Research Article

The Prevalence of Parasitic Contamination on Common Sold Vegetables in Alqalamoun Region

Adel T. Alhabbal*
Department of Biochemistry and Microbiology, Faculty of Pharmacy, Alkalamoon Private University, Deiratyah city, Syria.
Corresponding author's E-mail: al_habal_adel@hotmail.com

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ABSTRACT

It is well known that raw vegetables were considered as an agent for transmission of intestinal parasites and fresh vegetables have an important role in human nutrition. Therefore, the present study is designed to detect the parasite contamination in Alqalamoun region, in Syria. A total of 137 fresh vegetables were randomly collected. All samples were examined according to standard methods for detection of protozoan cyst, oocysts, helminth eggs as well as larva. Intestinal parasites were detected in 43/137 (31.38%) samples, *Giardia lamblia* cysts were the most prevalent parasite (13.13%) followed by *Entamoeba spp*. cysts (8.75%), *Enterobius vermicularis* eggs (5.83%), and *Ascaris lumbricoides* eggs (3.64 %). The highest contaminated vegetable were lettuce and parsley (32.56 %) and the lowest was radish (4.65%), These findings provide evidence for the high risk of acquiring parasitic infection from the consumption of raw vegetables in Alqalamoun region, Syria. Effective procedures are necessary to reduce parasitic contamination of vegetables.

Keywords: Vegetables, Giardia, Entamoeba, intestinal parasites, Syria.

INTRODUCTION

Vegetables are essential part of a healthy human diet due to their nutritional value. Raw vegetables are great source of vitamins, dietary fiber and minerals; and their regular consumption is associated with a reduced risk of cardiovascular disease, stroke and certain cancers .[1] Some vegetables are eaten raw as salad to retain the natural taste and preserve heat labile nutrients. Vegetables can become contaminated with enteric bacterial, viral and parasitic pathogens throughout the process from planting to consumption. The extent of contamination depends on several factors that include, among others, use of untreated waste water and water supplies contaminated with sewage for irrigation, post-harvest handling and hygienic condition of preparation in food service or home settings.[2]

In recent years, there has been an increasing in number of reported cases of food-borne illnesses linked to consuming fresh vegetables. The consumption of raw vegetables plays a major epidemiological role in the transmission of parasitic food-borne diseases. Intestinal parasites are widely prevalent in developing countries, probably due to poor sanitation and inadequate personal hygiene.[2] Several studies in different parts of the world showed that the vegetables can be agent for transmission of protozoan cysts, oocysts, helminthes eggs and larvae.[3] This problem is becoming an increasing concern because of the expanding number of susceptible people (i.e., the elderly and the immunocompromised) more extensive produce trade across international borders, and change in national and international policies concerning food safety.[4]

Up to our knowledge, no previous surveys have been conducted to evaluate the presence of parasitic contamination in vegetables in Alqalamoun region. Therefore, this study is designed to detect the parasitic contamination in some common vegetables used for raw consumption in Alqalamoun region, Syria.

MATERIALS AND METHODS

Sampling

The following vegetables were selected for this experiment**:** radish, spearmint, lettuce, coriander, parsley.

A total of 137 samples of fresh vegetables were collected to obtain the estimation of parasitic contamination, Sampling from different markets of Alqalamoun region in Syria was performed on three periods, A: in October 2013 and period B: in December of 2013, period C: in February of 2014.

Procedure for sample preparation & determination of parasites

The fresh vegetables (200 g) were collected and weighted into sterile nylon bags and transported for analysis to the Laboratory of microbiology and parasitology at Alkalamoon private university in Syria. Sample washed by vigorous shaking with 1 L of physiological normal saline (0.95% NaCl). The washing water was then left for about 12 h for sedimentation to take place. The top layer was discarded and the remaining washing water was centrifuged at 2000 rpm for 15 min.[5]

The supernatant was discarded and the sediment carefully collected. The sediment was mixed and examined as follow:

- Direct smear: a drop of the sediment was applied on the center of a clean grease-free slide. A clean cover slip was placed gently to avoid air bubbles and over

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flooding. The preparation was examined under a light microscope using x10 and x40 objectives (two for each sample).[6]

- Iodine smear: a drop of the sediment was mixed with a drop of Lugol's Iodine solution and examined as in direct smear (two for each sample).[6] Smears were used for detection of parasitic eggs, cysts and larva. Parasites found under the light microscope were identified as described by Downes.[7]

RESULTS AND DISCUSSION

Helminth eggs and protozoa cysts were detected in 31.386 % (43/137) of fresh vegetables examined. The most parasites detected in the samples were *Giardia lamblia* (13.13%), *Entamoeba spp* (8.75 %), *Enterobius vermicularis* (5.83 %) and *Ascaris lumbricoides* (3.64%). The lettuce and parsley were the most contaminated vegetables. In our study 43 samples were contaminated with parasites out of 137 samples examined as shown in tab 1.

Table 1: The percentage of parasites existing in the study

Parasite	Number of sample infected	Percentage
Giardia lamblia	18	13.13 %
Entamoeba spp	12	8.75 %
Enterobius vermicularis	8	5.83 %
Ascaris lumbricoides	5	3.64 %

Table 2 Summarizes the results of the presence of various parasites such as *Enterobius vermicularis*, Ascaris eggs, Entamoeba histolyca cysts, and Giardia cysts on lettuce, parsley, radish, spearmint and coriander.

Table 2: Parasitic presence according to the vegetables kind

Sample	n	Period	*Giardia lamblia*	*Enterobius vermicularis*	Entamoeba spp	*Ascaris lumbricoides*
Lettuce	28	A(n:2) B(n:8) C(n:4)	6 findings	2 findings	4 findings	2 findings
Parsley	37	A(n:2) B(n:8) C(n:4)	6 findings	2 findings	4 findings	2 findings
Radish	25	A(n:2) B(n:0) C(n:0)	2 findings	-	-	-
Spearmint	27	A(n:0) B(n:4) C(n:2)	2 findings	2 findings	2 findings	-
Coriander	20	A(n:0) B(n:6) C(n:1)	2 findings	2 findings	2 findings	1 findings

The consumption of raw vegetables plays an important role in the transmission of parasitic contaminations.[8] Recovery of parasites from vegetables used as the source of contamination may be helpful in indicating the incidence of intestinal parasites among a community.

The 31.38 % contamination rate in this study, 19.4% and 31.7% in Egypt [9,10] , 32.6% and 71% in Iran [11,12], 58% in Libya[13], 16.4% in Saudi Arabia[14]. Examination of vegetable samples in Kenya revealed also high rate of contamination (75.9%) [15].

This is partially explained by the fact that using sewage is an important agent in contamination of vegetables. Also, many epidemiological studies have relieved on excess of parasitic contaminations associated with raw water reuse in irrigation [3, 16, 17].

In this study, Lettuce and parsley (32.56 %) were the most contaminated vegetables. In Al-Qassim Region, Saudi Arabia, parasitological contamination was reported to be 56.6 % in parsley and 20.6% in lettuce[18]. In contrast, 32.14 % of parsley had been contaminated with parasites in an evaluation study of the edible vegetables in Qazvin, Iran[19].

In the present investigation, Giardia spp. cysts were detected in 13.13 % of the total vegetable samples. In Egypt, Giardia spp. Cysts was found in 6.7% of different vegetables[9]. A previous study from Saudi Arabia reported the Giardia spp. cysts in 31.6% of leafy vegetables examined [14]. Reports in Iran were 8.2% in Shahrekord [12], 14% in Jiruft [20], 6.5% in Tehran [21].

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The second most prevalent parasitic stage was *Entamoeba spp*. cyst 8.75 %,the result was detected in Al-Nassiriyah city, Iraq (25.30%) [22].

Enterobius vermicularis eggs were detected in 5.83 %. It was similar to studies conducted in other countries: in Manila, Philippines, as *Enterobius vermicularis* eggs were 4.5%[23,] In Khorramabad, Iran, the detected rate was 5.1%[24]. Higher rates were detected in Zahedan, Iran (8.1%) [25]. Lower contamination rate (0.8%) was detected in Nigeria [26]and (0.9%) in Turkey [27].

Eggs of A. lumbricoides were detected in 3.64 % of vegetables examined. The rate of contamination with Ascaris eggs was 2% in Ardabil [11], 2.5% in Jiruft [20] and 2.3% in Qazvin[19]. A high level of contamination of the environment with the eggs of intestinal parasites such as Ascaris spp. observed in many regions of the world is associated with the high fertility of these parasites [28]. Eggs of A. lumbricoides may survive in the external environment and maintain their invasiveness for up to 6 years[28].

In addition, several factors may contribute to such differences between present results with other similar studies. These may include; geographical location, type and number of samples examined, methods used for detection of the intestinal parasites, type of water used for irrigation and post harvesting handling methods of such vegetables. Different laboratory techniques may also contribute to recovery of different parasites since some procedures can either float or sediment the parasites.

CONCLUSION

In regard to results of this study, the importance of vegetables in the transmission of intestinal parasites is stressed, and it is necessary to improve the sanitary conditions of these kinds of food. The disinfection of vegetables is a treatment applied in order to reduce their natural contamination or processes to the product along the different steps of the food chain until its consumption. The use of night soil as fertilizer in farms may be solved by storage or by chemical disinfection of feces.

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