



Risk Factors Associated with Intestinal Parasitosis in Children Less than 12 Years of Age in a Rural Community in the State of Chiapas, Mexico

Miguel Angel Mazariego-Arana*, Ma Guadalupe Trujillo-Vizuet, Maria del Rocio Martinez-Marroquin, Oliver Eduardo Aragon-Perez, Sergio Dominguez-Arrebillaga, Roberto Alejandro Sanchez-Gonzalez

Abstract

Parasitic infections affect more than half of the world's population and constitute an onerous burden for public health, especially in underdeveloped nations, where they are highly prevalent. It is estimated that the presence of parasitosis is approximately 30% of the world population. The World Health Organization (WHO), considers it one of the main causes of morbidity, closely linked to poverty and related to inadequate personal hygiene and raw food, lack of sanitary services, lack of provision of drinking water and fecal contamination of the environment. It infects people of all ages, mainly children, causing growth and development disorders. Therefore, the present study aims to identify the risk factors associated with intestinal parasitosis in children less than 12 years of age in a rural community in Tapachula, Chiapas.

A descriptive, prospective, longitudinal study was carried out. The study population consisted of children less than 12 years of age, attended by the health center of the San Cristóbal Buenavista community in the municipality of Tapachula, Chiapas. An interview was conducted with the parents to learn about sociodemographic characteristics and risk factors, 3 serial stool samples were requested, blood samples were taken, the biological samples were analyzed and the results obtained were analyzed in the statistical software (IBM SPSS v23).

Keywords: Intestinal parasitosis; Children; Risk factors; Chiapas

Introduction

Intestinal parasitosis caused by protozoa or helminths is a public health problem in México [1]. Recent studies have shown that school-aged children have a higher risk of intestinal parasitic infection [2], due to constant exposure to risk factors (playing with contaminated soil, consuming contaminated water, putting hands in their mouths without washing, not wearing footwear, improper disposal of garbage) [3].

Infections by protozoa and helminths occur due to various factors: environmental (soil moisture, temperature, precipitation, density of vegetation and type of climate) [4,5], educational (level of knowledge about parasitic diseases, schooling) and socioeconomic (rural life, food and cultural customs, medical services, sanitation, public services, poverty level) [6,7].

The National Council for the Evaluation of Social Development Policy (CONEVAL), in 2018 reported that Chiapas has 34.5 percentage points higher than the national percentage (41.9%). 94% of the population was in a situation of poverty or vulnerability due to lack of income [8]. The vulnerable population such as children is affected by the socioeconomic factors caused by poverty. Therefore, the present study aims to identify the risk factors associated with intestinal parasitosis in children less than 12 years of age in a rural community in Tapachula, Chiapas.

Materials and Methods

A descriptive, prospective, longitudinal study was carried out. The study population consisted of children under 12 years of age, attended by the health center of the San Cristóbal Buenavista community in the municipality of Tapachula, Chiapas.

A talk on intestinal parasitosis was given to parents in the community health center, whose parents or guardians accepted their participation through informed consent, an interview was conducted to find out their sociodemographic characteristics and risk factors for intestinal parasitosis, they were provided with coproparasitoscopic bottles and explained the technique of collecting feces as well as the foods that they should not consume 3 days prior to the delivery of the samples (3 serial samples), their nutritional status was evaluated based on the NOM-031 SSA2-1999 [9], a venous blood collection was performed for complete blood count and serum iron. The stool samples were processed (direct examination and the Ritchie concentration by sedimentation technique) in the Laboratory of the Centro de Salud Urbano Tapachula and the blood samples in the Laboratory of Clinical Analysis LacMol. The results were delivered to the parents and the Health Center so that they could provide antiparasitic treatment.

The data obtained were analyzed using the statistical software (IBM SPSS v23), using descriptive and inferential statistics (x2), with a confidence level of $p < 0.05$.

Results

The data obtained were analyzed using the IBM SPSS ver.23 statistical program, using descriptive and inferential statistics (x2), with a confidence level of $p < 0.05$.

*Corresponding author: Miguel Angel Mazariego-Arana, Facultad de Ciencias Químicas, Universidad Autónoma de Chiapas, Chiapas, Mexico, Tel: 9626251555; E-Mail: aarana_99@yahoo.es

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Regarding the positivity of parasites for each serial sample, they were the following: sample 1 (23.2%), sample 2 (34.8%) and sample 3 (30.4%). The most frequent parasite was *E. histolytica* (25.81%), *E. coli* (20.97%), *G. lamblia* (19.35%), and *E. nana* (14.52%) (Figure 1). A significant difference ($p=0.001$) was found in monoparasitism with 82.26% and in a lower percentage polyparasitism with 17.74% (Table 1).

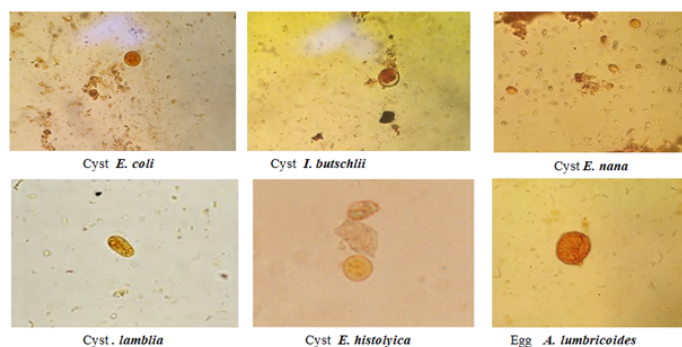


Figure 1: Parasites found in the lugol-stained stool samples of the minors participating in the study

In the evaluation of the nutritional level: Children with low weight, 4.3% presented parasites, children with healthy weight 34.8% presented parasites, in overweight children no parasites were found and in children with obesity 7.2% presented parasites (Table 2).

At the time of the study, the parents mentioned that the children had already been dewormed (62%), 14.3% had been dewormed a year ago and 23.7% had never been dewormed. Regarding the hematic biometry, 11.6% of the children presented anemia of which 1.4% corresponds to anemia due to iron deficiency. Anemia was found associated with the presence of parasitosis ($p=0.05$) (Table 3).

The results obtained in the interviews regarding the risk factors analyzed in the children, 94.2% have a cement floor in their home, the disposal of excreta (50.7%) is in a septic tank, the consumption of water is from a well (88.4%) but they treat the water (69.6%), 97.1% wash their hands before eating and after going to the bathroom, 66.8% have a clean appearance of their fingernails, 95.7% burn the garbage generated, co-exist with animals such as dogs and cats (55.1%), 26.1% walk barefoot at home. When performing the statistical analysis for the association of risk factors with the acquisition of parasites, they were not statistically significant (Table 4).

Parasite type	Sample 1		Sample 2		Sample 3		Frequency	%
	Male	Feminine	Male	Feminine	Male	Feminine		
<i>E. histolytica</i>	2	0	3	2	6	3	16	25.9
<i>E. coli</i>	5	1	4	1	1	1	13	21
<i>G. lamblia</i>	2	1	5	1	2	1	12	19.4
<i>I. butschlii</i>	1	0	0	0	0	0	1	1.6
<i>E. nana</i>	1	1	2	1	3	1	9	14.5
<i>E. histolytica</i> , <i>G. lamblia</i> , <i>I. butschlii</i>	0	1	0	0	0	0	1	1.6
<i>E. histolytica</i> , <i>G. lamblia</i>	0	1	0	0	1	1	3	4.8
<i>G. lamblia</i> , <i>I. butschlii</i>	0	0	1	1	0	0	2	3.2
<i>E. histolytica</i> , <i>I. butschlii</i>	0	0	1	0	0	0	1	1.6
<i>E. coli</i> , <i>I. butschlii</i>	0	0	1	1	0	0	2	3.2
<i>A. lumbricoides</i> , <i>E. histolytica</i>	0	0	0	1	0	0	1	1.6
<i>E. histolytica</i> , <i>E. coli</i>	0	0	0	0	0	1	1	1.6
Frequency	11	5	17	8	13	8	62	100

Table 1: Frequency of parasitosis by sex of children and by sample number. According to the results obtained in the stool samples.

Nutritional Level	Parasite type	Prevalence	X ²
Low weight	<i>A. lumbricoides</i> , <i>E. histolytica</i> , <i>E. nana</i> , <i>G. lamblia</i> , <i>E. coli</i> .	4%	p=0.05
Healthy weight	<i>G. lamblia</i> , <i>E. coli</i> , <i>E. histolytica</i> , <i>I. butschlii</i> , <i>E. nana</i> .	34%	
Obesity	<i>G. lamblia</i> , <i>E. coli</i> , <i>E. nana</i> .	7%	

Table 2: Nutritional status and prevalence of parasites. According to the Official Mexican Standard NOM-031-SSA2-1999

Parameter	Media	Standard deviation
Hemoglobin	12.54 gr/dl	3.9 gr/dl
Hematocrit	39.51 %	2.58%
Media concentration of Hb	31.92 gr/dl	0.331 gr/dl
Medium globular volume	93.8 fl	1.51 fl

Table 3: Results of the analysis of Hemoglobin, Hematocrit, Average Hb concentration and average globular volume. According to the results obtained from the hematic biometry.

Risk factors	Frequency	X ² p	
	Suitable (%)	Not suitable (%)	X ² p
Type of floor at home	94.2	5.8	0.254
Excreta disposal	50.7	49.3	0.418
Water consume	11.6	88.4	0.440
Water treatment	69.6	30.4	0.08
Coexistence with animals	44.9	55.1	0.478
Wash hands before eating and after going to the WC	97.1	2.9	0.284
Clean appearance of fingernails	66.8	33.2	0.518
Wearing sandals at home	73.9	26.1	0.300
Trash disposal	95.7	4.3	0.555

Table 4: Risk factors in children with intestinal parasites. According to a personalized survey and by consensus.

Discussion

Intestinal parasitosis in children is currently a public health problem in México. In Chiapas, some studies have reported prevalences from 76% [10,11] to 11.9% [1], in our study we obtained a 46.4% prevalence of intestinal parasitosis in children, finding *E. histolytica* more frequently in its form cystic, although less frequently compared to studies carried out in other regions of Chiapas [10,11] and Durango [6]. Monoparasitism (82.3%) was found to be more prevalent than polyparasitism (17.7%), opposite case with a study carried out in a rural area of Colombia where a predominance of polyparasitism was found [4].

Regarding to nutritional status, malnutrición was found to be a lower percentage; on the other hand, in a study carried out in the border area of Chiapas with Guatemala, they found malnutrition associated with parasitism [1]. Anemia was found associated with the presence of parasitosis ($p=0.05$), but it was not iron-deficient. Which agrees with the results we obtained, since it is infection by protozoan parasites (98.7%)?

The results obtained in the interview with the parents did not reflect risk factors associated with parasitosis in the community, however, a study carried out in Venezuela reveals that there may be erroneous data at the time of the interview and the discovery of *E. nana* reflects the error in the interview derived from the fact that the presence is a good marker of oral-fecal contamination by food or water [7]. Which agrees with our study where we found *E. nana* in 14.5%, but without risk factors associated with intestinal parasitosis? We must educate the population of rural communities about the prevention of parasitic infections, even though poverty has a direct influence because we do not have all the necessary public services, but working on preventive health will

contribute to the health lag.

Summary of findings

Prevalence of intestinal parasites 45%.

E. histolytica in higher percentage.

E. nana, indicative of the existence of oral-fecal contamination by food or water.

Conclusion

The prevalence of intestinal parasitosis in children from the rural community of Tapachula, Chiapas was found at 45%. The positivity of parasites by serial samples was 23.2% (sample 1), 34.8% (sample 2) and 30.4% (sample 3).

The children did not present a serious malnutrition problem, but they did present anemia with a statistically significant difference in intestinal parasitosis. No associated risk factors were found in the study population, but paradoxically *E. nana* was found.

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