

INTESTINAL PARASITES IN SCHOOL FOOD HANDLERS IN THE CITY OF UBERLÂNDIA, MINAS GERAIS, BRAZIL (1)

Julia Maria COSTA-CRUZ (2), Margareth Leitão Gennari CARDOSO (3) & Daldy Endo MARQUES (4)

SUMMARY

In order to verify the presence of intestinal parasites in food handlers, stool samples were collected from 104 cooks and their helpers that were working in food preparation in 20 public elementary schools, in various areas of the city of Uberlândia, Minas Gerais, Brazil. The samples were collected during the months of November and December, 1988, in plastic flasks containing a 10% formaldehyde solution and processed by the Hoffmann, Pons & Janer method. The sediment was examined using triplicate slides. All individuals were females aged between 24 to 69 years. Intestinal parasites were found in 85.0% of the studied schools and 47.1% of the studied food handlers (cooks and helpers) were found to be positive. Among the 49 infected food handlers, 32 (65.3%) carried a single parasite and 17 (34.7%) carried two parasites. The following intestinal parasites were found: *Giardia lamblia* (21.1%), *Entamoeba coli* (21.1%), hookworms (9.6%), *Ascaris lumbricoides* (5.8%), *Entamoeba histolytica* (2.9%), *Hymenolepis nana* (1.9%), *Strongyloides stercoralis* (1.0%). These data emphasize the need for a rigid semi-annual control in all school food handlers, including diagnosis, specific treatment and orientation about the mechanisms of transmission of the intestinal parasites.

KEYWORDS: Intestinal parasites; Food handlers; School health program.

INTRODUCTION

Epidemiologic surveillance studies about intestinal parasitic infections in developing countries contribute to an identification of their agents and offer subsidies to their control. Many intestinal parasites' life cycle are directly associated to the lack of hygiene habits and to the unfavorable environmental and sanitary conditions that make easier the person to person transmission, of protozoa and helminths¹⁵.

Asymptomatic individuals that work direct or constantly with food manipulation may become a potential source of contamination and dissemination of several pathogens, among them the enteric parasites^{5, 8, 14}. Enteroparasitoses in food handlers have been reported in many cities from Chile^{2, 5, 6, 9, 11, 17}, Panamá¹⁹, Jordan¹⁰ and at hospital environments^{3, 12, 13, 16}. Intestinal parasitic infections found among nursing babies and the connection with their infected food handlers were

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(2) Professor of Parasitology at the Universidade Federal de Uberlândia.

(3) Graduate student, Masters degree in Applied Immunology and Parasitology at the Universidade Federal de Uberlândia.

(4) Former coordinator of the "Ações Integradas de Saúde Escolar" program.

Correspondence to: Dr. Julia Maria Costa-Cruz, Disciplina de Parasitologia, Departamento de Patologia, Universidade Federal de Uberlândia, Av. Pará, 1720, Campus Umuarama, 38400-902 Uberlândia, MG, Brazil. Fax: (034) 218-2333.

described by FRENZEL et al., in Chile ⁴ and TORRES et al., in São Paulo, Brazil ²⁰.

Our purpose in the present study was to verify the occurrence of intestinal parasitic infection in school food handlers as part of a health school program in the city of Uberlândia, MG, Brazil.

MATERIAL AND METHODS

During the months of November and December, 1988, stool samples were collected from 104 school food handlers and their assistants from 20 public elementary schools from various areas of the city of Uberlândia, MG, as shown in Fig. 1.

A single stool sample, of about 10g per individual, was collected in a 50 ml plastic flask, containing a 40% formaldehyde solution diluted to 10%. All samples were sent to the Parasitology Laboratory of the Universidade Federal de Uberlândia where they were processed by the HOFFMANN, PONS & JAN method ⁷. The sediments were stained by lugol solution and were examined using triplicate slides.

RESULTS

Infected school food handlers were found in 85% of the 20 studied schools. Table 1 shows the schools' distributions by number, number of studied food handlers per school and the number of infected

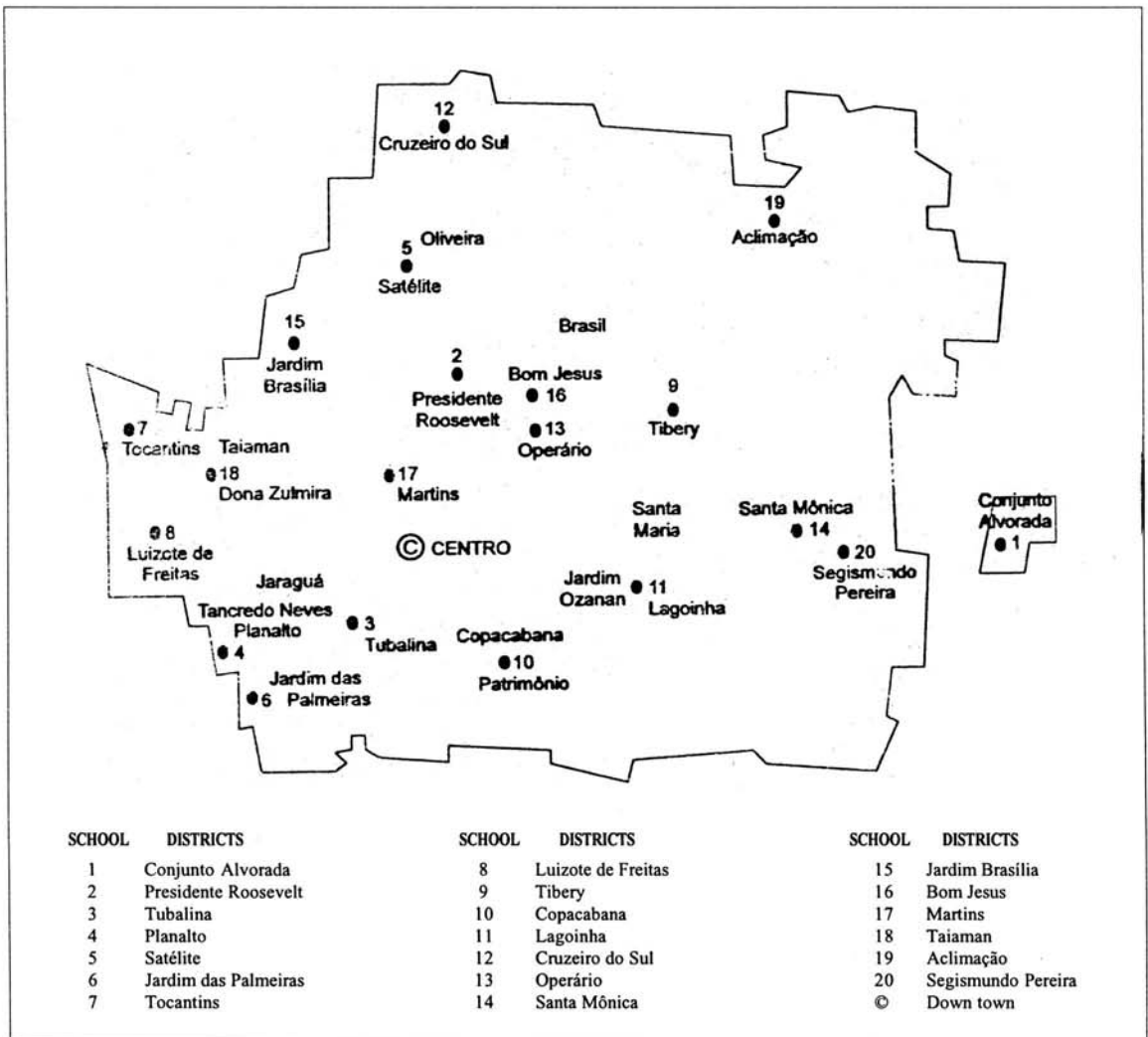


Fig. 1 - Geographic distribution of the 20 public elementary schools, where the intestinal parasitic infections among food handlers were studied, listed by district in the city of Uberlândia, Minas Gerais, Brazil, 1988.

TABLE 1

Distribution of infected school food handlers among schools of Uberlândia, Minas Gerais, in November and December, 1988.

School number	studied school food handlers	infected food handlers	% Positivity
1	2	2	100.0
2	3	3	100.0
3	8	7	87.5
4	7	6	85.7
5	5	4	80.0
6	9	6	66.7
7	3	2	66.7
8	7	3	42.9
9	5	2	40.0
10	5	2	40.0
11	9	3	33.3
12	6	2	33.3
13	3	1	33.3
14	7	2	28.6
15	8	2	25.0
16	5	1	20.0
17	5	1	20.0
18	4	0	0
19	2	0	0
20	1	0	0
Total	104	49	47.1

Ascaris lumbricoides, 1 *Entamoeba histolytica* and 1 *Strongyloides stercoralis*. The following associations were found: *Giardia lamblia* and hookworms in 5 cases; *Giardia lamblia* and *Entamoeba coli* in 4 cases; *Giardia lamblia* and *Ascaris lumbricoides* in 2 cases; and 1 case from each of the following associations: *Giardia lamblia* and *Hymenolepis nana*; hookworms and *Entamoeba histolytica*, hookworms and *Entamoeba coli*; *Ascaris lumbricoides* and *Entamoeba coli*; *Entamoeba histolytica* and *Entamoeba coli*; and *Hymenolepis nana* and *Entamoeba coli*.

The occurrence of intestinal parasites distributed according to the school food handler's home district is shown in Table 3.

DISCUSSION

The detection of school food handlers infected with intestinal parasites in 17 of the 20 public elementary schools varied from 20% to 100%. The present study was the first to be conducted in the city of Uberlândia, Minas Gerais, Brazil.

This study showed that only two schools had contamination indices lower than 25%. The food handlers from one of the schools had a 25% positive rate for *Giardia lamblia*. Of the other schools two presented only *Entamoeba coli* infections. In three of the schools a single infected individual was not found. School number 18 was built just before this study was done and it has all facilities as treated water, sewer and pavement. The schools numbered as 19 and 20 have a low population density and the number of collected samples were also low. And yet eight school food handlers from school number 20 refused to take part in this survey.

individuals and their rates of positive findings. Table 2 demonstrates the occurrence of the intestinal parasites in school food handlers distributed by age. All studied individuals were females aged between 24 to 69 years.

It was found that 49 of 104 (47.1%) school food handlers had parasitic infections and among them 32 (65.3%) had a single parasite and 17 (34.7%) two parasites. It was verified that from the 32 cases mentioned above, 10 individuals were eliminating *Giardia lamblia*, 14 *Entamoeba coli*, 3 hookworms, 3

TABLE 2

Distribution of the intestinal parasites by age group of the infected school food handlers, in Uberlândia, Minas Gerais, 1988.

Parasites	Age group (year)					n	%
	20-29	30-39	40-49	50-59	60-69		
<i>Giardia lamblia</i>	3	13	6	0	0	22	21.1
<i>Entamoeba coli</i>	0	13	4	4	1	22	21.1
Hookworms	1	5	3	0	1	10	9.6
<i>Ascaris lumbricoides</i>	1	1	2	2	0	6	5.8
<i>Entamoeba histolytica</i>	0	2	0	0	1	3	2.9
<i>Hymenolepis nana</i>	0	1	0	0	1	2	1.9
<i>Strongyloides stercoralis</i>	0	0	1	0	0	1	1.0

TABLE 3
 Intestinal parasites listed by infected school food handler's home district in Uberlândia, Minas Gerais, Brazil, 1988.

DISTRICT	B R A S I L	C J.	C O P A L V O R A D A	C R U Z L O B A N D A	D. M U R A	J A R G U Á	J D.	J D.	J D.	L U I Z I N S	M A R I T I N S	O L I V E I R A	P A R T I M O N I O	P L A N T O	P. R O O S E V E L T	S A N T A M A R I C A	S A N T A M O N I C A	S E R P E N T E R I S	T A N C E N Y	T I B E R I Y	T O C A N T I N S	T U B A L I N A	
PARASITES																							
<i>Giardia lamblia</i>	-	-								--	--											--	
<i>Entamoeba coli</i>			--	--	-	-	-	-	--	--											--	--	
Hookworms																						--	--
<i>A. lumbricoides</i>																							
<i>E. histolytica</i>																							
<i>H. nana</i>																							
<i>S. stercoralis</i>																							

In a coproparasitologic investigation studying 1,800 students in Uberlândia, COSTA-CRUZ et al. ¹ detected 55.9% infected children with intestinal parasites and the most frequent ones were: *Giardia lamblia* (26.3%), *Entamoeba coli* (13.6%), *Ascaris lumbricoides* (11.2%), *Hymenolepis nana* (7.6%) and hookworms (7.3%). *Entamoeba histolytica* infection occurred in 1.9% and *Strongyloides stercoralis* in 1.2%. The occurrence of enteroparasitic infection in individuals that were seen through 23 of the 25 ambulatory services in Uberlândia municipality in 1988 was described by RIBEIRO DE SÁ & COSTA-CRUZ ¹⁸. A total of 8,158 stool samples were tested and 26% were found to be positive for the following parasites: *Entamoeba coli* (23.7%), *Giardia lamblia* (23.6%), *Entamoeba histolytica* (17.4%), *Endolimax nana* (16.0%), *Ascaris lumbricoides* (9.6%), *Hymenolepis nana* (4.1%), hookworms (1.8%), *Strongyloides stercoralis* (1.4%) *Enterobius vermicularis* (1.2%), *Taenia* sp. (0.6%), *Trichuris trichiura* (0.5%) and *Schistosoma mansoni* (0.1%).

In the present study, the occurrence of 47.1% of infected individuals is considered high if compared to the 4% positive index found in food handlers from 18 day-care centers supported by the municipality of São Paulo, SP ²⁰, Brazil, and to the 34% positive index found among regular food handlers who cared for nursing babies in the city of Valdivia, Chile ⁴. These results, that were based on the analysis of a single stool sample per individual, are considered high if compared to the ones described by MUNHOZ et al. ¹² that detected a positivity rate of 37.1% from stool samples of general hospital workers and 58.4% after submitting some individual samples to triplicate assays.

In the methodology described for the present study, 4 helminths and 3 protozoa were detected. The protozoa infection level, compared to the total number of individuals, was 45.2% with the predominance of *Giardia lamblia* and *Entamoeba coli*. The helminth positive index was 18.3%, with the predominance of hookworms. In this study, the detection of food

handlers infected by *Giardia lamblia* and *Entamoeba histolytica* is more pertinent than the results found among infected individuals by helminths, since the first mentioned protozoa can be directly transmitted by the hands. The detection of *Entamoeba coli* in parasitologic tests serves as a risk indicator of stool contamination among the individuals exposed.

The occurrence of *Giardia lamblia* (21.1%) registered in this study was superior to the ones reported by DIAZ et al.³ and by REYES & MUNOZ¹⁶ that were performed among hospital food handlers from Santiago, Chile and from the reports of other authors among food handlers from many cities from Chile^{2, 4, 5, 9, 11, 17}. The occurrence of *Entamoeba coli*, which in our study was detected at the same frequency as *Giardia lamblia*, was lower than the ones mentioned by other studies^{2, 3, 4, 5, 9, 16, 17}, and was higher than that one observed by LOBATO et al.¹¹. In two other studies, the detection of individuals infected by *Giardia lamblia* (with 26.3%¹ and 23.6%¹⁸) in Uberlândia, during the same year, confirmed the high prevalence of this infection.

The 2.9% index for *Entamoeba histolytica* was higher only than the ones found by LAHAM et al.¹⁰ that detected .7% and lower than DIAZ et al.³ (2.9%), DALL'ORSO et al.² (3.5%), LOBATO et al.¹¹ (5.0%) FRENZEL et al.⁴ (8.6%), REYES & MUNOZ¹⁶ (15.1%) and REYES et al.¹⁷ (21.5%).

The detection of 10 individuals (9.6%) infected by hookworms contrasted with the data described in the literature so far. Hookworm infection was only registered in Jordan resulting in a positive index of 2.5%.

The ascariasis was lower than that described by FRENZEL et al.⁴ (14.9%) and higher than four other studies that showed indices varying from .8% to 4.9%^{2, 5, 9, 10}.

The occurrence of *Hymenolepis nana* in 1.9% of the cases in the present study is epidemiologically important since the eggs are easily spread in community environments. The *Hymenolepis nana* index was higher than four studies previously conducted among food handlers. These studies found from 1% to 1.8% positive indices^{5, 10, 11, 16}.

The results from the present study showed that there is a need for a rigid semi-annual parasitic control program to take place among all school food handlers,

including, as well, an orientation pertaining to the mechanisms of transmission of the enteroparasitoses and their specific treatment.

RESUMO

Parasitas intestinais em manipuladores de merenda escolar na cidade de Uberlândia, Minas Gerais, Brasil.

Para verificar a presença de parasitas intestinais em manipuladores de merenda escolar foram coletadas amostras fecais de 104 cantineiras e serventes que auxiliavam no preparo da alimentação de 20 Estabelecimentos da rede pública de ensino de 1º grau, localizados em diferentes bairros, da cidade de Uberlândia, Minas Gerais. As amostras foram coletadas nos meses de novembro e dezembro de 1988 em frascos plásticos contendo formol a 10% e processadas pelo método de Hoffmann, Pons & Janer sendo o sedimento examinado em triplicata. Todos os indivíduos pertenciam ao sexo feminino com idade entre 24 e 69 anos. Foram detectados manipuladores de merenda escolar parasitados em 85% das Escolas estudadas. Das 104 amostras de fezes, 49 (47,1%) estavam positivas, sendo que 32 (65,3%) pertenciam a indivíduos monoparasitados e 17 (34,7%) a indivíduos biparasitados. Os parasitas em ordem decrescente de ocorrência foram: *Giardia lamblia* (21,1%), *Entamoeba coli* (21,1%), ancilostomídeos (9,6%), *Ascaris lumbricoides* (5,8%), *Entamoeba histolytica* (2,9%), *Hymenolepis nana* (1,9%) e *Strongyloides stercoralis* (1,0%). Conclui-se pela necessidade de rigoroso controle semestral, tratamento específico e orientação sobre os mecanismos de transmissão das enteroparasitoses a todos os manipuladores de merenda escolar dos Estabelecimentos de ensino.

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REFERENCES

1. COSTA-CRUZ, J. M.; AMBROSIO, M. R.; MARQUES, D. E. et al. - Inquérito coproparasitológico em escolares de Uberlândia, MG. Rev. Soc. bras. Med. trop., 24 (supl., 2): 141, 1991.

2. DALL'ORSO, L. M.; PINILLA, N.; PARRA, G. & BULL, F. - Parasitos y protozoos comensales intestinales en manipuladores de alimentos del área central de la ciudad de Concepción, Chile. **Bol. chil. Parasit.**, 30: 30-31, 1975.
3. DIAZ, M. C.; MUÑOZ, V.; DURRUTY, J. et al. - Estudio bacteriológico y parasitológico en manipuladores de alimentos de servicios hospitalarios. **Rev. méd. Chile**, 108: 900-902, 1980.
4. FRENZEL, A.; TORRES, F.; GUERRERO, S. et al. - Parasitosis intestinal en lactantes y su relación con la infección de sus manipuladores de alimentos y el saneamiento ambiental. **Rev. méd. Chile**, 107: 343-351, 1979.
5. FUENTES, A.; SAGUA, H.; ARAYA, R. & GONZÁLEZ, J. - Estudio parasitológico de manipuladores de alimentos en la ciudad de Antofagasta. **Rev. chil. Tecnol. méd.**, 4 (2): 69-71, 1981-1982.
6. HENRÍQUEZ, M. A. B. & CASTELBLANCO, C. G. - Enteroparasitosis en manipuladores de alimentos. **Rev. chil. Nutr.**, 17: 122-125, 1989.
7. HOFFMANN, W. A.; PONS, J. A. & JANER, J. L. - The sedimentation concentration method in schistosomiasis mansoni. **Puerto Rico J. publ. Hlth.**, 2: 283-298, 1934.
8. JACKSON, G. J. - Public health and research perspectives on the microbial contamination of foods. **J. Anim. Sci.**, 68: 884-891, 1990.
9. KRSTULOVIC, L. & REYES, V. - Enteroparasitosis en manipuladores de alimentos de la Comuna de El Monte. **Parasit. al Día**, 8: 13-14, 1984.
10. al-LAHHAM, A. B.; ABU-SAUD, M. & SHEHABI, A. A. - Prevalence of *Salmonella*, *Shigella* and intestinal parasites in food handlers in Irbid, Jordan. **J. Diarrhoeal Dis. Res.**, 8: 160-162, 1990.
11. LOBATO, I. L.; ARRIAGADA, J. P.; NUNEZ, J. O. et al. - Enteroparasitosis en manipuladores de alimentos de la ciudad de Arica, I Region, Chile. **Rev. chil. Tecnol. méd.**, 8: 355-356, 1985.
12. MUNHOZ, R. A. R.; FAINTUCH, M. B. & VALTORTA, A. - Enteroparasitoses em pessoal de nutrição de um hospital geral: incidência e valor da repetição dos exames. **Rev. Hosp. Clin. Fac. Med. S. Paulo**, 45: 57-60, 1990.
13. OTERI, I. & EKANEM, E. E. - Food hygiene behaviour among hospital food handlers. **Publ. Hlth. Rep. (Wash.)**, 103: 153-159, 1989.
14. QUICK, R.; PAUGH, K.; ADDISS, D. et al. - Restaurant-associated outbreak of giardiasis. **J. infect. Dis.**, 166: 673-676, 1992.
15. RAMIREZ, R. - Algunos factores epidemiológicos que favorecen la infección enteroparasitaria en Chile. **Bol. chil. Parasit.**, 30: 80, 1975.
16. REYES, M. H. & MUÑOZ, V. - Enteroparasitosis en manipuladores de alimentos en hospitales. **Rev. méd. Chile**, 103: 477-479, 1975.
17. REYES, H.; OLEA, M. & HERNÁNDEZ, R. - Enteroparasitosis en manipuladores de alimentos del Area de Salud Oriente de Santiago. **Bol. chil. Parasit.**, 27: 115-116, 1972.
18. RIBEIRO DE SÁ, M. A. & COSTA-CRUZ, J. M. - Incidência de enteroparasitas nos Centros de Saúde do município de Uberlândia, MG, no ano de 1988. **Rev. Soc. bras. Med. trop.**, 24 (supl. 2): 141-142, 1991.
19. SANCHEZ, J. L.; RIOS, C.; HERNANDEZ-FRAGOSO, I. & HO, C. K. - Parasitological evaluation of a foodhandler population cohort in Panama: risk factors for intestinal parasitism. **Milit. Med.**, 155: 250-255, 1990.
20. TORRES, D. M. A. G. V.; CHIEFFI, P. P.; COSTA, W. A. & KUDZIELICS, E. - Giardiase em creches mantidas pela Prefeitura do Município de São Paulo, 1982/1983. **Rev. Inst. Med. trop. S. Paulo**, 33: 137-142, 1991.

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