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Original article

Epidemiology of dermatophytoses in 31 municipalities of the province of Buenos Aires, Argentina: A 6-year study

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A R T I C L E   I N F O

A B S T R A C T

Background: No reliable data are available in the province of Buenos Aires regarding the frequency of dermatophytoses and other fungal diseases. The distribution of the clinical forms and the species involved are also unknown.
Aims: To present the data collected by the laboratories participating in the Mycology Network of the province of Buenos Aires (MNPBA) from a retrospective epidemiological survey on dermatophytoses.
Methods: A descriptive and exploratory analysis was performed on the cases of dermatophytoses gathered between 2002 and 2007 by the Mycology Network of the province of Buenos Aires.
Results: Of the 3966 dermatophytosis cases reported by 41 laboratories in 31 municipalities, more than a half occurred in three highly populated urban municipalities. The male:female ratio was 1:1.5. The most frequent clinical form was *tinea unguium*, diagnosed in 904 cases (51.83%), followed by *tinea capitis* (19.32%), *tinea corporis* (15.19%), *tinea pedis* (6.77%), *tinea cruris* (3.73%), and *tinea manuum* (2.18%). The species involved was identified in 1368 (33.49%) cases. *Trichophyton rubrum* was the most common species, with a frequency of 42.03%. An association was found between urban municipalities and *T. rubrum* or the *Trichophyton mentagrophytes* complex.
Conclusions: Results from the MNPBA survey provide valuable information that should enable further interventions to be designed in order to prevent and control the disease.

Epidemiología de las dermatofitosis en 31 municipios de la provincia de Buenos Aires, Argentina: estudio de 6 años

R E S U M E N

Antecedentes: No existen datos fiables acerca de la frecuencia de las dermatofitosis y otras enfermedades fúngicas en la provincia de Buenos Aires. Por otra parte, la distribución en la provincia de las formas clínicas y las especies involucradas no es conocida.
Objetivos: El objetivo de este estudio fue reportar los datos recogidos por los laboratorios que participan en la Red de Micología de la Provincia de Buenos Aires (MNPBA) a través del análisis de encuestas epidemiológicas retrospectivas sobre casos notificados de dermatofitosis.

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for a complete list of members.

Métodos: Se realizó un análisis descriptivo y exploratorio de los casos de dermatofitosis recogidos por los laboratorios de la Red de Micología de la provincia de Buenos Aires durante un período de 6 años (2002-2007).

Resultados: Se registraron 3.966 casos procedentes de 41 laboratorios distribuidos en 31 municipios. Más de la mitad de los casos tuvieron lugar en tres municipios urbanos muy poblados. La proporción varón:mujer fue de 1:1,5. La forma clínica más frecuente fue *tinea unguium*, diagnosticada en 904 casos (51,83%), seguida de *tinea capitis* (19,32%), *tinea corporis* (15,19%), *tinea pedis* (6,77%), *tinea cruris* (3,73%) y *tinea manuum* (2,18%). La identificación de las especies de dermatofitos se realizó en 1.368 casos (33,49%). La especie predominante fue *Trichophyton rubrum* (42,03%). Se observó asociación entre los municipios de alta densidad poblacional y la presencia de *T. rubrum* y del complejo de especies *Trichophyton mentagrophytes*.

Conclusiones: Los resultados de las encuestas de MNPBA generan información de calidad que permite el diseño de nuevas intervenciones para la prevención y control de estas micosis.

In 1997 the Mycology Department of the National Institute of Infectious Diseases (INEI, ANLIS "Dr. Carlos G. Malbrán", City of Buenos Aires, Argentina) established the National Mycology Laboratories Network[6] whose main objectives are (1) to provide clinical diagnoses to the whole population, (2) to contribute to the control of the mycoses, (3) to participate in the surveillance of fungal infections and emerging fungal pathogens, (4) to enable staff to perform standardized laboratory procedures, and (5) to provide tools for improving the quality of the diagnoses. The National network comprises 130 laboratories grouped according to their complexity level and the step required to reach a diagnosis (Fig. 1). The laboratories are distributed in 23 provinces. If a laboratory fails to provide a conclusive diagnosis, the mycological sample must be sent to a laboratory of a higher level of complexity in the same province. In Argentina, the Clinical Mycology National Reference Laboratory (CMNRL) is the one with the highest complexity level in relation to tasks and diagnostic tools (level 4), where inconclusive mycological diagnoses from other laboratories are collected.

Dermatophytoses affect millions of people and are the most common fungal infections worldwide. Its incidence is rising and represents a public health concern with a significant impact on health-care costs.[3,19] Although in most cases the infection remains in the *stratum corneum* of the epidermis and the outcome is mild, it can shift to a more severe condition depending on the patients' immune status.[16,18] Therefore, dermatophytoses and their causative agents vary according to a wide range of factors (ethnic group, life-style, socio-economic conditions, geo-climatic factors, and geographical location).[10] In Argentina reliable epidemiological data on dermatophytoses are lacking for the Province of Buenos Aires (PBA), which comprises 134 municipalities located on a 307,571 sq. km area. At present 55 laboratories from 31 municipalities participate in the Mycology Network of the PBA (MNPBA). Crowded suburbs around the capital city (Metropolitan Buenos Aires; 9,270,661 inhabitants), with industrial, and commercial activities and services, are included. The rest of the province is less densely populated, with 4,556,542 inhabitants involved in rural activities.[11,12]

The aim of the study was to report the data collected in a retrospective epidemiological survey on dermatophytoses. Data were collected by the laboratories of the MNPBA under the coordination of the Mycology Department of INEI, ANLIS "Dr. Carlos G. Malbrán". Between 2002 and 2007 a descriptive and exploratory analysis of dermatophytoses was performed.

Methods

From January 2002 to December 2007 a six-year retrospective epidemiological review of 5650 cases of superficial mycoses was carried out. In order to collect the data, a form with closed questions was created and distributed to the laboratories. Records of dermatophytoses were collected monthly from 55 public clinical laboratories of the MNPBA, Argentina. The criteria for a clinical diagnosis of dermatophytosis were positive direct examination (hyaline septate hyphae, with or without arthroconidia) and/or dermatophyte-positive culture according to the criteria established by the CMNRL, the Mycology Department of the National Institute of Infectious Diseases ANLIS "Dr. Carlos G. Malbrán". Demographic and clinical data were recorded, including patients' age, gender, etiologic agent and clinical form of the lesion, the laboratory identification, and sampling date. During 2005 and 2006 the etiologic agent was not recorded and for 2007 this information was only partially recorded. This study was approved by the Research Ethics Committee of National Institute of Epidemiology "Dr. Juan H. Jara".

Statistical analysis

The population was stratified into seven groups according to patients' age (<9 years; 10–19; 20–29; 30–39; 40–49; 50–59; >60 years). Pearson's Chi Square (χ^2) test was performed to study the relationship between the frequency of dermatophytosis and the selected variables, and to find significant differences in the distribution of each species. P-values ≤ 0.05 were considered statistically significant using R Software, version 2.9.2 (24/08/2009).[23]

In order to study the relationship between the etiologic agents and the population density the municipalities were categorized in two groups: (a) high population density districts (>500 inhabitants/sq. km) which were mainly urbanized and industrialized, and (b) low population density districts ($\leq$500 inhabitants/sq. km), mainly rural (agriculture and livestock). The relationship between dermatophytosis and population distribution over the geographical areas of 31 municipalities of the PBA was determined by the Kernel Method. The kernel estimator provided a continuous surface of densities calculated for all areas.[4] The kernel parameters used in this study were the quadratic estimation function (k) and bandwidth fixed at 1000 m. TerraView software, version 3.2.0 (03/07/2008) was used for spatial analysis. Each municipality of the PBA was one unit.