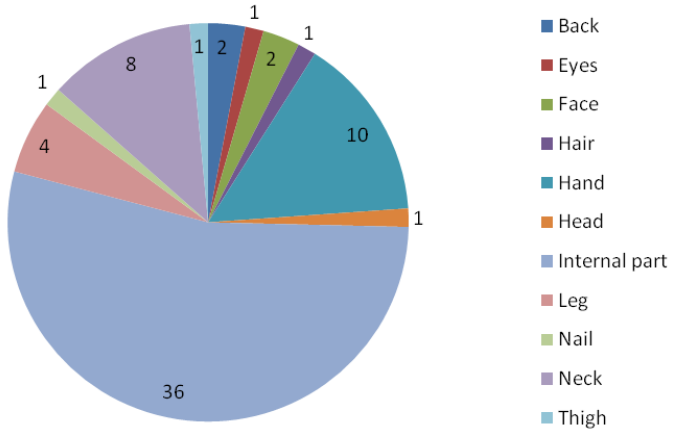

Figure 3. Histogram showing site of infection for the recovery of skin scrapings. Values are in percentages.

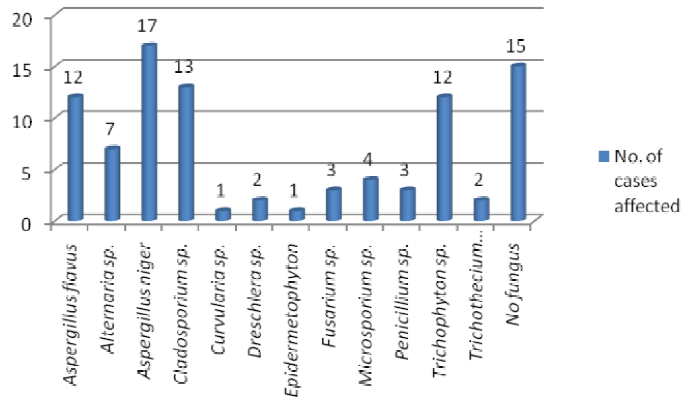

Figure 4. Histogram showing the incidence of fungi isolated from clinical samples.

alone and in combination. The incidence of *Aspergillus niger* (19%), *Cladosporium* sp. (14%), *Aspergillus flavus* (13%), *Trichophyton* sp. (13%) and *Microsporum* sp. (5%) was high and *Fusarium* sp., *Curvularia* sp., *Penicillium* sp., *T. roseum, Epidermetaphyton* sp., *Drechslera* sp. and *Alternaria* sp. was low (Figure 4). These clinical isolates were further maintained in agar slants.

DISCUSSION

During the study, 60 samples were collected and diagnosed for superficial fungal infection. Their cultural and microscopic characteristics yielded 12 fungal species causing dermatophytic infection. Eighty seven (87%) cases were affected by these organisms and 13% cases were free from dermatophytic infection as no trace of fungal infection was recorded during the culture test. However, accurate assessment of the prevalence of etiological agents is useful to estimate the size of problem and prevent its transmission. It was inferred that the males had more infections than females (primarily, males are more exposed to dust and external environment so more prone to infection and secondly, females are not paying attention to the lesion they have, as in most of the communities females do not bother about their health and they do not get enough time to visit the doctor). Certain factors may influence the distribution of dermatophytosis. According to Ekanem and Gugnami (1987), age influences susceptibility to dermatophytosis because of the changes in immunity. The pattern of site of infection was maximum in internal part (curved area of the body, the tissue in and around genital area), followed by hand, neck, leg and other body parts.

The common symptoms that were found to be associated with the infection were inflammatory lesions, redness, dry patches, itching, flaky rings and pain. The incidence of *A. niger, Cladosporium* sp., *A. flavus, Trichophyton* sp. and *Microsporum* sp. fungi was high and *Fusarium* sp., *Curvularia* sp., *Penicillium* sp., *T. roseum, Epidermetaphyton* sp., *Drechslera* sp. and *Alternaria* sp. was low (based on the present study). The presence of other non-dermatophytes (particularly *Aspergillus* and *Penicillium* species) may be due to the ubiquitous nature of their spores in our environment, carried transiently on healthy skin (from the enviornment the infection propagules may be transmitted on the skin where it colonizes due to the production of elstases proteinases and keratinases by the fungi) (Oyeka and Ugwu, 2002). *Fusarium solani* was isolated from scrapings from skin lesions. In our study, this organism was recovered in mixed with other organism. *Alternaria alternata* is a soil saprophytes and common pathogen. Cutaneous infections caused by *Alternaria* species are often associated with debilitating diseases or conditions Cabanes et al. (1988). During the past decade, there has been a significant increase in the number of phaeohyphomycotic infections recognized in humans reported by De Hoog and Rubio (1982) and Ernst (1983).

Majority of the isolated dermatophytes according to percentage of occurrence were *Microsporum audouinii* (18.88%), *Trycophyton mentagrophytes* (13.33%) and *Trycophyton terrestre (*3.33%). *M. audouinii* and *T. mentagrophytes* were the most frequently isolated dermatophytes. Other skin mycoses isolated include *Fusarium moniliforme* (6.66%), *A. flavus* (5.55%), *Fusarium oxysporum* (5.55%) and *Penicillium funiculosum* (4.44%). Infection was mainly due to *M. audoinii, Chrysosporium keratinophilum* and *T. mentagrophytes* as reported by Maruthi et al. (2008).

Conclusion

The infection was pronounced in males as compared to females, based on 60 patient cases studied. Utmost infection was recovered from internal parts followed by hands, neck and legs. Most frequently occurring fungus was *Aspergillus* sp. followed by *Cladosporium* sp. *Trichophyton* sp.*,* and *Microsporium* sp.

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