

Study of dermatophytes and non dermatophytes in hair and nails of Kids and Adults between 2-20 years in Tripoli Libya

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ABSTRACT

The presence of fungal species on skin and hair is a known finding in many mammalian species and humans are no exception. Superficial fungal infections are sometimes a chronic and recurring condition that affects approximately 10-20% of world's population. However, most species that are isolated from humans tend to occur as coexisting flora. This study was conducted to determine the diversity of fungal species from the hair and nails of 20 children (2-5) years and 20 male – female adults (10-20) years in the central region of Tripoli Libya during the period from of start November, 2021 to April 2022.This samples were cultured on tow types of nutrient media (SDA,PDA).

Some samples were collected from 20 children (2-5) years old and 20 male and female adults (10-20) years old, then cultivated on Sabouraud's agar(SDA) and potato dextrose agar (PDA) plates method for isolation of keratinophilic and other fungi. Within incubation at 28 c for fungi were examined and identified and photographed microscopically .

A total of 59 fungal species belonging to 7 genera were isolated and identified . The most widespread species were (*Aspergillus. spp*) 47.5% followed by ; *Alternaria alternate* 17.1%, (*Penicillium* species) 15.2%, (*Ulocladium botrytis*) 10.2%, (*Emericella sp*) 6.74%, and the less common isolated species were (*Trichothecium spp*) 1.7% (*Fusarium spp*) 1.7%.

The results of this study showed that the isolated fungi from male hair were more than that of female (81.4% vs. 18.6%) .

Keywords: Fungi, Hair, Nails, SDA,PDA, Tripoli, Libya .

Introduction

Dermatophytes is the common infection caused by fungi known as dermatophytosis. The dermatophytes are a group of fungi that are able to damage and utilize keratin found in the skin , hair , nails , horns and feathers ((Bisen and Tewari, 2015).).as the sole nitrogen and carbon source and survive as saprophytes in nature. (English, 1963)

Evidences indicate that dermatophyte fungi are one of the most efficient human parasites , due to their efficiency invading keratinous tissues (Zarin et al., 2011)

Fungi with affinities to attack keratinized tissue are called "Keratinophilic fungi". These fungi are present in the environment all over the world, specifically in keratin containing habitats where humans and animals are living.

Dermatophytosis can either be caused by true dermatophytes (*Microsporum*, *Trichophyton* and *Epidermophyton*), yeasts (*Candida*), or moulds (e.g., *Aspergillus*, *Alternaria*, and *Fusarium*) (Sahin et al., 2004).

In various geographical locations, several studies have been conducted to characterise the of fungi isolated from human hair and nails. In Turkey, *Trichophyton rubrum*, *T. mentagrophytes*, *T. verrucosum* and *T. violaceum*. *Microsporum canis*, *M. gypseum*, *Epidermophyton floccosum*, were commonly isolated from the hair and nails of students (Metintas and Kiraz, 2004). In northern Egypt, the most prevalent species included *Aphanoascus*, *Aspergillus*, *Penicillium*, *Paecilomyces* and *Chrysosporium* (Gherbawy et al., 2006). . In Northeast India, *T. rubrum*, *T. mentagrophytes* and *M. gypseum* were also the common isolates (Sarma, 2007). In Northern Greece, dermatophytes including *Trichophyton rubrum* (53.9%), *Trichophyton mentagrophytes* (17.6%), and *Microsporum canis* (22.5%) were the most common isolates (Nasr et al., 2016).

Another study conducted in 2009 among patients clinically diagnosed with dermatophytic infections in an Eastern province of Saudi Arabia showed a variety of species including *Epidermophyton floccosum*, *Trichophyton rubrum*, *Trichophyton schoenleii*, and the non-dermatophytes *Candida albicans* and *Fusarium* (Alsheikh, 2009) .

Reports from Souq Al- Jumah, Tripoli, (2017 , امال واخرون) revealed that the most frequently isolated causal agents which cause cutaneous mycoses in females were *Candida albicans* (37.36%), followed by *Penicillium chrysogenum*, *Alternaria alternata*, *Cladosporium sp* (24.18%) in females *A. alternata* (35.56%) for each. followed by *Penicillium chrysogenum* (26.67%), isolates from male were *Candida albicans* (54.35%) followed by *Cladosporium sp*. (30.43%) which was ranked the second most frequent isolate.

The present work is aimed to isolate and identify the fungi where found in hair and nails of kids, and adults (2-20) years old) in Tripoli.

Materials and methods

This study was conducted at the Departement of botany , faculty of science , university of Tripoli.

A total of (40) Samples (nail , clippings and hair parts) were collected from kids (2-5y) and adults (10-20 y) in Tripoli area From period between the month of November / 2021 until the month of April 2022.

Sample collection

Sample of (nail clippings and hair parts) were collected from kids and adult males at the university of Tripoli during the period from the month of November 2021 to the month of April 2022 at diffident ages from (2 to 20 years) , 40 samples were collected from males and female (20 samples from each group) , cultivation and diagnosis of the isolated samples were conducted in this study.

Diagnosis

Sample cultivation

Two types of media were used in this study Sabouraud Dextrose Agar (SDA) and Potato Dextrose Agar (PDA) . the medium was prepared as indicated by (1990 , البوني) .

The sample were culture on petri dishes containing the media incubated for 1 to 3 weeks at a temperature of 28c , and examined daily often the growth a pears of fungi . The morphological features of each fungi as were recorded by using different references ((Moss and McQuown, 1969, Stockdale, 1963; Van Oorschot, 1980; Spiewak, 1998; Kushwala, 2000).

Results

A total of 40 male and female sample were collected from kids and adults in this study. The age was ranged between 2 to 20 years. Thirty out of 40 (75 %) hair and nail samples analysed produced fungal colonies when incubated and examined, the total number of isolates including those grown on SDA and PDA cultures were 59 isolates.

Fifty nine fungal species were isolated and identified from all collected nail and hair sample , during the period of study (Table 3,4,5) . The number of colonies were ranged between 3-7 colonies / plate, and the average number was 6.7 colonies (Table 1).

Table 1: Number of isolated fungal .

	Number of colonies/ single plate
Rang	3-7
Average	6.7

Aspergillus species represent the highest occurrence of isolated Keratinophilic fungi with 47.5%, other isolates were; *Alternaria alternate* 17.1%, *Penicillium spp* 15.2%, *Ulocladium botrytis* 10.2%, *Emericella sp* 6.7%, and minimum in *Trichothecium sp* 1.7% , *Fusarium sp* 1.7% . (Table.2, Fig.1)

Table. 2 : Frequency and Number of fungal isolates from 40 human hair and nail samples

Fungi species	Number	percentage of appearance (%)
Aspergillus spp	28	47.5
<i>Alternaria alternate</i>	10	17.1
<i>Penicillium spp</i>	9	15.2
<i>Ulocladium botrytis</i>	6	10.2
<i>Emericella sp</i>	4	6.7
<i>Trichothecium sp</i>	1	1.7
<i>Fusarium sp</i>	1	1.7

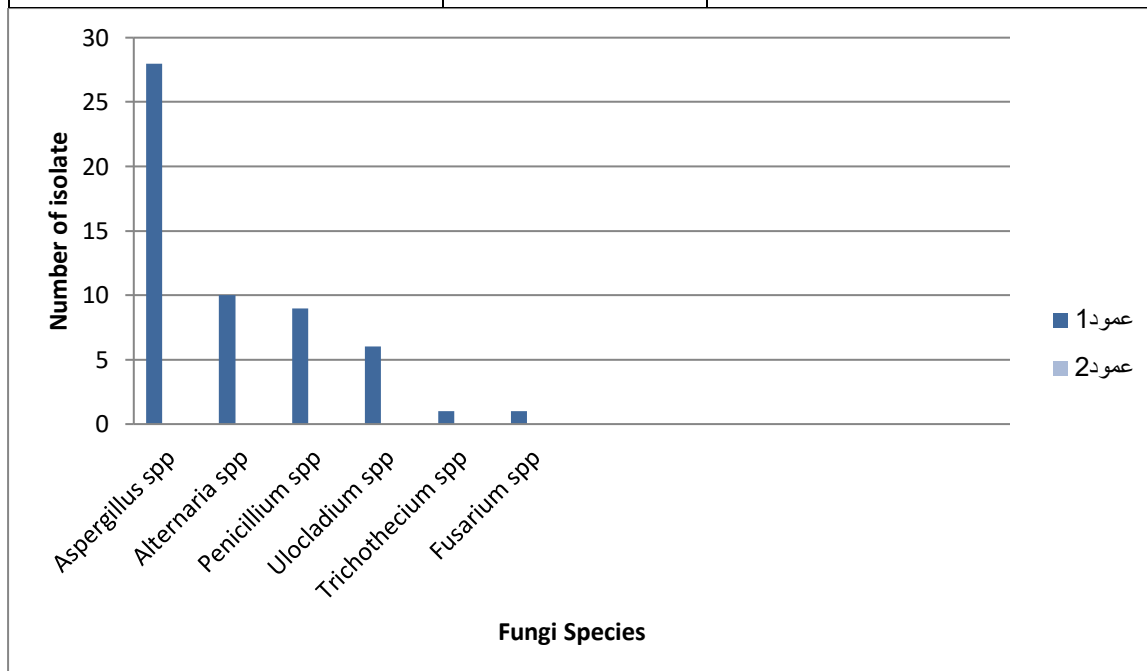


Fig. 1: Frequency of keratinophilic fungi in hair and nail samples

Table 3. Fungal Genera and Species isolated from hair and nail samples

Genus	Species	Sub Division
Aspergillus	<i>A. nager</i>	Deuteromycotina
	<i>A.flavus</i>	
	<i>A.terreus</i>	
	<i>A.Hayline</i>	
Ulocladium	<i>U.botrytis</i>	
Trichothecium	<i>Trichothecium sp</i>	
Penecillium	<i>P.glaborum</i>	
	<i>P. capsulatum</i>	
	<i>P. chrysogenum</i>	
Fusarium	<i>Fusarium sp</i>	
Alternaria	<i>A.alternata</i>	
Emericella	<i>Emericella sp</i>	

Table 4: percentage of Fungi isolated from hair and nail samples

Fungi Species	Number	percentage of appearance (%)
<i>Aspergillus niger</i>	19	32.2%
<i>Aspergillus flavus</i>	6	10.5%
<i>Aspergillus terreus</i>	2	3.4%
<i>Aspergillus Hayline</i>	1	1.7%
<i>Ulocladium botrytis</i>	6	10.2%
<i>Trichothecium sp</i>	1	1.7%
<i>Penicillium glaborem</i>	1	1.7%
<i>Penicillium capsulatum</i>	3	5.1%
<i>Penicillium chrysogenum</i>	1	1.7%
<i>Penicillium sp</i>	4	6.7%
<i>Fusarium sp</i>	1	1.7%
<i>Alternaria alternate</i>	10	17.1%
<i>Emericella sp</i>	4	6.7 %

Table. 5: percentage of isolated Fungi from hair and nail samples of males and females.

Fungi Species	percentage of appearance (%)			
	Nails		Hairs	
	F	M	F	M
<i>Aspergillus niger</i>	2(3.4%)	11(18.6%)	1(1.7%)	5(8.4%)
<i>Aspergillus flavus</i>	2(3.3%)	3(5.1%)	-	1(1.7%)
<i>Aspergillus terreus</i>	-	1(1.7%)	-	1(1.7%)
<i>Aspergillus Hayline</i>	-	-	-	1(1.7%)
<i>Ulocladium botrytis</i>	1(1.7%)	4(6.7%)	-	1(1.7%)
<i>Trichothecium sp</i>	-	-	-	1(1.7 %)
<i>Penicillium glabrum</i>	-	-	-	1(1.7%)
<i>Penicillium capsulatum</i>	3(5.1%)	-	-	-
<i>Penicillium chrysogenum</i>	1(1.7%)	-	-	-
<i>Penicillium sp</i>	-	4(6.7%)	-	-
<i>Fusarium sp</i>	-	1(1.7%)	-	-
<i>Alternaria alternate</i>	1(1.7%)	6(10.16%)	-	3(5.08%)
<i>Emericella sp</i>	-	3(5.08%)	-	1(1.7%)

Discussion

Fungi associated with student's hair.

The results indicate that 81.4 % of male hair samples gave fungal growth while only 18.6 % of females hair samples gave positive results , these results agree constantly with several other results which indicate that males are more susceptible to infection with fungi (الحمادي, 1997 , Fathi & Al-Samarai , 2000 ، الحسني 2003)

Uneke *et al* , 2006 showed that this difference is due to the shortness of hair in males compared to female which facilitates fungi access to the scalp and infection it under certain circumstances , and males constantly visit barbers , as shaving tools may be full of fungi spores.

sixteen fungi were collected from male and female hair. *Aspergillus* was the most common genus from male and female hair. This genus was represented by *A. niger* *A. flavus*, *A. terreus* and *A. Hayline* most of these fungi were reported in other studies as in Assiut, Egypt (Moharam *et al.*, 1988) , Qena and Red Sea governorates (Maghraby, 1994) , (Atchade *et al.*, 2017, Oda *et al.*, 2013, Abdel-Mallek *et al.*, 1995) and from hair samples in Riyadh Saudi Arabia (

Alghamdi *et al.*, 2018). *A. flavus* was reported to have keratinase activity and produce of extracellular keratinase (Kim, 2007) .

Fungi associated with students nail:

Forty-three fungi belonging to 7 genera were recovered from male and female nails. Dermatophytes and other related genera represented by *Aspergillus* was the most frequent genus collected in this study. *A.niger* and *A.flavus* were infrequently encountered from male and female nails. The results agree with other studies which indicate that these species were isolated with different incidences from students nails (Abdel-Hafez and El-Sharouny, 1990; Abdel-Raouf, 2000). *Alternaria alternate* ranked second in frequency, this fungus was isolated also from student nails in Sohage , Egypt (Abdel-Raouf, 2000). *Ulocladium botrytis*, *spp Fusarium spp* , *Emericella spp* , and *Penicillium sp* were also isolated in this study . these genera were previously isolated by Katiyar and Kushwaha (2000) , Efuntoye and Fashanu (2001) and Gherbawy et al (.2006).

CONCLUSION

Keratinophilic fungi have included dermatophytic fungi and non- dermatophytic fungi. Dermatophytes are anamorphic hyphomycetes, keratinophilic fungi that parasitize keratinized tissue (hair, nails, and skin) of human and animals and cause dermatophytoses. These are the most frequent fungal infections worldwide. There is a need for a hygiene protocol to prevent the spread of pathogenic fungi, and also invasion of the deeper structures of the head including the meninges and the brain parenchyma. These findings should be taken into consideration and necessary treatment methods should be taken up periodically .

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