



# Enfermedades Infecciosas y Microbiología Clínica

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## Screening for parasite infections in immigrant children from low-income countries



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### ABSTRACT

**Introduction:** In Spain, minors represent approximately 20% of the immigration flow. Many of these immigrants come from countries in the tropics and sub-tropics where intestinal parasitic infections caused by helminths and protozoa are one of the major causes of human disease. The main objective of the present work was to describe parasite infections in a group of immigrant children.

**Methods:** A prospective evaluation was performed in 373 minors from Sub-Saharan Africa, North Africa, and Latin America. Details were collected from the medical records and physical examination. Urine, stool and peripheral blood samples were obtained for serological and routine laboratory tests. Direct and indirect parasitological tests were also performed.

**Results:** At least 1 parasitic disease was diagnosed in 176 (47.1%) immigrant children, while 77 (20.6%) minors were infected with two or more parasites. The number of parasites was highest in children from Sub-Saharan Africa compared with the rest of the areas of origin ( $p < .001$ ), and in children from urban areas compared with those from rural areas (OR 1.27 [1.059–1.552],  $p = .011$ ). The most frequent causes of multiple parasite infection were filariasis plus strongyloidiasis and filariasis plus schistosomiasis. Intestinal parasite infection was diagnosed in 38 cases (13.8%). Logistic regression analysis revealed that for each month of stay, the probability of a positive finding in the stool sample decreased by 0.02% [ $\beta = -0.020$ , ( $p = .07$ )].

**Conclusions:** The high infection rates of parasite diseases in immigrant children point to the need for screening protocols for certain infectious diseases in these children according to their country of origin and their length of residence in Spain.

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## Detección de infecciones parasitarias en menores inmigrantes procedentes de países en vías de desarrollo

### RESUMEN

**Introducción:** En España, los menores representan aproximadamente el 20% del flujo migratorio. Muchos de estos menores provienen de regiones tropicales y subtropicales donde las infecciones por helmintos

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y protozoos son una de las principales causas de morbilidad. El objetivo de este trabajo es describir las infecciones parasitarias presentes en un colectivo de menores inmigrantes.

**Métodos:** Se evaluaron prospectivamente 373 menores procedentes de África subsahariana, África del Norte y Latinoamérica. Se realizó una historia clínica detallada. Se obtuvieron muestras de sangre periférica, orina y heces para la realización de los diferentes análisis bioquímicos, serológicos y parasitológicos directos e indirectos.

**Resultados:** En 176 (47,1%) menores se diagnosticó al menos una enfermedad parasitaria. En 77 (20,6%) menores se detectaron 2 o más parásitos. En los niños de África subsahariana el número de parásitos fue mayor comparado el resto de orígenes ( $p < 0,001$ ). Los menores de zonas urbanas tenían más parásitos comparado con los niños de zonas rurales (OR 1,27 [1059-1552],  $p = 0,011$ ). Las causas más frecuentes de parasitación múltiple fueron filariasis más estrogiloidosis y filariasis más esquistosomiasis. Se diagnosticó parasitosis intestinal en 38 casos (13,8%). El análisis de regresión logística reveló que por cada mes de estancia, la probabilidad de un resultado positivo en las heces disminuía un 0,02% [ $\beta = -0,020$  ( $p = 0,07$ )].

**Conclusión:** Las altas tasas de infección parasitaria en niños inmigrantes señala la necesidad de una detección protocolizada de estas enfermedades según el país de origen y el tiempo de residencia en España.

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## Introduction

The migratory flow from low-income countries located in tropical and subtropical areas to developed countries is continuously increasing. Therefore, the health status of the immigrant population has become a relevant subject in developed countries.

Frequently, these immigrants present with imported infectious diseases. Some of the most frequent diseases are caused by parasites, usually helminths.<sup>1–3</sup> Often, these infections are asymptomatic or have nonspecific symptoms. Although the overall mortality from these infections is low, parasite infections are among the main causes of morbidity in low-income countries. Therefore, some infections (*i.e.*, lymphatic filariasis, schistosomiasis or onchocerciasis) have been identified by the WHO as important causes of morbidity and have a high disease burden.<sup>4–6</sup>

Therefore, healthcare professionals must be aware of issues pertaining to screening, diagnostics, and treatment for diseases that are not endemic. This can be challenging, particularly with shifting patterns of migration and resultant changes in disease epidemiology.<sup>7</sup>

In Spain, as in other European countries, almost 20% of new immigrants are minors.<sup>8</sup> However, little data are available in the medical literature concerning imported parasitic diseases in immigrant minors in Europe.<sup>9,10</sup> In international adoptees infectious conditions of special concern include presence of intestinal parasites.<sup>11</sup> Thus, appropriate medical screening in this high-risk population is not well established.<sup>9</sup>

The main objective of the present study was to describe the imported parasitic diseases in a collective of immigrant minors from Sub-Saharan Africa, North Africa, and Latin America.

## Patients and methods

This study was performed in the Tropical Medicine Office (TMO) of Complejo Asistencial Universitario de Salamanca (CAUSA), Salamanca, Spain. We prospectively evaluated the prevalence of parasitic diseases through screening programs in immigrants under 18 years of age coming from Sub-Saharan Africa, North Africa and Latin America between January 2007 and December 2011. The study was reviewed and approved by the ethical committee of CAUSA, and written consent was obtained from the subjects' legal guardians. Minors or guardians were asked about where they came from to define urban or rural area. In case of doubt the cutoff

of 5000 as rural inhabitants and more than 5000 inhabitants as urban was applied. Two categories in terms of the immigrants' lengths of residence were considered: recently arrived immigrants, defined as people with less than six months in Spain, and immigrants of long stay, defined as people with  $\geq 6$  months in our country, including those who travel occasionally to their origin countries.

The immigrant minors were screened by the examination of detailed medical records and a physical examination. Urine and peripheral blood samples were obtained from patients for serological and routine laboratory tests. Anemia was defined as a hemoglobin level  $\leq 11.5$  g/dL. Eosinophilia was defined as  $>0.45 \times 10^9$  eosinophils/L of blood. Direct parasitological tests included: (i) examination of 3 stool specimens taken 48–72 h apart were requested from each child. Specimens were preserved in 10% formalin and polyvinyl alcohol. Samples in formalin were concentrated; (ii) microscopy of a terminal urine specimen; in selected patients; (iii) 24 h urine sample for testing ova, (iv) Knott test for microfilaremia and (v) skin snips. Two skin snips were taken from each patient, one from the lateral aspect of each buttock. Each snip measured 1–2 mm and to form a diamond shaped grid of about 2 cm  $\times$  2 cm on each buttock. Indirect parasitological tests included commercial serologic tests for *Echinococcus granulosus* (Echinococcosis Fumouze, Fumouze Diagnostics, France), *Taenia solium* (NovaLisa Taenia solium IgG, NovaTec ImmunDiagnostica GmbH, Germany) and *Trypanosoma cruzi* (Architect Chagas, Abbott Laboratories, USA). In-house ELISA assays were used for the diagnosis of filariasis, schistosomiasis, fasciolosis, and strongyloidiasis.<sup>12–14</sup>

## Statistical analysis

The descriptive data analysis was expressed as the mean *plus* standard deviation (SD) and percentages when appropriate. One-way ANOVA was used to compare analytical values among the three origin areas. The  $\chi^2$  test was used to test associations between categorical variables and specifically to evaluate the association between demographic variables and the final diagnoses. A regression analysis was performed to investigate associations between length of stay and the probability of a positive parasitology results. The level of statistical significance was  $p < 0.05$ . SPSS 21 statistical software (available from <http://www.spss.com>) was used for the statistical analyses.

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