Burden of serious fungal infections in Austria, Abstract Nr. 757

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in association with the LIFE program at www.LIFE-worldwide.org

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Abstract

Introduction

The number of fungal infections occurring each year in Austria is not known. We have estimated these based on populations at risk, supplemented with existing data.

Methods

All published epidemiology papers reporting fungal infection rates from Austria were identified.

Results

Of the 8.22M population, 14.5% are children (0-14 years) and 18% of population are ≥65 years old. We therefore estimate that 110,000 Austrian women get recurrent vaginal thrush (4+ times annually). 106 cases have been recorded

in Tirol in 2011, a total of 1221 nationally. Of the 688 cases of pulmonary TB in 2011, 84% in HIV negative people, and that 25% of chronic pulmonary aspergillosis (CPA) cases are TB related we estimate a 5-year period prevalence of 382 CPA cases (assuming 15% annual mortality). Asthma prevalence in adults is 7% and assuming 2.5% of asthmatics have ABPA, 7,537 patients with ABPA are likely and 9,949 with severe asthma with fungal sensitisation (SAFS). Of the 15,000 estimated HIV positive patients, only 45 presented with AIDS in 2010 and 100% are taking ARVs. Only 5 cases of cryptococcal meningitis were identified and it is not possible to estimate the annual incidence of Pneumocystis pneumonia, or oesophageal candidiasis which is principally in non-AIDS patients. The rate of candidemia in Austria is low at 2.63/100,000 population consistent with 209 cases, although only 165 were actually documented. Candida peritonitis is estimated at 40% of the ICU candidaemia rate, based on French data. Most cases or oral and oesophageal candidiasis were probably in non-HIV infected people. Invasive aspergillosis in haematological and transplant patients is estimated at 96 cases [which contrasts with 158 from registry data (2007/8)] and 283 in COPD patients admitted to hospital. 28 mucormycosis and 2 histoplasmosis cases were recorded.

Conclusion

Substantial uncertainty surrounds these estimates except for invasive aspergillosis figures in immunocompromised patients and candidaemia, where hospital-based surveillance studies have been done. Therefore, epidemiological studies are urgently required to validate or modify these estimates.

Introduction and Background

Invasive fungal diseases (IFDs) are an increasingly encountered threat among critically ill patients and are a significant cause of morbidity and mortality [1]. Worldwide, most infections are caused by the genera *Candida*, *Aspergillus* and *Cryptococcus*. The incidence and severity of IFD are dependent on a variety of factors including increased use of immunosuppressive agents, antineoplastic agents, broad-spectrum antibiotics, prosthetic devices and grafts and hyperalimentation. Improvements in medical care have resulted in critically ill patients surviving longer, rendering them vulnerable to IFD. Populations at risk for IFD include haematopoietic stem cell transplant (HSCT) and solid organ transplant (SOT) recipients; patients with haematological malignancy; patients with HIV / AIDS; and intensive care unit (ICU), surgical and burn patients [1, 2, 3].

Candida species have historically been the most common causative organisms. However, the epidemiology of IFD has shifted in recent years as Aspergillus species and other moulds have become increasingly important pathogens [4, 5]. Most data available are mainly derived from single-institution reports or multiple sites within countries rather than from multi-national reports.

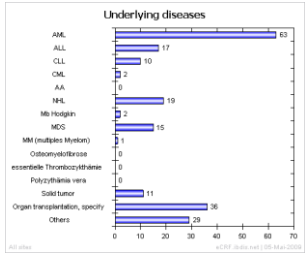
Fungi infect billions of people every year, yet their contribution to the global burden of disease is largely unrecognized. True rates are unknown because of a lack of good epidemiological data and despite the high mortality rates of invasive fungal infections, they remain understudied and underdiagnosed as compared with other infectious diseases. Most serious fungal infections occur as a consequence of other health problems such as asthma, AIDS, cancer, transplantation and corticosteroid therapies.

Endemic mycoses, such as histoplasmosis, coccidioidomycosis, and penicilliosis have a restricted geographic distribution and largely confined to areas of the world where the etiologic agents are found in nature. In recent years, however, increased domestic and international travel has led to an increase in the number of reported outbreaks and sporadic cases of mycotic diseases. In Austria, for most fungal infections we lack any surveillance data, active or passive.

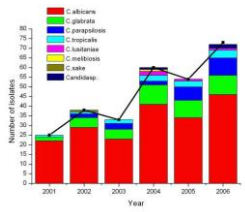
Herein, we have estimated fungal infections based on populations at risk, supplemented with existing data from several sources.

Material and Methods

All published epidemiology papers reporting fungal infection rates from Austria were identified. We also extracted reported data from the International Classification of Diseases (ICD) from Ministry of Health as comparators. Where no data existed, we used specific populations at risk and fungal infection frequencies in those populations to estimate national incidence or prevalence, depending on the condition. Asthma and COPD rates were from Statistik Austria, Gesundheitsbefragung 2006/2007 and OECD. 2011 HIV data was from Ministry of Health. 2011 transplantation numbers were from Gesundheit Österreich. Infections are grouped in invasive fungal infections (cryptococcal meningitis, invasive aspergillosis, candida bloodstream infection, Pneumocystis pneumonia), chronic lung or deep tissue infection (chronic pulmonary aspergillosis), allergic fungal disease (allergic bronchopulmonary aspergillosis (ABPA), severe asthma with fungal sensitisation (SAFS)), mucosal infection (oral and oesophageal candidiasis, Candida vaginitis (thrush)) and skin, hair and nail infection (tinea capitis).



The Nationwide Austrian *Aspergillus* Registry, NAAR, Perkhofer, IJAC 2010



Presterl et al. 2007

Results

Infection	Number of infections per underlying disorder per year					Total burden	Rate /100 K
	None	HIV/AIDS	Respiratory	Cancer/Tx	ICU		
Oesophageal candidiasis	-	100	-	418	-	518	6.3
Oral candidiasis	?	100	100	503	?	703	8.6
Candidaemia	-	-	-	70	139	209	2.6
Candida peritonitis	-	-	-	-	70	70	0.9
Recurrent vaginal candidiasis (4x/year +)	110,000	-	-	-	-	110,000	2,616
ABPA	-	-	7,537	-	-	7,537	91.7
SAFS	-	-	9,949			9,949	121
Chronic pulmonary aspergillosis	-	-	382	-	-	382	4.7
Invasive aspergillosis	-	-	-	50	283	333	4.1
Mucormycosis	-	-	-	28	-	28	0.3
Cryptococcal meningitis	-	5	-	-	-	5	0.06
Pneumocystis pneumonia	-	?	?	?	-	?	-
Histoplasmosis	?	2	-	?	-	2	0.02
Fungal keratitis	?	-	-	-	-	-	-
Tinea capitis	1221	-	-	-	-	1221	14.9
Total burden estimated	111,221	207	17,976	1,068	492	130,964	

Demographic figures, 1999 and 2009	1999	2009
Population*	7 992 323	8 363 040
Women	4 130 143	4 290 174
Men	3 862 180	4 072 866
Life expectancy at birth	77.9	80.2
Women	80.9	82.9
Men	74.8	77.4
Population older than 65 years*	1 231 690	1 464 173
Population younger than 20 years'	1 859 988	1 754 082
Fertility rate	1.34	1.39

Source: Statistics Austria 2010

DISCUSSION

Austria is a landlocked country of roughly 8.22 million people in Central Europe. The Austrian health care system is characterised by a high density of easily accessible health care facilities. In 2008 a total of 267 hospitals with about 64 300 beds were available for in-patient care. The most common discharge diagnosis in Austria are malignant neoplasms (80% cancer) for women and diseases of the circulatory system in the case of men. The latter is also the most frequent cause of death in Austria, followed by cancer and respiratory diseases. In 2009 a newborn girl had a life expectancy of 82.9 years and a newborn boy of 77.4 years. Over the past 30 years life expectancy has increased by more than eight years whereas infant mortality has decreased by more than 75%. The infant mortality rate corresponded to 3.8 deaths per 1 000 live births in 2009. In 2008 a 60-year- old man had a remaining life expectancy of 21.3 years, and in the same year a woman aged 60 could expect to live for an additional 25.1 years. Many of the se individuals will have underlying chronic illnesses and consequently, are at greater risk of developing more serious infections.

As shown by our study, we can conclude that several fungal infections are unreported and therefore are impossible to count in absolute numbers. To have an impression of the overall fungal burden in Austria it is necessary to make some assumptions about population from known data sets and published literature. Based on available data approximately 1.59% of Austrian's population will have serious fungal infections during one year. Recurrent vaginal candidiasis and severe asthma with fungal sensitisation (SAFS) are accounting for the most frequent infections, followed by ABPA. From data available, most infections occur in immunocompromised and respiratory patients. We lack any data on Pneumocystis pneumonia and Fungal keratitis.
The rate of candidemia in Austria is low at 2.63/100,000 population consistent with 209 cases, although only 165 were actually documented. Candida peritonitis is estimated at 40% of the ICU candidaemia rate. Most cases or oral and oesophageal candidiasis were probably in non-HIV infected people. Invasive aspergillosis in haematological and transplant patients is estimated at 96 cases [which contrasts with 158 from registry data (2007/8)] and 283 in COPD patients admitted to hospital. 28 mucormycosis and 2 histoplasmosis cases were recorded.

The rate of candidemia is lower when compared to *Aspergillus* [1,2] infections. This might be somewhat unusual when compared to other reports; however, we are of the opinion that intensive surveillance studies on mold infections done in the past contribute to this findings. No nation-wide studies on candidemia have been done so far. Overall, we notice an increase of infections due to mucormycetes [6], the reason are not yet fully understood. However, in Austria most of the centres treating patients with hematological malignancies use extensive treatment with voriconazole and/or echinocandins, drugs, which do not target mucormycetes.
Since most of our data are extrapolated from surrogate markers this model requires validation. However, it provides a standardized means of estimating and comparing the burden of disease across population.
Enhanced surveillance and reporting will be critical to improve our understanding of the importance of invasive fungal infections, to enable prioritization of research and prevention efforts , and to evaluate prevention strategies.

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