Mycological study of tinea corporis in patients attending dermatology clinic of Al-Hussien Hospital, Al- Azhar University Cairo, Egypt

Thesis

Submitted for partial fulfillment of M.Sc. Degree

In Dermatology, Venereology and Andrology

By

Mohamed Anwar Ebada

MBBCh, Al-AzharUniversity

Supervised By

Prof. Dr. Fadia Abd Al Hakim Sorour

Professor of Dermatology, Venereology and Andrology

Faculty of Medicine Al –Azhar University

Dr. Hamed Mohamed Ahmed

Ass. Professor of Dermatology, Venereology and Andrology

Faculty of medicine –Al-Azhar University

Faculty of Medicine

Al-Azhar University

2013

ACKNOWLEDGMENTS

First and foremost, thanks to **God**, most merciful and greatest beneficent.

I would like to express my grateful appreciation to **Dr. Fadia Abd Al Hakim Sorour**, Professor of Dermatology, Venereology and Andrology, Faculty of Medicine, Al-Azhar University, for her support, guidance and generous supervision and encouragement.

I am deeply gratefull to **Dr. Hamed Mohamed Ahmed** Ass, Professor of Dermatology, Venereology and Andrology, Faculty of Medicine, Al-Azhar University for his precious advice, efforts, meticulous revision and generosity.

Finally, I am very gratefull to all staff members and all my colleagues in the department of Dermatology, Venereology and Andrology, Faculty of Medicine, Al-Azhar University for their fruitful guidance all through the work.

- My family dedication, my mother, father and wife

  I love each and every one of you.
- I realy also appreciate what you do for me.
- Word's fail to express my appreciation.

Table of contents

Subjects	Page
Table of contents.	**I**
List of abbreviations.	**II**
List of figures.	**IV**
List of tables.	**VI**
Introduction.	**1**
Aim of the study	**6**
Review of Literature: A. Fungi. B. Dermatophytes. C. Tinea corporis. D. Pathogenthis of dermatophytes. E. Diagnosis of tinea corporis. F.Identification of dermatophytes**.**	 **7** **9** **25** **37** **47** **56**
Patients and Methods.	**61**
Results.	**65**
Discussion.	**85**
Summary.	**91**
Recommendations.	**93**
References.	**94**
Arabic Summary.	**108_109**

List of abbreviations

Item	Abbreviations
Basic Fibroblast Growth Factor	BFGF
Borelli's lactrimel agar	BLA
Chlorazol black E	CBE
Colony-stimulating factors	CSFs
Dendritic cell	DC
Dimethyl sulfoxide	DMSO
Dipeptidyl- peptidases	DPP
Delayed Type Hypersensitivity	DTH
Dermatophyte test medium	DTM
Epidermophyton	E
Erythema multiforme	EM
Granuloma Annulare	GA
Gomori methenamine silver	GMS
Hematoxylin and eosin	H&E
Interferon	IFN
Immunoglobulin	IG
Interleukins	IL
Potassium hydroxide	KOH
Leucine aminopeptidases	Lap
Langerhan's cell	LC
Microsporum	M
Metalloproteases	Mep
Periodic acid-Schiff	PAS
Potato dextrose agar	PDA
Pattern recognition receptors	PRRs

Subacute cutaneous lupus erythematosus	SCLE
Sabouraud's dextrose agar	SDA
Subtilisin	Sub
Trichophyton	T
Tellurite-resistance/dicarboxylate transporter	TDT
Transforming Growth Factor β	TGF β
Toll like receptors	TLRs
Tumor Necrosis Factor-α	TNF-α

List of figures

Figures	Page
Figure 1: Majocchi's Granuloma.	29
Figure 2: Sex distribution among cases.	66
Figure 3: Other types of tinea associated with the lesion	67
Figure 4: Family history among cases	68
Figure 5: History of animal contact among patients	69
Figure 6: Site distribution among patients	70
Figure 7: Tinea circinata affecting the chin of a male child	71
Figure 8: Tinea corporis affecting left forearm of an adult female.	71
Figure 9: Tinea circinata on the dorsum of the right hand of an adult female.	72
Figure 10: KOH examination among cases	73
Figure 11: KOH test showing hyphae with arthroconidia.	74
Figure 12: KOH test showing hyphae without arthroconidia.	74
Figure 13: Culture result among cases	75
Figure 14: Colony of T. violaceum.	76
Figure 15: Colony of T. rubrum.	76
Figure 16: Colony of T. verrucosum.	77
Figure 17: Colony of T. tonsurans.	77
Figure 18: Colony of M. audouinii.	78
Figure 19: Post culture mount results	79
Figure 20: Post culture mount of T. violaceum.	80

Figure 22: Post culture mount of T. rubrum downy type	80
Figure 22: Post culture mount of T. tonsurans.	81
Figure 23: Post culture mount of T. Verrucosum.	81
Figure 24: Post culture mount of M. audouinii.	82
Figure 25: Post culture mount of M. canis.	83

List of tables

Table 1	Age and sex distribution among cases	65
Table 2	othe types of tinea associated with the lesion	66
Table 3	Family history among case	67
Table 4	History of animal contact among patients	68
Table 5	Duration of the disease among cases	69
Table 6	Site distribution of the disease among patients	70
Table 7	KOH examination among cases	73
Table 8	Culture results among cases	75
Table 9	Post culture mount results	78
Table 11	KOH sensitivity among cases	83
Table 12	Culture sensitivity among cases	84

INTRODUCTION

Fungi are unicellular or multicellular, eukaryotic, heterotrophic microbes. Each fungal cell contains a full array of organelles and is bound by a rigid cell wall containing chitin, glucan, and/or cellulose. Of the thousands of fungal species that are free-living in nature are pathogenic for plants, only a small group is known to be pathogenic for humans and animals ***(Reiss et al., 2012).***

Fungi are ubiquitous in nature, being found in the air, in soil, on plants, and in water, including the oceans, even as a part of lichens growing on rock. There is essentially no part of our earth where fungi are not found ***(Reiss et al., 2012).***

Fungi come in many forms but only three are of our interest as they may cause disease in human beings:

1. Yeasts: round/oval, unicellular and reproduce by budding.

2. Moulds: long, floppy, fluffy colonies that microscopically can be seen as long tubular structures called hyphae. They reproduce by forming spore-forming structures at the end of hyphae called conidia.

3. Dimorphs: most medically important, can change from yeast to mould and vice versa; grow in environment as moulds and in humans as yeast ***(Jain et al., 2010).***

Superficial fungal infections are among the world's most common diseases and the prevalence of superficial mycotic infections has risen to such a level that skin mycoses affect more than 20-25% of the world’s

population ***(Falahati et al., 2003).***Dermatophyte infections are one of the earliest known fungal infections of mankind and are very common throughout the world ***(Venkatesan et al., 2007).***

The prevalence of dermatomycoses or tinea infections has been studied in different parts of the world. The relative occurrence of the etiologic agents of these infections varies from country to country and from one climatic region to another. In tropical countries, a warm and humid climate, crowded living and poor sanitary conditions all promote the spread of these infections ***(Neela, 2007).***

Dermatophytosis is common in tropical countries and may reach epidemic proportions in areas with high rate of humidity, over population and poor hygienic conditions ***(Madhavi et al., 2011).***

Dermatophytes have been divided into three groups, anthropophilic, zoophilic, and geophilic dermatophytes. The affinity of each of these groups to humans varies. For example, anthropophilic dermatophyte species are primarily associated with humans and rarely infect other animals. Zoophilic dermatophyte species commonly infect animals or are associated with animals, but occasionally infect humans. Geophilic dermatophyte species are primarily associated with keratinous materials, such as hair, feathers, and horns, once they are dissociated from living animals and are involved in the process of decomposition. This type of dermatophyte may infect humans and animals through contact with soil ***(Kanbe, 2008).***

Generally, dermatophytes exhibit a cosmopolitan problem, that is, they are found in different regions of the world with variations in the frequency of particular species, as geoclimatic and social conditions

interfere with the distribution of dermatophyte species ***(Seebacher et al., 2008).***

Dermatophytosis is a trivial disease but has a lot of psychological effect and is a costly disease in terms of treatment. Though various species of dermatophytes produce clinically characteristic lesions; a single species may produce variety of lesions depending upon site of infection ***(Kumar et al., 2012).***

The ringworm(Tinea corporis) is the typical infection of the exposed glabrous skin (i.e., skin regions except the scalp, groin, palms, and soles) and can be caused by all known dermatophytes, but the prevailing fungi in a particular region are likely to be the most frequently found infective agents ***(Bolognia et al., 2003)***.

Humans may become infected with tinea corporis through close contact with infected persons, animals or soil. Occasionally, autoinoculation from infected nails, scalp or feet may occur. The peak incidence of infection is after puberty, although patients may present in the preadolescent period. There is no sexual predilection. Climate and personal habits are the main determinants of these infections. Fungal infections are facilitated by warm, moist environments (such as public showers and swimming pools) and the sharing of towels, clothing and toiletries. Prolonged use of systemic corticosteroids may render a person more vulnerable to fungal infection ***(Hsu et al., 2001).***

Tinea corporis infection may present as an annular erythematous plaque with a raised leading edge and scaling. Clearance occurs in the center of the lesion; however, resolution is often incomplete, because nodules may be left scattered throughout the infected area. The clearance

in the center of the lesion may be the manifestation of an immune response of the host to the infecting organism. Pruritus is a common symptom, and pain may be present if the involved area is macerated or secondarily infected ***(Aditya et al., 2003).***

Because of the broad range of differential diagnosis of dermatophyte infections, it is important to perform a mycologic examination, consisting of Wood`s light examination which can detect fluorescence in some dermatophytes, potassium hydroxide (KOH) preparation microscopy can detect hyphae and conidia in skin scrapings and fungal culture on Sabouraud's agar media are necessary for the identification of the organism ***(Hainer, 2003).***

Because of the difficulty to differentiate clinically dermatophytosis from other non-mycotic dermatosis, it is important to establish biologically an accurate diagnosis. A definitive diagnosis of dermatophyte infection needs to be done before the initiation of antifungal therapy because of the long duration of the treatment and its high cost, and of the potential side effects of the drugs. In addition, knowledge of the zoophilic or anthropophilic origin of the dermatophyte may allow setting up prophylactic measures such as treatment of pets whose owners develop skin disease ***(Robert and Pihet, 2008).***

Knowledge of the predominant causative species provides a clearer understanding of risk factors for superficial fungal infections and future epidemiologic trends ***(Ameen, 2010).***

Identification/ determination of isolates at the species and strain levels is extremely important for accurate antifungal therapy as it reveals

possible routes of infection and for prevention of infection to others, especially in immunocompromised individuals ***(Kanbe, 2008)***.

Dermatophytosis can be caused by several dermatophyte species. These species are closely related in genetic structure in spite of different phenotypic and ecological features. The morphological similarity, variability, and polymorphism of dermatophytes have meant that species identification for dermatophytes is time consuming and requires a significant degree of knowledge and technological expertise ***(Kanbe, 2008)***.

Aim of the study

To find the predominant etiological agent of tinea circinata/ corporis among patients attending the dermatology clinic, AL-Hussein Hospital, Al-Azhar University, Cairo, Egypt.

1. Fungi:

Fungi are unicellular or multicellular, eukaryotic, heterotrophic microbes. Each fungal cell contains a full array of organelles and is bound by a rigid cell wall containing chitin, glucan, and/or cellulose. Of the thousands of fungal species that are free-living in nature are pathogenic for plants, only a small group is known to be pathogenic for humans and animals. It is also true that any fungus capable of growing at 37◦C is a potential pathogen in a debilitated or immunocompromised host. Some fungi are primary pathogens (e.g., Coccidioides species) and can cause disease in immune-normal persons. Severity of a fungal disease is related to host factors (immune status, general health status) and the number of infectious propagules (conidia or spores) inhaled, ingested, or injected. Persons who are immunocompromised, or otherwise debilitated, are prone to develop more serious disease and to be susceptible to opportunistic fungi against which immune-normal persons have a high level of resistance ***(Reiss et al., 2012).***

Fungi are ubiquitous in nature, being found in the air, in soil, on plants, and in water, including the oceans, even as a part of lichens growing on rock. There is essentially no part of our earth where fungi are not found. A few fungal species are adapted to live as commensals in humans but for most fungal pathogens humans are accidental hosts. Of all the fungi with pathogenic potential most are opportunistic, whereas a few are able to cause disease in healthy humans ***(Reiss et al., 2012).***