Prevalence of different Parasitic stages in commercial Vegetables in Al-Nassiriyah city, Iraq

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Introduction

Intestinal parasitic diseases are still a public health problem in the developing countries (1,2). About one third of the world, more than two billion people are infected with intestinal parasites (3,4).

Vegetables are essential for good hearth, and they form a major component of human diet in every family. They are vital energy contributors that are depended upon by all levels of human as food supplement or nutrient (5).

Since vegetables require a moist environment for their growth, these conditions favor the development of transmissible forms of entero parasites such as cysts and eggs (6,7). Vegetables, particularly those eaten raw and without peeling , can be agents of transmission of protozoa (8,9). and helminthes (10,11). Vegetables normally becomes a potential source of human parasitic infection by contamination, during production, collection, transport and preparation or during processing and the sources contamination are usually faeces, faecally contaminated soil or water (12,13).

According to many studies(14-16), there was a strong association between vegetables especially raw one and parasitic infections. Moreover, many outbreaks of protozoan infections in humans have been linked to raw fruits and vegetables (17) .

Previous studies have revealed that many types of vegetables, purchased at markets in different regions from many developing countries, were contaminated with helminthes eggs, as well as protozoan oocysts (18-21).

No studies to our knowledge have examined the enteroparasitic contamination of commercial vegetables in Iraq, Therefore, the main objective of the present study was to determine the parasitological contamination of fresh vegetables sold in markets in Al-Nassiriyah city. and provides a clear picture on the

prevalence of intestinal parasitic infections in common vegetables that are frequently eaten raw. These findings could lead to better practices in and handling vegetables to protect against intestinal parasitic infections.

Materials and Methods

In February and June 2009, we collected different types of winter and summer vegetables that are frequently eaten raw from the Vegetables market in Al-Nassiriyah city. Winter Vegetables include (parsley, garden cress, lettuce, tomato and celery) while summer Vegetables consist of (radish, pepper, cucumber, tomato and celery).

We gathered 200 grams of each vegetable without washing and it placed in a nylon bag with their details (date and kind of sampling).In laboratory, we divided each sample in to tow parts. We washed the first part from each sample in a same way that be usually used in most houses, we socked vegetables in a plastic dish of water for 10 minutes then removed it and washed it by tap water. Each washed and unwashed vegetables groups divided in to 2 parts again .To isolate protozoa cysts and worms eggs, we took one part from each group and the following **Centrifuging procedure** was used (22):-

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 of pores . All the mature nematodes, larvae and parasite ova retain upon the filter. Washing the filters by water, microorganisms gather into a dish and pour in a measuring cylinder. After 1hour all the large materials deposit and all the light ones float. The supernatant is emptied and the remainder equally is divided In to several tubes and then centrifuged for 5-7 min. with 3000- 4000 R.P.M. 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.

As well as the **temporal precipitation** was done on the other parts from each group:-

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 after adding a drop of lugol iodine.

Statistical Analysis: - Comparisons between different groups was performed using the statistical software SPSS.

Results:-

The examination of vegetables which collected from markets showed contamination of these vegetables with many types of parasites (eggs and cysts).

Entamoeba Spp.was the most common parasite detected 41(**%**25.30) followed by ***Ascris lumbricoides*** 33 (**%**20.37), ***Giardia lamblia***. 28 (**%**17.28), **Fasciola spp**.26 (**%**16.04), ***Trichuris tricura*** 9(**%**5.55) , **Toxocara Spp**.7 (**%**4.32), Taenia Spp.7(**%**4.32), ***Hymenolepis nana*** 6(**%**3.70) and ***Strongyloides stercoralis*** 5 (**%**3.08) table (1).

Parasites were significantly more frequent in winter's vegetables 107(**%**66.04):- lettuce 32(**%**19.75,celery 31(**%**19.13), cress 18 (**%**11.11), parsley 17(**%**10.49) and tomato 9(**%**5.55) , than in summer's vegetables 55(**%**33.95) :- radish 22 (**%**13.58), celery 21(**%**12.96) , tomato 7(**%**4.32), cucumber 3(**%**1.85) and pepper 2(**%**1.23) table (2).

While there was no significant different in the frequency of parasites in vegetables before washing 97(%66.04) and after washing 65(%33.95) table (3).

Table (1) Prevalence of different parasitic stages in all samples of vegetables vegetables which collected from markets:-

Types of parasites	Number of parasites in all samples of vegetables (%)
Entamoeba Spp.	41 (25.30)
Ascris lumbricoides	(20.37) 33

Giardia lamblia	28 (17.28)
Fasciola spp.	26 (16.04)
Trichuris tricura	9 (5.55)
Toxocara Spp.	7 (4.32)
Taenia Spp	7 (4.32)
Hymenolepis nana	6 (3.70)
Strongyloides stercoralis	5 (3.08)
Summation	162

Table (2) Seasonal prevalence of different parasitic stages in vegetables which collected from markets:-

Types of parasites	Total number of parasites in winter's vegetables					Total number of parasites in summer's vegetables				
	lettuce	celery	cress	parsley	tomato	radish	celery	tomato	Cucumber	Pepper
Entamoeba Spp.	6	8	5	5	3	5	5	2	1	1
Ascris lumbricoides	7	7	4	4	2	2	4	2	1	0
Giardia lamblia	5	5	2	3	2	6	3	1	1	0
Fasciola spp.	7	5	2	2	1	4	3	1	0	1
Trichuris tricura	2	2	1	1	0	1	2	0	3	0
Toxocara Spp.	2	1	1	0	0	1	1	1	0	0

Taenia Spp	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**0**	**0**	**0**

types of parasites	number of parasites in Unwashed vegetables	number of parasites in washed vegetables

Hymenolepis nana	**1**	**1**	**1**	**1**	**0**	**1**	**1**	**0**	**0**	**0**
Strongyloides stercoralis	**1**	**1**	**1**	**0**	**0**	**1**	**1**	**0**	**0**	**0**
Summation	**32**	**31**	**18**	**17**	**9**	**22**	**21**	**7**	**3**	**2**
%	**19.75**	**.1319**	**11.11**	**10.49**	**5.55**	**13.58**	**12.96**	**4.32**	**1.85**	**1.23**

Table (3) Seasonal Distribution of different parasitic stages in washed and unwashed vegetables which collected from market:-

	winter's vegetables	summer's vegetables	Summation	winter's vegetables	summer's vegetables	Summation
Entamoeba Spp.	16	8	24	11	6	17
Ascris lumbricoides	14	6	20	10	3	13
Giardia lamblia	9	7	16	8	4	12
Fasciola Spp.	9	5	14	8	4	12
Trichuris tricura	4	2	6	2	1	3
Toxocara Spp.	3	2	5	1	1	2
Taenia Spp.	3	1	4	2	1	3
Hymenolepis nana	2	2	4	2	0	2
Strongyloides stercoralis	2	2	4	1	0	1
Summation (%)	62 (38.27)	35 (21.60)	97 (66.04)	45 27.77)(	20 (12.34)	65 (33.95)

Discussion:-

The parasitic diseases were endemic in Iraq . Vegetables may act as passive vehicles for transmission of pathogenic parasites and protozoa that are primarily transmitted through the fecal-oral route(23,24). In recent years, there has been an increase in the

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 (25).

In our study, we isolated different types of parasitic stages from the vegetables which collected from market. This accepted with many studies world wide(12,15,26-29) .In Iran, the rate of vegetables Contamination to parasitic out puts ranged from %1.94 to %68. 3 (30-34). Results of study in Saudi Arabia has shown that 76 out of 470 samples (%16.2) contained parasite stages(35).

Our results showed that Entamoeba Spp.was the most common parasite detected in the examined vegetables 41(%25.30)followed by ***Ascris lumbricoides*** 33 (%20.37), ***Giardia lamblia***. 28 (%17.28), Fasciola Spp**.** 26 (%16.04), ***Trichuris tricura*** 9(%5.55) , Toxocara Spp.7 (%4.32), Taenia Spp.7(%4.32),***Hymenolepis nana*** 6(%3.70) and ***Strongyloides stercoralis*** 5 (%3.08).

A previous study carried out in South Western Saudi Arabia has demonstrated that eggs of Ancylostoma and Ascaris together with cysts of ***Entamoeba coli*** and ***Blastocystis homonis*** are the most common parasites stages found in the 5 leafy vegetable plants investigated(9). In Kenya the intestinal parasites found on the vegetable samples include protozoa: ***Entamoeba histolytica, Giardia lamblia*** and ***Balantidium coli*** and helminthes: ***Ascaris lumbricoides***, ***Trichuris trichiura*** and hookworms (27) ,While in Ardabil, Iran**,** the parasites stages detected in the vegetables were Giardia cysts (7%), Dicrocoelium eggs (6%), Fasciola eggs (5%) and Ascaris eggs (2%) (36). In a similar study in Riyadh, Saudi Arabia , parasites sages recovered from different leafy plants were ***Entamoeba coli*** (35.5%), ***Giardia lamblia*** (31.6%), Dicrocoelium spp. (28.9%), Ascaris spp. (26.3%), Taenia sp. (19.7%), ***Blastocystis hominis*** (17.1%), Fasciola spp. (14.5%), ***Hymenolepis*** spp. (14.5%), ***Ancylostoma*** spp. (11.8%), ***Toxoplasma gondii*** (6.6%) and ***Trichostrongylus*** spp. (2.6%) (35).

The presence of intestinal parasites in vegetables may have resulted from the use of wastewater to irrigate vegetables (37) .However, (37) found out that no helminthes or developmental

parasitic stages in the treated water as opposed to untreated water where, they found stages of helminthes eggs in untreated water.

Also some studies indicated that agricultural use of untreated wastewater was the major cause of the increase in intestinal parasites (38).The use of sewage water plays an important role in the epidemiology of transmission of parasitic diseases to human through consuming such vegetables (39).

The observed differences in prevalence rates of the different pathogenic intestinal parasites from fresh vegetables reported in the different studies is expected. Several factors may contribute to such differences 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(29).And these observations might be correlated to the warm burden and their daily eggs out put in hosts(40).

In the present study we noticed that the Parasites were significantly more frequent in winter's vegetables 107 (% 66.04) :- lettuce 32 (% 19.75) , celery 31 (% 19.13) , cress 18 (% 11.11) , parsley 17 (% 10.49) and tomato 9 (% 5.55) than in summer's vegetables 55 (% 33.95) :- radish 22 (% 13.58) , celery 21 (% 12.96) , tomato7 (% 4.32) , cucumber 3 (% 1.85) and pepper 2 (% 1.23).

This accepted with a similar studies indicated that Parasites were significantly more frequent in vegetables in the rainy season (41) . Also the parasites were more common in the months of September to December (6).

The degree of contamination caused by parasites in commonly used leafy vegetables has been studied in Saudi Arabia. This study revealed that the prevalence of parasites was % 28 in green onion, % 25 in radish , % 17 in watercress , % 17 in lettuce and %13 in leek (36) .While prevalence of the parasites in Gaza was 22.5% in rocket, 17.5% in each of parsley and purslane, %16.3 in dill, %13.7 in red cabbage and %12.5 in cucumber (42) . Also depending on the type of leafy plant, examined the prevalence of parasitic stages in these plants, was found 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(35).

The presence of trichomes on the surface of irregular leaves and their irregularity, which facilitate the adhesion of eggs and larvae, may have contributed to the high frequency of parasites (43) and the morphology of the mint leaves overlappingon each other, protecting the eggs of helminths against conditions unfavorable to their survival and persistence , such as sunlight, desiccation, wind (44).

We also found that there was no significant different in the frequency of parasites in vegetables before washing 97(% 66.04**)** and after washing 65(%33.95).

A similar studies concluded that parasites are common in vegetables that are frequently eaten raw and the use of tap water does little to remove them (42) .previous studies showed that, washed vegetables with tape water only was associated with higher Fasciola prevalence**(**45,46**).** Although moderate reduction in the number of parasites was observed , there was no significant reduction in the number of parasites between washed (with tape water) vegetables and unwashed ones (40) .In a survey on the actual condition of vegetables as a transmitter of Ascarid , they stated that a simple washing at home is not effective for eliminating Ascarid eggs from the leaves of vegetables (47,48) .

we isolated different types of parasitic stages from the vegetables which collected from market.we noticed that a simple washing at home is not effective for eliminating the parasitic stages from these vegetables.In view of these findings there is an indication that the consumption of raw vegetables when not properly and hygienically prepare before consumption may be one of the important routes of parasitic infection. Inclusion of these vegetables in traditional and familiar food such as fresh salad certainly will expose consumers of such foods to the risk of acquiring intestinal parasites.

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مدى انتشار المراحل المختلفة للطفيليات في بعض الخضر المعروضة في السوق المحلي لمدينة الناصرية

الناصرية – العراق

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الخلاصة

أجريت الدراسة الحالية لتحديد مدى انتشار المراحل المختلفة للطفيليات المرضية في بعض الخضر المعروضة في السوق المحلي لمدينة الناصرية والتي من المعتاد تناولها طازجة دون طهي والتعرف على أنواع تلك الطفيليات من خلال جمع نماذج مختلفة للخضر الشتوية في شهر شباط 2009 و شملت البقدونس ، الرشاد ، الخسّ ، الكرفس والطماطة فضلا عن جمع نماذج مختلفة من الخضر الصيفية خلال شهر حزيران من العام ذاته والمتمثلة بالفجل ، الكرفس ، الفلفل ، الخيار والطماطة . أظهرت نتائج الفحوصات المختبرية التي خضعت لها النماذج تلوث تلك الخضر بمراحل مختلفة لأنواع من الطفيليات الممرضة للإنسان فكانت هي اكثر الطفيليات الموجودة في الخضر المفحوصة وكان عددها 41 *Entamoeba Spp.* (%25.30) 33 *Ascris lumbricoides* (%20.37 28 *Giardia lamblia* (%17.28) 6(%16.04) *Fasciola spp* (%5.55) 9 *Trichuris tricura* (%4.32) 7 *Hymenolepis nana* و *Taenia Spp* (%4.32) 7 *Toxocara* Spp. 7 (%3.08) 5 (*Strongyloides stercoralis* ثم (6(%3.70 .كما ان المراحل الطفيلية تلك كانت

عمـا هـي عليـه فـي الخضـر (66.04%)موجـودة باعـداد أعلـى فـي الخضـر الشـتوية 107 ، الكـرفس 31 32 (19.75%) اذ سـجلت اعلـى نسـبة تلـوث فـي الخـس 55(33.95%)الصـيفية . امـا (5.55%) و الطماطـة 9 17 (10.49%) ، المعدنوس 18 (11.11%) الرشـاد ،19.13%)(للكـرفس ،7 (12.96%) للفجـل ، 21(13.58%)الخضـر الصـيفية فكانـت نسـب التلـوث فيهـا 22 للفلفل . أكدت الدراسـة ملاحظـة هامـة سبقت (1.23%) للخيـار و 2 (1.85%) للطماطـة ، 3 (4.32%) الإشارة إليها من قبل باحثين أخر تمثلت بعدم كفاءة الغسل المنزلي المعتـاد للخضر موضوع البحث في إزالـة ما علق بتلك الخضر من مراحل مختلفة للطفيليات.

Prevalence of different Parasitic stages in commercial Vegetables in Al-Nassiriyah city, Iraq

The present study was carried out to evaluate some of the vegetable which found in vegetables market in Al-Nassiriyah city. To check whether they harbor different parasites stages. In February and June 2009, we collected different types of winter and summer vegetables that are frequently eaten raw. Winter vegetables samples include parsley, garden cress, lettuce, tomato and celery while summer vegetables consist of radish, pepper, cucumber, tomato and celery. The samples were analyzed in the laboratory for parasitic stages contained in these samples. The examination showed contamination of these vegetables with many types of parasitic stages. **Entamoeba Spp**.was the most common parasite **detected 41(%25.30) followed by *Ascris lumbricoides* 33 (%20.37), *Giardia lamblia* 28 (%17.28), Fasciola spp.26 (%16.04), *Trichuris tricura* 9(%5.55) , Toxocara Spp.7 (%4.32), Taenia *Spp* . 7(%4.32), *Hymenolepis nana* 6(%3.70) and *Strongyloides stercoralis* 5 (%3.08).** Parasites were significantly more frequent in winter's vegetables 107 (%66.04) than in summer's vegetables 55 (%33.95). The highest prevalence of parasitic stages in winter's vegetables was recorder in lettuce 32(%19.75) followed by celery 31(%19.13) , cress 18 (%11.11) , parsley 17(%10.49) and tomato 9(%5.55). in summer's vegetables the prevalence of parasitic stages was found to be radish 22 (%13.58), celery 21(%12.96) , tomato 7(%4.32) , cucumber 3(%1.85) and pepper 2(%1.23) .Also we noticed that a simple washing at home is not effective for eliminating the parasitic stages from these vegetables.