Original Research

A Clinicomycological study on dermatophytes in a tertiary care centre in central India

Dr. Anushi Hardaha[1], Dr. Pranjal Nema[2] , Dr. Shubhra Dubey[3], Dr. Ashish Pandey[4]

[1]Junior Resident, [2]Senior Resident, Atal Bihari Medical College, Vidisha, M.P, India
[3]Senior Resident, LN Medical College, Bhopal, M.P, India
[4]Senior Resident, AIIMS, Bhopal, M.P, India

Corresponding author
Dr. Ashish Pandey
Senior Resident, AIIMS, Bhopal, M.P, India

Received: 29 October, 2023 Accepted: 30 November, 2023

Abstract:-
Background. Dermatophytosis is common worldwide and continues to increase.
AIM and Objective: To study the spectrum of dermatophytes in patients attending tertiary care hospital, Bundelkhand Medical College Sagar.
Material and Methods. Clinical samples viz. hairs, nails, and skins were collected from 179 patients. A portion of each sample was examined microscopically, and the remaining portion of each sample was cultured. Dermatophyte isolates were identified by studying macroscopic and microscopic characteristics of their colonies.
Result Out of 179 samples, dermatophytes were detected in 126 (70.3%) cases. The mean and median age of the participants was 35.8 and 46 years, respectively. Overall, in the present study, there were 55.6% male and 44.4% female participants.. The most common species of dermatophyte identified on culture was Trichophyton rubrum (42.9%), followed by others. Conclusion. Most cases of dermatophytosis were caused by Trichophyton rubrum.
Keywords: Dermatophytes, KOH wet mount, Fungal culture, Sabouraud's Dextrose Agar

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Introduction:- Superficial mycosis is a common infections affecting human. They nearly affect 20% to 25% of the world's population. Superficial mycoses of skin, nails and hair are among the common fungal infections. The most commonly encountered species are the Dermatophytes, [1] Dermatophytes are among the few fungi causing communicable diseases, that is, diseases acquired from infected animals or birds or from the fomites they have engendered(1,4). These species may cause human and animal infections. The identification and speciation of dermatophytes are chiefly based on the macroscopic appearance of colonies like rate of growth, texture, pigmentation, colony topography and microscopic appearances like conidia and special hyphae. They do not cause any mortality but their significance lies in their morbidity, thus creating a major public health problem. Taxonomically, dermatophyte is a group of saprophytic fungi(1). Several members of this distinct group of fungi have evolved to pathologically grow on the superficial anatomical structures of humans and other domestic animals(1,2). The co-evolution of humans and this group of fungi have resulted in dermatophytes becoming the most common fungal infections among humans(1,2). The unique characteristic of these fungi is the production of an enzyme 'Keratinase (a protein-digesting enzyme)' that digest and breakdown the abundantly present keratin in the superficial dermal structure(1,2). These fungi use the protein in the superficial structures as permits invasion, colonization, and chronic infection of the stratum corneum layer of the keratinized tissues viz. skin, nails, and hair(3,4). However, cannot penetrate to the deeper tissues, hence, the infection is generally restricted to the dead cornified layer. The two most common classifications are based on clinical features/anatomical location and taxonomically grouping, respectively(5–7).Dermatophytes are categorized into three groups viz. anthropophilic, zoophilic, and geophilic depending on the primary source of their habitation(5–7). In the anthropophilic group, there are more than 40 distinct species belonging to three prominent genera viz. Microsporum, Trichophyton, and Epidermophyton are the most common cause of dermatophytosis in humans(1,2,8).Dermatophytosis, also known as Tinea and commonly called as Ringworm infections, are prevalent around the globe, with a preponderance in the tropical region secondary to a significantly higher level of humidity, crowding, and poor sanitary conditions(9,10)
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Material and Methods:- This was a prospective cross-sectional study done during July 2021 to July

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2022 in Department of Microbiology, Bundelkhand Medical College, and affiliated hospitals, a tertiary care institute in Sagar, Madhya Pradesh. Clinical samples viz. hairs, nails, and skins were collected from 179 patients. Skin lesions were sampled from the peripheral, erythematous, actively growing margin of the lesions. The affected area of the skin is decontaminated with 70%ethyl alcohol to eliminate surface bacterial contamination. the skin scales in the active growing edge of the lesion (15) were scrapped into the black paper kept inside the sterile petri dish by means of the blunt edge of a sterile scalpel. For nail sample. The affected nail was meticulously cleaned with 70% Ethyl alcohol and the nail was clipped or scrapped deeply enough to obtain recently invaded nail tissue by a flame sterilized tweezer. Nail clippings were taken from nail plate, nail bed and subungual region of the nails. In suspected tinea capitis, after cleaning the affected area with 70%Ethylalcohol, Lustreless hair and hair stubs are preferred and epilated along with root portion by a pair sterilized surgical forceps. Direct microscopy by 10% KOH mount for skin and hair specimen (stored for 15-20 minutes) and 20% - 40% KOH mount for nail specimen (stored for 24 hours) done to examine fungal hyphae with arthroconidia. Narrow, septate, branching hyphae with or without arthroconidia and other features were observed .A portion of each clinical specimen streaked on to suitable media like SDA and dermatophyte test media etc and incubated at 26-to-28-degree Celsius for 3-4 weeks. The collected specimen were inoculated on fungal culture media irrespective of the findings in direct KOH wet mount microscopic examination. Culture of dermatophytes requires media containing antibiotics .Sabouraud's Dextrose Agar with antibacterial agents such as chloramphenicol or gentamycin and cycloheximide to inhibit the growth of saprophytic fungi. The inoculated cultures were incubated at room temperature and 37°C . After incubation Macroscopic appearance of colonies and it's microscopic examination by LPCB mount was done to demonstrate hyphae and conidia.

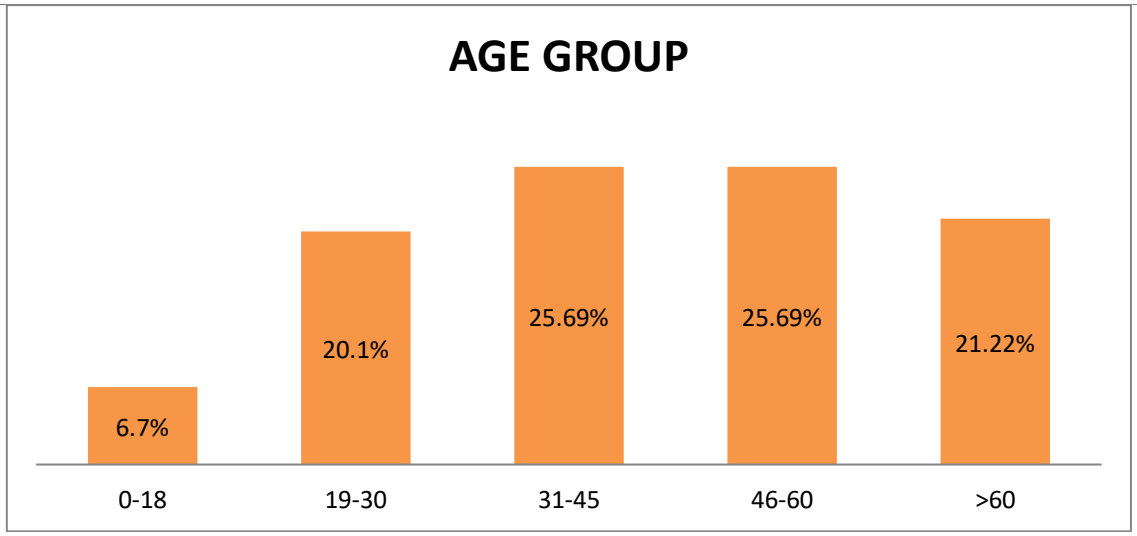
Result:- . Of 179 samples, dermatophytes were detected in 126 (70.3%) cases. The mean and median age of the participants was 35.8 and 46 years, respectively. Most of the participants were between 31-60 years of age (51.3%), followed by > 60 years of age (21.2%). Overall, in the present study, there were 55.6% male and 44.4% female participants. The most common species of dermatophyte identified on culture was Trichophyton rubrum (42.9%), followed by Trichophyton mentagrophyte (23.3%), and Epidermophyton floccosum (20.6%).

Table : Distribution of participants after culture diagnosis (n=179)

Diagnosis	n	%
Dermatophytosis	126	70.39
Not Dermatophytosis	53	29.60
Total	179	100

Table : Age distribution among participants (n=179)

Age group	n	%
0-18	13	**6.7**
19-30	36	**20.11**
31-45	46	**25.69**
46-60	46	**25.69**
>60	38	**21.22**
Total	179	**100.00**



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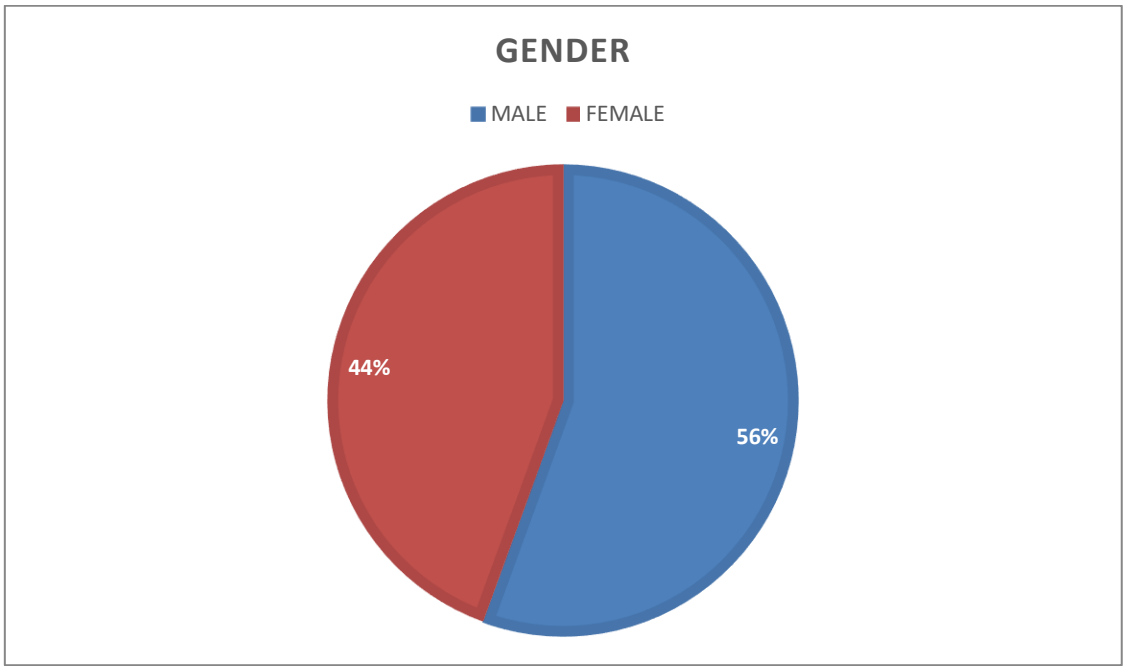
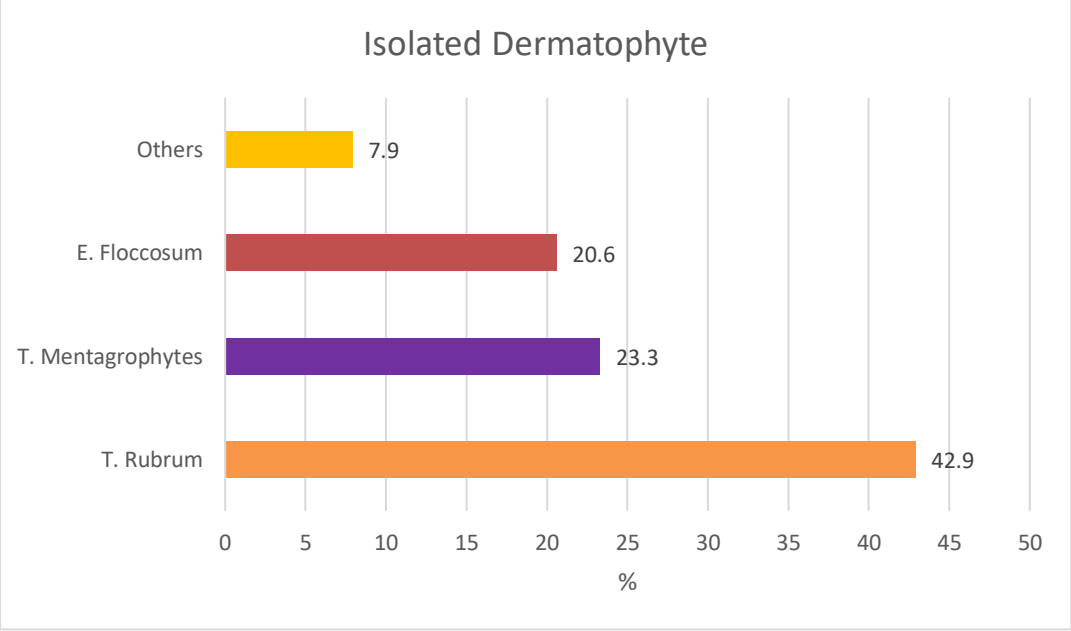


Table : Dermatophyte species identified on culture (n=126)

Species	n	%
Trichophyton rubrum	54	**42.9**
Trichophyton mentagrophytes	36	**23.3**
Epidermophyton floccosum	26	**20.6**
Others	10	**7.9**
Total	126	**100.00**

Figure: Dermatophyte isolated after culture



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KOH mount of dermatophytes

Figure – Tan powdery coloney of T mentagrophytes on DTM

Figure-Coloney of T rubrum on SDA

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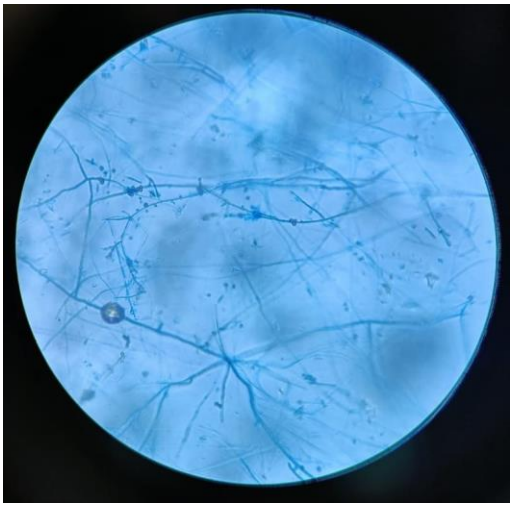

Figure-LPCB mount of T rubrum

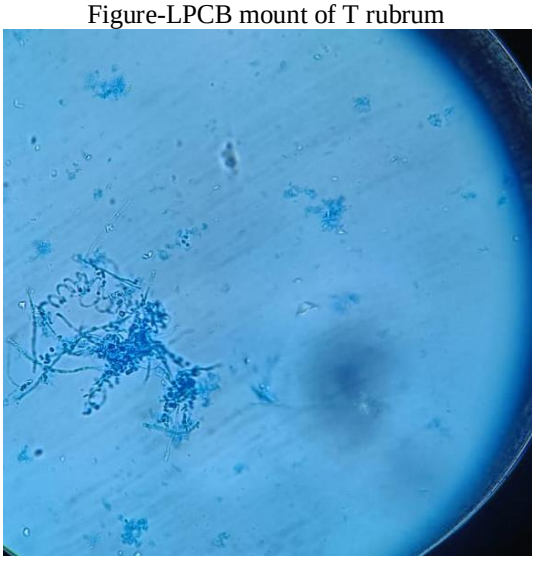

Figure –LPCB of T Mentagrophytes

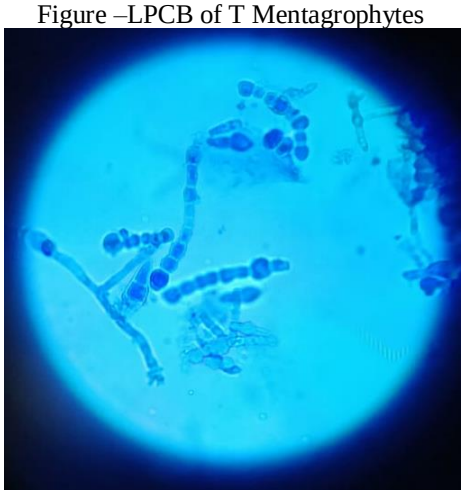

Figure-LPCB of E floccosum

Discussion:-

The majority of the research done on the prevalence of dermatophytosis as well as the factors that put people at risk were carried out in either the southern or the northern states(66). The prevalence of dermatophytosis in central India has only been investigated in a methodical manner by a very small number of research .In the present study, the mean and median age of the participants was 35.8 and 46 years, respectively. Most of the participants were between 31-60 years of age (57%), followed by > 60 years of age (22.2%).Overall, in the present study, there were 55.6% male and 44.4% female participants. Like our findings, several other studies have also reported that dermatophytosis was most common among middle-aged male patients. For

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example, **Agarwal US et al**. **(2014)** reported that the largest number of patients in their study(30.3%) were in the 21–30 years age group. Males (68.3%) outnumbered females (31.6%) with a male-to-female ratio of 2.16:1(14). **Sengupta M et al. (2015)** also reported a male preponderance and dermatophyte infections were most common among farmers(15).**Singh S and Beena PM. (2003)** reported that young adults in the age group of 16-30 years were mainly affected. The male-to-female ratio was 1.57:1(16). In the present study, the most common species of dermatophyte identified on culture was Trichophyton rubrum (42.9%), followed by Trichophyton mentagrophyte (23.3%), and Epidermophyton floccosum (20.6%). Several of the published studies also reported findings like ours. For example, **Penmetcha U et al. (2016)** reported that T. rubrum is the commonest species followed by T. mentagrophytes(17). Similarly, **Sengupta M et al. (2015)** also observed that the most common species of dermatophyte identified among patients was T.rubrum followed by T.mentagrophytes(15). However, some studies have reported contrasting findings. **Alshehri BA et al.(2021)**reported that Microsporum species was the most common dermatophyte accounting for 50.5% (n = 201) followed by trichophyton with 36.9% (n = 147)(13). Microsporum species were the prevalent dermatophytes in patients < 10 years of age, while Epidermophyton species were the most frequent dermatophyte species in age groups 10–19, 20–29, and 30–39 years. However, Trichophyton species were the most frequent dermatophyte species in individuals 70–79 years. **Agarwal US et al**. **(2014)** Out of a total of 300 cases, Trichophyton mentagrophytes, grown in 91 (37.9%) cases were the most common isolate. T. mentagrophytes was the most common isolate in tinea corporis, tinea capitis and onychomycosis while T. rubrum was most common in tinea corporis with cruris(14).

Conclusion – Dermatophyte infections are very common in developing country like india where hot and humid climate along with poor hygienic conditions play an important role in the growth of fungi like dermatophytes. There is a wide difference in isolation of different species from different regions of India. And Trichophyton species is the commonest aetiological agent of dermatophytosis. On average, the patients diagnosed with dermatophytosis were 36 years, with the median being 46 years old. Most of the participants were between the ages of 31 and 60 (51.3%), with the next largest group being over the age of 60 (21.22%). In this research, there were a total of 55.6% male participants and 44.4% female participants. Trichophyton rubrum was found to be the most prevalent species of dermatophyte when it was grown in culture, accounting for 42.9% of all cases. This was followed by Trichophyton mentagrophyte (23.3%) and Epidermophyton floccosum (20.6%).

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