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Prevalence of intestinal parasite infection among children in rural daycares in Chiapas.

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Abstract

Intestinal parasite infection continues to be a public health problem for people living in many regions, particularly in tropical and subtropical areas. Children remain the primary affected population.

Objective. To identify the prevalence of intestinal parasite infection and the factors associated with it in the child population from zero to five years attending daycares in the municipality of Union Juarez, Chiapas, Mexico.

Materials and methods. 38 children were included and 100 samples obtained from January to March of 2019 were analyzed. These were studied through direct examination and through concentration techniques.

Results and conclusions. A 76% prevalence of intestinal parasite infection was found. Of these, in 28% of cases, multiparasitism was found with a maximum of three species per host. There was no difference due to sex or age. This study identified two species of intestinal protozoa, *Entamoeba histolytica* (64%) and *Blastocystis hominis* (10%), and two species of helminths, *Ascaris lumbricoides* (16%) and *Trichuris trichiura* (10%). The most frequent associations were *Giardia lamblia/Ascaris lumbricoides* (4.18%) and *Giardia lamblia/Entamoeba coli* (3.64%). The socioeconomic conditions of this population favor the transmission of intestinal parasites.

Key words: *prevalence, intestinal parasitism, daycare, protozoa, helminths.*

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Introduction

Intestinal parasite infections are intestinal infections produced by ingesting protozoan cysts or worm larvae or eggs—through contaminated food or water—or by percutaneous penetration by larvae from the soil.[1]

Intestinal parasites are among the most common infectious agents in humans. They are widely transmitted and continue to be a global public health problem, with the highest prevalence documented in the poorest communities in developing countries. The varying levels of endemicity depend on multiple factors, such as deficient sanitary conditions and socioeconomic factors.[2]

Intestinal parasite infections affect all social classes and cause significant morbimortality, particularly in marginal urban and rural populations. They result from multiple socioeconomic, cultural, historical, and political factors.[3]

Enteroparasite diseases are more frequent among children because they have more opportunities for contact with these parasites. Deficient basic environmental hygiene, homes with dirt floors, a lack of potable water and sewage systems, the improper disposal of garbage, and improper hygiene habits such as playing in dirt or not washing hands before eating are risk factors that promote the persistence of intestinal parasite infections.[4]

One of the means of diagnosing gastrointestinal parasite infection is through concentration techniques (sedimentation and flotation) which allow the parasites to be detected and correctly identified. The most common methods used for diagnosis of intestinal parasites are the direct smear (Beaver's method), concentration techniques such as Ritchie and Faust, and counting methods.[5]

Thus, the objective of this study was to identify the prevalence of intestinal parasitism and the factors associated with it in the population of apparently healthy children from zero to five years attending daycares in the municipality of Union Juarez.

Materials and methods

An observational, descriptive, cross-sectional, and analytic study was performed in two daycares in the municipality of Union Juarez, Chiapas. The study population was made up of children under five years of age. Fecal samples were obtained from children whose parents gave informed consent to participate in the study. The samples were transported to the laboratory of the Department of Chemical Sciences of the Autonomous University of Chiapas for analysis. They were examined using direct smears with Lugol's iodine, merthiolate-iodine-formaldehyde (MIF), and the Faust flotation technique.

Statistical analysis included descriptive statistics using frequency and percentages.

Results

38 children were included in the study. Analysis of fecal samples indicated 76% prevalence of intestinal parasite infection(29/38) with 23.7% (9/38) of cases negative. Multiparasitism was found in 28% of cases, with a maximum of three species per host. Neither age nor sex was predictive (Figure 1). With respect to helminths, low infection rates of *Ascaris lumbricoides* (16%) and *Trichuris trichiura* (10%) were found. Two species of intestinal protozoa were identified, *Entamoeba histolytica* (64%) and *Blastocystis hominis* (10%) (table 1).

Figure 1.
Prevalence of intestinal parasite infection among children from zero to five years, by type of parasite, age group, and sex

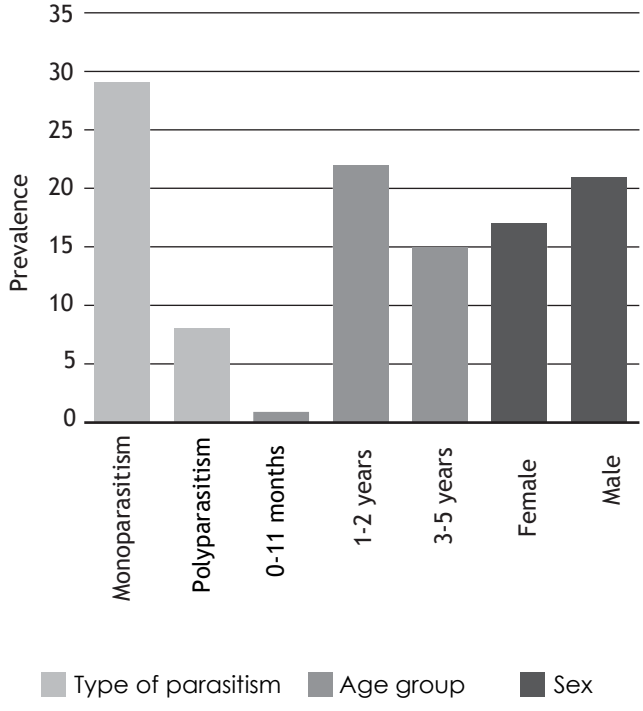
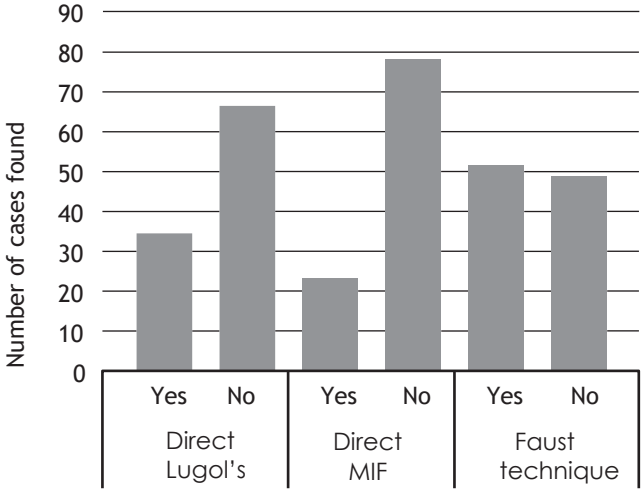


Table 1.
Prevalence of intestinal parasites in children from zero to five years in daycares in Santo Domingo and Union Juarez, Chiapas, Mexico.

Parasite species	n	%
Entamoeba histolytica	25	64
Blastocystis hominis	4	10
Ascaris lumbricoides	6	16
Trichuris trichiura	4	10

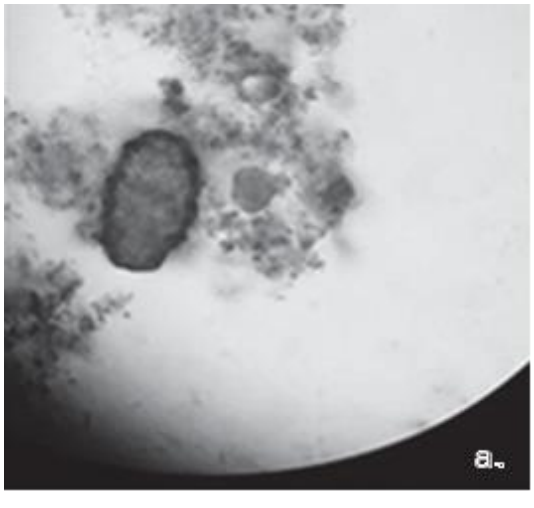
Variation was observed in the number of suspected and positive cases depending on the technique used. Using staining with Lugol's iodine, the number of positive cases was 32. With MIF it was 18, and using Faust's technique 52 positive samples were found out of 100 samples and 300 observations (Figure 2).

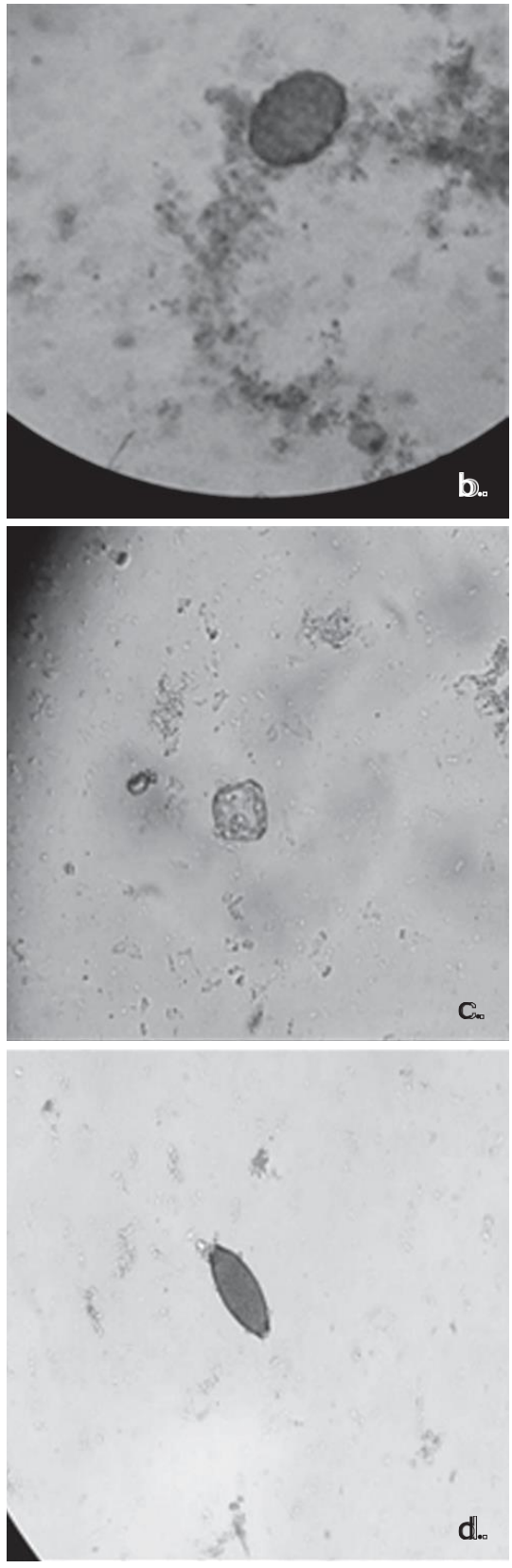
Figure 2.
Number of positive and negative cases of parasite infection among the samples observed, by technique used.



The parasite forms found using these techniques included infertile *Ascaris lumbricoides* eggs from unfertilized females; these are elongated and irregular, 90 × 50 µm. Their internal structure consists of a mass of unorganized refractile granules of varying sizes. Using the Faust flotation technique, it was possible to observe a cleaner field free of artifacts which could interfere with the observation of the sample, enabling the identification of *Blastocystis hominis* cysts and *Trichuris trichiura* eggs or larvae (Figure 1).

Figure 1.
Microscopic observation of parasites found





a. and b. Ascaris lumbricoides egg, MIF technique
c. Blastocystis *hominis* cyst, Faust technique
d. *Trichuris trichiura* egg, Faust technique

Discussion

Intestinal parasite infections continue to be a public health problem for people living in multiple regions, especially in tropical and subtropical areas. Children continue to be the population most affected due to their immunological immaturity and underdeveloped hygiene habits. In many children, intestinal parasite infection has negative consequences, both physically and cognitively.[6]

The overall infection rate with intestinal parasites among the children was 76%. Multiparasitism was found in 24% of cases, with a maximum of three species per host. A very low prevalence of both *Ascaris lumbricoides* (16%) and *Trichuris trichiura* (10%) was observed. These percentages are also low in comparison with studies conducted in other regions, for example in Colombia.[7]

The prevalence of *E. histolytica* was 64%, making it the most common parasite. Based on the fact that the children did not present pathology, it was predominately in its cystic form, which is the potentially infectious form.

According to these results, the Faust flotation technique is most efficient for the diagnosis of protozoan cysts as well as helminth eggs and larvae. Its limiting factor is that it is less effective for heavier eggs such as those of *Taenia spp.* or unfertilized *Ascaris* eggs. However, more positive samples and a subjectively greater number of eggs per microscopic field were found, including in cases such as *T. trichiura* and *A. lumbricoides. A. lumbricoides* was not observed in all samples, however.

Daycare attendance greatly influences the acquisition and transmission of intestinal parasites. In fact, each year multiple cases of parasite outbreaks in these types of centers are documented in the literature. This was the impetus for conducting this study, which we believe to be the first of this kind carried out in this municipality. Additionally, it is most useful to make use of additional techniques when diagnosing helminthiasis in order to increase the probability of identifying positive samples.

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