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Prevalence of Intestinal Parasites in Vegetables Consumed in Ahvaz, South West of Iran

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Uncooked vegetables are an important part of a healthy diet in different parts of the world. The present study was carried out to determine the parasitological contamination of vegetables sold at markets of Ahvaz southwest of Iran. Parasitological examinations were performed in material derived from 135 vegetables to detect of intestinal parasites. Each sample was washed with physiological saline solution, allowing sedimentation at room temperature for 24 h. Ten milliliter of sediment were centrifuged at 3000 rpm for 5 min. Sediment was studied in lugol stained slides under light microscopy. Results of the current survey have shown that 21 out of 135 samples (15.5%) were contaminated with parasite stages. Parasites detected were *Giardia* cysts (13.3%), *Entamoeba coli* (6.6%), *Entamoeba histolytica/dispar* (2/9%), Trophozoite of free living protozoa (5.9%), larva of free living nematode (7.4%) and look alike hookworm eggs (2.2%). Vegetables proceeding from all areas presented a similar degree of contamination mostly of Protozoan cysts; radish was the most contaminated vegetable. This study further emphasized the role of vegetables in the transmission of *Giardia* parasite in the region.

Key words: Intestinal parasites, consumed vegetables, south west of Iran

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INTRODUCTION

Intestinal helminthes and protozoan parasites are among the most common infection worldwide particularly in developing countries (Pozio, 2008). It was reported that as much as 60% of the people in the world are infected with pathogen and nonpathogen gut Parasites (Brown and Neva, 1987; Kang *et al*., 1998). Freshly eaten vegetables make up an ordinary part of the healthy diet of many people. Because row consumption, vegetables potentially can be agent of transmission for intestinal parasitic infection (Erdogrul and Sener, 2005). Irrigation of agricultural land by rivers and mine ponds particularly in endemic area can make heminthic and protozoan contamination in vegetables because they are usually highly polluted with human and animal faeces (Okorokwo, 1998). As well as handling vegetables with contaminated hands is other factor for Contamination.

Many studies have reported the contamination of vegetables in Iran and other parts of the world. In Ardabil, Iran study was conducted on two groups of vegetables collected from markets and gardens showed fifty percent (48/96) of markets vegetables and 71% (32/45) of gardens vegetables were contaminated with different parasites (Daryani *et al*., 2008).

Study in south western Nigeria on 120 different vegetables samples showed eighty-two (68.3%) of the vegetables were contaminated by intestinal parasites from which water leaf (Talinium triangulare) and 'soko' (Celosis) had the highest rate of parasitic contamination (100%) (Ogbolu *et al*., 2009).

Internationally, other various studies reported diverse rates of parasitic contamination in row vegetables (Al-Binali *et al*., 2006; Al-Shawa and Mwafy, 2007; Abougrain *et al*., 2010). Accordingly, this study was aimed to evaluate the Parasitological contamination of freshly eaten vegetables sold at local markets in Ahvaz, southwest Iran.

MATERIALS AND METHODS

Study area: Ahvaz is a city in and the capital of Khuzestan province Southwest of Iran (Fig. 1). It is covering an area of 375.000 Square kilometers. The population of the city in year of 2006 was 1425891. Ahvaz has a desert climate and with summer temperature exceeding 50°C, consistently one of the hottest cities on the planet. The average annual rainfall is around 230 mm. According to recent report for World Health Organization (WHO) this city was the most air polluted in the world.

Fig. 1: Map of Ahvaz city, capital of Khuzestan province southwest of Iran, meteorological organization, 2012 (en.wikipedia.org/wiki/Ahvaz)

Sampling and parasitological examination: A total of 135 fresh vegetables of 9 sorts that are frequently eaten raw include Lettuce, Parsley, Radish, Leek, Spearmint, Basil, green onion, Spinach and Cress were randomly collected between February and July 2012 from markets of 5 local points in Ahvaz, Iran for the survey of vegetable-borne parasites. Simply, vegetable samples were placed in clean plastic bags till examination.

Fifteen samples of each vegetable were analyzed (15×9 = 135). The vegetables were processed immediately on arrival in our laboratory in the Parasitology department of Ahvaz Jundishapur University of medical sciences. Approximately 500 g of each vegetable washed with 10 L of physiological saline solution (0.95% NaCl). The washing solution after poured through sterile gauze was left for about 24 h for sedimentation to take place. The top water was discarded and 5 mL of the remaining washing water centrifuged at 3000 rpm for 5 min. The supernatant was decanted and a few drops of the sediment previously added by lugol stain were spread on 3 slides and examined for parasites through light microscopy.

Statistical analysis: SPSS version 16 software was used for data analysis and Chi-square for significance differences. Differences were considered as significant whenever p-value was less than 0.05 (Greenwood and Nikulin, 1996).

RESULTS

Out of 135 vegetable samples, only 21 (15.5%) were contaminated with parasites. There was statistically

significant association between the sort of vegetable examined and the presence of parasitological contamination ($p<0.05$). Radish had the highest contamination rate of 6 (40%), lettuce 3 (20%), Parsley 1 (6.6%), Leek 2 (13.3%), Spearmint 1(6.6%), Basill (6.6%), Green onion 2 (13.3%), Spinach 2 (13.3%) and Water Cress 3 (20.0%) (Table 1).

Table 2 shows that only three parasitic species; *Giardia lamblia, Entamoeba histolytica/dispar* and *Entamoeba coli* were recovered from contaminated vegetables. In contrast, no helminthic parasite species was detected in the present study. Albeit trophozoit of free living protozoa, Larva of free living nematoda and look alike hookworm eggs were also detected in this study. *G. lamblia* was recovered from 13.3% of the total examined vegetables; followed by *E. coli* and *E. histolytica/dispar* with 6.6 and 2.9%, respectively. There was no statistically significant association between the markets surveyed and the presence of contamination ($p>0.05$).

DISCUSSION

Vegetables, for usually raw consumption and then for their possible contamination with parasites, studies involving the recovery of parasites from this material are being increased worldwide. Several investigations in the world indicated that the vegetables can be agents for transmission of protozoan and helminthic parasites (Al-Shawa and Mwafy, 2007; Vuong *et al*., 2007).

This study found, vegetables collected from markets within Ahvaz were contaminated with one or more intestinal parasites, with 15.5% overall prevalence, in accordance with other study (Al-Megrin, 2010). Results of the latter study have shown that 76 out of 470 samples (16%) contained parasite stages. Depending on the type of leafy plant examined, the highest prevalence rate of parasitic infection was found 27.8% (17/61) in lettuce. In contrast to the highest prevalence rate of parasitic infection was in radish (40%), in the present study. In agreement, Hassan *et al*. (2012) reported, with the root vegetables, 50% of radish had been contaminated with parasites in a study of parasitological contamination of freshly eaten vegetables collected from local markets in Alexandria, Egypt. The latter study also reported the high contamination of 40% for carrot which was not screened in the present study. Contamination was also revealed in other examined vegetables including parsley (20%) and lettuce (0%) compared to 6.6 and 20.0%, respectively, in the present study. In contrast, Shahnazi and Jafari-Sabet (2010) reported that only 20% of radish had been contaminated with parasites in an evaluation study of the edible vegetables in Qazvin, Iran.

In Riyadh, Saudi Arabia, parasitological contamination was reported to be 27.8% (17/61) in lettuce, 22.8% (13/57) in watercress, 20.6% (7/34) in leek, 19.1% (9/47) in green onion, 17.4% (15/87) in parsley, 15.4% (4/26) in spinach, 13.6% (3/22) in basil, 11.5% (3/26) in coriander, 9.4% (3/32) in radish, 5.3% (1/19) in dill and 4.7% (2/42) in mint (Al-Megrin, 2010). Several investigations into the recovery of parasites from leafy vegetables have been done in different points of the world and the prevalence was high in all examined vegetables and the reported parasites were such as *G. lamblia*, *E. coli*, *A. lumbricoides* eggs and *Taenia* spp. Eggs (Akhlaghi and Oormazdi, 2000; Robertson and Gjerde, 2001; Monge and Arias, 1996; Davami *et al*., 2000; Sahebani *et al*., 1999; Sarkari, 1996; Vuong *et al*., 2007).

In this study, the contamination rate for *Giardia* in overall samples of vegetable was 13.3%.

In a very recent study carried out by Rahdar *et al*. (2012) in Ahavz Iran has demonstrated nematode eggs 60%, larva of nematodes in the third stage 40% together with intestinal protozoan 10% are the most common parasites stages found in the 40 leafy vegetable plants investigated. Compare to the current study, the latter study has shown relatively much higher contamination rates of helminthes and protozoan parasites. This could be attributed to the fact that contamination in vegetable

Table 1: Distribution of intestinal parasites in freshly eaten vegetables according to their types in Ahvaz city

Vegetable plant	No. examined	No. contaminated	Contamination (%)
Lettuce	15	3	20.0
Parsley	15	1	6.6
Radish	15	6	40.0
Leek	15	2	13.3
Spearmint	15	1	6.6
Basil	15	1	6.6
Green onion	15	2	13.3
Spinach	15	2	13.3
Water cress	15	3	20.0
Total	135	21	15.5

Table 2: Prevalence of intestinal parasites in freshly eaten vegetables according to their types in Ahvaz city

	Type of vegetable									
Parasite	Lettuce	Parsley	Radish	Leek	Spearmint	Basil	Green onion	Spinach	Water cress	Total (%)
Entamoeba coli	1	1	2	2	0	0	1	1	1	9 (6.6)
Giardia lamblia	3	1	5	1	1	1	2	1	3	18 (13.3)
Entamoeba histolytica/dispar	0	0	2	1	0	0	0	0	1	4 (2.9)

from farms is highly contaminated with parasitic stages. This finding is supported by Daryani *et al*. (2008) who were reported fifty percent (48/96) of markets vegetables and 71% (32/45) of gardens vegetables were contaminated with different parasites. Washing of the vegetable before selling, may plays an important role in reduction of transmission of parasitic infection to human through consuming such vegetables as it has been demonstrated in the present study. The presence of parasitic contamination in vegetable can affect by the parasitic fauna carried by the community. The highest amount of parasites detected in this study was related to *Giardia* (13.3%). A previous study carried by Saki *et al*. (2012) also demonstrated highest rate of contamination, 4.52% for *Giardia* parasitic infection in the area. Other investigations in the world reported different results for *Giardia* contaminations in consumed vegetables: Robertson and Gjerde (2000) from Norway with 2%, Monge and Arias (1996) in Costa Rica with 5%, Nazemi *et al*. (2012) in Shahroud, Iran with 34.78% and Zohour and Molazadeh (2001) in Jiruft, Iran with 14%.

CONCLUSION

Freshly eaten vegetables should be considered a potential risk for contracting parasites, particularly protozoa, in Ahvaz, Iran. Therefore, inhabitants of the region should be informed to disinfect the material completely before raw consumption.

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