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Burden of serious fungal diseases in Republic of Korea

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Objectives Republic of Korea is a member of the Organization for Economic Cooperation and Development (OECD) with a population of 50.7M in 2011 (49.9% female, 9.2% < 10 years, 11.2% ≥ 65 years) and GDP of \$30,370 in 2009. Although advanced health surveillance systems are being used in Korea, there have been no nationwide data for serious fungal diseases to date. The objective of this study is to estimate the burden of serious fungal diseases in Republic of Korea.

Methods The bases for the computations have been adopted from previously published literature (Denning et al, Bull World Health Organ. 2011;89:864–72 and Denning et al, Med Mycol. 2013;51(4):361–70). Population and hospital data were obtained from Korean Statistical Information Service (KOSIS). HIV/AIDS data were obtained from World Health Organization (WHO), Korea Centers for Disease Control and Prevention (KCDC), and the KCDC Cohort Study in HIV/AIDS patients. Transplant data of 2011 were obtained from KCDC and Korean Society of Blood and Marrow Transplantation.

Results Current burden of serious fungal diseases in Republic of Korea was estimated at 961,417 cases every year (1.9% of Korean population; details shown in Table). Based on the 888 newly diagnosed HIV/AIDS patients in 2011 with the assumption that 1.1% of HIV/AIDS patients present with cryptococcal meningitis, the burden of cryptococcal meningitis was estimated at 10 cases, plus with assumption that 10% present with *Pneumocystis jirovecii* pneumonia, the burden of PCP was estimated at 89 cases yearly in this population. Oesophageal candidiasis has been estimated to affect 135,177 patients every year, including 10,510 patients with cancer. Assuming the prevalence of asthma in adults is 4.57%, the prevalence of ABPA was estimated at 94.8/100,000 and SAFS at 125.2/100,000. The rate of candidemia was estimated at 5/100,000 population with 2,537 cases per year. Assuming 5% of adult women have recurrent *Candida* vaginitis, *Candida* vaginitis affected 689,214 women. Invasive aspergillosis in immunocompromised patients was estimated at 813 patients and in COPD admissions 1,215 cases with a combined rate of 3.5/100,000. Apart from serious fungal infections, there were 2,384,446 patients (4.7% of population) with dermatophytoses in 2009, including 40,700 children (0–9 years) and 116,384 older children (10–19 years). Prevalence of tinea capitis in children was unable to be identified.

Conclusion Based on local data and estimates of this investigation, 1.9% of South Koreans have serious fungal diseases. Considering that nationwide survey of fungal infections in susceptible populations are lacking and invasive fungal infections in cancer or HIV/AIDS patients tend to be under-reported by medical record/health insurance systems, the true number of serious fungal infections in Korea should be higher than our estimates.

Table 1 Burden of serious fungal diseases in Korea.

Burden of Fungal Infection	Number of infections per underlying disorder per year				ICU admission (9997)	Total Burden	Rate/100k
	Non HIV/AIDS	HIV/AIDS	Respiratory	Cancer/Immunocompromised			
Cryptococcal meningitis	13	10	–	–	–	–	0.17
Pneumocystis pneumonia	–	89	–	–	–	89	0.07
Invasive aspergillosis	–	–	2,210	–	–	2,210	2.50
Chronic pulmonary aspergillosis	–	–	26,080	–	–	26,080	180.11
Allergic bronchopulmonary aspergillosis (ABPA)	–	–	48,110	–	–	48,110	94.83
Severe asthma with fungal sensitisation	–	–	43,907	–	–	43,907	129.17
Candidemia	–	–	–	1,756	–	1,756	1.50
<i>Candida</i> pneumonia	–	–	–	–	883	883	0.74
Oral candidiasis	–	–	–	–	–	–	–
Oesophageal candidiasis	137,562	427	6,756	16,550	–	154,795	266.44
Recurrent <i>Candida</i> vaginitis (> 4 year)	689,214	–	–	–	–	689,214	2,709.06
Microsporidiosis	–	–	–	10	–	10	0.02
Histoplasmosis	–	–	–	–	–	–	–
Coccidioidomycosis	–	–	–	–	–	–	–
Blastomycosis	–	–	–	–	–	–	–
Fungal keratitis	–	–	–	–	–	–	–
Tinea capitis	–	–	–	–	–	–	–
Total serious fungal infections burden	800,776	527	176,846	12,856	3,337	961,417	

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Abstract withdrawn

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A complex study of invasive fungal infections in a Hungarian University Hospital

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Objectives Invasive fungal infections (IFIs) have high mortality, and in many cases can be recognised post mortem. These patients are usually hospitalized in Intensive Care Units (ICUs). Various symptoms and signs may suggest the suspicion of this infection, but these are non-specific. Aims of our study are: 1) monitoring the clinical parameters of (adult) patients with possible IFI to achieve correct and earlier diagnosis, 2) improving the microbiological background to help the work of clinicians, 3) choosing adequate clinical and laboratory parameters for decision of optimal antifungal treatment (agent, duration, adverse effects etc.), 4) developing a combined (clinical and laboratory) algorithm to diagnose and to treat adequately IFIs in our institution.

Methods We prospectively monitor clinical and (chemical) laboratory signs of adult patients with suspected IFIs (basic illness, risk factors, symptoms, levels of procalcitonin and C reactive protein etc.). According to these findings, if deep suspicion of IFI exists, we start microbiological investigations for the detection of fungal colonization (s) and/or infection(s). We initiate microbial culturing of specimens originated from different body sites (endotracheal aspirate, throat, urine, invasive devices, blood etc.), and we carry out molecular biological method (PCR) for detection of fungi in blood samples. We calculate Candida Score and Colonisation Index based on these results. In the laboratory, we identify fungal strains with our laboratory methods used in daily routine (germ tube production, micromorphology on rice agar, biochemical identification with AUXACOLOR 2 and PNA-FISH), and we also identify them by MALDI-TOF Biotyper device. We perform sequence analysis from every isolate belonging to different species in every patient. Pulse-field gel electrophoresis will be done from all isolates of the same species originated from different body sites of the patient.

Results Since 1st January, 2013 ten patients have been involved in this study from. Age distribution was 35–84 years (mean 66 years). APACHE II scores were between 16 and 49. Calculated Candida Scores were 3 and 4 for every patient, and Colonisation Index varied between 0.33 and 1.0. *Candida* species were cultured from 4 or 5 (non sterile) body sites in 5 patients. In most cases, 2 or 3 different species were cultured from different body sites, 2 patients were infected/colonised by the most frequently isolated species, *C. albicans* solely. In 3 patients, *Candida* species were found in blood cultures, fungal DNA could be detected in blood samples and/or sera by PCR (without blood culture positivity) in 4 patients. Results of molecular typing methods and sequencing are in progress.

Conclusion According to our preliminary results, monitoring of different markers of suspected IFI is important, however there are no specific signs, so the clinicians have to evaluate these informations (risk factors, chemical laboratory results, testing of colonisation, blood cultures, molecular biologic detections) in totality. Waiting for the results of blood cultures is not adequate, because of low positivity rate. Positive result of the PCR for detection of fungal DNA does not represent IFIs in every case.