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PREVALENCE OF DERMATOPHYTOSIS IN PATIENTS AT THE DERMATOLOGY DEPARTMENT OF TRA VINH UNIVERSITY HOSPITAL, VIETNAM

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Abstract – *Dermatophytosis is a term used to describe superficial fungal infections caused by dermatophytes, yeasts, and non-dermatophyte fungi. These infections can vary widely in severity, ranging from mild or symptomless cases to serious systemic infections that may become life-threatening. Early diagnosis, monitoring, and treatment are crucial in effectively managing the disease and preventing fungal growth. A descriptive cross-sectional study was conducted from May 2024 to August 2024, with patients visiting the Department of Dermatology at Tra Vinh University Hospital as the study subjects. The study included 76 patients, and the rate of skin fungal infection was found to be 38.2% through the direct wet mount technique and 39.5% through culture. Among these, 50% were caused by dermatophytes (Trichophyton spp. 46.7%, Microsporum spp. 3.3%), while the other 50% were caused by non-dermatophytes molds. The research results have provided an overview of the types of fungi found in patients visiting Tra Vinh University Hospital, contributing to the improvement of treatment quality for patients.*

Keywords: dermatophytes, non-dermatophytes molds, superficial mycoses, Tra Vinh University Hospital.

I. INTRODUCTION

Dermatophytosis is a superficial fungal infection caused by dermatophytes, yeasts, and non-dermatophyte fungi. According to the World Health Organization (WHO) [1], approximately 20–25% of the global population is affected by superficial fungal infections. While these fungi are typically harmless and even part of the human microflora, they can cause severe and potentially life-threatening infections if they spread throughout the body [2]. Clinically, dermatophytosis can be classified into three groups: scalp ringworm (affecting the hair and possibly the scalp), Tinea corporis (A fungal infection of the epidermis), and onychomycosis (nail fungus). Scalp ringworm is a fungal infection of the hair and scalp, commonly caused by *Trichophyton* spp. and *Microsporum* spp., except *T. concentricum*. Infections caused by *Trichophyton* spp. typically present as scaly patches of hair loss. In cases of *Microsporum* spp. infection, broken hair strands can be observed, forming broad patches. Kerion, a severe inflammatory form, appears as a swollen, scaly lesion that discharges pus, leading to secondary scarring alopecia that is resistant to treatment [3]. Tinea corporis is defined as a superficial fungal infection of glabrous (non-hairy) skin, excluding the palms, soles, and groin. This condition can be transmitted directly from infected individuals or animals, from contaminated surfaces, or through autoinoculation from fungal sources on the feet. Wearing tight clothing and humid climates are associated with increased infection rates and disease severity. Fungal spores can persist in clothing, on direct-contact skin surfaces, and in minor skin abrasions. While any dermatophyte can cause Tinea corporis, *T. rubrum* is the most frequently encountered pathogen and is often associated with follicular lesions. Other common causative agents include *E. floccosum*, *T. interdigitale* (both anthropophilic and zoophilic species), *M. canis*, and *T. tonsurans*. Onychomycosis is characterized by subungual

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hyperkeratosis, which involves the accumulation of keratin cells beneath the nail plate, causing the nail to lift and detach distally (onycholysis). Over time, the nail plate may become thickened and brittle, with rare occurrences of hemorrhage or complete nail detachment. Additionally, onychomycosis may manifest as white or yellow-brown discoloration and subungual debris. The primary causative agents of onychomycosis are *Trichophyton* spp., including *T. rubrum*, *T. mentagrophytes*, *T. schoenleinii*, *T. tonsurans*, and *T. megninii*, among others [4]. Early diagnosis, monitoring, and treatment are crucial for improving treatment effectiveness and preventing fungal growth.

However, in Tra Vinh, comprehensive studies on the prevalence of dermatophyte infections remain limited. Therefore, this study was conducted with the aim of determining the rate of skin fungal infections in patients visiting the Department of Dermatology at Tra Vinh University Hospital. The results of this study can provide valuable information for clinicians in screening and diagnosing these infections and ultimately improving treatment effectiveness.

II. RESEARCH OVERVIEW

Dermatophytosis is a common superficial infection caused by dermatophytes, a group of pathogenic keratinophilic fungi. Dermatophytes are known to cause superficial fungal infections in animals and humans due to their ability to degrade keratin found in the skin, hair, and nails, leading to the development of dermatophytosis. Dermatophytes are divided into three groups: anthropophilic (human-loving), zoophilic (animal-loving), and geophilic (soil-loving). The global distribution of dermatophyte species is based on this classification rather than their natural habitat or host preference. Dermatophytosis is common worldwide but is more prevalent in tropical regions due to high humidity, overpopulation, and poor hygiene [5]. Several factors, including climate, gender, age, lifestyle, human migration, cultural practices, and socioeconomic conditions, influence the incidence of dermatophyte infections. More than 40 species and three significant genera, *Microsporum* spp., *Trichophyton* spp., and *Epidermophyton* spp., are known to cause dermatophytosis in humans [5]. The diagnosis of fungal infections is based on clinical symptoms and laboratory fungal detection tests. Clinical symptoms help guide the diagnosis, but confirmation requires laboratory tests to detect fungi in patient samples. There are several methods for detecting fungi, including direct examination with the naked eye and microscopy, staining techniques (smear staining or tissue biopsy sections), fungal culture, biochemical tests, immunological methods, molecular biology techniques, and animal inoculation tests.

In Vietnam, there have been several studies on dermatophytosis. Nguyen Quang Minh Man [6] showed that among the patients who came for examination, 71.9% were infected with fungi, and *Trichophyton* sp. was the most common species, accounting for 76.8%. In a study with a sample size of 156 patients in 2021, Tang Tuan Hai et al. [7] reported a fungal culture positivity rate of 72.4% for chronic dermatophytosis. Among the cultured fungi, *Trichophyton* species accounted for 80.9%. In addition, Tran Cam Van et al. [8] found that the prevalence of superficial fungal infections is 14.75%. Among them, dermatophytes constitute the highest proportion with 69.3%.

This study applied two techniques for diagnosing fungal infections: direct microscopic examination and fungal culture. Microscopic examination can confirm a diagnosis if fungal elements are detected in the specimen. If fungal structures such as spores or other characteristic features are observed under the microscope, the specific fungal species may sometimes be identified. However, the absence of visible fungi does not rule out an infection, as the sensitivity of each method depends on factors such as the type of specimen, sampling site, and the experience of the laboratory personnel. Fungi cultured on Sabouraud agar with antibiotics (Chloramphenicol <16 μg/ml) are commonly used for skin samples, abscesses, and subcutaneous tissues. Antibiotics have played a significant role in inhibiting bacterial growth and reducing the overgrowth of contaminating

fungi during the culture process.

III. RESEARCH METHODS

A. Study design and sampling method

This cross-sectional descriptive study was conducted among patients presenting with cutaneous lesions at the Department of Dermatology, Tra Vinh University Hospital, Vietnam, between May and August 2024. Comprehensive demographic and clinical data were collected, including age, sex, ethnicity, lesion characteristics, prior therapeutic interventions, and risk factor profiles. Documented variables encompassed occupational or lifestyle factors (e.g., prolonged use of occlusive clothing, communal sharing of personal items such as hats), hygiene practices, hyperhidrosis, history of cutaneous mycoses, and pre-admission antifungal medication use. Standardized clinical evaluations were performed to characterize lesion morphology and distribution, corroborated by diagnostic criteria for fungal etiology.

Exclusion criteria: The selection of the participants was based on voluntariness; therefore, patients who disagreed to participate were excluded. Besides, patients with psychiatric conditions, infected wounds, or lacking fungal test results were not considered.

B. Research procedures

Sample collection

Two distinct sample collection methodologies were employed in this study. In the first method, the affected site was disinfected with isopropyl alcohol, following which infected hair shafts and epidermal debris were aseptically scraped from the scalp and lesion peripheries using a sterile surgical scalpel. The collected specimens were transferred onto sterile brown paper under aseptic conditions. For the second method, purulent exudate from inflammatory lesions was obtained using moistened sterile cotton swabs. All procured samples were divided into two aliquots: one aliquot underwent a direct microscopic examination, while the other was reserved for mycological culture. To preserve sample integrity, specimens were transported to the laboratory within a two-hour window for immediate processing.

Sample processing

Direct microscopic examination: Scrapings were mounted on microscope slides with one to two drops of 20% potassium hydroxide (KOH) and covered with coverslip. The slides were gently heated over a flame for five minutes to facilitate tissue clarification. Each preparation was systematically examined under low- (10x) and high-power (40x) magnification to identify fungal elements, including hyphae and arthroconidia.

Fungal culture: Scrapings were inoculated onto Sabouraud dextrose agar (SDA) plates and aerobically incubated at 25^oC for a period of up to four weeks. Cultures were inspected periodically after 7 days and 21 days intervals to monitor colonial growth. Fungal isolates were macroscopically evaluated for colony morphology (e.g., texture, pigmentation) and microscopically analyzed using lactophenol cotton blue staining via the slide culture technique. Dermatophyte species were identified through a combination of macroscopic characteristics, microscopic features (e.g., conidial structures), and in vitro biochemical assays.

C. Data analysis

All patient data were entered and analyzed using Stata 14.0 statistical software. Descriptive statistics were applied to demographic, lifestyle, and living habit characteristics, which were summarized in frequency tables (n) and percentages (%).

D. Ethical considerations

The study was conducted after receiving approval from the Biomedical Ethics Committee of Tra Vinh University, decision number 236/GCT-HĐĐĐ, reviewed and approved through the expedited process on May 15, 2024.

IV. RESULTS AND DISCUSSION

A. Laboratory examinations

The results presented in Figure 1 indicated that direct microscopic examination with 20% KOH

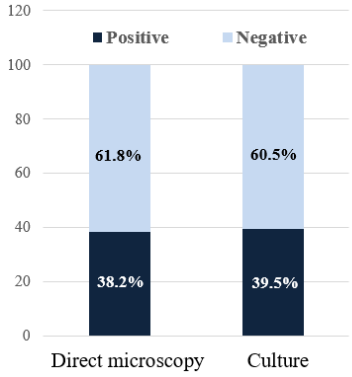
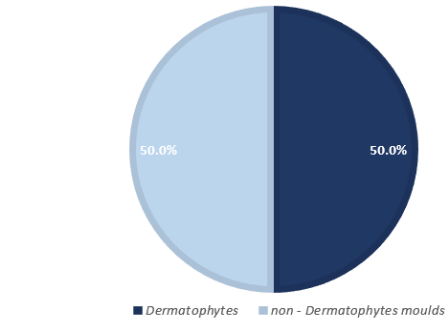
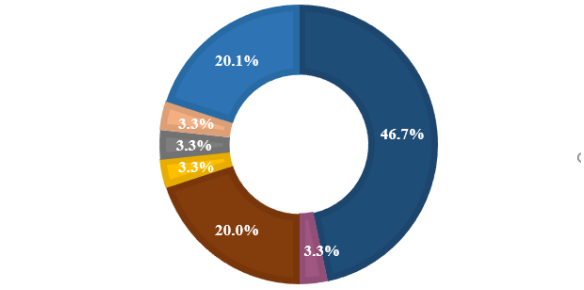


Fig. 1: Results of dermatophyte testing



(a) Overall rate



(b) Specific rate

Fig. 2: Results of dermatophyte identification

showed a positivity rate of 38.2%, while fungal culture on Sabouraud Chloramphenicol medium revealed a positivity rate of 39.5%. The study recorded a 38.2% positivity rate using direct microscopic examination with 20% KOH. This result is higher than the study by Tran Cam Van et al. [8], which reported a 14.75% positivity rate for direct microscopic examination with fungi. However, this result is lower than the study by Tang Tuan Hai et al. [7], which found 46% of 156 patients had positive direct microscopic examination results for fungal hyphae with septa. The culture results showed 30 samples with fungal growth, accounting for 39.5%. This rate is lower than Tang Tuan Hai et al. [7], where the positivity rate for fungal isolation was 72.4%.

The results from Figure 2 showed that the study found that the identification results after culturing revealed 50% dermatophytes (46.7% *Trichophyton* spp., 3.3% *Microsporum* spp.), and 50% other non-dermatophytes molds. Among the 30 fungal samples identified, the most prevalent species was *Trichophyton* spp., with 14 samples, accounting for 46.7%. This result is lower than the study by Nguyen Quang Minh Man [6] where 82 samples (71.9%) had fungal growth, and *Trichophyton* sp. was the most common species, with 63 cases (76.8%). *Trichophyton* spp. is one of the most frequently detected species globally, responsible for 50%–90% of dermatophytosis cases [9]. This study found that 46.7% of patients with dermatophytosis were caused by *Trichophyton* spp., which is a relatively comparable figure.

B. Participant characteristics

Table 1: Socio-demographic characteristics of patients visiting the Dermatology Department at Tra Vinh University Hospital

General Characteristics	Frequency (n)	Percentage (%)
Age Group		
≤ 30 years old	24	31.6
31–45 years old	13	17.1
46–59 years old	22	28.9
≥ 60 years old	17	22.4
Gender		
Male	40	52.6
Female	36	47.4
Ethnicity		
Khmer	7	9.2
Kinh	69	90.8

The results from Table 1 showed that the group of patients under 30 years old accounted for the highest percentage at 31.6%. This finding is similar to the study by Chau Van Tro et al. [10]

where patients aged 21–30 years accounted for 30.6% (60 patients), and the study by Pham Van Tuan et al. [3] which found that the under-30 age group had the highest number of patients, accounting for 39.4%. In this current study, male patients accounted for a higher percentage than female patients, at 52.6% vs. 47.4%. This result is consistent with Cao Bich Ngoc et al. [11], where male patients made up 51.7%, higher than female patients at 48.4%. However, this result is lower than Pham Van Tuan et al. [3], where male patients made up 68.2%, significantly higher than female patients at 31.8%. Among the 69 patients, 90.8% were Kinh people, which aligns with the demographic characteristics of the population in Tra Vinh Province, where the Kinh ethnic group is the majority.

Table 2: Characteristics of the association between lifestyle habits, living conditions, and dermatophytosis infection status

Characteristics	Frequency (n)	Percentage (%)
The patients wear tight, form-fitting clothes.		
Yes	12	15.8
No	64	84.2
The patients share hats.		
Yes	1	1.3
No	75	98.7
The patients wear wet clothes		
No	46	60.5
Rarely	8	10.5
Occasionally	6	7.9
Frequently	16	21.1
Shower with soap		
Yes	65	85.5
No	11	14.5
The patients sweat a lot.		
Yes	41	54.0
No	35	46.0
Has a history of skin fungal infection		
Yes	21	27.6
No	55	72.4
Has used medication before going for the medical examination		
Yes	57	75.0
No	19	25.0
The location of the fungal infection		
Scalp	3	4.0
Body	46	60.5
Nails (hands and feet)	10	13.2
Other locations	17	22.3

The results from Table 2 showed that 64 patients (84.2%) did not wear tight, non-breathable clothing. This rate is similar to the study by Nguyen Quang Minh Man [6], where 98 patients (86%) wore tight, form-fitting clothes 60.5% of patients did not wear damp clothing, a result consistent with the study by Nguyen Thi Quynh et al. [12] which found that 75 out of 109 patients (58.7%) did not wear damp clothes. 98.7% of patients did not share hats with others, and 96% of patients (73 patients) did not share blankets, pillows, or mattresses. These high percentages suggest that the patients are highly conscious of using personal items and maintaining personal hygiene, which helps prevent unwanted skin diseases. However, the study also found a small proportion of individuals who were somewhat careless about this, but this number was minimal and insignificant. The study also found that 41 patients (54%) experienced excessive sweating, which is consistent with the study by Nguyen Thi Quynh et al. [12] where 55% of patients reported excessive sweating, and the study by Chau Van Tro et al. [10] which found that 54.6% of 196 patients experienced frequent sweating. However, the result was lower than the study by Nguyen Quang Minh Man [6], where 85.9% of 114 patients reported excessive sweating. This discrepancy could be attributed to different study periods, as this study was conducted during the summer. 85.5% of patients in this study used soap for bathing. This result is higher than the study by Nguyen Thi Quynh et al. [12], where 65.1% of 109 patients used soap for bathing. The difference may be due to varying living conditions and economic factors in different regions.

The findings also revealed that 72.4% (55 patients) were experiencing a first-time fungal infection, while 27.6% (21 patients) had previously been infected. Additionally, 75% of patients (57 patients) had self-applied medication before seeking medical attention. This result is higher than the study by Nguyen Thi Thao Linh et al. [13] which 28% of patients used corticosteroids before visiting the hospital, and the study by Nguyen Quang Minh Man [6] showed that 65.7%

of patients had applied medication prior to consultation.

The results indicate that all body areas can be affected by dermatophyte infections if the body encounters favorable conditions for fungal growth. The majority of fungal infections were located on the body (back, chest, abdomen), with 46 patients (60.5%) affected. In line with the study by Chau Van Tro et al. [10], body infections were the most common, accounting for 61.7% of cases. However, this result is lower than Cao Bich Ngoc et al. [11], which found that the most common type of body fungal infection was the annular form, accounting for 89% of cases.

V. CONCLUSION

The study shows that dermatophyte infections are common among patients, accounting for a relatively high percentage of those visiting the dermatology clinic with skin-related conditions. Among these, 50% were caused by dermatophytes (*Trichophyton* spp. 46.7%, *Microsporum* spp. 3.3%), while the other 50% were caused by non-dermatophytes molds. The research results contribute to providing documentation for dermatologists in screening, diagnosing, treating, and preventing fungal infections for patients visiting Tra Vinh University Hospital, helping to improve the quality of diagnosis and treatment at the hospital. Additionally, the study serves as a foundation for future in-depth research on fungal infections.

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