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Enteroparasites in vegetables marketed in Rio Branco, Acre, Western Brazilian Amazon

Kelcinéia Araújo de Souza[1], Vânia Lúcia Brandão Nunes[2], Maria Elizabeth Cavalheiros Dorval[3], Andreia Fernandes Brilhante[4]*

1. Laboratório Central de Saúde Pública do Acre, Rua Guarujá, 165, Vilage Wilde Maciel, 69918-504, Rio Branco, Acre.
kelcineia.araujo@ac.gov.br *http://orcid.org/0000-0002-6626-926X*
2. Laboratório de Parasitologia Humana, Universidade Anhanguera-Uniderp, Alexandre Herculano, 1400, Taquaral Bosque, 79035-470, Campo Grande, Mato Grosso do Sul.
vlbnunes@terra.com.br *http://lattes.cnpq.br/2521225159181543* *http://orcid.org/0000-0002-6986-6369*
3. Laboratório de Análises Clínicas, Universidade Federal de Mato Grosso do Sul, Cidade Universitária, Caixa Postal 549, 79070-900, Campo Grande, Mato Grosso do Sul.
mecdorval@gmail.com *http://lattes.cnpq.br/6230848650199337* *http://orcid.org/0000-0001-9629-1583*
4. Centro de Ciências da Saúde e do Desporto, Universidade Federal do Acre, Rodovia BR 364, Km 04, Distrito Industrial, 69920-900, Rio Branco, Acre.
afb.brilhante@gmail.com *http://lattes.cnpq.br/0029213795464192* *http://orcid.org/0000-0002-4436-432X*

ABSTRACT

We analyzed the presence of human enteroparasites in vegetables marketed in Rio Branco, Acre state, in Brazil. We sampled 30 units of lettuce (*Lactuca sativa*) and 30 units of arugula (*Eruca sativa*) from supermarkets and free markets in the city. The samples were analyzed by spontaneous sedimentation technique to search for parasitic forms. Helminth eggs were detected: superfamily Ancylostomatoidea, *Trichuris trichiura* and *Taenia* sp.; and nematode larvae, as well as protozoan cysts: *Iodamoeba bütschlii*, *Endolimax nana*, *Entamoeba coli*, *Blastocystis hominis*, *Isospora* spp., *Giardia duodenalis* and *E. histolytica*. These results indicate that the consumption of these vegetables *in natura* may pose a risk to the health population, and education regarding proper handling and hygiene is necessary.

Keywords: intestinal parasites; *Lactuca sativa*; *Eruca sativa*; Amazonia.

Enteroparasitas em vegetais comercializados em Rio Branco, Acre, Amazônia Ocidental Brasileira

RESUMO

Analisamos a presença de enteroparasitos humanos em vegetais comercializados em Rio Branco, Estado do Acre, Brasil. Amostramos 30 unidades de alface (*Lactuca sativa*) e 30 unidades de rúcula (*Eruca sativa*) de supermercados e feiras livres da cidade. As amostras foram analisadas por técnica de sedimentação espontanea para pesquisa de formas parasitárias. Foram detectadas a presença de ovos de helmintos: superfamília Ancylostomatoidea, *Trichuris trichiura* e *Taenia* sp.; e larvas de nematóides, além de cistos de protozoários: *Iodamoeba bütschlii*, *Endolimax nana*, *Entamoeba coli*, *Blastocystis hominis*, *Isospora* spp, *Giardia duodenalis* e *E. histolytica*. Esses resultados indicam que o consumo desses vegetais *in natura* podem representar um risco para a saúde da população, sendo necessária educação sobre seu manuseio e higiene adequados.

Palavras-chave: parasitos intestinais, *Lactuca sativa*; *Eruca sativa*, Amazônia.

Introduction

Vegetables are a well-known vehicle for transmition of human pathogens, particularly those that are ingested *in natura* (BERGER et al., 2010). The presence of parasites on marketed vegetables is related to productive chain, sanitary conditions during production, storage, transportation and handling (ABREU *et al.* 2010; FERNANDES et al., 2015). These parasites are related to neglected diseases that are common throughout the world and lead to many public health problems (BRASIL, 2005).

Some studies carried out in the Southeast and Central-West of Brazil have diagnosed protozoa and helminths that can cause human parasitosis, in different sort of vegetables, being the lettuce (*Lactuca sativa*) the most studied and consumed in the country (MACIEL et al., 2014; SILVA et al., 2017; AMBROZIM et al., 2017). In the Brazilian Amazon there are few published studies about the occurrence of enteroparasites in vegetables (NOVACKI et al., 2017; RODRIGUES et al., 2020), and in Acre state, only one survey led in Cruzeiro do Sul (CAVALCANTE; CORRÊA, 2010).

In the state of Acre, most commercialized vegetables originate from small farms which do not follow any criteria for control or treatment of their produce. Therefore, the objective of this work was to analyze the occurrence of enteroparasites in vegetables used for crude consumption and universally available in supermarkets and open-air fairs in Rio Branco.

Material and Methods

The municipality of Rio Branco (09º59'11"S, 6749'52"W) capital of the state of Acre (AC), is located in the North region of Brazil, southwest of the Amazon region. The original vegetation in the region is Amazonia biome. The climate is equatorial, with temperatures varying from 24 to 32 °C and annual rainfall between 1877 and 1982 mm comprising the months of October to March. The economy is based on agriculture and extractivism (IBGE, 2019).

During April 2015, we obtained a total of 60 samples (30 samples each of lettuce and arugula). For each vegetable, 15 samples were from four supermarkets, and 15 were from four open street markets. The choice of supermarkets and open streets markets was made for convenience and randomly, in different neighborhoods of Rio Branco. The samples were collected in the morning, individually packaged in disposable plastic bags, placed in polystyrene boxes, and sent to Acre Central Public Health Laboratory (Laboratório Central de Saúde Pública do Acre – LACEN-AC) for parasitological analysis.

Twenty leaves were removed from each sample, and placed in a plastic tray containing 1000 mL of distilled water. With the aid of a brush, the leaves were washed according to the technique described by Oliveira and Germano (1992). Then, the liquid from each wash was filtered using a parafilter in a conical cup and was left to settle for 24 hours. At the end of the sedimentation time, the supernatant was discarded and 0.1 mL of the pellet was removed, placed between a slide and cover sheet, and stained with lugol solution. The material was examined by 10x and 40x optical microscopy using four slides of each sample.

Results and Discussion

All 60 samples were contaminated with some type of parasite (Table 1), with the predominant contamination by protozoans, mainly by commensal parasites such as *Iodamoeba bütschlii*, *Endolimax nana* and *Entamoeba coli*. Among the parasites found, on lettuce was the vegetable that was contaminated with all of them. In the arugula analyzes, no eggs of *Trichuris trichiura* and cysts of *Isospora* spp were visualized.

Table 1. Enteroparasites found in of lettuce (*Lactuca sativa*) (n = 30) and arugula (*Eruca sativa*) (n = 30) sampled from supermarkets and open street markets in Rio Branco, Acre state, in the western Brazilian Amazon in April 2015. % indicates the proportion of total samples contaminated by each parasite.

Enteroparasites	Supermarket		Open Street Market	
	Lettuce n (%)	Arugula n (%)	Lettuce n (%)	Arugula n (%)
Helminths				
Nematode larvae	9 (60)	14 (93)	13 (86)	9 (60)
Eggs of *Trichuris trichiura*	3 (20)	-	3 (20)	-
Eggs of *Taenia* sp.	-	1 (6)	1 (6)	-
Eggs of Superfamily Ancylostomatoidea	9 (60)	11 (73)	8 (53)	8 (53)
Protozoans				
Cysts of *Iodamoeba bütschlii*	4 (26)	2 (13)	3 (20)	5 (33)
Cysts of *Endolimax nana*	11 (73)	14 (93)	13 (86)	11 (73)
Cysts of *Entamoeba coli*	10 (66)	13 (86)	9 (60)	14 (93)
Cysts of *Blastocystis hominis*	5 (33)	3 (20)	2 (13)	4 (26)
Sporocyst of *Isospora* sp.	2 (13)	-	4 (26)	-
Cysts of *Giardia duodenalis*	7 (46)	-	3 (20)	2 (13)
Cysts of *Entamoeba histolytica*	7 (46)	10 (66)	5 (33)	9 (60)

Vegetable contamination by parasites usually occurs through the soil and water used for irrigation and washing, or directly from producers and manipulators (ARBOS et al., 2010; MELO et al., 2011). The predominance of protozoans in our samples may be due to that the small producers who supply Rio Branco usually water their hydroponics cultures with well water and irrigation dams. The main source of contamination of vegetables is through water contaminated with human or animal fecal material (ARBOS et al., 2010). The living conditions of horticulturists are often precarious, with defficient sanitary conditions, which may result in them being carriers of enteroparasites (SILVA et al., 2010).

In other studies, the parasitic contamination rates among vegetables were also found to be high, with amoebas of the genus *Entamoeba* being more prevalent than helminths and hookworms (ARBOS et al., 2010; NOMURA et al., 2015; LACERDA et al., 2020), similarly to our results.

Our results also demonstrated a high percentage of infection by nematode larvae. In other locations in the country, such as Montes Claros (Minas Gerais), wherein the authors found a significant number of samples of positive lettuce with *Strongyloides stercoralis* (SÁ et al., 2019), as well as in Londrina (Paraná), with samples of lettuce and almond positive for larvae of different species of nematodes (NOMURA et al., 2015).

Among the vegetables sampled, only one (arugula) was found to be contaminated with *Taenia* spp. eggs, this is still worrying, as the eggs of *T. solium* can cause neurocysticercosis in humans, which can lead to severe sequelae or even death (MARTINS-MELO et al., 2017).

The high percentages of commensal enteroparasites found in this study deserve attention even if they are not considered pathogenic, or may only be pathogenic in immunocompromised persons or in stress conditions, as in the case of *Blastocystis hominis* (PABORIBOUNE et al., 2014) and *Isospora* spp. (SILVA-BARBOSA et al., 2012). The presence of these enteroparasites can be indicators of low sanitation conditions since these vegetables are contaminated with fecal waste. Therefore, requires rigid inspection at production and sales points as well as educational awareness for producers and consumers regarding the importance of the cultivation ecosystem and sanitization of these foods.

Conclusion

Our results show a high percentage of enteroparasites contamination in vegetables marketed in Rio Branco, which may expose the population to the risk of transmission by these parasitic agents. Thus, these findings alert to the need for further studies with a wider range of supermarkets and open street markets, in order to better measure the contamination of these parasites in vegetables for human consumption in Rio Branco.

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