;PERGILLUS SPECIES INFECTION

IN RESPIRATORY DISEASES

Thesis

Submitted in Partial Fulfilment for Master Degree in Clinical and Chemical Pathology

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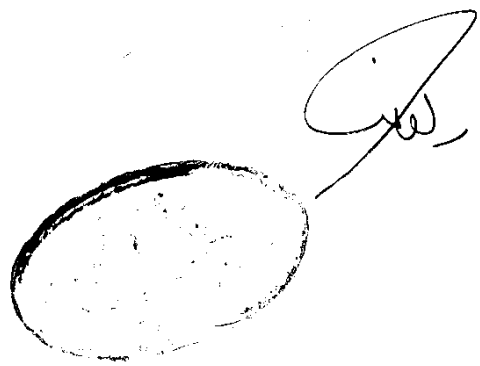

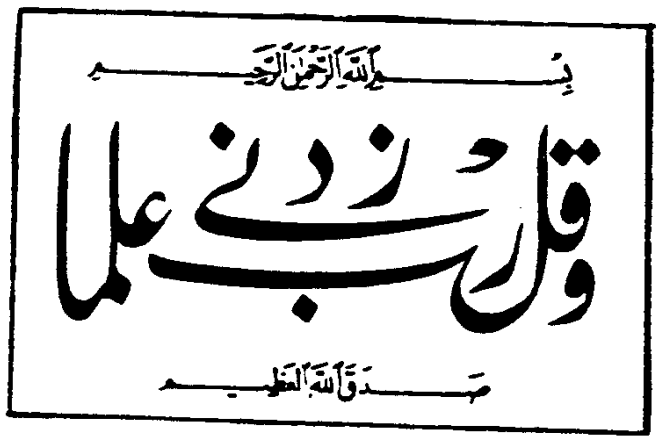

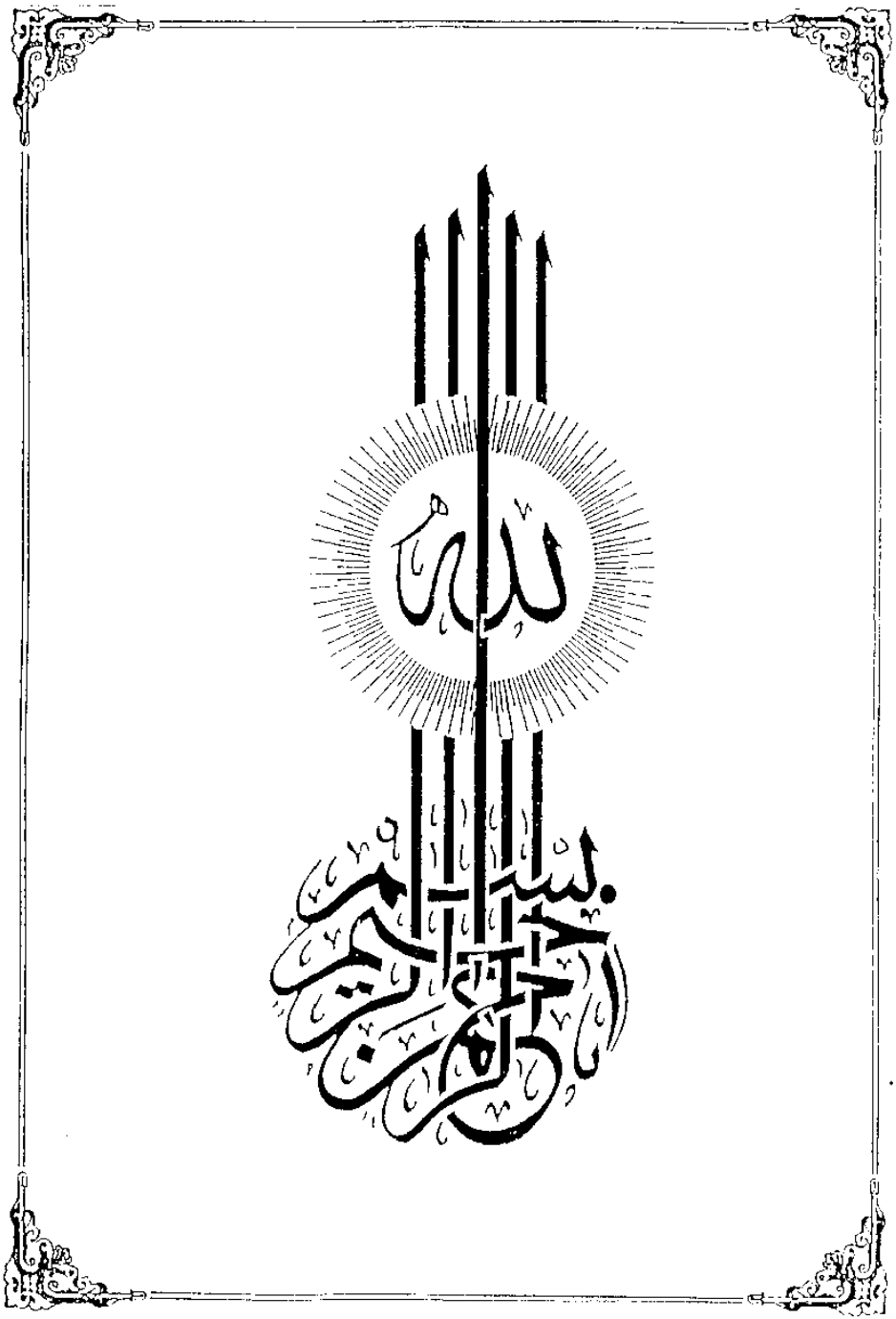

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Amany Sayed Abd El Monem

TO: MY FAMILY ;

MY HUSBAND

AND MY SON.

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INTRODUCTION AND AIM OF WORK

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Aspergillus species infection is usually acquired via the respiratory tract and manifests primarily as a bronchopulmonary illness. It may also cause fulminant invasive lung infection. In these cases antifungal therapy represents the only hope for treatment. Aspergillus may contribute to a pulmonary hypersensitivity disease where antifungal therapies are useless, and glucocorticosteroids may be helpful. Chronic saprophytic Aspergillus infection of the lung has been also reported ***[Pennington, 1980).***

Serious infections with Aspergillus species have been reported in patients with leukemia, lymphoma, renal transplant, and in patients receiving high doses of corticosteroids. Prolonged antibiotic therapy has also been associated with superinfection by Aspergillus ***(Brown et al., 1980).***

Fatal invasive pulmonary Aspergillosis may follow viral influenza infections. Two cases with verified influenza A infection were followed by fatal necrotizing pneumonia due to Aspergillus fumigatus. Both patients demonstrated cutaneous anergy and lymphocytopenia ***(Fischer and Walker, 1979).***

Influenza and perhaps other viruses that depress T cell function may result in increased susceptibility to infections in which T cells are important in host defenses ***(Fischer and Walker, 1979).***

The aim of work is to study the prevalence of the Aspergillus species as a cause of respiratory tract infections in patients from different department of Ain Shams University Hospitals.

REVIEW OF LITERATURE

CLASSIFICATION OF FUNGI

Fungi are eukaryotes with a higher level of biologic complexity than bacteria. They represent a degree of differentiation towards plants, **Ryan (1984).**

Fungi can be differentiated according to the macroscopic appearance of their colonies. Those that produce opaque, creamy, or pasty colonies are called yeasts, while, those that produce cottony, wooly, fluffy, or powdery aerial growths above the culture medium are called molds, and the dimorphic fungi which can be demonstrated to develop as yeasts when cultivated at 37°C and as molds when grown at 25 to 30°C **(Cooper, 1985)**, the yeast like fungi on the other hand as candida species, which grow partially as yeasts and develop also into long filamentous cells **(Cruickshank et al., 1973).**

Clinically, fungal infections of man are divided into a superficial mycoses affecting the skin, hair, nail and the mucous membranes; subcutaneous mycoses, which involve the skin, subcutaneous tissues, and bones and show slow localized spread; systemic mycoses, usually initiated in the lung and sometimes becoming widely disseminated. They are usually or often fatal **(Evan and Gentles, 1985).**

The fungi causing systemic mycoses lie in two categories, the first involves organisms that when they are in sufficient doses,

infect normal healthy individuals. There are pathogenic fungi of which blastomycosis is an example (**Beneke and Rogers 1980**). The second category includes organisms belonging to the normal flora of the host, they have the opportunity to cause infectious diseases and are therefore called opportunistic organisms (**Lennette et al., 1980**). The commonest organisms of this group are Aspergillus, Candida and Mucor species (**Salit and Hand, 1975**).

To conclude, systemic or (deep) mycosis may be caused by:

1. Primary pathogen such as:

   Histoplasma capsulatum

   Coccidiodes immitis

   Blastomyces dermatitidis

   Para coccidioides brasiliensis

2. Opportunistic pathogen such as:

   Aspergillus fumigatus

   Candida albicans

   Cryptococcus neoformans

   Mucor spp.

   Frey et al., 1979.

The pathogenic fungi constitute a very small group among the vast number of organism that belong to the kingdom of fungi. Member of this heterogenous group are scattered throughout four taxonomic classes based on their methods of reproduction (**Frey et al., 1979**).

1. **Phycomycetes (Zygomycetes):** *Sexual spores are of two varieties (oospores and zygospores). The tip of approximating hyphae fuse, and large thick walled bodies develop.*

2. **Ascomycetes:** *Sexual spores are produced within an ascus (4-8 spores) in which meiosis occurs.*

3. **Basidiomycetes:** *Sexual spores are produced from the ends of club-shaped structure called basidia. They are usually four in number and called basidiospores.*

4. **Deuteromycetes (Fungi imperfecti):** *They comprise fungi in which the sexual or perfect state has not yet been described. Some fungi, previously considered as members of the class fungi imperfecti, have been now allocated to one of the previously mentioned classes after the discovery of their perfect sexual state* **(Ketchum, 1984), Table (1).**

Table (1): The difference between taxonomic classes of fungi.

Class	Hyphae	Reproductive Elements		Biology
		Sexual	Asexual	
Zygomycetes	Non septate	Various types	Sporangio-Conidia	Saprophytes: rare pathogens
Ascomycetes	Septate	Ascospores	Conidia	Saprophytes: rare pathogens.
Basidiomycetes	Septate	Basidiospores	Conidia	Mushrooms, smuts non-pathogenic
Deuteromycetes (Fungi imperfecti)	Septate	None	Conidia	Common pathogen; Saprophytes

Quoted from *Ryan (1984)*

EPIDEMIOLOGY OF ASPERGILLOSIS

Aspergillosis is caused by a member of genus Aspergillus. This genus includes 150 recognized species and varieties, of which only a small number are pathogenic ***(Raper and Fennell, 1965).***

Natural Habitat:

Members of the genus Aspergillus are known to grow world-wide. They can be isolated from a large number of natural substances as soil, water, air and decaying vegetation ***(Raper and Fennell, 1965).*** *The life cycle of a member of the genus Aspergillus is normally saprophytic and invasion of living tissues should be regarded as incidental to their normal life cycle* ***(Austwick, 1965).*** *Spores of members of the genus Aspergillus are well adapted for possible dispersal. They are of a light weight, easily spread in the air, with thick walls and cell membranes resistant to dissication (Raper* ***and Fennell, 1965).*** *The number of fungal spores collected (colonies) from air are affected by a variety of natural factors, namely locality, season, humidity, rain, wind, sunshine, time of day vegetation and altitude* ***(Campbell, 1966).*** *The organisms are present in pathologic material as filamentous fungi with coarse, fragmented, septate hyphea* ***(Emmons et al., 1977).***

Sex and Age

Though investigators disagree whether males are truely more susceptible than females to Aspergillosis, some experimentations