

Identification of Malassezia Species in Seborrheic Dermatitis Patients by CHROM Agar-Medium

Thesis

*Submitted for Partial Fulfillment of Master Degree of
Dermatology, Venereology and Andrology*

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2019

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

قالوا

سببناك لا علم لنا
إلا ما علمتنا إنك أنت
العليم العظيم

صدق الله العظيم

سورة البقرة الآية: ٣٢

Acknowledgment

First and foremost, I feel always indebted to Allah, the Most Kind and Most Merciful.

I'd like to express my respectful thanks and profound gratitude to Prof. Dr. Mohamed Abd Alnaeem Sallam, Professor of Dermatology, Venereology and Andrology, Faculty of Medicine / Ain Shams University for his keen guidance, kind supervision, valuable advice and continuous encouragement, which made possible the completion of this work.

I am also delighted to express my deepest gratitude and thanks to Prof. Dr. Mohamed Taha Mahmoud Elsayed, Professor of Microbiology, Faculty of Veterinary Medicine / Zagazig University, for his kind care, continuous supervision, valuable instructions, constant help and great assistance throughout this work.

I am deeply thankful to Dr. Ahmed Abd Elfattah Afify, Lecturer of Dermatology, Venereology and Andrology, Faculty of Medicine / Ain Shams University, for his great help, active participation and guidance.

I would like to express my hearty thanks to all my family for their support till this work was completed.

Last but not least my sincere thanks and appreciation to all patients participated in this study.

Mustafa Nooruldeen

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List of Abbreviations

<i>Abb.</i>	<i>Full term</i>
<i>BCP</i>	<i>Benign Cephalic Pustulosis</i>
<i>CRP</i>	<i>Confluent and Reticulated Papillomatosis</i>
<i>CS</i>	<i>Corticosteroids</i>
<i>CYP 450</i>	<i>Cytochrome P-450</i>
<i>D</i>	<i>Dandruff</i>
<i>FAs</i>	<i>Fatty Acids</i>
<i>HIV</i>	<i>Human Immunodeficiency Virus</i>
<i>KOH</i>	<i>Potassium Hydroxide</i>
<i>M.</i>	<i>Malassezia</i>
<i>MF</i>	<i>Malassezia Folliculitis</i>
<i>PV</i>	<i>Pityriasis Versicolor</i>
<i>SD</i>	<i>Seborrheic Dermatitis</i>

ABSTRACT

Background: Seborrheic dermatitis (SD) is a subacute or chronic superficial inflammatory skin condition, characterized by pruritic, erythematous plaques with greasy, yellow-gray scales, which appear on areas rich in sebaceous glands such as the face, scalp, upper chest, and back.

Aim of the Work: To identify *Malassezia* species that are involved in the development of SD in different body sites (face, scalp and post auricular area) and in different age groups, by using Chrom agar.

Patients and Methods: The present study included 49 patients with seborrheic dermatitis attending the dermatology outpatient clinic in Ain shams university hospital in the period from December 2018 to June 2019.

Results: In this study, the most affected areas were the scalp and other sites as face and ears, which is concordant with the majority of studies worldwide. The role of sex in propensity to the development of *Malassezia* spp. Infection in SD is still unclear.

Conclusion: The distribution of *Malassezia* spp. on healthy and diseased skin shows significant variation and differences, although our knowledge of *Malassezia* yeasts has increased tremendously during the last two decades, their pathological roles remain ambiguous, and there is currently no conclusive evidence that any given species is responsible for a specific disease.

Keywords: *Malassezia Species - Seborrheic Dermatitis - CHROM Agar-Medium*

INTRODUCTION

Seborrheic dermatitis (SD) is a subacute or chronic superficial inflammatory skin condition, characterized by pruritic, erythematous plaques with greasy, yellow-gray scales, which appear on areas rich in sebaceous glands such as the face, scalp, upper chest, and back (*Gerd and Thomas, 2008*).

Seborrheic dermatitis exhibits two incidence peaks, one during infancy, and the other during the fourth to sixth decades of life. Infantile SD occurs between the second and tenth week of life and peaks at three months of age (*Poindexter et al., 2009*).

Endogenous and exogenous exacerbating factors are implicated in its etiology, such as hormones, lipids, and hyperproliferation. In last years, the presence of the genus *Malassezia* has been a constant finding, but the role of *Malassezia* spp. carriage has yet to be clarified (*Zhang et al., 2013*).

Most of the *Malassezia* species are lipophilic organisms and are part of human normal flora, especially greasy (oily) skin. Till 2013 more than 14 species of *Malassezia* detected as causative agents of pityriasis versicolor (PV), however the most common agents are: *M. globosa*, *M. furfur*, *M. obtusa*, and *M. sympodialis*, other agents are as follows; *M. restricta*, *M. slooffiae*, *M. pachydermatis*, *M. dermatis*, *M. japonica*, *M. nana*, *M. yamatoensis*, *M. equina*, *M. caprae*, and *M. cuniculi* (*Zarei-Mahmoudabadi et al., 2013*).

But currently 18 species are found on humans and animals, with variable association to pathogenicity (**Dawson, 2019**).

Although the pathophysiology of SD is not completely understood, correlation of SD flares with proliferation of *Malassezia species* and clinical response of SD to antifungal agents (i.e., Ketoconazole, Ciclopirox) have led many researchers and clinicians to believe that *Malassezia species* play a pivotal role in the pathogenesis of SD (**Aditya et al., 2003; Elewski, 2009**).

Significant differences were noted among age groups and species of *Malassezia* isolated. **Lee et al. in 2011** recovered *M. restricta* more frequently in teenage subjects and young adults and found *M. globosa* to be the predominant species in subjects over 50 years of age.

Prohic et al. in 2015 found *M. sympodialis* to be the predominant species on trunk skin in older subjects and *M. furfur* to be the most frequent in children. These observations were contrary to those of **Gupta et al. (2001)**, who cultured *M. globosa* more frequently on younger subjects and *M. sympodialis* on the skin of adolescents and adults.

AIM OF THE WORK

To identify *Malassezia* species that are involved in the development of SD in different body sites (face, scalp and post auricular area) and in different age groups, by using Chrom agar.

Chapter 1

SEBORRHEIC DERMATITIS

1.1. Definition:

Seborrheic dermatitis is a chronic, relapsing inflammatory skin condition with a predilection for areas rich in sebaceous glands. The disorder is characterized by scaling and erythematous patches that are poorly defined, with large variations in extent and morphologic characteristics depending on the area of skin involved (*Naldi and Rebora, 2009*).

1.2. Epidemiology:

Seborrheic dermatitis affects 1% to 3% of general population (*Dolenc-Voljč, 2017*), and it is more common in men than in women. SD occurs most commonly in infants at the first three months of their life, in adolescents and young adults, with the increasing incidence again in patients older than 50 years of age (*Dessinioti and Katsambas, 2013*).

An infantile stage, which usually involves the scalp (cradle cap), the face, and the diaper's area, is particularly common. It affects as many as 70% of newborns during the first 3 months of life but usually disappears by 1 year of age (*Naldi and Rebora, 2009*).

Seborrheic dermatitis also occurs more frequently in patients with Parkinson's disease and in patients treated with certain psychotropic drugs, also its one of the most common dermatoses seen in individuals infected with human immunodeficiency virus (HIV) infection with prevalence 34-83% (*Berk and Scheinfeld, 2010; Hald et al., 2015*).

1.3. Pathophysiology:

Despite the high prevalence, the pathogenesis of SD is not well understood. However, researchers have identified several factors that could be predisposing to SD including: fungal colonization, sebaceous gland activity, in addition to several factors that confer individual susceptibility (**Fig.1**) (*Rosso and James, 2011*).

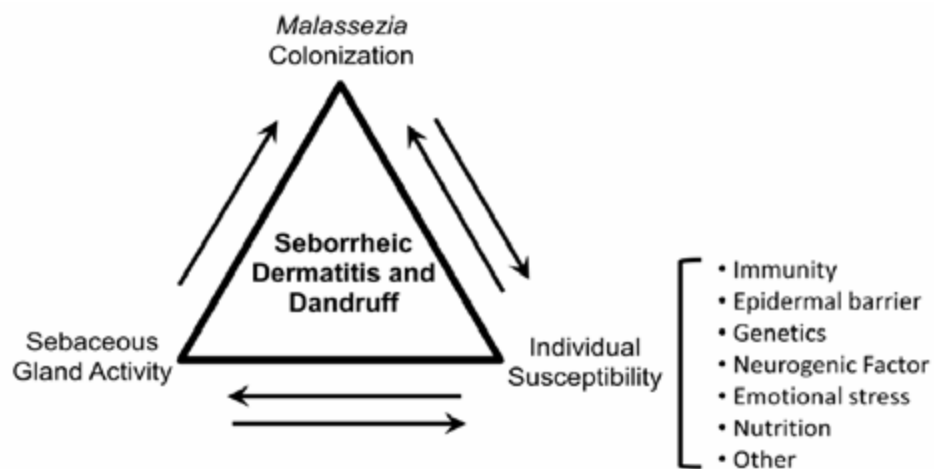


Figure (1): Predisposing factors and their interactions in the pathogenesis of seborrheic dermatitis (*Borda and Wikramanayake, 2015*).

1.3.1. Fungal colonization

Lipophilic yeasts of the genus *Malassezia* (former *Pityrosporum*) are commensals of the skin flora found on normal skin of 75% to 98% of healthy adults, and they possess the ability to metabolize fatty compounds in sebum. These yeasts appear to be involved in the pathogenesis of common skin disorders, such as seborrheic dermatitis (*Lee et al., 2011*).

The distribution of *Malassezia* species on the skin is predominantly on the face, scalp, and trunk, all of which are lipid-rich anatomic locations (sebaceous glands). Importantly, these locations also are sites of predilection for clinical involvement with Seborrheic dermatitis (*Kim , 2009*).

Malassezia yeast appears to cause a nonspecific immune response that begins the cascade of skin changes occurring in SD, in persons with SD, the yeast invade the stratum corneum, releasing lipases that result in free fatty acid formation and cause the inflammatory process to begin (*Clark et al., 2015*).

In order to discuss the characteristic structural and biomolecular abnormalities associated with Dandruff (D)/SD, it is convenient to categorize them by the following 4 sequential pathophysiological phases (*Turner et al., 2012*).

Malassezia ecosystem and interaction with the epidermis; initiation and propagation of inflammation; disruption of proliferation and differentiation processes of the epidermis; and Physical and functional skin barrier disruption (Fig.2) (*Schwartz et al., 2013*).

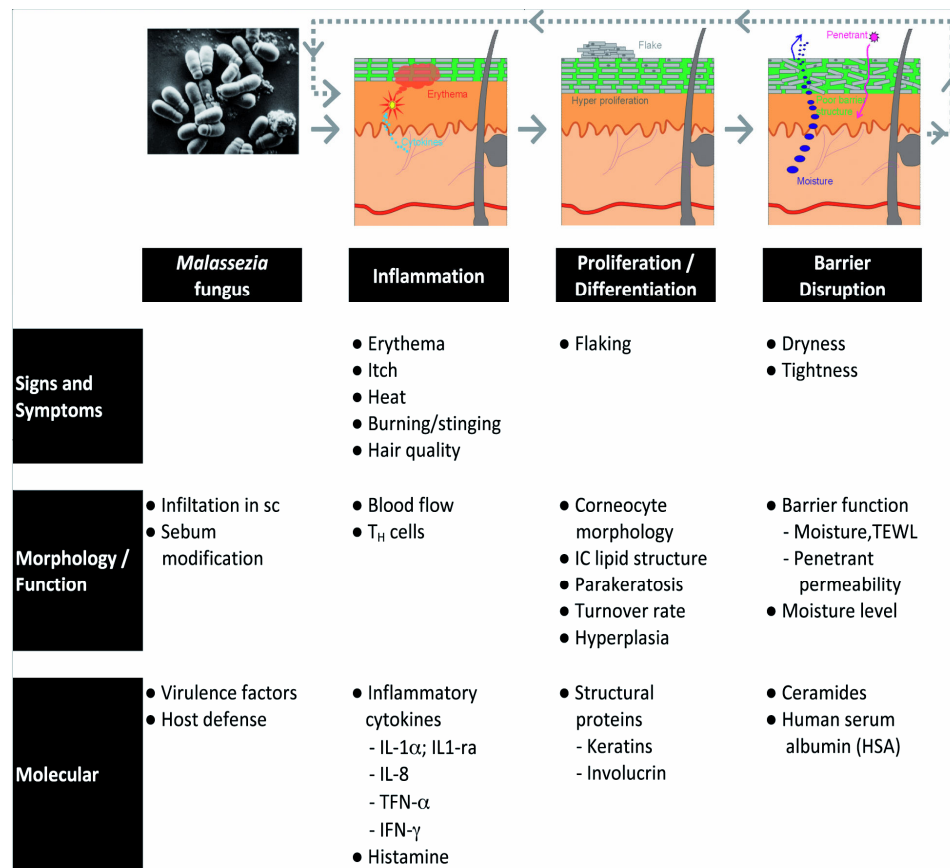


Figure (2): Chart summarizing the measures of dandruff and SD arranged by the pathophysiological phase and informational stratum showing a more complete model for scalp health (*Schwartz et al., 2013*).

Skin *Malassezia* secrete multiple lipases with broad spectrum activity which hydrolyzes most all triglycerides into fatty acids (FAs). *Malassezia*, however, have very specific nutritional requirements, only metabolize saturated FAs. The saturated FAs are consumed and the unsaturated FA left on the skin, unsaturated FAs induce D/SD-like flaking (*Grice and Dawson, 2017*).