Annals of R.S.C.B., ISSN:1583-6258, Vol. 26, Issue 1, 2022, Pages. 343 - 352
Received 08 November 2021; Accepted 15 December 2021.

Epidimological Study of Dermatophytes Infection in Kirkuk City

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Abstract

The current study was conducted to investigate the fungi causing skin diseases Dermatophytosis on humans in the city of Kirkuk and the prevalence of *Trichophyton mentagrophyte* for the period from November (2020) to May (2021) for different ages and both sexes, the samples were taken from (skin, hair, and nails), where the samples were subjected to direct examination using 10% KOH and at the same time, the samples were culture on a sabouraud medium to investigate the fungi that cause skin diseases in humans. The direct microscopic examination of the fungi showed positive results with a percentage of Infection (68%) of the total 100 samples, while laboratory culture on Sabouraud Dextrose Agar medium showed positive results with a percentage of (58%). Three genera of dermatophytes were diagnosed *Trichophyton, Microsporum* and *Epidermatophyton.* The results of the examination showed seven clinical manifestations of fungal infections. Tinea corporis recorded the highest infection rate (27%) and the lowest tinea facial (3%), and the highest rate of dermatophyte infection was in the age group (21-30) years and the lowest in the age group (61-70) years. The results of laboratory culture showed that *Trichophyton mentagrophyte* is more common than other dermatophytes, at a rate of (22.4%), and that the incidence of dermatophytes varied according to the area of residence, where the number of infection was in the city It was higher than the countryside, as it reached 81%, while the rural area was 17%, and the results of the research showed that the infection of males was higher than that of females, reaching 53%, while the percentage of females was 47%.

Keywords : Dermatophytosis , ,*Trichophyton mentagrophyte* , Superficial mycosis

Introduction

Human skin is considered the first mechanical line of defense for the body, and it is a tissue structure composed of protein (keratin) mainly and equipped with many means of protection, the most important of which are the relative dryness of the skin and low pH (4-5) PH as well as the abundance of fatty secretions, but there are several factors that make the skin more vulnerable Infection with various pathogens, including immunosuppression and diabetes, or skin damage such as burns and various wounds, human skin is susceptible to infection by many microorganisms with obligate pathogen or opportunistic living These organisms have the ability

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to form and secrete many proteolytic enzymes, especially keratinase enzyme. As is the case with skin fungi (Mohammed and Al-Damy., 2012).

Dermatophytosis is one of the earliest known fungal infections to mankind and are very common throughout the world although dermatophytosis does not produce mortality it does cause morbidity and poses a major public health problem, especially in tropical countries such as India due to the hot and humid climate. Skin or nail infections can also be caused by non – deramtophytic fungi and yeast – like fungi. These can also be cutaneous manifestation of systematic mycosis. Over the last decades, an increasing number of non – dermatophyte filamentous fungi have been recognized as agents of skin and nail infections in humans, producing lesions clinically similar to those caused by dermatophytes (Patel *et al*., 2010). all dermatophytes belong to three genera *Trichophyton*, *Microsporum,* and *Epidermophyton,* and based on their natural hosts, these fungi can be distinguished into three species anthropophilic species whose natural host is human and transmitted by contact with infected persons, as well as Zoophilic whose natural host is animal and they are transmitted to humans upon exposure to them , and the last is Geophilic, which lives restored in the soil and it is transmitted to humans and animals (Rudramurthy and Shaw., 2017).

Materials and methods

Samples Collection

100 clinical samples were collected including (skin scrabs - hair samples - nail clippers) from different age groups and for both sexes from patients referred to the consultant dermatology at Azadi Teaching Hospital Kirkuk, as well as some private clinics for the period from November (2020) to May (2021), where a Clinical examination of those patients by a dermatologist, and a questionnaire was assigned to each patient, which contained some medical and special information about the auditors.

Samples

After the clinical examination of the outpatients and observing the clinical characteristics, samples were collected from the patients after wiping the affected area with cotton saturated with 70% alcohol for the purpose of sterilization in order to get rid of bacteria and remove suspended substances and medicines that could obstruct the direct microscopic examination. Samples were collected from different areas, which are the following:

1-Skin

The skin scales were collected from the edge of the affected area, as they contain the fungal hyphae formed by the fungus causing the infection, by scraping the area using a sterile surgical blade. the sample was divided into two parts, and a section of the scales was placed directly on a

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clean glass slide for the purpose of microscopic examination and other part of the scales, it was planted on the center of the SDA.

2- Scalp

Hair and scales samples were collected from the edge of the affected area in the head, using sterile forceps, and the same method was followed with the previous method used with the skin.

3-Nails

Nail samples were collected by cutting the edge of the affected nail. The same method was followed with the skin.

Results and discussion

1-The samples examined during the study

The results of the current study shown in the table(1-1) for the isolation and diagnosis of pathogenic dermatophytes, whose number was 100 a sample of males and females, and were clinically diagnosed by dermatologists the results of direct microscopy showed 68 positive samples and 32 negative samples ,68% and 32%, respectively, while the results of the laboratory culture on SDA medium showed that 58% positive results, while the number of negative samples was 24%. The appearance of negative results in the microscopic examination may be due to the error in the method of collecting the sample, as it is sometimes not collected from the area of the edges of the active infection, but is collected from the central part of the affected area, which may have acquired local immunity, so it is free of skin fungi as well the amount of the collected sample is small and insufficient to give a positive result (Robson, 2012; Milne, 1996) as for the appearance of negative results in laboratory culture, the reason may be that some patients sometimes resort to using topical treatments at random and without consulting a specialist doctor to relieve pain or The inconvenience caused by these infections, which may sometimes lead to affecting the vitality of dermatophytes and their lack of growth after transplantation, or the error in storing the sample while transporting it to the laboratory, as it is kept in containers that retain moisture, which helps the growth of discarded fungi and thus these fungi become the main sample (Hayette and Sacheli , 2015 ; Collee *et al*., 1996) or the reason may be due to the method of culture and the culture medium or contamination of the sample during or after transplantation or because of the incubator, as well as the cause of infection Change the fungi and thus give a negative result (Al-Hashimi, 1979).

Table (1-1) shows the infection of dermatophytes based on direct microscopic examination and laboratory culture

Test type	negative samples		positive samples		total summation
direct microscopy	32	32%	68	68%	**100%**

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laboratory culture	42	42%	58	58%	**100%**

2-Distrbution of Infection with Dermatophyte According to Sex:

The results of the research showed that the infection rate of males in total (53%) is higher compared to the infection rate of females (47%), meaning that there is a disparity between males and females in the rate of infection. the results of this study agree with Hassan (2007), Al Jumaili (2008), Al-Assaf (2008), Mustafa (2009), Saleh (2010), Muhammad (2012), Al-Saadi (2012), (Mohammed *et al*., 2015) and (Ali *et al*., 2017), as they found that the percentage of males infected was Higher than female and this may be due to differences in social or occupational behavior or due to the presence of physiological differences (Hay & Adrians., 1998) Or it can be attributed to a discrepancy in health habits, which is one of the contributing factors in the occurrence of skin fungal infections (Omar., 2000), while the results of this study do not agree with the Al-Hamdani (2010), Bandar (2012), (Abboud *et al*., 2013), Muhammad (2014), Muhammad (2015), Kazem (2016) and Al-Zubaidi (2019), who found that the incidence of females was higher than that of males the reason for the discrepancy between the sexes is due to the difference in the degree of exposure to causative agents between males and females. Young males, for example, in the second and third decade of life, are more active, energetic and mobile than the rest of the ages (Mankoid & Kanvnde, 1969). The frequent movement and movement between different geographical areas and the frequent interaction between them is bad in the workplace or sleeping Sometimes they were military, for example, or prisoners. Or from those who engage in group sports activities, all of this may expose them to the transmission of fungal skin infections among themselves and this is consistent with what was mentioned (Rippon, 1979). Also, the cause of male injuries may be attributed to a higher percentage of the work they do, as most of their work extends to long working hours and from Then do not change clothes And washing for a relatively long time, as well as their frequent exposure to heat and humidity, which makes them a suitable environment for the growth of skin fungi in the event that they are transmitted to them (Todaro *et al*. , 1983).

3-The relationship of skin fungal infections with the areas of infection of the body:

The results shown in Table (2-2) show seven clinical manifestations of dermatophytosis, where the results of the current study showed that Tinea corporis infection was the highest type of dermatophyte infection among the other recorded infections, as the number of patients infected with tinea corporis was 27 with a rate of (27%.) This result is in agreement with Mustafa (2009), (Muhammad and Al-Daami 2012), (Abdul-Hassan *et al*., 2014), Muhammad (2015), (Ali *et al*., 2017), Al-Zubaidi (2019), and thus tinea corporis considered the most prevalent this is because it affects most areas of the body, followed by Tinea ungium, 18 infected with a rate of (18%). the infection of this type of tinea is common and affects the nail area and the skin around the nail without penetrating the living tissues (Suhonen *et al*., 1999). Al-Ta’i

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2001 and (Al-Naeemi 2007) and (Ali *et al*., 2017) obtained a rate of 8.3%, 10% and 23%, respectively.(Ali *et al*., 2017) recorded a rate of nail ringworm (22.5%) due to the size of The sample taken and the time period of the study. The reason for these infections is dermatophytes and non- dermatophytes fungi , such as Yeast like C. albicans, and they may share with each other in causing of Tinea ungium (Noble *et al*., 1998). then tinea capitis ranked third in terms of infection with 16 infected people (16%) Tinea capitis spreads widely in children Compared to adults, as a result of the incomplete development of their immune system, which facilitates the occurrence of infection (Omar., 2000), in addition to the lack of care for general hygiene and direct dealing with animals such as dogs, cats and sheep, especially in rural areas. either infection occurs in adults, it may result from the use of personal tools and their transmission between People are like combs, especially at barbers, and this facilitates the transmission of infection from an infected person to a healthy person. This result does not agree with (Mohammed *et al*., 2015), where tinea capitis was dominant over other tineas, followed by tinea manum 14 with a rate of (14%), followed by tinea of the thigh cruis 12 infected (12%), followed by tinea pedis (10) infected (10%), and the lowest tinea is the face Tinea faeici 3 infected (3%) it ranked last and the main reason for the occurrence is the lack of care for personal hygiene and the use of other people's towels, which are considered main vectors for this type of infection, and this result is consistent with (Ali *et al*., 2017), where the incidence of infection was 4%.

Table (2-2) shows the percentage of the distribution of the type of Tinea according to the areas of the body isolated from them

Tinea type	number	Percentage
1-Tinea corporis	27	**27%**
2-Tinea ungium	18	**18%**
3-Tinea capitis	16	**16%**
4-Tinea manum	14	**14%**
5- Tinea cruris	12	**12%**
6_ Tinea pedis	10	**10%**
7-Tinea faeici	3	**3%**
Total	100	**100%**

The relationship of fungal infections to age groups:

The study showed that the people most exposed to infection with dermatophytes are those whose ages ranged between (21-30) years, while the least susceptible people were aged between (61-70) years as shown in Table (1-3). Tinea corporis is the most common type of infection with a

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percentage of (46%), where the number of patients is (27) infected. As for the age group (21-30) years, the number of infection was (11) infected and in the age group (11-20) years (8) and ages (Month_10 years) three infections, while the age groups (31-40) and (41-50) ranged between 3-2, respectively, while no case of Tinea corporis was recorded in the age group 51 and above. this study agreed with (Ali *et al*., 2017) and (Kadhim.,2018), which showed that this type of tinea is more common among adults and the elderly compared to children, and it was found that Tinea corporis is common in all age groups, but to a lesser extent in the elderly. This difference in rates of infection may be due to climatic conditions, where Infection increases in hot and humid areas, in addition to healthy habits among individuals, which are the main factors causing of Tinea corporis in adults (Hsu *et al*., 2001) the results of the study also showed that Tinea ungium ranked second in terms of the number of samples with a rate of 31%. this type of tinea affects the elderly and adults, and its frequency was among the age group (11-20) and (41-50 years old (3) infection for each category and in the category (21-30) and (61-70) two infection for each category and the category (31-40) and (51-60) with (4) infection, while no infection were recorded In the category (month-10) years, tinea ungium is one of the widespread tinea, and its prevalence has increased significantly at the present time due to the availability of suitable conditions for the growth of these causative fungi and the increase in the spread of immune diseases such as immunodeficiency diseases and chronic diseases such as diabetes, in which the incidence of this type of tinea multiplies (Migeramishoar *et al*., 2002) and the cause of this infection may be attributed to the frequent use of chemicals such as cleaning powders, especially housewives, and the use of acetone to remove nail dyes, or it may be the nature of the profession where among the total number of nail ringworms, females were infected (12) while males (6)) infection.

As for Tinea capitis, it ranked third in terms of the number of samples, with a rate of 27% , 16 patients, and the highest rate of infection was recorded in the age group (months to 10) years, and it reached (10) cases out of the total number of infectiones, while only two cases were recorded in the group the age group (11-20), (31-40) and (61-70), and no cases was recorded in the age group (21-30) up to (51-60), and this percentage may agree with (Mahmoud, 2000) and (Richardson,2003) , (Sarhan, 2010) and (Mohammed *et al*., 2015) and (Ali *et al*., 2017) who showed the most age group affected by Tinea capitis is between (6-10) years and noted that the infection mainly targets males with a greater percentage From females, and this is consistent with the study, where the number of males infected 12 out of the total number of infections, while females only 4 cases, and the reason for the large number of male infections may be due to the short hair of males, which provides an opportunity for easy access of fungal spores to the scalp (Al-Husni, 2000) Infection among children with Tinea capitis compared to adults as a result of the incomplete development of their immune system, which facilitates the occurrence of infection (Omar., 2000) in addition to the lack of care for hygiene and direct contact with animals, such as dogs, cats and sheep, especially in rural areas, and among the infected were (7) who keep animals inside the house.

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Then, Tinea manum recorded (14) cases of infection, with percentage (24%) and the most infected group was (21-30) and (7) infected out of the total number of infection, and the most age group was infected and this result corresponds to what (Ellabib & Kavanagh., 2002) and (Bandar *et al*.,2012), where the most affected group was (21-30), with a percentage of (5.8) and by 6 patients, and it differs with what was reached by (Al-Qaisi, 2006), who found that the rate of infection with Tinea manum was more prevalent in Children more than adults, then the category (11-20) with (4) infected while the category (month-10 years), (41-50) and (51-60), one infected was recorded for each category, and the other groups did not record any case . the prevalence of Tinea manum in adults more than children is attributed to the fact that the most affected by this type of fungal infection are housewives and those who deal with water for a long time, in addition to cooks and people who deal with fish and vegetables.

As for Tinea cruis, it ranked fifth in the number of cases of infection, the number of infected was (12) and at a rate of (20%), the percentage was almost equal between age groups, with two infections for each group, but the group (51-60) recorded three infections and this result agrees with (Kadhim.,2018), where the rate of infection with Tinea cruis was 6%, with a number of 12 infected, while the rate of Tinea pedis was (17%), with number of patients (10), where the infection was between the category (11-20) and (31-40). Three cases were recorded for each category, and for the category (21-30), two infections were recorded, and no infection was recorded for the category (month - 10 years). As for the categories (51-60) and (61-70), one case was recorded for each category. Reasons that help, such as sweating the feet and not cleaning them, and due to wearing shoes for long periods and not being exposed to ventilation and sunlight. The least cases of ringworm were recorded from Tinea faeici. The number of infected was (3) distributed between the categories (months-10 years) only one case and the category (21-30) only two case, and no case was recorded in the other categories, and this result is consistent with (Mohammed, 2014) and (Kadhim.,2018), where the percentage of For 1% infection, the cause of infection is attributed to the use of other people's towels that act as carriers of skin fungi from infected people to healthy people.

Table (1-3) shows the distribution of Tinea infection by age groups

Categorial age group (years)	**tinea corporis**	**tinea pedis**	**tinea capitis**	**Tinea ungium**	**tinea manum**	**tinea cruris**	**Tinea faeici**
1month - 10 years	3	0	10	0	1	1	1
11-20	8	3	2	3	4	2	0
21-30	11	2	0	2	7	2	2
31-40	2	3	2	4	0	2	O

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41-50	3	0	0	3	1	2	0
51-60	0	1	0	4	1	3	0
61-70	0	1	2	2	0	0	0
Total	27	10	16	18	14	12	3
percentage	46.55	17.24	27.58	31.03	24.13	20.68	5.17

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