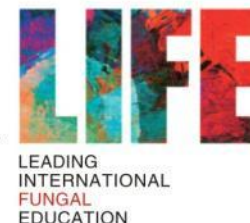


Burden of serious fungal infections in China

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Introduction

The incidence of serious fungal infections has been increasing over the past several decades as a result of the expanding number of immunocompromised patients with risk factors such as HIV infection, transplantation, immunosuppressive therapy, corticosteroid therapy, and broad-spectrum antibiotic medication, etc. Despite the availability of newer and potent antifungal agents, the morbidity and mortality of invasive fungal infections remain high. Understanding of the burden of fungal infections is crucial to both better disease prevention and treatment. In China, with the largest population in the world, population-based surveillance on various fungal infections is still lacking. However, data from specific high risk populations and some cities has increasingly been reported. We have attempted to estimate the burden of serious fungal infection in China through literature review.

Methods

All published epidemiology papers reporting fungal infection rates from China were identified. If few data existed, we used specific populations at risk and fungal infection frequencies in those populations to estimate national incidence or prevalence. Population (2009), HIV (2011) and TB (2011) data were from WHO. Asthma, ABPA and CPA rates were from Denning, Bull WHO 2011, Med Mycol 2013 (ahead of print) and Ma, 2011. COPD admissions were from Tan, Respirology, 2009. Cryptococcal meningitis (CM) estimate in HIV was assumed to be 1% of late stage HIV patients, and the rate of CM in other cases on the ratios reported by Chen, Mycopathologia, 2012. Pneumocystis jiroveci pneumonia (PCP) rates were based in Hong Kong rates in HIV and in non-HIV on Wang, J Med Microbiol, 2011. Penicillium marneffei infection rate was based in HK data, adjusted for regional differences in HIV prevalence. Tinea capitis rate was on a report from Shanghai (Zhu, Mycopathologia, 2010). Keratitis rate was based on Xu in Qingdao (Chin Med J, 2012).

Results

Of the 1,363M population, 20% are children (0–14 years) and 12% are >60 years old. 20M Chinese (age 15–50) women are estimated to get recurrent vaginal thrush (4+ times annually). Of the 740,000 estimated HIV positive patients in 2011, 92,227 are not on ARVs (CD4 <350). Of these an estimated 83,000 develop oral thrush, 50,000 oesophageal candidiasis, 461 CM, 16,140 PCP and 1,383 P. marneffei infection. We estimate a 5-year period prevalence of 256,534 CPA cases (assuming 15% annual mortality); 80% from 893,121 cases of pulmonary TB, 20% other conditions. Asthma prevalence in adults is estimated at nearly 20M and assuming 2.5% of asthmatics have ABPA, 491,721 patients with ABPA are likely and 648,300 have severe asthma with fungal sensitisation (SAFS). The rate of candidemia was estimated at 5/100,000 population (68,150 cases) and Candida peritonitis at 19,982 cases. Invasive aspergillosis (IA) in >100,000 haematological patients is estimated at 8,178 cases and in the COPD 154,000 cases (11.9M admissions). IA numbers in renal and liver transplantation and numerous other fungal diseases were not estimated.

Infection	Number of infections per underlying disorder per year					Total burden	Rate /100K
	None	HIV/AIDS	Respiratory	Cancer/Tx	ICU		
Oesophageal candidiasis	–	50,834	–	–	–	50,834	3.7
Candidaemia	–	–	–	20,445	47,705	68,150	5.0
Candida peritonitis	–	–	–	–	19,082	19,082	1.4
Recurrent vaginal candidiasis (4x/year +)	19,959k	–	–	–	–	19,959	2,929
Allergic bronchopulmonary aspergillosis (ABPA)	–	–	491,721	–	–	491,721	36.1
Severe asthma with fungal sensitisation (SAFS)	–	–	648,300	–	–	648,300	47.6
Chronic pulmonary aspergillosis (CPA)	–	–	265,534	–	–	265,534	19.5
Invasive aspergillosis	–	–	–	8,178	154,155	162,333	11.9
Mucormycosis	–	–	–	2,726	–	2,726	0.2
Cryptococcal meningitis	922	461	–	922	–	2306	0.17
Pneumocystis jiroveci pneumonia (PCP)	–	16,140	?	8,070	–	24,210	1.8
Penicillium marneffei infection	?	1,383	–	–	–	1,383	0.1
Fungal keratitis	17,038	–	–	–	–	17,038	1.3
Tinea capitis	34,075	–	–	–	–	34,075	2.5
Total burden estimated	20,010k	151,822	1,405,555	37,615	221k	21,829k	

Conclusion

Without any national surveys of fungal disease in China, uncertainty surrounds all these estimates. But the burden of fungal disease is almost certainly one of the greatest in the world. Epidemiological studies are urgently required to validate or modify these estimates.

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