

SURVEY OF THE PARASITE TRANSMISSION ROLE OF FRESH VEGETABLES IN URMIA CITY, IRAN

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Abstract. In Urmia, a total of 640 samples from eleven different vegetables (2,221.93 g) used for raw consumption was analyzed for the presence of helminths (eggs, parasite larvae, and free-living larvae) and protozoa (oocysts and cysts), for one year. Helminth contamination (2,776, 2,840, and 1,680, respectively) was detected in all vegetable samples (celery, radish, lettuce, leek, spinach, parsley, dill, green onion, cress, fenugreek, and coriander leaves). Oocysts and protozoan cysts were not detected. More eggs were found during the rainy season (summer and fall) and in cress (12.6%). Identified parasite genera were *Trichuris*, *Trichostrongylus*, *Ascaris*, *Schistosoma*, *Taenia*, and *Hymenolepis nana*.

INTRODUCTION

The ingestion of raw vegetables represents an important means of transmission for several infectious diseases. The objectives of the present survey were to perform a parasitological evaluation of vegetables sold commercially in greengrocers in Urmia City, Iran, which were consumed raw, and to analyze the presence of human and livestock parasitic eggs, larvae, cysts, and oocysts; to determine the greater percentages and the season of contamination; to identify the parasites by morphology and micrometry.

MATERIALS AND METHODS

A parasitic survey on vegetables collected from greengrocers in the Urmia City was conducted to detect human and livestock parasitic eggs, larvae, cysts, and oocysts. Vegetables were analyzed by the appropriate methodology, to discover and identify the paths of transmission of enteroparasites of medical and veterinary interest.

Parasitological examinations were performed in material derived from 640 vegetable samples to detect cysts, oocysts, larvae, and eggs of intestinal parasites. The location of the survey were divided into four zones comprising greengrocers and markets in Urmia City, from December 2001 to November 2002. A total of 640 samples was collected, with 11 different vegetables (total 2,221.93 g), being coriander leaves, dill, fenugreek, green onion, lettuce, leek, parsley, radish,

celery, spinach, and cress. First, both sides of the vegetable leaves were washed carefully with a hard brush, and then each unit or bundle was washed with 50 ml of sterilized water, allowing sedimentation at room temperature for 8 hours. Next, 5 ml of sediment were centrifuged at 3,000 rpm for 5 minutes. Finally, the species of parasites and the mean number of parasites per gram of vegetable were determined by light microscopy and micrometry.

RESULTS

The greatest percentages of eggs and larvae in spring, summer, fall, and winter were green onion (26.6%), lettuce (28%), parsley (23%), and fenugreek (45.2%), respectively. Helminth contamination by egg per gram (EPG) (1.2, 2.6, 1.4, 1.7) and larva per gram (LPG) (0.7, 1.3, 1.6, 2), respectively was found. Identified filariform and rhabditiform parasite larvae and identified helminths were *Trichuris* spp, *Trichostrongylus* spp, *Ascaris*, fluke (*Schistosoma* spp), Cestode (*Taenia* sp, *Hymenolepis nana*) (Tables 1, 2, 3, and 4). Oocysts and cysts were not detected.

DISCUSSION

Similar to the results of Choi and Lee (1972), eggs of 5 parasites (*Ascaris*, *Trichuris*, *Trichostrongylus*, *Clonorchis*, and hookworms) and 2 larvae (filariform and rhabditoid), were found. Furthermore, a number of eggs and larvae of undetermined species were found. In contrast, Robertson and Gjerde (2001) in Norway, and Sahebani (2000), Akhlagi *et al* (2001) in Iran, showed that samples examined for oocysts were positive. Of the contaminations discovered, fenugreek was highest (45.2%), followed by green onion (26.6%), lettuce (28%), and parsley (23%), in spring, summer,

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Table 1
Rate of contamination in 8 different fresh vegetables in spring.

Sample	Cr	D	F	Go	Lc	Lk	P	R	Total
Weight (g)	135.2	101.2	115.23	164.02	180.3	124.31	128.1	201.38	1,149.74
Eggs (%)	63 (4.6)	83 (6.1)	165 (12.1)	364 (26.6)	235 (17.2)	188 (13.8)	45 (3.3)	222 (16.3)	1,365 (1.2) ^a
Larvae (%)	27 (3.2)	78 (9.2)	95 (11.2)	210 (24.8)	202 (23.8)	83 (9.8)	48 (5.7)	105 (12.4)	848 (0.7) ^b
F-L L	20	64	79	200	111	73	32	14	529

Cr=Coriander, D=Dill, F=Fenugreek, Go=Green onion, Lc=Lettuce, Lk=Leek, P=Parsley, R=Radish, F-L L=Free-living larvae, ^aEPG, ^bLPG

Table 2
Rate of contamination in 7 different fresh vegetables in summer.

Sample	Ce	D	G0	Lc	Lk	P	S	Total
Weight (g)	17.55	18.63	33.4	34.15	13	10.17	23.76	150.66
Eggs (%)	92 (23.7)	23 (5.9)	89 (22.9)	109 (28)	56 (14.4)	12 (3.1)	8 (2.1)	389 (2.6)
Larvae (%)	20 (10)	18 (9)	20 (10)	26 (13)	64 (32)	38 (19)	14 (7)	200 (1.3)
F-L L	14	9	12	12	18	14	12	91

Ce=Celery, D=Dill, Go=Green onion, Lc=Lettuce, Lk=Leek, P=Parsley, S=Spinach, F-L L=Free-living larvae

Table 3
Rate of contamination in 8 different fresh vegetables in fall.

Sample	Ce	Cr	Cs	D	Go	Lk	P	S	Total
Weight (g)	119.41	141.03	106.8	98.56	138.52	127.5	113.94	115.07	960
Eggs (%)	235 (17.3)	48 (3.5)	287 (21.1)	47 (3.5)	18 (1.3)	134 (9.8)	314 (23)	280 (20.5)	1,363 (1.4)
larvae (%)	83 (5.2)	11 (0.7)	351 (22.1)	41 (2.6)	25 (1.6)	40 (2.5)	455 (28.7)	584 (36.7)	1,590 (1.6)
F-L L	27	5	150	64	10	15	357	311	939

Ce=Celery, Cr=Coriander, Cs=Cress, D=Dill, Go=Green onion, Lk=Leek, P=Parsley, S=Spinach, F-L L=Free-living larvae

fall, and winter, respectively, which concurs with the observations of Davami (1997) and Firoozabadi *et al* (2001). Of the parasites studied, *Ascaris* eggs were highest in number, followed by *Trichostrongylus* eggs and filariform larvae; the least often observed were rhabditoid larvae, which is accord with Choi and Lee

(1972) and in close agreement with Oliveira and Germano (1992).

These percentages suggest a risk of human infection, since parasites capable of infecting man may exist in association with these vegetables.

Table 4
Rate of contamination in 8 different fresh vegetables in winter.

Sample	Cr	Cs	D	F	Go	Lk	S	P	Total
Weight (g)	14.44	11.83	101.2	14.06	20.13	20	28.46	10.96	211.0
Eggs/g (%)	63 (17.3)	48 (13.2)	6 (1.64)	165 (45.2)	62 (17)	9 (2.5)	12 (3.3)	-	365 (1.7)
Larvae (%)	27 (6.2)	72 (16.4)	6 (1.4)	95 (21.7)	93 (21.2)	7 (1.5)	137 (31.3)	1 (0.2)	438 (2)
F-L L	20	9	9	79	67	10	16	-	210

Cr=Coriander, Cs=Cress leaves, D=Dill, F=Fenugreek, Go=Green onion, Lk=Leek, P=Parsley, S=Spinach, F-L L=Free-living larvae

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