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Parasitic Contamination of Vegetables from Farms and Markets in Tehran

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Abstract*:*

Because of endemic parasitological infectious diseases in Iran and contaminated vegetables, as one of the most important ways of contamination, carried out a parasitical study on 263 vegetable samples from 44 farms in the suburbs of Tehran city, and also 166 vegetables samples from 20 green grocery markets in the same city. From 263 samples of farms 147 cases (65%) of contamination were recorded, of which 43 cases (16/5%) of human pathogenic parasites were isolated.

In this study various techniques were used such as: Baermann funnel, centrifuging of plants and soil, temporal precipitation procedure and so on. Ova and parasites such as *Ascaris lumbricoides*, *Trichuris trichiura*, *Trichostrongylus* sp. *Toxocara* sp. Larvae of Nematodes, protozoa cysts like *Amoeba* sp. *Giardia lamblia* and some flagellatae were seen.

The highest percent of contamination was detected in leek and parsley and the lowest one was detected in tarragon.

The results show that vegetables could be a potential source of parasitic infection.

Key Words: Parasite, Vegetable, Farms, Markets, Tehran, Iran.

Introduction

Consumption of vegetables either raw or cooked, in addition to its usage as a great source of vitamins and minerals, is a tradition in Iran. Vegetables are used extensively in different parts of the country, but and unfortunately people do not know how to wash them properly.

According to human prevalence rates of parasitic infections in different parts of country and the association between vegetables (especially raw ones) and these infections, we decided to take a thorough study about the methods of transmission. Some previous studies have reported the rate of vegetable contamination to parasitic outputs from 1.94% to 68.3% in different parts in Iran (1, 3, 4, 6, 7). Of course some of them have reported the nonpathogenic parasites as well (3, 1).

At first the vegetable farms from suburbs of Tehran, then the vegetables in the green groceries of the city, were examined. Afterwards, the contamination rate of both places were studied and compared. True overall, objectives of this study were to identify the ova and larvae of worms as well as protozoa cysts in vegetables, finally the role of vegetables in human parasitic diseases.

Materials and Methods

Sampling from south of Tehran, was carried out, including 7 villages from southwest, 15 from mid-south and 22 from southeast of Tehran's suburb.

263 vegetable samples were collected from 44 farms. The vegetable samples included parsley, commondill, coriander, tarragon, spring onions, spearmint, sweet basil, radish, fenugreek, leek, cress, spinach and beetroot leaves. We gathered 150-200 gr of each vegetable along with its root from different crates and placed a nylon bag with details of field as well as the date of sampling.

Sampling from the markets and the green groceries was done in the same way, randomly from different parts of Tehran including north, south and center of the city. We had 166 samples from 20 green groceries.

The following methods to isolate protozoa cysts, worms ova and various soil nematodes were used:

A-Baermann funnels (9)

In this procedure, at first the soil contacting vegetable roots is put upon the filter and the filter is placed on the funnel full of water which has an evacuating valve. After 2 hours the soil larvae and nematodes move toward water and accumulate inside the funnel tube. At last opening the funnel tap leads the nematodes and larvae in the glass bottle. This process was repeated three times.

B-Centrifuging of plants and soil (9):

In this procedure after 15 minutes of pouring the sample in a dish of water, all the large and small materials and mires could be deposited. The deposited materials are passed from filters with 1000 µm, 250 µm, 100 µm, and 37 µm in diameter. All the mature nematodes, larvae and parasite ova retain upon the filter.

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Washing the filters by water, microorganisms gather into a dish and pour in a measuring cylinder. After 1 hour all the large materials deposit and all the light ones float.
The supernatant is emptied and the remainder equally is divided into several tubes and then centrifuged for 5-7 min. with 3000-4000 rpm. Then again we emptied the supernatant and add equal volumes of sucrose solution to the precipitate again centrifuged it in 1000 R.P.M for 1 min until the parasite ova float on the surface.

C- The temporal precipitation (9):
First of all, we soaked vegetables in a plastic dish, and then the mud and other materials were precipitated within 2-3 min. We removed the vegetables from the surface and threw out the primary sedimental materials. After soaking the vegetables in normal saline for 10-15 min, the floating vegetables were discarded and following some washing steps the remaining fluid became almost clear. Following 12 h deposition of the fluid, the sedimentation was examined.

Results

From 44 farms and 20 markets, 40 farms and all 20 markets had parasitic contamination. Nineteen contaminated farms had no parasitic contamination transmissible to human. Four farms were free of parasitic outputs; therefore 23 of 44 farms had no parasitic infections transmissible to humans.
Totally from 429 collected samples, 280 cases (65.2%), showed contamination with parasites' outputs.
Concerning farms from 263 samples 147 cases (65%) of vegetable contamination were recorded, of which in 43 cases (16/5%) human pathogenic parasites were seen (table 1) but with regard to the market vegetables which brought from the different parts of the country, the parasitic contamination rate, transmissible to humans was 35% (Table 2). Finally the highest rate of contamination was reported in leek and parsley and the lowest in tarragon.

Table 1*:* Distribution of pathogen parasites, related to examined farms in Tehran and suburbs.

Pathogenic parasites	South West		Mid South		South East		Total	
	Contaminated farms	Contaminated samples	Contaminated farms	Contaminated samples	Contaminated farms	Contaminated samples	Contaminated farms	Contaminated samples
Ascaris Iumbricoides	1	2	1	1	-	-	2	3
Trichuris trichiura	-	-	1	1	-	-	1	1
Trichostrongylus	1	2	2	2	7	11	10	15
Entrobius vermicularis	-	-	-	-	1	1	1	1
Toxocars.sp.	-	-	1	1	1	1	2	2
Taenia. sp.	-	-	-	-	1	2	1	2
Amoeba. sp.	-	-	1	2	-	-	1	2
Giardia lamblia	2	3	1	3	5	11	8	17
Total sample	-	7	-	10	-	26	-	43

Table 1*:* Distribution of pathogen parasites, related to examined markets in Tehran and suburbs.

Pathogenic parasites	South West		MidSouth		South East		Total	
	Contaminated Markets	Contaminated samples	Contaminated Markets	Contaminated samples	Contaminated Markets	Contaminated samples	Contaminated Markets	Contaminated samples
Ascaris Iumbricoides	2	3	4	4	2	4	8	11
Trichuris trichiura	2	2	3	3	1	2	6	7
Trichostrongylus	3	4	7	9	4	6	14	19
Entrobius vermicularis	1	1	1	1	-	-	2	2
Toxocars.sp.	-	-	2	2	-	-	2	2
Taenia. sp.	-	-	1	1	-	-	1	1
Amoeba. sp.	-	-	1	1	-	-	1	1
Giardia lamblia.	3	4	5	5	5	6	13	15
Total sample	-	14	-	26	-	18	-	58

Discussion

Regarding some parasites such as *Trichostrongylus*, *Strongyloides stercoralis* and animal *Ascaris* such as *Toxocara* and human and animal hook worms, soil is a basic problem and of importance, because their larvae are developed in it until they become infective.

In the present study *Trichostrongylus* showed the highest rate of contamination in farms and stores, followed by *Ascaris*. In some previous studies in the country, *Ascaris* encompasses the highest rate in this regard (4, 7, 11). As for protozoa, *Giardia lamblia,* demonstrated the highst rate of contamination, this, coincided with the previous studies in this field (4, 6, 11).

The final hosts of *Toxocara* are cats and dogs but their immature shape in the form of visceral larvae is seen in human. *Enterobius vermicularis* ova can also enter the digestive tract by ingestion of soil, vegetables and food products, although the main source of transmission is direct.

As for the cestoda class, the ova of *Echinococcus granulosus* can enter the digestive tract by ingestion of raw vegetables and ingrate to other viscera and its immature form named hydatid cyst can cause several problems in some organs. In this study a kind of Taenia egg was also isolated which was not identified.

Considering the protozoa kingdom, amoebic cysts, *Giardia* and *Balantidium* under the good condition can live for a long time and could be ingested via vegetables. *Cryptosporidium* from the coccidia group can also enter the digestive tract through contaminated food products and causes severe digestive disorders. Oocysts resultant from life-cycle *Toxoplasma* parasite spread in fields from cat excrement can also enter the human through vegetables.

With regard to the parasites in vegetables of fields and markets in Tehran, it could be understood that parasitic contamination from vegetable farm in Tehran is relatively low, because the people working in these farms often use chemical fertilizers and they often water the farms from deep wells.

Another reason is that the pastures and the places where domestic animals are kept are far from the farms and this makes a lower rate of contamination, but in the markets it is dissimilar. First, it is possible that the knowledge of the villagers concerning the use of chemical fertilizers and human waste fertilizers is limited compared with the farmers in Tehran. Second, the contamination of waters which is used in other parts of the country is high because of the methods of irrigation and utilizing of the superficial waters.

Third, it is possible that vegetable contamination in the markets is secondary because of contaminated ways of transportation and ware housing and also contamination of workers who are working in the markets.

In conclusion it should be noted that in general the cleanliness rules are observed in urban areas more than that of rural areas.

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