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Original Research Article

Studying the clinic mycological pattern of the dermatophytic infection attending OPD in tertiary care hospital in eastern Uttar Pradesh and Bihar

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ABSTRACT

Background: Superficial dermatophytic infection is infection of skin nail or hair with fungus. Nowadays, these fungal infection are at a rise and run a prolong course despite of treatment due to resistance to conventional antifungal agents. There is a felt need to conduct epidemiological study to know the change in the pattern and cause of widespread resistance. This study was aimed at identifying clinico-mycological pattern of dermatophytic infections in patients attending the dermatology outpatient department of a tertiary care hospital in eastern Uttar Pradesh and adjoining area.
Methods: Patients with suspected dermatophytoses attending the outpatient department were enrolled in the study. A detailed history, clinical examination and sample collection for mycological examinations was done.
Results: There were 500 patients recruited in the study, with a male: female ratio of 3:1. The most commonly affected age group was 20–30 years (35%). Tinea corporis et cruris was the most common type observed (31%). Potassium hydroxide positivity was seen in 390 samples (78%) and culture positivity was found in 350 samples (70%). The most common species identified was *Trichophyton verrucosum* (35.5%).
Conclusions: There is a rise in dermatophytic infection caused by zoophilic species like *Trichophyton verrucousum*.

Keywords: Dermatophytosis, Superficial mycoses, Tinea, *Trichophyton* spp, *Microsporum* spp

INTRODUCTION

Superficial mycoses refer to the diseases of skin and its appendages caused by fungi. This group includes dermatophytosis, pityriasis versicolor, and candidiasis and nondermatomycotic molds.[1]

India is a large subcontinent with different climatic and topographic conditions. The hot and humid climate favours the acquisition and maintenance of fungal infections.[2] This as well as due to overcrowding, poor socioeconomic condition and poor hygiene increase the chances of acquiring fungal infection. Although dermatomycoses are worldwide in distribution, the endemic and most prevalent species of dermatophytosis differ strikingly from one geographic locality to another.[3] Various studies have been done on the prevalence of dermatophytes in different parts of our country depicting the variety and changing pattern of fungal infection.[2-6]

The rise in tinea infection in recent years as well as change in epidemiological pattern of the disease prompted us to take up the present study which utilizes conventional methods of isolation and identifications of

dermatophyte species from superficial mycoses in human patients. As per our knowledge this is the first study conducted in eastern Uttar Pradesh which also includes parts of Bihar and Nepal.

METHODS

A prospective observational study was carried out in 500 patients attending dermatology OPD of BRD medical college, Gorakhpur with mycotic infection from January 2017 to July 2017.

Selection criteria of patient-

1. All patients attending skin OPD with suspected lesions of tinea infections.
2. Light microscopy of KOH preparation for scales of skin/hair/nail scrapings will be taken from lesions shows hyphae or conidia and/or culture positive patients.
3. All KOH positive and/or culture positive samples will be included for further data analysis.

Data collection

Data was collected in a predesigned format. It included patient's identification number, sex, age, occupation, history and clinical presentation including specific risk factors for superficial fungal infection.

For patient with visible and sufficient scales on lesion, following protocol was followed-

1) *Specimen collection*- Nail, hair and skin specimen were collected as per standard techniques. The involved site was cleaned with 70% alcohol and the specimen was obtained by scraping the edge with scalpel. Hairs from the lesions were epilated and scales were obtained by scraping the edges. Nail clippings or subungual deposits were taken.

2) *Microscopic examination*- Material to be examined were placed on a clean glass slide and 10% KOH for skin scrapping and 20% KOH for hair and nail sample was taken. It was left for 30 minutes to 1 hour at room temperature. Preparation was observed in 40 X magnification under bright field microscope. Slides which were initially negative were re-examined next day.

3) Culture, isolation and identification of fungal isolates-specimen from skin and hair are inoculated in one media SDA with cycloheximide (0.05 g/l) along with chloramphenicol (0.005 g/l) while that obtained from nail were inoculated in two test tube one containing only chloramphenicol for isolation of dermatophytes and non dermatophytes while other test tube has both chloramphenicol and cycloheximide to inhibit non dermatophytes.

Fungal isolates were identified by procedures detailed in standard mycology textbook by observing colony morphology, colour, consistency, topography etc. and were further examined under microscope after staining with lactic phenol cotton blue.

Statistical analysis was done using SPSS 17.0 software. Chi square test and contingency table were used as significant test analysis.

RESULTS

Demographic profile of patients (age and sex distribution)

Out of 500 patients, 375 were male and 125 were female. Male to female ratio was 3:1. The youngest patient was 6 months old and the oldest patient was 75 years old. Majority of patient belonged to age group 20-30 years i.e. 35%. This can be seen in Table 1.

Table 1: Percentage distribution of patients according to age sex.

Age group	Sex				Total	
	Male		Female			
	No.	%	No.	%	No.	%
Below 20	88	23.4	11	8.8	99	19.8
20-30	145	38.6	30	23.6	175	35
30-40	51	13.6	40	32.2	91	18.2
40-50	52	13.8	14	11.6	66	13.2
50 and above	39	10.6	30	23.8	69	13.8
Total	375	100	125	100	500	100

Table 2 shows the site involved in the patient showing that most common site of infection was mixed type i.e. tinea cruris and tinea corporis accounting for 31% followed by tinea cruris alone (Figure 5-8).

As seen from Table 3 the maximum duration of illness was 6 months to 2 years, thus the infection runs a chronic course.

Table 2: Clinical profiles of tinea patients.

Types	Sex				Total	
	Male (375)		Female (125)			
	No.	%	No.	%	No.	%
T. cruris	78	20.8	14	10.7	92	18.4
T. corporis	57	15.1	32	25.3	89	17.8
T. faciei	8	2.1	2	21	10	2
T. mannum	7	1.8	3	2.5	10	2
T. pedis	5	1.5	2	2.1	7	1.4
T. unguim	31	8.3	11	9	40	8
T. capitis	7	1.8	1	1	8	1.6
T. corporis and T. cruris	112	30	43	33.7	155	31
Other mixed infections	70	18.6	17	13.6	87	17.4

Table 3: Distribution of duration of illness.

	Sex				Total	
	Male		Female			
Duration of illness	No.	%	No.	%	No.	%
Within a month	31	8.2	12	9.6	43	8.6
1 to 6 months	120	32	43	34.4	163	32.6
6 months to 2 years	137	36.5	49	39.2	186	37.2
2 years and above	87	23.2	21	16.8	108	21.6
Total	375	100	125	100	500	100

Table 4: Associated with secondary infection.

Secondary infection	No.	%
Present	45	9
Absent	455	91
Total	500	100

It was seen that secondary infection was present in 9% cases only.

Table 5: Distribution of associated conditions in tinea patients.

Associations	No.	%
Diabetes mellitus	16	3.2
Hyperhidrosis	10	2
Immunosuppression	8	1.6
Atropy	1	.2
No association	465	93
Total	500	100

Thus we can infer from above table that diabetes, hyperhidrosis and immunosuppression are important associated condition.

As seen in Table 6 family history was positive in nearly 40% showing the importance of person to person transmission as well as treatment of all family members simultaneously.

Table 6: Family history.

Family		No.	%
Positive	Conjugal	144	28.5
	Non conjugal	57	11.4
Negative		299	60.1
Total	500		100

Table 7: Treatment history.

Topical treatment	No.	%
Steroid alone or combination creams (with antifungals antibacterial or salicylic acid)	303	60.6
Antifungal creams	100	20.1
Salicylic acid alone	60	12
No treatment	36	7.3
Total	500	100

Treatment history shows that maximum patient had already used OTC products which mainly contains steroid only or a combination cream. These OTC product not only prolong the duration of illness but also have side effects like atrophy, striae, contact dermatitis etc.

The most common systemic treatment used by patient was fluconazole (20%) followed by grieofulvin (17%) (Table 8).

Table 8: Systemic treatment history.

Systemic treatment	No.	%
Fluconazole alone	100	20
Terbinafine alone	17	3.3
Griseofulvin alone	85	17
Multiple*	34	6.8
Steriod (tablet/injectable)	5	1
No treatment	259	51.9
Total	500	100

Table 9: KOH examinations.

KOH examination	No.	%
Positive	390	78
Negative	110	22
Total	500	100

KOH examination showed positivity in 78% cases.

Table 10: Results of culture.

SDA	No.	%
Positive	350	70
Negative	150	30
Total	500	100

Culture on SDA showed culture was positive for 70% cases.

Table 11: Correlation of KOH mount and SDA culture.

	KOH+	KOH-
Culture+	253	97
Culture-	137	13

From above data we can infer that-

Senstivity of KOH examination= True Positive/True Positive + False Negative × 100=91.42%

Specificity of KOH examination= True Negative/True Negative + False Positive × 100=53.3%

Senstivity of culture examination= True Positive/True Positive + False Negative × 100=82.05%

Specificity of culture examination= True Negative/True Negative + False Positive × 100=72.7%

Thus the most common specie associated was *T. verrucosum* (35.5%) followed by *T. mentagrophytes* (30.8%).

Table 12: Showing the causative organism and species associated with dermatophytic infection.

Species	No.	%
Trichophyton verrucosum	121	35.5
Trichophyton mentagrophytes	105	30.8
Trichophyton rubrum	71	20.8
Trichophyton tonsurans	43	12.6
Total	340	100

Table 13: Clinical -mycological profile of patients.

Type	Total	*T. Verrucosum*		*T. Mentagrophytes*		*T. Rubrum*		*T. Tonsurans*	
		No.	%	No.	%	No.	%	No.	%
T. corporis	55	25	45	20	36.36	10	18.18	--	--
T. cruris	54	13	24	26	48.18	15	27.77	--	--
T. faciei	7	2	28	4	57.14	1	14.2	--	--
T. pedis	5	1	20	3	60	1	20	---	--
T. manuum	7	1	14.7	5	71.4	1	14.27	--	--
T. capitis	7	--	--	--	--	2	28.5	5	
Onychomycosis	23	--	--	11	47.82	12	52.17	--	--
T. corporis and T. cruris	112	45	40.1	30	26.78	21	18.75	13	11.6
Others	70	34	48.57	6	8,57	8	11.42	25	35.7

Table 14: Non-dermatophytes molds isolated from cases of dermatomycosis.

Non dermophytic moulds	Number
Aspergillus niger	3
Aspergillus fumigatus	3
Fusarium	2
Alternaria	2

DISCUSSION

In this study, as seen in Table 1 majority of patients i.e. 35% were adults in age group 20–30 years which is was seen in previous studies also.[7,8] Male: female ratio was 3: 1; a male preponderance has been seen in some earlier studies.[9-13]

Female are more suspectible to develop tinea pedis, tinea mannum and onychomycosis due to household work.[14-16]

Unlike in earlier studies where it was observed that the duration of symptoms to be greater than 3 months in 53.3% of the patients, 1–3 months in 33.7% cases and less than 1 month in 13% of the cases there is recent increase in duration of disease. Most of our patient had a prolonged duration of illness i.e. 58.8% patient had illness for more than 6 months as seen in Table 3. This could be attributed to use of OTC drugs and incomplete treatment leading to relapse.

A history of fungal infections in family members was elicited in 39.9% of cases, of which 28.5% were conjugal as depicted in Table 6. Transmission by direct contact occurs in tinea infection, explaining the conjugal cases, while transmission in family members might be due to fomites or *de novo* infection.[17]

As seen in Table 9 potassium hydroxide examination for fungal elements was positive in 78% of the patients. Previous studies had reported similar findings for potassium hydroxide positivity.[18-22] In the present study, culture positivity was 70 per cent which can be seen in table 10 ; previous reports show a variance of this ranging from 24 to 87 per cent.[23-26] On the basis of these findings, sensitivity of potassium hydroxide examination, considering culture to be the gold standard, was 91.24% and its specificity was 53.3 per cent sensitivity and specificity of culture, if one were to consider potassium hydroxide as the gold standard was 82.05% and 72.7%, respectively. Hence, we can say that potassium hydroxide is highly sensitive and less specific and culture is highly specific and less sensitive. Similar results were found in other studies.[27-30] In studies conducted between 2002 to 2011, *T. rubrum* was the most common isolate while in some studies *T. mentagrophytes* was seen as most common isolate. Similar findings were also observed by Sahai and Mishra and Bhatia and Sharma.[31] Ajello, in 1960, said "species not only differ from region to region but may change with the passage of time."

The isolation rate in our study is higher as compared to various other studies where it ranged from 50-60%.[32,33]

While previous studies had shown that *T. rubrum* was the most common isolated fungal species followed by T. *mentagrophytes* our study showed that *T. verrucosum* was the most common isolate (Table 12 and Figure 1-3).

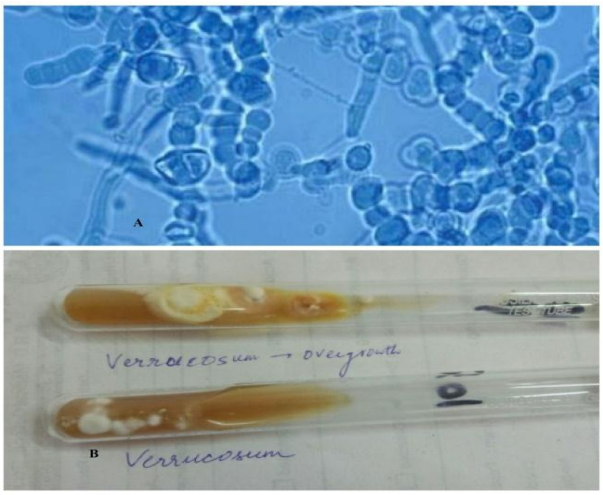

Figure 1: A= LPCB showing *T. verrucosum* with club shaped microconidia and rat tail shaped macroconidia, B= SDA showing browny-white to yellow grey colonies.

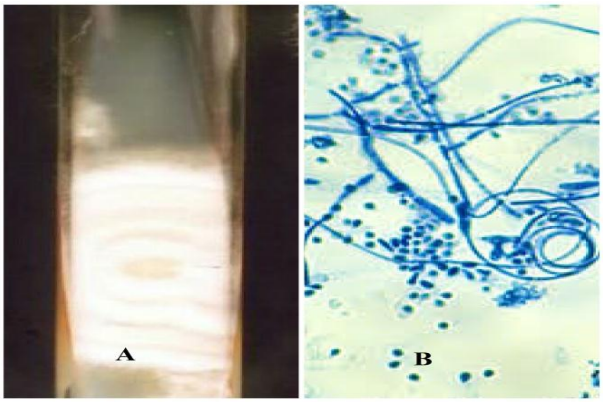

Figure 2: A= Mentagrophytes growth on SDA showing powdery to granular, creamy-white colony, B= LPCB showing numerous pyriform to round grape like microconidia with spiral hyphae.

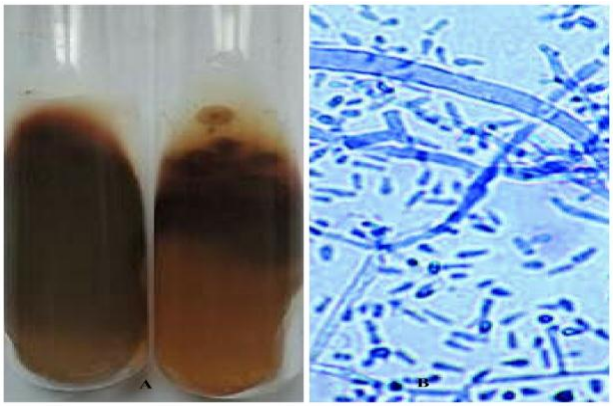

Figure 3: A= *T. rubrum* growth on SDA showing reverse pigmentation, B=LPCB showing tear drop shaped microconidia.

This could be explained as an occupational hazard as most people in this area are farmers and exposed to cattle.

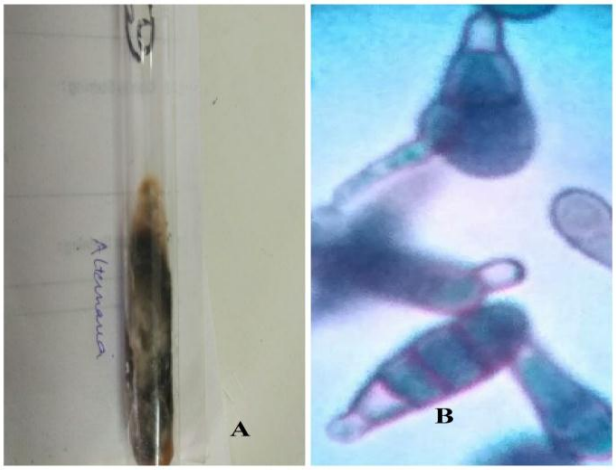

Figure 4: A= Alternaria on SDA; B=LPCB alternaria.

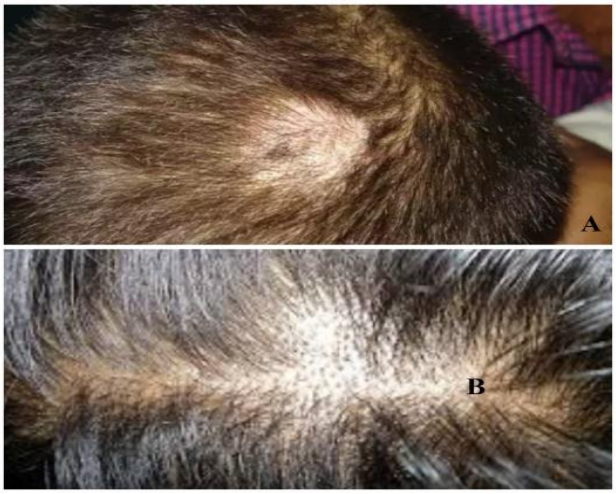

Figure 5 (A and B): T. capitis black dot and grey patch.

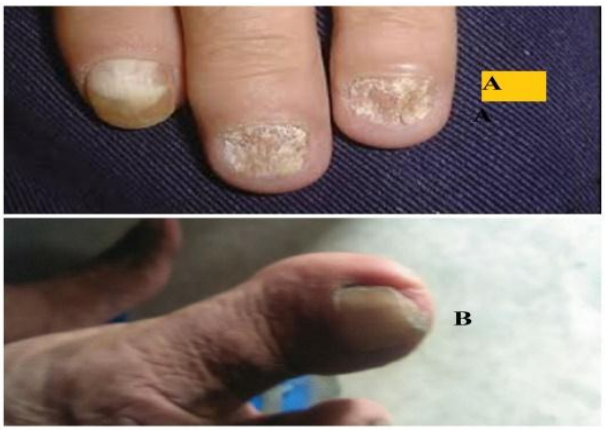

Figure 6 (A and B): Onychomycosis.

A striking finding in our study was the isolation in pure cultures of non dermatophytic molds even on repeat cultures (Table 14 and Figure 4). Though commonly considered as contaminants, they have been reported to colonize damaged tissues and cause secondary tissue destruction. Their role in causing cutaneous infections is not proven and a primary pathogenic role of NDM is controversial.[34] But these species are increasingly implicated in causing primary invasion of the nail in onychomycosis.[35,36] It is suggested that this subgroup may have a direct causative role as it fulfills the criteria of a pathogen (proposed initially for nails) viz isolation in pure culture, KOH positivity and non-isolation of dermatophytes in the culture.[37]

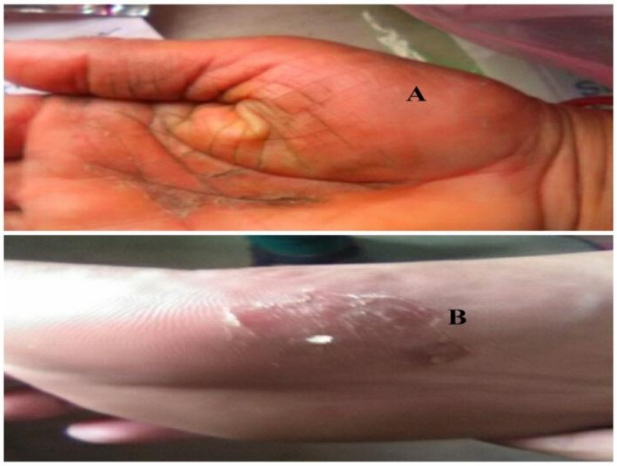

Figure 7: A= T. manuum B= T. pedis.

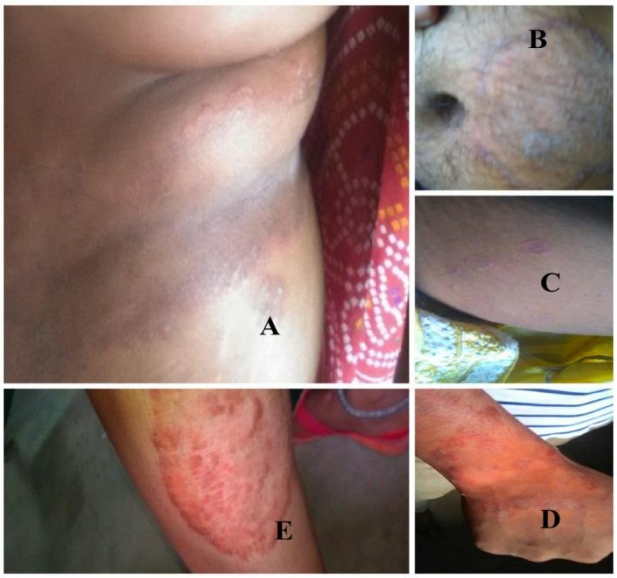

Figure 8 (A-E): T. corporis at various location on body.

CONCLUSION

The present study was carried out to study the variation in epidemiological pattern of superficial dermatophytic infection. There is recent change in the view of prolonged course, increasing resistance, recurrence of study and the

prominent species causing the disease. The study highlights that there is rise in infection caused by *T. verrucosum* which is a zoophilic dermatophytic. Further drug sensitivity could not be done due to lack of infrastructure and resources.

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Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

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