

A CLINICO-MYCOLOGICAL STUDY OF DERMATOPHYTOSIS AT A TERTIARY CARE HOSPITAL OF BIHAR

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Abstract

Background: Around the globe, the most common fungal agents which have been linked with superficial infections of the skin are dermatophytes. Hence, this study was carried out with an objective to measure the prevalence of different clinical patterns of dermatophytosis and to correlate our clinical diagnosis with KOH positivity and positivity by fungal culture keeping in account the ever-changing profile of these fungal infections in India, the Indian climate, its vast area and diversity, the change in the structure of population of India, scarce availability of data on the epidemiology and the aetiological factors mentioned above. **Materials and Methods:** The current study was a prospective observational study conducted in the department of microbiology at Darbhanga Medical College, Darbhanga, and Bihar. The study population included patients diagnosed to have dermatophytosis between January 2022 to December 2022 were included in the study. Patients who had used topical or systemic antifungal preparation in the preceding 4 weeks were excluded from the study. Ethical clearance was obtained from IHEC. Written and informed consent was sought from the patients and their attenders. Specimens were obtained under aseptic condition to minimize contamination. Skin scrapping; hair and nail clipping from the patients who are clinically diagnosed dermatophytosis were collected. Sufficient amount of specimen was collected for direct microscopic examination and culture. Prior to the collection of the specimen the sites were cleaned well with 70% alcohol while sterile distilled water was used for painful areas. Collected specimens were treated with KOH, 10%, 20% for skin and hair respectively and for nail 40% was used. All preparations were examined under low power and confirmed under high power. The samples were inoculated into Sabourauds dextrose agar with (0.5%) cycloheximide and (0.05%) chloramphenicol was incorporated to avoid contamination with saprophytic fungi and bacteria. The samples were inoculated into Sabourauds dextrose agar with (0.5%) cycloheximide and (0.05%) chloramphenicol was incorporated to avoid contamination with saprophytic fungi and bacteria. **Result:** KOH positivity was seen in 39 of the study population while culture yielded 22 positive growths. The most common organism isolated in culture was *T. mentagrophyte*, followed by *T. rubrum* and *T. tonsurans*. **Conclusion:** KOH and culture help in diagnosing and starting treatment but it's not always mandatory, it can be clinically diagnosed and treated.

INTRODUCTION

Around the globe, the most common fungal agents which have been linked with superficial infections of the skin are dermatophytes.^[1] Dermatophytosis is an ailment which is characterized by infection of tissues which are keratinized like the epidermis, the nails or the hair.^[2] The aetiology of this disease is especially a group of fungi which are filamentous

and closely related to each other. These organisms called dermatophytes comprise of the genera of Epidermophyton, genera of Microsporum and genera of Trichophyton which have been associated with causing superficial mycoses. These dermatophytes yield keratinases and these keratinases by degrading the keratin result in an invasion of the superficial tissues of the skin by these dermatophytes. These fungi generally infect

the nonliving layers of skin which are usually cornified and are cutaneous infections.^[3] Nevertheless, in conditions which are chronic, there may be involvement and invasion of deeper tissues, especially when there is infection occurring concurrently with other organisms. As a whole, in simple words, dermatophytes usually lack the capacity for the invasion of tissues which are deeper or organs in the human host.^[4] Because of their typical ring-like appearance, infections caused by dermatophytes are commonly known as ringworm infections. This term is used inaccurately since it is not caused by a worm but because of the rash which is circular with a ring-like an appearance. They are also called as Tinea infections and they are termed in accordance with the position of the infection on the human body like the term *T. capitis* referring to infections in the region of the head. As these infections are frequently mixed up with other disorders of the skin, there is a need for making an early diagnosis in the laboratory for managing these conditions in the best way possible.^[5] Dermatophytes, on the basis of clinical, morphologic and microscopic characteristics are grouped in three anamorphic genera, *Trichophyton*, *Microsporum* and *Epidermophyton*.^[6] The diagnosis of the species causing dermatophytosis is very important because of a single species having the ability to present with several clinical patterns and several species presenting with a single clinical pattern. So, there is a need for identifying the fungal species by doing a culture which also helps in identifying the infection source, so that the appropriate measures for prevention can be taken. Hence, this study was carried out with an objective to measure the prevalence of different clinical patterns of dermatophytosis and to correlate our clinical diagnosis with KOH positivity and positivity by fungal culture keeping in account the ever-changing profile of these fungal infections in India, the Indian climate, its vast area and diversity, the change in the structure of population of India, scarce availability of data on the epidemiology and the aetiological factors mentioned above.

MATERIALS AND METHODS

The current study was a prospective observational study conducted in the department of microbiology at Darbhanga Medical College, Darbhanga, and Bihar. The study population included patients diagnosed to have dermatophytosis between January 2022 to December 2022 were included in the study. Patients who had used topical or systemic antifungal preparation in the preceding 4 weeks were excluded from the study. Ethical clearance was obtained from IHEC. Written and informed consent was sought from the patients and their attenders. Specimens were obtained under aseptic condition to minimize contamination. Skin scraping; hair and nail

clipping from the patients who are clinically diagnosed dermatophytosis were collected. Sufficient amount of specimen was collected for direct microscopic examination and culture. Prior to the collection of the specimen the sites were cleaned well with 70% alcohol while sterile distilled water was used for painful areas. Depending on the morphology and sites involved by dermatophytes specimen were collected using sterile nail clipping, scissors, epilation forceps, sterile scalpel blades and curettes. Black photographic paper was used for collecting and better visualization of skin scrapings. Collected specimens were treated with KOH, 10%, 20% for skin and hair respectively and for nail 40% was used. All preparations were examined under low power and confirmed under high power. The samples were inoculated into Sabourauds dextrose agar with (0.5%) cycloheximide and (0.05%) chloramphenicol was incorporated to avoid contamination with saprophytic fungi and bacteria. The inoculated agar slants were incubated in room temperature at 25°C and 37°C in incubator and observed daily for growth. If no growth was noticed by four weeks culture was considered negative for the growth of fungi. Growth on SDA was identified to genes and species level by LPCB mount.

The demographic variables like age, gender of the affected person, clinical diagnosis, laboratory parameters like findings of KOH preparation and growth in culture were considered as relevant parameters. Odds ratio along with 95% CI are presented. Chi square test was used to test statistical significance. P value <0.05 was considered statistically significant. IBM SPSS version 22 was used for statistical analysis.

RESULTS

A total of 100 people presenting with dermatophyte infection were included in the study. The age of the subjects was ranged between 11 to 69 years, with a mean age of 38.2 ± 13.6 . Males constituted 78% of the study population. Majority (59%) of the subjects were between the age group of 18 to 35 years. The most common clinical presentation was *T. corporis*, followed by *T. unguium* and *T. cruris*. Tinea involving other parts of the face, head, feet, and hands contributed to the remaining minor proportion of study population. [Figure 1] KOH positivity was seen in 39 of the study population while culture yielded 22 positive growth. [Table 1] The most common organism isolated in culture was *T. mentagrophyte*, followed by *T. rubrum* and *T. tonsurans*. The other minor proportion of culture isolated fungi were *Trichophyton Schoenleinii*, *Trichophyton verrucosum* and *Microsporum gypseum* in 1% of the subjects each. [Table 2] Association of test result with the clinical presentation of the patients has been shown in [Table 3].

Table 1: Comparison of KOH and culture in study population (n=100)

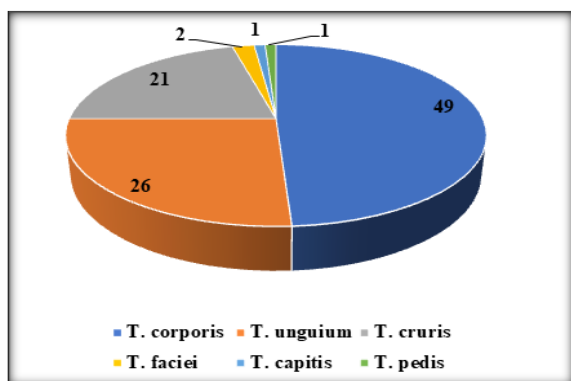
KOH	Culture		Total
	Positive	Negative	
Positive	22	17	39
Negative	0	61	61
Total	22	78	100

Table 2: Organism isolated from the samples on culture

Organism	Number
T.mentagrophyte	11
T.rubrum	5
T.tonsurans	3
T.schonleinii	1
T.verrucosum	1
T.gypseum	1

Table 3: Association of test reports of KOH and culture with the diagnosis of the patients

Diagnosis	Report of KOH		Report of culture	
	Positive	Negative	Positive	Negative
T.corporis (n=49)	29 (59.2%)	20 (40.8%)	16 (32.7%)	33 (67.3%)
T.unguium (n=26)	7 (26.9%)	19 (73.1%)	4 (15.4%)	22 (84.6%)
T.cruis (n=21)	3 (14.3%)	18 (85.7%)	2 (9.5%)	19 (90.5%)
T.faciei (n=2)	0	0	0	0
T.capitis (n=1)	0	0	0	0
T.pedis (n=1)	0	0	0	0

**Figure 1: Distribution of patients based on their clinical presentation**

DISCUSSION

The most common fungal agents which have been linked around the globe with superficial infections of the skin are dermatophytes.^[4] Besides being one of the common public health problems worldwide, dermatophytosis is commonly seen in countries of the tropical region such as India. It could reach epidemic levels in regions with high humidity levels, overcrowding and poor sanitary conditions.^[7] In India, where the climate is so hot with high humidity, this fungal infection of the skin is very common.^[8] There have been several numbers of studies done in India from all around the country on the distribution of dermatophytosis. With the increasing use of corticosteroids for managing these infections, there is a change in the profile of these infections over the years. Verma and Madhu also stressed the need for studies with regards to various factors related to dermatophytosis because of the changing mycological profile of these infections.^[9] In our study, most of the subjects were aged between sixteen to thirty years with male

dominance. Similar to our study, Prasad et al in their study observed that the maximum prevalence of Tinea cases occurred in the age group of twenty one to thirty years.^[10] And also similar results were reported by Grover et al.^[11] They reported that a higher prevalence of 39.6% was observed in their study in the same age group. Singh et al in their study in 2003 also observed that infection with superficial dermatophytes was highest in the age group of sixteen to thirty years.^[12] Yehia et al in their study in 2010 observed that the mean age of the subjects was 28.5 years in Kuwait which was marginally lesser than our study with 33.65 years as the mean.^[13] Grover et al in their study also reported the proportion of males to be higher than females in their study population with 80.9% of subjects to be males with only 19.1% to be females.^[11] Singh et al also reported a similar ratio of 1.57:1 in their study population in western India.^[12]

T. corporis was the most frequent in our study and the trunk, extremities and face were the sites most commonly involved. Prasad et al in 1987 in their study reported that infections around the groin (T.cruis) were most frequently involved in males, but in females, the waist was the most common area involved.^[10] In contrast to our findings, Grover et al reported T. pedis (29.2%) to be the most frequent which was followed by T. cruris (26.2%).^[11] In the study done by Singh S et al the most frequent infection was T. corporis, succeeded by T. cruris.^[12] Asticcioli et al also reported the most common infection as T. corporis and similar findings were also reported by Das et al in their study with T. corporis contributing to 21.4% of the infections diagnosed in the laboratory.^[14,15] In contrast to our study, Maraki et al reported the most frequent infections was T. unguium followed by T. pedis.^[16] Onychomycosis was reported as the most frequent

infection caused by fungi by Drakensjo et al and Yehia et al in their studies, contrary to our study findings.^[13,17]

In our study, the proportion of KOH positive infections was 39% while the culture positivity was only 22%. Prasad Petal in their study reported that the proportion of KOH positive infections was 52% while the proportion of culture positive infections was 42% in about hundred clinically diagnosed Tinea infections.^[10] In contrast to our study, Grover et al in their study reported KOH positivity rate of 53.3% while culture positivity was only 79.1%.^[11] Similar to our study, Singh S et al also reported that the proportion of KOH positivity was higher than the culture positivity among 157 subjects.^[12]

The most common organism isolated in culture was *T. mentagrophyte*, followed by *T. Rubrum* and *T. tonsurans*. Similar to our study, in the study done by Prasad Petal it was *T. mentagrophytes* seen in 46.90% of the study subjects followed by *T. rubrum* saw in 31.9% of the study population.^[10] Grover et al reported *T. tonsurans* as the commonest in about 20.5%, succeeded by *T. rubrum* in 8.7% of the study population.^[11] Similar to our study results, Singh et al also isolated *T. rubrum* in 73.27% of the study subjects followed by *T. mentagrophytes* and also Das et al observed similar results on isolation with *T. rubrum* being the most frequent.^[12,15]

CONCLUSION

The commonest clinical pattern of dermatophytosis was *T. corporis*, followed by *T. unguium* and *T. cruris*. In culture commonest organism isolated was *T. mentagrophyte*, followed by *T. rubrum* and *T. tonsurans*. With more male predominance KOH positivity was seen in 39 patients and culture was positive in 22 patients commonest clinical pattern was *T. corporis* and culture organism isolated was *T. mentagrophyte*. KOH and culture help in diagnosing and starting treatment but it's not always mandatory, it can be clinically diagnosed and treated.

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