Original Article

The risk of pathogenic intestinal parasitic infections in vegetables and vegetables handlers in some of Baghdad markets

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Summary:

Back ground: Intestinal parasitic infections are among the most common infections world wide and are regarded as a serious public-health problem.

Methods: The study was carried out during the period from October 2008 to the end of January 2009 in five different markets of Baghdad. Six different type of vegetables were selected for this study including tomato, onion, cabbage, lettuce, carrot and pepper. The vegetables soaked for 10 minutes and washed in saline, centrifuged and the sediment examined for the presence of intestinal parasites. A total of 168 specimens of faeces were collected from vegetables handlers of the markets studied then, specimens were examined for the presence of intestinal parasites by the direct smear method and the concentration method.

Results: *Entamoeba histolytica* cysts and ova of *Ascaris lumbricoides* isolated from all types of vegetables studied except onion. *Giardia lamblia* cysts found on cabbage and lettuce. Ova of *Enterobius vermicularis* and *Hymenolepis nana* were isolated from tomato, cabbage and lettuce. In addition, the ova of *Trichuris trichiura* and *Taenia* spp. were isolated from cabbage and lettuce. Also about third of the vegetables handlers surveyed (36.3%) were infected with one or more of intestinal parasites. *Entamoeba histolytica* was the commonest intestinal protozoan detected, with a prevalence rate of (31.1%), followed by *Giardia lamblia* (14.8%). *Ascaris lumbricoides* and *Hymenolepis nana* were the most common helminths detected with a prevalence rate of 19.7% and 13.1% respectively, with no significant difference between both sexes of the people examined.

Conclusion: The vegetables and vegetables handlers may play an important role in the prevalence of intestinal parasitic infections.

Key words: Intestinal parasites, vegetables, vegetables handlers

Introduction:

The vegetables and fruits are an important source of nourishment and a major source of vitamins, minerals and fiber, and are considered an important food group for maintaining good human health(1). The increased demand for foods, especially soft fruits and vegetables, and their global provision and rapid transport enhance both the likelihood of their surface contamination and the survival on them of the transmissive stages of pathogenic human intestinal parasites(1). Trends in many countries toward eating raw or slightly cooked vegetables, to preserve their taste and content of heat–labile nutrients, may further increase the risk of food borne parasitic infection.

Vegetables and fruits normally become potential sources of human infection through their contamination ,during their growth, collection, transport, processing and preparation, the main causes of contamination include: poor personal hygiene and environmental condition like contamination of soil and water sources with animal or human feces and poor sewage disposal such as use of soil as fertilizer or the presence of animals in production areas(2). When the soil becomes contaminated, soil on the surface of vegetables may harbor intestinal parasites that remain viable through subsequent handling to the point of consumption (3). Thus, the raw fruits and vegetables are common vehicles for the transmission of intestinal parasites (4,5).

Intestinal parasitic infection represent a large and serious medical and public health problems (6), cause significant morbidity and mortality throughout the world. In Iraq, the infection with intestinal parasites is common (6,7). There are diverse source and ways of their transmission to human, vary from one region to other and from one year to other. Variation are probably due to nature of residence, level of personal and community hygiene and sanitation , and the safety of water and food consumption (8). From these points of view, this research attempts to determine the prevalence of pathogenic intestinal parasitic infections among vegetables handlers and different kinds of vegetables collected from different markets in Baghdad city.

Materials and Methods:

The study was carried out during the period from October 2008 to the end of January 2009 in Baghdad markets. In this study five markets from different areas of Baghdad were selected. The markets includes: AL-Beyaa Market, New Baghdad market, AL-Kadhimiya market, AL-Mansour market and AL-Shaab Market. The vegetables used in this study were tomato, onion, cabbage, lettuce; carrot and pepper were selected from above markets.

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Also 168 specimens of feces from adult male and female vegetables handlers from the sampled markets were collected for stool examination.

Every Markets were visited only once. In each visit, one kilogram was bought from each kind of vegetables studied. The vegetables were brought to the laboratory of Al–Zahraa Hospital, soaked separately in one liter of normal saline solution for 10 minutes and washed in the same solution. The solution was centrifuged (1500 r.p.m for 10 minutes) and the sediment examined for the presence of protozoal cysts and helminthic ova were identified morphologically by microscopical examination of direct wet films.

Also about 10 grams of fresh stool was collected from each of the 168 vegetables handlers from the markets studied in a special container with a screw [(9)]. Then, specimens were examined microscopically within 10-20 minutes of their recipient to laboratory, using saline stool smear method and Lugol's iodine method. Then, the specimens were examined by concentration method using zinc- sulphate flotation technique [(9)].

The results were presented in numbers, percentages and by using chi-square as a test of significance.

Results:

The results obtained from the examination of raw vegetables for the presence of protozoal cysts and helminthic ova were presented in table (1). From the data presented in this table, it can be seen that cysts of *E. histoytica* and ova of *A.lumbricoides* were recovered from different vegetables at all markets studied.

Moreover *E. histolytica* cysts and ova of *A. lumbricoides* isolated from all types of vegetables studied except onion. *G. lamblia* cysts found on cabbage and lettuce. – Ova of *E. vermicularis* and *H. nana* were isolated from tomato, cabbage and lettuce. In addition, the ova of *T. trichiura* and *Taenia* spp. were isolated from cabbage and lettuce.

Stool specimens were collected from the vegetables handlers. Out of 168 vegetables handlers, 61 were positive for intestinal parasites, which mean aprevalence of 36.3% of the infected people. The types of parasites isolated and their percentages were showed in table (2).

Double and triple infection were presented in 8 specimens (4.8%). The type and percentage of each are shown in table (3). The commonest double infection was between *E. histolytica* and *A. lumbricoides* (62.5%), while the triple infection was between *E. histolytica*, *A. lumbricoides* and *H.nana* (12.5%).

Overall, considering single, double and triple infection, the commonest parasite was *E. histolytica*, which was presented in 31.1% of the examined samples, the infection with a single parasite was more common (86.9%) than that with double and triple parasites, are shown in table (4).

Table (5) shows that there is no significant difference in prevalence of intestinal parasites between the two sexes groups ($p>0.05$), being 37.6% in males and 34.7% in females.

Table (1): The prevalence of protozoal cysts and helminthic ova isolated from vegetables from five different markets in Baghdad city.

Type of parasite	Markets				
	AL-Beyaa	New Baghdad	AL-Kadhimiya	AL-Mansour	AL-Shaab
Protozoa:					
Entamoeba histolytica	$(+)^{4}$	$(+)^{3,4,6}$	$(+)^{4,5}$	$(+)^{1,4}$	$(+)^{1,3,4}$
Giardia lamblia	-	$(+)^{3,4}$	-	-	$(+)^{4}$
Helminths:					
Ascaris lumbricoides	$(+)^{3,4,6}$	$(+)^{1,5}$	$(+)^{4}$	$(+)^{3}$	$(+)^{3,4}$
Enterobius vermicularis	-	$(+)^{4}$	$(+)^{1}$	$(+)^{4}$	$(+)^{3,4}$
Trichuris trichiura	-	$(+)^{3,4}$	-	-	-
Hymenolepis nana	$(+)^{1}$	-	$(+)^{3,4}$	-	$(+)^{3}$
Taenia spp.	$(+)^{3,4}$	-	-	-	-

(1) tomato (2) onion (3) cabbage (4)lettuce (5)carrot (6) pepper

Table (2): The prevalence of intestinal parasites isolated from single, double and triple infections among examined vegetables handlers according to type of parasite.

Type of parasite	Number isolated	Percentage of infection (%)
Protozoa:		
E. histolytica	19	31.1
G. lamblia	9	14.8
Helminths:		
A.lumbricoides	12	19.7
H. nana	8	13.1
E. vermicularis	6	9.8
T. trichiura	5	8.2
Taenia spp.	2	3.3
Total	61	100

Table (3): The prevalence of double and triple infections among examined vegetables handlers according to type of parasites.

Parasites	*Total infection*	
	Number	*Percent (%)*
E. histolytica + A. lumbricoides	*5*	*62.5*
E. histolytica+ G. lamblia	*2*	*25*
E. histolytica + A. lumbricoides +H. nana	*1*	*12.5*
Total mixed infection	*8*	*100*

Table (4): The prevalence of single, double and triple intestinal parasite species in stool specimens of vegetables handlers.

Number of intestinal parasites species	Number positive	Percentage (%)
Single	53	86.9
Double	7	11.5
Triple	1	1.6
Total of infected samples	61	100

Table (5): The prevalence of intestinal parasites among examined vegetables handlers according to sex.

Sex	Number examined	Positive cases	Percentage of infection (%)
Males	93	35	37.6
Females	75	26	34.7
Total	168	61	36.3

Discussion:

Intestinal parasites still continue to be major problems in health world wide, they can be the cause of a wide clinical spectrum ranging from symptomless infections to life-threatening conditions, particularly in developing countries (10).

The findings from this study have shown that parasitic eggs and cysts found on vegetables. Guirges and Al-Mofti(11) , Ozlem and Hakan (12) and Uneke (13). Had indicated parasitic contamination of vegetables in previous reports.

In the present study, found out that cabbage and lettuce had more parasitic contamination than, tomato, pepper and carrot. In addition, no cyst and ova of parasites detected on onion, this could be due to the fact that the contamination varies according to the type of vegetables (14). Cabbage and lettuce, had uneven surfaces and make parasitic eggs and cysts attached to the surface of the vegetables more easily, either in the farm or when washed with contaminated water, in addition these crops growing close to the ground in general, are more susceptible to contamination by water, soil ,or animals, while the other vegetables had least parasitic contamination because of these smooth surfaces which reduce the parasitic contamination. Finally, some chemical constituents of tissue such as organic acids, essential oils, pigments ,phytoalexins, have antagonistic effects and provide some form of protection against the development of parasites(2).

In the present investigation , among the seven different intestinal parasites identified in the study *E. histolytica* and *A. lumbricoides* were isolated from all types of vegetables studied except onion, followed by other intestinal parasites; they are indicators of poor socio-economic condition, and poor environmental and sanitation practices(15), as well as the presence of protozoa and helminths might be due to lack of modern toilet facilities, inadequate public health enlightenment and illiteracy that makes people defecate indiscriminately resulting in pollution of water and farmland, which cause contamination of vegetables in the farmland(14) In addition, the practice of using human excreta rather than chemical fertilizer, as well as the use of untreated sewage or irrigation water containing pathogens, are also responsible for contamination of vegetables. It is obvious therefore, that the pollution with protozoal cysts and helminthic ova is everywhere in the farmland, the pollution is accelerated by flies, animals and human feet and hands(11), which increase the risk for the contamination of vegetables in farmland. The habits of eating raw or uncooked contaminated vegetables lead to outbreak of human infection with intestinal parasites (3).

The most common intestinal protozoans affecting the vegetables handlers were *E. histolytica* detected with a rate of (31.1%), followed by *G. lamblia* (14.8%). Their presence in the stool of vegetables handlers could be attributed to the variations in methods of transmission these intestinal protozoans to human through contaminated water, food and by house flies (16). Among the intestinal helminths, *A.lumbricoides* and *H. nana* were the most common being, detected with a rate of 19.7%. and 13.1%, respectively.

The main double infections were between *E. hisolytica* and *A. lumbricoides* (62.5%) of the total mixed infections, this is might be due sharing the same epidemiological patterns including feco-oral transmission(17) ,in food borne and water borne outbreaks. In addition *E. hisolytica* is affected by much the same socioeconomic factors that influence the distribution of *A. lumbricoides* (8).

Regarding sex, this study showed no significant difference in the prevalence of intestinal parasites among the two sexes. This might be due to the wide spread of infection (18).

The high prevalence of infection with intestinal parasites among the vegetables handlers in some of Baghdad markets may be related to lack of bathroom and washing facilities, poor sanitary conditions, lack water supplies and a frequent presence of piles of garbage that provide a fertile environmental for transmission of intestinal parasites(19). Vegetables may become contaminated at the point of sale in markets, from hand that have note been washed after defecation, or from contaminated water for washing vegetables and containers and from insect that land on both food and garbage (3). These represent risksof transmission of intestinal parasites to consumers.

Conclusion:

There is a high risk of infection with intestinal parasites in the sampled markets. Vegetables sold at Baghdad markets were found to be contaminated with parasites. Furthermore, About third of the vegetables handlers surveyed (36.3%) had one or more parasitic infections, These lead to conclude that vegetables and vegetables handlers may play an important role in the prevalence of intestinal parasitic infections, hence the people require to pay

more attention in the prevention of parasitic infections, through education on food safety, and improvements in environmental and sanitary conditions.

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