The Effects of Increased Humidity and Temperature on the Prevalence of Skin Mold Infection

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INTRODUCTION

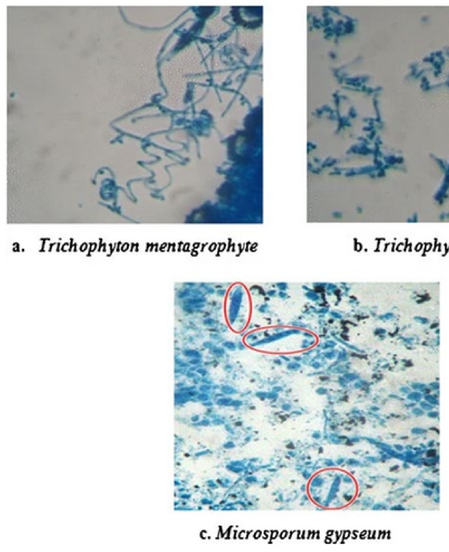
It is well-established that fungi tend to flourish in hot and humid environments. Dermatophytosis, a skin condition caused by a group of well-known molds and fungi, is notably prevalent in regions with such climate conditions. Molds are a group of filamentous fungi that have previously been classified inside Deuteromycetes but are now considered a polygenetic group and are classified inside divisions Ascomycota and Zygomycota. Dermatophytes produce keratinases to degrade keratin thus allowing them to infect superficial skin tissue. In our rapidly changing world, where climate patterns are shifting towards hotter and more humid conditions, it is important to understand how environmental factors can influence the prevalence of this condition. To explore these effects, we reviewed a literature study to observe available information across three distinct sites to examine variations in the prevalence of dermatophytosis. This research provides valuable insights into the impact of environmental factors on the prevalence of this skin condition, especially in a changing climate.

OBJECTIVES

The objective of this literature study is to investigate the changing prevalence of dermatophytosis in relation to environmental factors, specifically focusing on the impact of increasing temperatures and humidity.

METHODS

Google Scholar was used to identify relevant case studies. Key search terms included: “dermatophytosis”, “dermatophytes”, “hot and humid”, “skin mold”, “climate change”, “India”, and “dermatophytosis prevalence”.
Search is narrowed to three studies because they covered geographically different sites with different climates.



a. *Trichophyton mentagrophyte* b. *Trichophyton rubrum* c. *Microsporum gypseum*

Figure 3. Microscopic examination of stained preparation of dermatophyte spp. (Magnification 40 × 10 ×) a. Spiral hyphae of Trichophyton mentagrophyte b. Pencil shaped septate hyphae of Trichophyton rubrum c. Pyriform, septate hyphae of Microsporum gypseum are visible in the figures. (Bhatia & Sharma, 2014).

RESULTS

The worldwide prevalence of superficial mycotic infections is estimated to be in the range of 20%–25%, with dermatophytes being the primary causative microorganisms. Dermatophyte infections are predominant in tropical and subtropical developing countries like India due to the favorable hot and humid climate. About 90% of chronic dermatophytosis cases were attributed to Trichophyton rubrum, with tinea cruris and corporis being the major subtypes. In a study conducted in Himachal Pradesh, India, 36.6% of examined patients were found to have skin, nail, or hair infections caused by dermatophyte species (Bhatia & Sharma, 2014). In a study in Tiruchirappalli, Tamil Nadu, India 78% of examined patients have an infection by some dermatophyte species (Balakumar et al., 2012). In a study in Kerala, India 68% of examined patients have infection by some dermatophyte species (Vineetha et al., 2018).

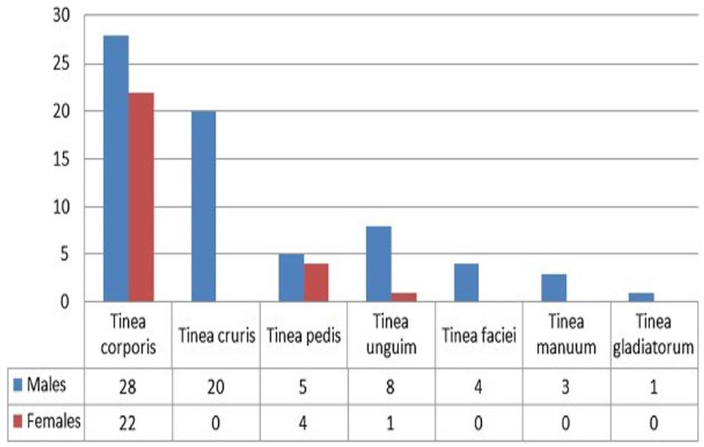


Figure 2. Details of culture positive samples among male and female patients of dermatophytosis. (Bhatia & Sharma, 2014).

CONCLUSION

In conclusion, the research findings highlight the significant burden of dermatophytosis in India, particularly in regions characterized by hot and humid climates. The prevalence of this fungal skin infection, attributed primarily to Trichophyton rubrum, is notably high, with a substantial percentage of individuals affected in the examined populations. The contrast in prevalence between the southern and northern parts of India underscores the environmental influence on the disease's spread, with the warm and moist conditions in the southern regions providing an ideal habitat for dermatophytes. Moreover, the potential connection between the prevalence of dermatophytosis and climate change is a critical aspect to consider, as shifting climate patterns may exacerbate the problem in the future. These findings emphasize the importance of public health interventions, disease management strategies, and research to address this significant health issue, especially in the context of changing environmental conditions.

	Samples Examined				No. of culture positive samples		
Tinea infection (Types)	Total	Males	Females	KOH positive samples	Total	Males	Females
Tinea corporis	61	43	18	61	28	22	6
Tinea crusis	35	34	1	35	20	20	-
Tinea pedis	34	21	13	34	9	5	4
Tinea unguium	47	24	23	48	9	8	1
Tinea faciei	7	6	1	7	4	4	-
Tinea manuum	8	5	3	8	3	3	-
Tinea gladiatorum	1	1	-	1	1	1	-
Tinea capitis	8	1	7	7	-	-	-
Tinea barbae	1	1	-	1	-	-	-
Total	202			202	74	63 (85.1%)	11 (14.9%)

Table 1. Epidemiological studies on Dermatophytosis in human patients in Himachal Pradesh, India. (Bhatia & Sharma, 2014).

Figure 2. Tinea pseudoimbricata - multiple concentric circles with intermittent areas of clearing seen in steroid modified tinea (Vineetha et al., 2018).

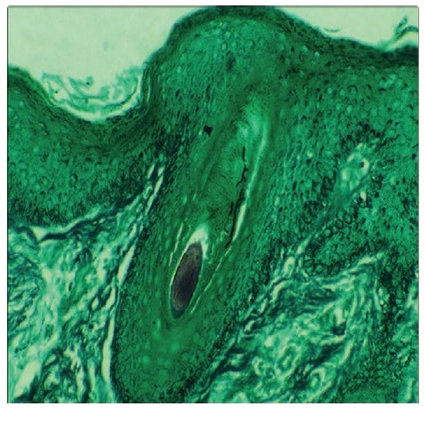


Figure 3. Grocott's methenamine silver stain (×400) showing fungal hyphae around hair follicle (Vineetha et al., 2018).

FUTURE WORK

Future research in this field should explore the evolving impact of climate change on the prevalence and distribution of dermatophytosis and assess the effectiveness of targeted public health interventions to mitigate the spread of this fungal infection in regions affected by changing environmental conditions.

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