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Change in Global Incidence and Mortality of Invasive Fungal Infection

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Dear Editor,

Over the past decade, as more epidemiological studies have been conducted, individual assessments of the incidence and death rates from fungal infections have been gradually compiled. Despite over 80 countries reporting on the significant health impacts of serious fungal diseases (1), the full extent of these diseases' impact remains unclear. This is in part due to the limited surveillance of fungal diseases, which is conducted in only a few countries and covers a minimal number of fungal conditions. Fungal diseases have varied clinical significance, causing infections that can be life or sight-threatening and leading to significant illness, especially with chronic fungal conditions (1).

The inaugural effort to quantify the occurrence of a fungal disease was in 2009, focusing on cryptococcal meningitis related to AIDS. This was succeeded by an assessment of the incidence and prevalence of chronic pulmonary aspergillosis (CPA) following tuberculosis in the lungs. Initial estimates of the number of cases and fatalities caused by various fungal infections4 were then expanded upon with research into CPA arising from sarcoidosis5 and allergic bronchopulmonary aspergillosis (ABPA) in the context of asthma (2).

Annually, more than 6.5 million individuals acquire life-threatening fungal infections, resulting in approximately 2.5 million deaths. The global yearly incidence of invasive aspergillosis is estimated to be over 2 million cases, with a death toll of 1.8 million. Candida bloodstream infections have an annual incidence rate of around 626,000 cases. Moreover, nearly 1 million cases of invasive candidiasis occur each year without positive blood cultures. Additionally, around 500,000 cases of pneumocystosis are reported annually, with about 80% of these cases affecting individuals with HIV infection. The most recent global annual estimate for cryptococcal meningitis stands at 194,000 cases, with nearly 25% of these cases in individuals without HIV infection or any known immunodeficiency (3).

Although the data are constrained by their quality and the assumptions needed for these estimations, they highlight the significant impact of various fungal diseases on human health. Focusing primarily on the burden of aspergillosis, candidiasis, pneumocystosis, and cryptococcal meningitis, this review cannot accurately gauge the effects of rarer fungal infections, such as endemic mycoses. Nonetheless, the evidence underscores that fungal diseases are a significant and increasing cause of mortality worldwide (3).

Despite this report being based on a literature review limited by the quality of data and necessary assumptions for estimations, it underscores the significant impact of various fungal diseases on human health. With a primary focus on the consequences of aspergillosis, candidiasis, pneumocystosis, and cryptococcal meningitis, the review is unable to accurately assess the impact of less common fungal infections, including endemic mycoses. However, the findings highlight that fungal diseases are a significant and escalating source of global mortality (1).

Furthermore, to the best of our knowledge, this represents the first evidence-based worldwide estimates for incidences of invasive aspergillosis in intensive care patients (excluding influenza or COVID-19 epidemics) and those with lung cancer; invasive candidiasis in patients who do not have a positive blood culture; pneumocystis pneumonia in both HIV-positive and HIV-negative patients; cryptococcal infections in non-HIV patients; and histoplasmosis in AIDS patients, along

with coccidioidomycosis (1). The overall estimated crude mortality rate (roughly 3.8 million) was calculated using the ratios of diagnosed and treated patients to those untreated, based on likely case detection, combined with the actual mortality rates of treated cases and the assumed mortality rates of untreated ones. The mortality directly attributable to these conditions is estimated to be around 68% of the overall crude mortality figure (1).

In conclusion, it is estimated that annually, more than 6.55 million individuals worldwide suffer from a life-threatening fungal infection. These updated figures indicate significant changes in incidence compared to the widely accepted statistics from the past decade (4, 13). Several challenges hinder accurate estimation, including the lack of reliable data for calculating the total number of individuals at risk, the absence of comprehensive epidemiological data for some fungal diseases from numerous countries, and the overall uncertainty of these estimates.

Footnote

Conflict of Interests: The author is the editor-in-chief of the journal.

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