

Tropical Diseases 2019: Evaluating the current status of laboratory diagnosis of fungal infections in the Philippines: Future needs - Alice Alma C Bungay - University of the Philippines

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Fungal infections represent the invasion of tissues by one or more species of fungi which can range from superficial infections to cutaneous and subcutaneous infections, to serious deep tissue, blood, lung or systemic diseases. For almost five decades, the worldwide incidence of fungal infections has increased dramatically. Several factors have contributed significantly to this increase which includes indiscriminate and widespread use of broad-spectrum antibiotics to suppress or kill bacteria, use of corticosteroids, anti-cancer drugs and invasive surgical procedures, among others. The complex interplay between host and microbe is especially evident in the pathogenesis of fungal diseases. In the ecology of organisms as well as host-microbe interactions, fungi which were once classified as saprobic organisms or commensals in their respective ecological niches have now been recognized as opportunistic pathogens or disease-causing agents which possess latent capabilities to cause life-threatening infections in immune-deficient hosts, particularly Acquired Immune Deficiency Syndrome (AIDS) patients.

There are also great similarities between fungal cells and animal cells since they are both eukaryotes, which significantly complicate therapeutic approaches to fight fungal diseases which frequently occur in hosts with compromised immunity. Certain fungi, like *Candida albicans* are particularly commensals, forming part of the normal flora while others like *Cryptococcus neoformans*, are environmental opportunists that take advantage of the abrogated host's system. Some fungi are dimorphic in nature occurring as mold forms in the environment transforming into yeast phase in tissues which are able to produce infections even in healthy hosts. They cause diseases called endemic mycoses, which are group of diseases caused by diverse fungi that share common characteristics. In the Asia-Pacific region, the epidemiology of fungal infections is not well described and the information regarding incidence is lacking.

There were several researchers who conducted reviews of fungal infections in the region. Surveys conducted showed rising incidence of fungal diseases. The occurrences of such fungal infections in the Asia-Pacific region do exist and pose significant impact or threat on public health. Although the means of diagnosing and treating fungal infections have greatly improved over the last decade, fungi still represent a serious threat to the health of immunocompromised and immunodeficient patients. In addition to the more commonly

encountered fungi, recent years have also seen the emergence of life-threatening infections that had been previously seen in clinical practice. Many of these fungi are difficult to detect and treat and their emergence as serious agents of disease among specific patient cohorts presents new challenges to the delivery of safe and effective antifungal therapy. As an offshoot of the Fulbright Visiting Scholar Program where several diagnostic methods were studied and done at Duke University Medical Center, this study will discuss more on the growing concern about opportunistic fungal infections, epidemiology and diagnostic procedures applicable in the Philippines. Mycological methods would include sample/specimen collection, use of appropriate culture media, diagnostic methods, virulence tests using animal models and histopathology techniques.

Fungal diseases kill more than 1.5 million and affect over a billion people. However, they are still a neglected topic by public health authorities even though most deaths from fungal diseases are avoidable. Serious fungal infections occur as a consequence of other health problems including asthma, AIDS, cancer, organ transplantation and corticosteroid therapies. Early accurate diagnosis allows prompt antifungal therapy; however this is often delayed or unavailable leading to death, serious chronic illness or blindness. Recent global estimates have found 3,000,000 cases of chronic pulmonary aspergillosis, ~223,100 cases of cryptococcal meningitis complicating HIV/AIDS, ~700,000 cases of invasive candidiasis, ~500,000 cases of *Pneumocystis jirovecii* pneumonia, ~250,000 cases of invasive aspergillosis, ~100,000 cases of disseminated histoplasmosis, over 10,000,000 cases of fungal asthma and ~1,000,000 cases of fungal keratitis occur annually.

Since 2013, the Leading International Fungal Education (LIFE) portal has facilitated the estimation of the burden of serious fungal infections country by country for over 5.7 billion people (>80% of the world's population). These studies have shown differences in the global burden between countries, within regions of the same country and between at risk populations. Here we interrogate the accuracy of these fungal infection burden estimates in the 43 published papers within the LIFE initiative.