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Microbiological study of fungal infection of primary school student's hair scalp

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Abstract

This study was carried out in several primary schools for boys and girls from 1 January 2023 to 1 May 2023 where '60' hair samples of (scalps) of different ages ranging from (8-11) years were collected in Al-Rifaay district and transferred to the Faculty of Science's Microbiology Laboratory utilizing specialized sample collecting bags. According to the data, there were 25 different types of fungi from 24 different species. The most prevalent of these species is *Aspergillus*, which is followed by *Penicillium* and the remaining races as follows:

1. *Saccharomyces*
2. *Sepedonium*
3. *Rhizopus*
4. *Gliocladium*
5. *Microsporm*
6. *Alternaria*.
7. *Hormodanarum*
8. *Rhodotorula*
9. *Blastomyces*
10. *Epidermophyton*
11. *Sporothrix*
12. *Sporangiophore*
13. *Pularia (Aureobasidium)*
14. *Coccidioides*
15. *Biolaris*
16. *Verticillum*
17. *Sporobolomyces*
18. *Geotrichum*
19. *Candida*
20. *Zygomycetes*
21. *Hortaea*
22. *Scopulariopsis*

Keywords: Skin fungi, zoophilic, keratin, *Epidermophyton*, dermatophytes

Introduction

Dermatophytes and yeasts are two possible causes of superficial fungal infections of the skin. The three closely related keratin-ophilic fungal taxa known as dermatophytes—*Epidermophyton*, *Microsporum*, and *Trichophyton*—attack the keratin tissues of both humans and animals, including the skin, hair, and nails, which depend on the protein keratin for sustenance (Liu *et al.*, 2000) [5]. The structural component of the outermost layer of human skin is keratin. Additionally, it serves as the primary structural component of nails and hair. Dermatophyte infection process Adherence to the host tissue, invasion, and the emergence of a host response are the three components of colonization in the host. In the first stage of infection, the colonization process is assisted by the release of various proteolytic and other enzymes by dermatophytes, which in turn provoke inflammatory (Chinnapun, 2005) [2].

There are three forms of dermatophytosis, also known as tinea infections: The first category consists of anthropophilic fungi, which are naturally found in humans and can spread from person to person but infrequently in animals like *E. floccosum* and *T. tonsurans rubrum*.

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The second kind, known as zoophilia, involves animals like *M. canis* and *T. mentagrophytes* that serve as their primary host but are susceptible to humans. *M. gypseum* and *T. ajelloi* are examples of the third form, which is geophilic and found in soil as a restoration. They can infect both humans and animals (Sharquie & Jabbar, 2021) [8].

Candidiasis is caused by candida albicans and candida spp. can be distinguished by the presence of a severe inflammatory reaction to the presence of the micro-organism (Weitzman & Summerbell, 1995) [12].

The majority of head injuries to the skin caused by frond-causing fungi occur in animals between the ages of 2 and 11 months, and cats are the primary source of these injuries (Chupia *et al.*, 2022) [3].

T. unguium is a fungal skin injury to nails, which is characterized by inflammation that begins around the nails, which leads to different and varying changes according to the type of fungi, these changes include the largeness of the nails and their discoloration and their transformation into a pale shape instead of bright health sparkle and easy nail breakage, and encouraging the development of the injury is aging, diabetes and narrow shoes.

Studies have shown that there are types of skin fungi that specialize in a particular type or group of people. In America and Canada, *T. tonsurans* fungi were observed in areas inhabited by black children, due to the nature of wavy hair or their difficult living conditions (Bronson *et al.*, 1983) [1].

The surface of the skin and hair is an environment not suitable for the growth of most pathogens where highly acidic dry environments for the presence of creatine, but the intervention of man by adding materials to the highest appointment led to damage in these areas and a change in nature, which made them vulnerable to the invasion of pathological microbes and to know this fact we wanted to identify the fluorescence present in the hair so this study was conducted. After this simple introduction, this study aims to find out the fungal and yeast species that affect the scalp in primary school pupils of both sexes in the district of Al-Rifaay.

2. Methods and Methods

2.1. Samples of study

Hair samples from 60 primary school students, both boys and girls, were collected using special collection bags for the collection of dry and sterile samples. The samples were then transferred to the Faculty of Science's microbiology laboratory after receiving approval from the school administration, presenting it with an official book from the Faculty of Science entitled to the Directorate of Education of Al-Rifaay school departments the subject of research, and getting oral consent from the study participants and recording all of their information.

2.2. Fungal Identification

Direct plate method (method of Petri dishes) (Warcup, 1950) [11] used for the isolation of fungi where the molding of the implant medium prepared which contains Sabouraud Dextrose Agar (SDA) with Chloramphenicol and Cycloheximide in sterile petri dishes and after the hardening of the middle transported His eye hair after being immersed in 10% potassium hydroxy solution for 1-3 minutes to one of the dishes after that hugged in the incubator (incubator) at

a temperature of 25 °C and for a range of 2-3 days depending on the type of fungi.

For the purpose of studying isolated fungi and classifying them accurately, the dishes were examined three days after the transplantation of samples and for three weeks the fungus was laboratoryally diagnosed based on the implant and appearance qualities of fungi using clean glass slices containerized on lactophenol cotton blue dye and in some cases 0.1% KOH solution and the use of lenses with a magnification power of only 10x, 40x.

The fungus was purified and parts of isolated fungal colonies were transported to slanted circles and incubated at a temperature of 25 °C and then kept in the refrigerator after the appearance of growth in it.

3. Results

In this investigation, 60 samples (hair) from male and female elementary school kids were used to demonstrate the findings of the fungal contamination detection. The investigation revealed that the fungal species *Aspergillus* is the most common, followed by the *Penicillium* fungus and then the remaining species. The appearance of twenty-five species is part of the twenty-four species identified based on medical fungal atlases, as indicated in table (1).

Table 1: Showing races and fungal species

No.	Genus	Species
1	Pencilium	<i>Penicillium</i> spp.
2	Saccharomyces	<i>Saccharomyces</i> spp.
3	Gliocladium	<i>Gliocladium</i> spp.
4	Hormodendrum	<i>Hormodendrum</i> spp.
5	Rhodotorula	<i>Rhodotorula</i> spp
6	Sepedonium	<i>Sepedonium</i> spp
7	Aspergillus	<i>Aspergillus niger</i>
8	Microsporum	<i>Microsporum distortum</i>
9	Rhizopus	<i>Rhizopus</i> spp.
10	Blastomyces	<i>Blastomyces dermatitidis</i>
11	Epidermophyton	<i>Epidermophyton floccosum</i>
12	Sporothrix	<i>S. schenckii</i>
13	Sporangiophore	<i>Sporangiophore</i>
14	Pullularia (Aureobasidium)	<i>Pullularia (Aureobasidium)</i>
15	Coccidioides	<i>Coccidioides immitis</i>
16	Alternaria	<i>Alternaria</i> spp.
17	Bipolaris	<i>Bipolaris</i> spp.
18	Microsporum	<i>Microsporum gypseum, M. canis</i>
19	Verticillium	<i>Verticillium</i> spp.
20	Sporobolomyces	<i>Sporobolomyces</i>
21	Geotrichum	<i>Geotrichum</i> spp.
22	Candida	<i>C. albicans</i>
23	Zygomycetes	<i>Zygomycetes</i> spp.
24	Hortaea	<i>H. werneckii</i>
25	Scopulariopsis	<i>Scopulariopsis</i> spp.

4. Discussion

Using special bags for the transportation of bacterial fungal infections, the current study collected 60 samples from primary schools for both boys and girls in the city of Al-Rifaay. The samples were taken from the scalp and were aged between 8 and 11 years. The results showed that 25 fungi, representing 24 species, were present, and that the genus *Aspergillus* was the most common. This is consistent with the findings of numerous researchers in various regions who observed fungi under a microscope and isolated zoophilic species in this study of fungi *M. canis*, *T. verrucosum*, and *T. mentagrophytes*.

It is explained that the children from whom these fungi are isolated are in direct contact with animals, especially livestock, cats, and dogs Emmons *et al* (1974) ^[4], Because of the high morbidity of these fungi, they can develop different types of palm (Tinea), especially the head frond, the body frond, the beard frond and the nail fronds (Śpiewak & Szostak, 2000) ^[10].

The isolation of *M. gypseum* fungi, a soil-loving skin fungus, also indicates that these children are in contact with soil (Ramesh & Hilda, 1998) ^[6].

The current study's findings demonstrated that the skin is the body part most affected, and that male children are more infected than female children for a number of reasons, including the fact that male children play in the sun for extended periods of time, which causes them to perspire more, and that wearing clothing that is sensitive to environmental factors raises the body's temperature and humidity., all of which make conditions suitable on the surface of the body for the growth of skin fungi (Singh & Beena, 2003) ^[9], In addition to playing with animals and in soils, they are a source of skin fungus (Ramesh & Hilda, 1998) ^[6]. The incidence has also increased due to a lack of interest in personal cleanliness, a low level of life, and cultural norms (Ranganathan *et al.*, 1995) ^[7].

Clinical symptoms are frequently obvious, with the appearance of head fronds resulting from a fungal infection of the head's skin, specifically at the roots of the hair, which causes itching, skin peeling, and hair loss. The symptoms caused by fungi in the scalp vary depending on the type of fungal pathogen and the area it targets. These fungi are particularly common among schoolchildren and young boys, and they are highly contagious.

A fungus species known as "Dermatophytes" produces a scalp infection. Skin fungi target the outermost layer of the skin, and hair plants can occasionally trigger an inflammatory response in the scalp known as "Kerion," which results in the formation of yellow bags and purulent liquid. This leads to the development of a yellow rash layer on the scalp's surface. An increased inflammatory response causes a substantial loss of hair in the inflammatory area or makes the hair easily uprooted. This condition can result in permanent baldness and the formation of a scar on the scalp. Since these symptoms can be found in other illnesses, a precise diagnosis and confirmation of their existence are necessary.

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