

Original article

Prevalence of intestinal parasites in selected vegetables at major public markets in Metro Manila, Philippines

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Abstract

Objective: This study aims to determine the prevalence of intestinal parasites infesting the vegetable foodstuffs and determine the parasitological profile of the vegetable foodstuffs examined. **Methods:** About 200 randomly sampled vegetable foodstuffs obtained from the vendors of the Balintawak and Divisoria public markets were examined for the occurrence of intestinal parasites. **Results:** A total of 119 (59.5%) vegetable foodstuffs examined were tested positive. The most common parasite found was the *Ascaris lumbricoides*. No significant differences between the prevalence of intestinal parasites at the two public markets were found ($P > 0.05$). **Conclusion:** The vegetables can be a potential source of parasitic infection.

Keywords: Parasite; Vegetable; Foodstuff; Intestinal parasite; Public market

INTRODUCTION

Fresh vegetables are important in one's daily diet, as they contain vitamins and minerals. However, there is an increasing number of reported food-borne illnesses attributed to the consumption of fresh vegetables^[1]. The consumption of fresh vegetables has been a major way of transmission of parasitic contaminants, particular intestinal parasites.

Intestinal parasites cause significant morbidity and mortality worldwide. Millions of people across the world suffer from parasitic infections, particular those brought by intestinal parasites. In the Philippines, parasitic infections caused by intestinal parasites constitute a major medical problem. These in-

testinal parasites are commonly transmitted through a fecal oral route to humans due to poor personal hygiene^[2], environmental pollution of soil and water sources by human feces and animal excreta, and the use of night soil as fertilizer^[3].

Assessments on the parasitic contamination of vegetables are vital because most Filipinos purchase and consume vegetables as their source of nourishment. This study aims to determine the prevalence of intestinal parasites infesting vegetable foodstuffs and to identify the parasitological contamination profile of the different fresh vegetables sold at major public markets in Metro Manila, Philippines. Information obtained from these assessments may help in the design of control strategies that will safeguard the general public's health.

MATERIALS AND METHODS

The study was carried out from May 2008 to June

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2008 in two major public markets in Metro Manila, Philippines. Fresh vegetables from the farms situated in the provinces of the Philippines are brought in to Metro Manila through the Balintawak and Divisoria public markets every Sunday. These public markets are open-air markets in Metro Manila, Philippines.

About five different fresh vegetables were bought in the public markets. These vegetables are eaten raw and are added as garnishing in food viands. The vegetable samples included the mustard (*Brassica junca*), pechay (*Brassica pekinensis*), cabbage (*Brassica oleracea*), lettuce (*Lactuca sativa*), and celery (*Apium graveolens*). A 100 g sample of each vegetable was bought from the vendors by random sampling. A total of 200 vegetable samples randomly selected in the two public markets were placed in plastic bags, transported to the laboratory, and examined by the concentration method.

Vegetable samples brought to the laboratory were washed with water; washings were collected, allowing sedimentation at room temperature for 6 h. The supernatant was discarded, and the filtrate was centrifuged for 10 mins at 3 200 rpm. Sediment was examined in Lugol-stained slides through light microscopy [3].

The prevalence of intestinal parasites on the vegetables at the two public markets was determined. Significant differences in the prevalence of intestinal parasitism in the two public markets in Metro Manila, Philippines, were determined using the z test for two proportions. The null hypothesis for the z test indicated no significant difference in the prevalence of intestinal parasitism in the two public markets, whereas the alternate hypothesis presented a significant difference in the prevalence of intestinal parasitism between the public markets. The test indicating a P value of <0.05 could be a reason to conclude that the differences between the two markets were significant.

RESULTS

A total of 200 vegetable samples composed of 20 samples for each species were collected; mustard, pechay, cabbage, lettuce, and celery were from the two public markets, namely Balintawak and Divisoria

Public markets.

In all, 119(59.5 %) vegetable samples were infested with intestinal parasites. Twenty-nine (72.5%) of pechay, 22(55.0%) lettuce, 28(70.0%) mustard, 32(80.0%) celery, and 8(20.0%) cabbage were tested positive. About 61.0% of vegetable samples bought randomly from the vendors of the Divisoria market were tested positive for intestinal parasites (Table 1).

Out of the 119 vegetable samples that were tested positive, vegetable samples were found to contain one or more intestinal parasites, with 87 (43.5 %) *Ascaris lumbricoides*, 8 (4.0 %) *Trichuris trichiura*, 33 (16.5 %) hookworm, 11 (5.5 %) phasmid nematode, 17 (8.5 %) Ascarid, 10 (5.0 %) *Entamoeba histolytica*, 5 (2.5 %) *Iodamoeba* sp., and 33 (16.5 %) unidentified parasites.

There was no significant difference between the prevalence of various intestinal parasite species among the vegetable samples obtained at the two public markets of Metro Manila (P > 0.05).

Table 1 Prevalence of intestinal parasites in public markets of Metro Manila, Philippines (n, %).

Vegetable samples	Public market location		
	Balintawak market	Divisoria market	Overall
Pechay	13/20 (65.0)	16/20 (80.0)	29/40 (72.5)
Lettuce	10/20 (50.0)	12/20 (60.0)	22/40 (55.0)
Mustard	15/20 (75.0)	13/20 (65.0)	28/40 (70.0)
Celery	17/20 (85.0)	15/20 (75.0)	32/40 (80.0)
Cabbage	3/20 (15.0)	5/20 (25.0)	8/40 (20.0)
Total	58/100 (58.0)	61/100 (61.0)	119/200 (59.5)

DISCUSSION

This was a cross-sectional study, and its scope is limited to assessing the prevalence of intestinal parasites among the vegetable samples, cabbage, mustard, lettuce, celery, and pechay, obtained from the Balintawak and Divisoria public markets during the periods of study. This study showed that the preva-



lence of intestinal parasitic infestation of the vegetable foodstuffs sampled was 59.5 % , and no significant difference on the prevalence of intestinal parasites among the vegetable samples was obtained at the two public markets. It is likely that no differences were found since both public markets exhibit poor environmental sanitation and management of wastes in the market was evident. The results of this study showed parallel findings to that conducted by De Leon et al. ^[3], whereas the vegetables were likewise infested with parasites. This study likewise showed that the most common intestinal parasite found in the vegetable samples was the *A. lumbricoides*. This result is supported in a study conducted by Cauyan and Usero ^[4], whereas they have shown that the most common intestinal parasite found in the Philippine vegetables eaten raw are the ova of the *A. lumbricoides*. The presence of the parasites in the foodstuffs indicates high transmission risks of the parasites to the general public. A study has indicated that the presence of these parasites in the vegetable foodstuffs may be attributed to the handling techniques of the vegetables, particularly by those handlers whose contaminated hands have not been washed after defecation ^[2] or from flies that mechanically transmit the parasites from the feces to the foodstuffs ^[5]. It is likely that vegetables derived from the farms in the provinces of the north may still use night soil in their agricultural farms ^[3]. The practice in the use of night soil in agricultural farms may lead to the environmental contamination of soil, whereas vegetables are grown with human feces ^[1].

Results of the study showed that parasitic infestation in the vegetable foodstuffs obtained at the Balintawak and Divisoria public markets were evi-

dent. No significant differences on the prevalence of parasitic infestation in the vegetable foodstuffs obtained from the two public markets were found. The presence of these parasites in the vegetable foodstuffs may be attributed to the food handlers handling the vegetables from the farms to the markets or in and around the markets and to the use of night soil as a common agricultural practice in farms rearing these vegetable foodstuffs. These findings indicate a public health priority that will look into the need to educate people on food safety, environmental sanitation in and around the market, personal hygiene, and the ways of reducing the prevalence of possible infections in the foodstuffs sold at the markets.

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