Ecological Study of Pulmonary Blastomycosis

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Introduction

There has been a global increase in people who are diabetic, elderly (aged greater than 65 years) and injecting drugs.[1,2,3] These characteristics may alter the incidence of diseases and potentially affect how diseases are diagnosed. Given these global changes; this study's purpose is to evaluate the baseline characteristics of blastomycosis. This disease has an incidence of 0.7 per 100,000 persons in the United States and is endemic to the Midwest and Southern United States.[4] This rarity and regionality make it a unique disease benefitting from further analysis. Case studies for *Blastomyces* have demonstrated positive cultures in 72% to 87% of patients.[4] Therefore the baseline characteristics will be compared to culture positivity to determine statistical significance.

Method

This study was a retrospective single-center ecological study. Patient charts were identified via ICD code search for blastomycosis. All protected health information was de-identified following data collection. Chi-square analysis and Fisher's exact test (for injection drug use) were utilized to compare baseline characteristics to culture positivity.

BASELINE CHARACTERISTICS	
Tobacco Abuse	21 (67%)
Diabetic	12 (38%)
Elderly	11 (34%)
Female	11 (34%)
Immunosuppressed	10 (32%)
COPD	9 (28%)
Cancer	7 (22%)
Work related	7 (22%)
Hepatitis C	2 (6%)
Substance use	1 (3%)

Results

32 patients were diagnosed with pulmonary blastomycosis. 30 patients (94%) had pathology proven blastomycosis while the last 2 patients (6%) only had urine antigen positivity. 8 patients (25%) had positive fungal cultures and pathology for blastomycosis. The average age of patients with pulmonary blastomycosis was 59.5 years old with 11 elderly patients (34%). Out of the 32 total patients there were 11 females (34%); 2 with hepatitis C (6%); 12 with diabetes (38%); 10 with immunosuppression (pancytopenia, chronic steroid usage, organ transplant, cystic fibrosis) (32%); 9 with COPD (32%); 21 with Tobacco abuse (66%); 7 with cancer (Glioblastoma, prostate cancer, adenocarcinoma of the lung, breast cancer, Hodgkin's disease, small cell lung cancer and anal carcinoma) (22%); 7 with work exposure (working around turned dirt or indoor mold) (22%) and 1 with injection drug use (opiates) (3%). No statistically significant difference was found for culture yield for any of the baseline characteristics measured. injection drug use required a Fisher's exact test analysis since there was only 1 patient and 0 of those had a culture.

	PATHOLOGY DIAGNOSIS OF *BLASTOMYCES*	CULTURE DIAGNOSIS OF *BLASTOMYCES*	P-VALUE
Tobacco Abuse	16	5	0.830
Diabetic	8	4	0.399
Elderly	9	2	0.519
Female	9	2	0.519
Immunosuppressed	6	4	0.186
COPD	7	2	0.820
Cancer	6	1	0.459
Work related	6	1	0.459
Hepatitis C	1	1	0.399
injection drug use	1	0	1 (Fisher's exact test)

Discussion

The average age of 59.5 years old is consistent with the previous Tennessee average (1996-2005) of 59 while the male to female ratio decreased to from 2.5:1 down to 1.9:1.[4] 66% of the patients were tobacco abusers possibly representing an impaired ability to clear fungal spores. Individually all other baseline characteristics accounted for less than ½ of the total, and therefore endemic inoculation may still be the main cause. Given that only1 patient used injection drugs; it does not appear to be directly associated with pulmonary blastomycosis. Interestingly out of the 32 patients when accounting for both tobacco abuse and immunosuppression there were 28 unique patients. Thus tobacco abuse may contribute to the development of pulmonary blastomycosis. Our culture results were exceedingly low in comparison to the reported case studies (25% versus 72% to 87%) in part due to samples only being sent to pathology, and due to fungal cultures being send-out labs. When comparing the p-values; immunosuppression was most closely associated with culture positivity, but realistically pathology was the most accurate at diagnosing pulmonary blastomycosis (94%). All our data is limited by our single center design and unlikely generalizable.

Conclusions

Pulmonary blastomycosis is most accurately diagnosed by pathology in an endemic region. Tobacco abuse could potentially be associated with the development of pulmonary blastomycosis, and immunosuppression likely results in the highest culture yield.

Resources

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