



Prevalence of Intestinal Parasitic Infection in Three Rural Communities in Mexico

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Abstract

Introduction: In Mexico there are communities with significant lags compared to the rest of the country because they have a high level of marginalization and low human development and of which it is not known if the frequency and type of parasites that prevail in these areas. The purpose of this work was to know the prevalence of intestinal parasites and the risk factors in Bahuinocachi (Bo-coyna, Chihuahua), Llano de la Parota and Agua Tordillo (Acatepec, Guerrero).

Methodology: The study was cross-sectional of 205 participants. Blood and feces samples were collected. Data on demographics and predisposing factors of intestinal parasitic infection were collected using a questionnaire. The feces were analyzed microscopically after a concentration procedure and the sera were used to search for antibodies against *A. lumbricoides*, *T. canis* and *E. histolytica* by ELISA.

Results: The overall prevalence of parasitosis was 70.1%. Agua Tordillo presented the highest prevalence of antibodies against *A. lumbricoides*.

Conclusions: The three communities studied presented intestinal parasite infection. In Bahuinocachi, protozoas predominate and in Llano la Parota and Agua Tordillo there was co-infection of helminths and protozoa. The study has highlighted the importance of the intestinal parasitic in the communities studied. It is necessary to get better the basic sanitary and environmental conditions as well as the need implement for programs in health education, because it was found that Ascariasis is a health problem and also there is coinfection with protozoa.

Keywords: Intestinal Parasitic; Rural Communities; Prevalence

Introduction

Parasites are distributed worldwide and constitute one of the health problems affecting mainly developing countries [1,2]. PAHO / WHO estimates that 20 - 30% of all Latin Americans are infected by parasites, while the figures in some rural communities are up to 95% [3]. In Mexico, its prevalence is persistent due to frequent reinfections due to the presence of the parasite and susceptibility of the host [4]. The factors favoring parasitic development in

the host are related to its nutritional and immunological status and the factors that allow for the dissemination of the parasite and to complete the biological cycle are related to the environment and socioeconomic conditions [5]. Parasitosis prevails due to faecal contamination of soil and water, due to poorly maintained latrines or sewage network destruction, direct defecation, the use of waste with feces to fill up land or as fertilizer of plants or rains that pollute the wells [6-13].

Methodology

This study was carried out in three marginalized communities, the first being Bahuinocachi that belongs to the municipality of Bocoyna in the state of Chihuahua, located to the northwest of Mexico in the highest zone of the Sierra Madre Occidental, known as the sierra tarahumara. The other two communities are Llano de la Parota and Agua Tordillo which are located in the municipality of Acatepec in the state of Guerrero, southeast of Mexico in the high mountain; Agua Tordillo and Llano de la Parota. A questionnaire was used to collect the demographic, socioeconomic, environmental information and the general health of the participants and was designed in the Spanish language and an interpreter read the questions in their native language. A sample of feces and venous blood was collected from each participant. Collected feces samples were analyzed at 48 hours of collection by the Faust flotation concentration technique and a direct smear was also performed to stain the kinyoun method to determine the presence of coccidia. For the evaluation of antibodies against *E. histolytica*, *A. lumbricoides* and *Toxocara* spp, each of the 3 parasites was extracted as total antigen for each of the tests and anti-IgG conjugated to horseradish peroxidase as secondary antibody [14]. A previous analysis was performed to determine the cutoff value with 30 healthy participants for each trial. Statistical significance was set at $p < 0.05$ (SPSS version 22).

Results

30% of the population registered in the population census of Bahuinocachi and Llano de la Parota communities, as well as 13.4% in Agua Tordillo, participated in the study. Among the participants in the study 63 (30.7%) were males and 142 (69.3%) were females. In Bahuinocachi and Agua Tordillo, children under 11 predominated (16.1 and 21.5%, respectively), and those older than 18 years (12.5%) participated in Llano de la Parota. The overall prevalence of parasitosis was 70.1% $p < 0.05$. In Bahuinocachi the prevalence of *H. nana* was 2.1%, *E. coli* 18.6%, *E. nana* 18.6%, *Microsporidium* spp 9.7%, *E. histolytica* 3.4% and *G. intestinalis* 2.8%. The prevalence of parasites in Llano de la Parota was *A. lumbricoides* 17.2%, *E. coli* 15.9%, *E. nana* 4.8% and *Microsporidium* spp. 4.8%, *E. histolytica* 4.1% and *G. intestinalis* 0.7%. The prevalence of parasites in Agua Tordillo was *A. lumbricoides* 23.4%, *H. nana* 2.1%, *E. coli* 15.2%, *E. nana* 11%, *Microsporidium* spp. 12.4%, and *E. histolytica* 3.4%. The age of the most parasitized participants ranges from 7 to 15 years. The prevalence of parasites in the three communities was associated with the use of latrine, under water supply, without drainage, when sleeping from 4 to 6 people in a room, lack of medical attention, if they used to bathe in a local pond. Agua Tordillo presented the highest prevalence of antibodies against *A. lumbricoides*. Figure 1 shows the type of latrines they use, the areas around the houses where backyard animals are located with the proximity to trash, latrines, and water tanks.



Figure 1: Risk factors associated with parasitic infection from exposure to human and animal feces. It is observed that in the environment there are latrines, garbage, and the dirt yard, which can favor water and soil pollution.

Discussion

There are currently no data to report on the prevalence of intestinal parasites in these communities. The three marginalized communities are located in the sierra and far from other communities, their geographic isolation is a logistical challenge that influences

the continuous provision of services or health brigades, because they live in small groups scattered in the mountainous area. A low prevalence of parasitosis was observed in children 0 - 2 years of age probably because the child interacted less with their environment and ingested breast milk or tea or coffee with boiled water [15].

The population that presented the greatest intestinal parasitosis were children and adolescents between 7 and 15 years of age, it is justified because at these ages they interact more with their environment and their hygienic habits are deficient, possibly malnutrition [16]. However, the population > 30 years also has an intestinal parasitosis index of 31.7%, probably due to the scarcity of water; they do not have a habit of washing their hands after going to the bathroom or before eating food. In Chiapas and Oaxaca, Mexican states have reported 44.1% of parasitic diseases in primary children school, which is higher than that reported at a national level of 18.7% and is associated with a short stature, compared to the state of Baja California with only 4.3% [17]. In all three communities there was a higher prevalence of parasite parasites such as *E. coli*, *E. nana*, possibly due to the use of containers and utensils that may have been contaminated with parasitic cysts during handling and storage of drinking water. It was observed that children did not wash their hands after handling and / or playing with animals. Parasite cysts can remain infectious in the environment for a very long period of time, which means they could easily get on the skin of animals such as dogs, which mix freely with family members. Likewise, not wearing shoes can also help transport parasites from contaminated soil with feces. In Llano de la Parota or Agua Tordillo, most of the children interviewed showed dirty hands and almost always without shoes or huaraches, and they had white patches on their faces. In no community did they predominantly report gastrointestinal symptoms, perhaps because they are asymptomatic or because of lack of information about their health status that they do not care about. The control of intestinal parasitism is one of the strategies to follow to provide a community with a good quality of life because in the case of children and adolescents is one of the main causes of retarded growth, learning and development. In adults, it is difficult to perform their work well; these infections are generally underestimated and represent an important morbidity factor when they are associated with malnutrition. In a study done in the central region of the state of Guerrero *A. lumbricoides* was identified as the most frequent intestinal pathogen in children [18]. Few studies have been conducted in the Sierra de Guerrero to identify and define the prevalence, co - infection and pathogenic potential of parasitic infections.

Conclusion

There are many factors that favor its transmission, such as poor sanitation and consumption of contaminated food. The availability

of drinking water is another determining factor in the social and economic development of a community and is associated with the presence of intestinal parasites and gastrointestinal symptoms, as has been reported in studies in marginalized children in other countries [19].

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