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EPIDEMIOLOGICAL OF PARASITES THAT CONTAMINATED FRESH VEGETABLES

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ABSTRACT

To know the Epidemiological of parasites that contaminated fresh vegetables, 128 samples of six types of fresh vegetables such as Garden Cress, Leek, Radish, Lettuce, Celery and Basil were collected from local markets of two cities in Thi-Qar province during the period from the first of November 2012 to the end of April 2013. Sedimentation technique was used for samples examination. The highest percentage of parasites which feature in some those vegetables more than others parasites were as follow *G. lamblia* with rate (91.7%) followed by *T. hominis* (62.5%) in Leek, *A. duodenale* (58.3%) in Basil . As for the highest percentage of parasites in each one month were as follow *G. lamblia* (100%) and *E. vermicularis* (45.8%) in November , *T. hominis* (70%) in December , *G. lamblia* (70%) in January , *T. hominis* 60% in February , *G. lamblia* (70.8%) and *E. histolytica* (45.8%) in March , *G. lamblia* (90%) and *B. coli* (70%) in April. As for the highest percentage of parasitic contamination of vegetables was (100%) in November and April and the lowest percentage was (%70) in February. The study has been recorded presence of each *Diphyllobotherium latum* , *Schistosoma mansoni* and *Schistosoma japonicum* in spite of absence its intermediate host from the region of study. The conclusion of this study that there is a certain types of parasites prefer certain types of vegetables as well as certain months to reach the summit prosperity (it must be noted that the change of the weather or the appearance or disappearance of cheerleaders pollution does mean nothing compared with obligation to the right environmental rules). And the possibility of isolation *A.*

duodenale from Basil for the purpose of conducting the necessary studies against that parasite which poses a threat on the health of who exposed to it . The presence of some parasitic species which eliminates the presence of its host represent indicator on the use of untreated sewage in watering and fertilizing farmland.

KEYWORDS: Parasitic contamination, vegetables, Markets.

INTRODUCTION

Fresh vegetables represent from the important healthy food because they are rich source with vitamin A, C, E and contain on numerous of metal elements such as Sodium, Potassium, Calcium, Iron and Iodine , moreover they are feature with less thermal calories and have no cholesterol at all[1], but eating these vegetables as a fresh represent one of common source of transmission of infection with many diseases including parasitic diseases[2], where the infection of disease that transport by food undertake all geographical and political and educational border.[3]

As well as the presence of parasites in all countries of the world whether in developing countries or in developed[4], especially in rural regions for presence helping factors that transport the infection with parasites such as prevalence of the cultivation and the more consumption of vegetables in addition to using human and animal manure without prior treatment.[5]

Some parasites like intestinal protozoa which are simple in their habits in order to move and which does not rely heavily on external conditions where be present in abundance in the world but its provided varies depending on the simplicity of the helping factors in reproduction , as for other parasites like helminthes that sometimes live on the outer surface of body of the final host during the larval stages are limited largely because they are affected by environmental conditions such as temperature, humidity and nature of the soil.[6] this study was done to investigate between the extent of the relationship between the presence of parasitic species and each for months of study, types of vegetables which the parasites have been isolated from them, markets of collecting vegetables and absence and presence intermediate host in the area where the parasites studied.

MATERIALS AND METHODS

Normal Saline

This solution was prepared by dissolve 9 gram from sodium chloride in 1000 ML of distilled water until concentration of salt becomes 0.9 %.[7]

Lugol's iodine solution

This solution was prepared by dissolve 5 gram of Iodine Crystals and 10 gram of Potassium Iodide in 30 ML from distilled water with 70 ML of Ethanol alcohol.[7]

Procedure

A) Collection of samples

128 sample has been collected of six types of fresh vegetables were (Garden Cress, Leek, Radish, Lettuce, Celery , Basil) from different markets of Nassiriyah and Suq-AL – Shuyukh cities from the first of November 2012 to the end of April 2013.

B) Preparation of samples

Samples have been transported directly from markets to laboratory , parts that was not eaten if found have been isolated from these samples to be excluded from the examination , then weight from the parts have been covered by the examination about 100 gram for purpose of the study and cut a section of the samples like leaflet of lettuce into small pieces , washed the samples with normal saline and put in pots (1 litter in size) and soaked with appropriate quantity of water and left for 24 hours, the samples were lifted from the pots on buckle (above the pot that contains on washing water), samples were rinsed by brush with small amount of water by using washing battle, the samples were lifted aside and then washing water was transported (after filtration it through buckle to remove large impurities that suspended in it) into flask with size 500 ML for precipitation and left the stable for 60 minutes to precipitate what the present in it to the bottom of the flask . Removed the upper serene water quietly and use what is left in the bottom of the flask from residual material as a model for testing.[8]

Sedimentation method

The residuum was taken in tube of centrifuge and added (5-10) ML of normal saline to it, the tube was shacked very well, the suspended was centrifuged quickly with 2500 r/ min for period 5 minutes by using centrifuge. This process was repeated three times until the filter become clear, then the filtrate was poured. the sediment drops were mixed with a few remaining filtrate drops in the bottom of the tube then a drop of sediment was taken by

Pasteur pipette and put on clean slide and added to it a drop of Lugol's iodine and covered with cover slip and examined using microscope.[8]

Statistical analysis

T- test and ANOVA – test were used in statistical analysis in connection with this study according with.[9]

RESULTS

128 sample of six types of fresh vegetables have been collected from different markets of Nassiriyah and Suq-AL – Shuyukh cities . The result were as follow: *Giardia lamblia* with percentage (91.7%) which was the dominant parasite in leek while Coccidia, *Trichuris trichiura* , *Schistosoma haematobium* and Larva of nematoda appeared with less percentages (4.2%) for each one parasite in that vegetable . As for Garden cress , *Giardia lamblia* (70.8%) was the common parasite and Taenia saginata, Schistosoma mansoni, Schistosoma haematobium and larva of nematoda with the lowest percentage (4.2%) for each one parasite. As for Radish , high percentage (62.5%) for *Giardia lamblia* but *Schistosoma japonicum* and *Ancylostoma duodenale* appeared with low percentage (4.2%) for each one parasite.

In Celery, *Giardia lamblia* appeared with (79.2%) while *Enterobius vermicularis, Ancylostoma duodenale, Dipylidium caninum*, larva of nematoda with less percentage (4.2%) for each one parasite .While Lettuce , *Giardia lamblia* appeared with (45%) and *Enterobius vermicularis, Diphyllobotherium latum, Ancylostoma duodenale, Trichuris trichiura* with less percentage (5%) for each one .Finally in Basil, *Giardia lamblia* (75%) while Coccidia *Heterophyes heterophyes* , *Hymenolepis nana, Trichuris trichiura* and *Fasciola hepatica* with less percentage (8.3%) for each one parasite. Therefore statistical analysis using ANOVA- test with level $P< 0.05$ found significant differences (Table 1).

Giardia lamblia with (100%) was the dominant parasite in November while *Heterophyes heterophyes* and *Hymenolepis nana* appeared with the lowest percentage (4.2%) for each parasite . As for December , *Trichomonas hominis* with (70%) was the common parasite while less percentage was (4.2%) for larva of nematoda. In January, *G. lamblia* with (70%) was the common parasite but the lowest percentage was (5%) for *T. saginata*.

As for February, *T. hominis* appeared with (60%) but *E. vermicularis* and *Strongyloides stercoralis* appeared with the lowest percentage (5%) for each one parasite . In March *G.*

lamblia (70.8%) while *S. stercoralis* and *S. japonicum* appeared with less percentage (4.2%) for each one. As for April, *G.lamblia* (90%) was the common parasite while Coccidia , *E. vermicularis, T. Trichuris, S. mansoni, F. hepatica* and *D. caninum* appeared with less percentage (5%) for each parasite . Therefore statistical analysis using ANOVA- test with level $P< 0.05$ found significant differences (Table 2).

Vegetables of Nassiriyah city were polluted with rate (100%) during November and April months while those vegetables appeared with less percentage of pollution (60%) in February. Vegetables of Suq-AL – Shuyukh city were polluted with rate (100%) during November while the rest months appeared with rate of pollution (80%) for each one month, but statistical analysis using T- test didn't find significant differences.

As for the total percentage of pollution for vegetables of Nassiriyah and Suq-AL – Shuyukh cities, the highest percentage was (100%) during November and April months while low percentage was (70%) in February and statistical analysis using T- test found significant differences (Table 3).

Table (1): Distribution of parasitic percentage according to type of vegetable.

Parasites	Vegetables					
	Leek (24samples)	Garden cress (24samples)	Radish (24samples)	Celery (24samples)	Lettuce (20 samples)	Basil (12samples)
(cyst and trophozoite) of *G. lamblia*	22 (91.7%)	17 (70.8%)	15 (62.5%)	19 (79.2%)	9 (45%)	9 (75%)
(cyst and trophozoite) of *E. histolytica*	4 (16.7%)	8 (33.3%)	6 (25%)	3 (12.5%)	2 (10%)	3 (25%)
(cyst and trophozoite) of *B. coli*	6 (25%)	4 (16.7%)	6 (25%)	7 (29.2%)	2 (10%)	4 (33.3%)
trophozoite of *T. hominis*	15 (62.5%)	9 (37.5%)	10 (41.7%)	9 (37.5%)	2 (10%))	5 (41.7%)
(cyst and trophozoite) of *E. coli*	0 (0.0%)	3 (12.5%)	0 (0.0%)	3 (12.5%)	0 (0.0%)	0 (0.0%)
Oocysts of Coccidia	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	3 (15%)	1 (8.3%)
Ova of *E. vermicularis*	4 (16.7%)	2 (8.3%)	3 (12.5%)	1 (4.2%)	1 (5%)	2 (16.7%)
Ova of *H. heterophyes*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (8.3%)
Ova of *H. nana*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (8.3%)
Worm and ova of *S. stercoralis*	2 (8.3%)	5 (20.8%)	3 (12.5%)	2 (8.3%)	0 (0.0%)	0 (0.0%)
Ova of *T. saginata*	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ova of *D. latum*	0 (0.0%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	1 (5%)	0 (0.0%)
Ova of *A. lumbricoides*	2 (8.3%)	6 (25%)	3 (12.5%)	2 (8.3%)	2 (10%)	5 (41.7%)
Ova of *A. duodenale*	0 (0.0%)	3 (12.5%)	1 (4.2%)	1 (4.2%)	1 (5%)	7 (58.3%)
Ova of *T. trichiura*	1 (4.2%)	0 (0.0%)	0 (0.0%)	2 (8.3%)	1 (5%)	1 (8.3%)
Ova of *S. mansoni*	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ova of *S. japonicum*	0 (0.0%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ova of *S. haematobium*	1 (4.2%)	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ova of *F. hepatica*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (8.3%)
Ova of *D. caninum*	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)
Larva of nematoda	1 (4.2%)	1 (4.2%)	0 (0.0%)	1 (4.2%)	0 (0.0%)	0 (0.0%)
LSD (0.05) = 42.8127, Sig = 0.000 , $F_{Calculated}$ = 21.738						

Table (2) Distribution of parasitic types percentage according to months of study

Parasites	Months					
	November (24samples)	**December (20samples)**	**January (20samples)**	**February (20 samples)**	**March (24 samples)**	**April (20 samples)**
(cyst and trophozoite) of *G. lamblia*	24 (100%)	11(55%)	14 (70%)	7 (35%)	17 (70.8%)	18 (90%)
(cyst and trophozoite) of *E. histolytica*	3 (12.5%)	3 (15%)	0 (0.0%)	3 (15%)	11 (45.8%)	6 (30%)
(cyst and trophozoite) of *B. coli*	1 (4.2%)	3 (15%)	0 (0.0%)	3 (15%)	8 (33.3%)	14 (70%)
trophozoite of *T. hominis*	0 (0.0%)	14 (70%)	0 (0.0%)	12 (60%)	12 (50%)	12 (60%)
(cyst and trophozoite) of *E. coli*	2 (8.3%)	4 (20%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Oocysts of Coccidia	2 (8.3%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.3%)	1 (5%)
Ova of *E. vermicularis*	11 (45.8%)	0 (0.0%)	0 (0.0%)	1 (5%)	0 (0.0%)	1 (5%)
Ova of *H. heterophyes*	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ova of *H. nana*	1 (4.2%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Worm and ova *S. stercoralis*	0 (0.0%)	3 (15%)	4 (20%)	1 (5%)	1 (4.2%)	3 (15%)
Ova of *T. saginata*	0 (0.0%)	0 (0.0%)	1 (5%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
Ova of *D. latum*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.3%)	0 (0.0%)
Ova of *A. lumbricoides*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	15 (62.5%)	5 (25%)
Ova of *A. duodenale*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	9 (37.5%)	4 (20%)
Ova of *T. trichiura*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	4 (16.7%)	1 (5%)
Ova of *S. mansoni*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5%)
Ova of *S. japonicum*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (4.2%)	0 (0.0%)
Ova of *S. haematobium*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	2 (8.3%)	0 (0.0%)
Ova of *F. hepatica*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5%)
Ova of *D. caninum*	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	1 (5%)
Larva of nematoda	0 (0.0%)	1 (5%)	2 (10%)	0 (0.0%)	0 (0.0%)	0 (0.0%)
LSD (0.05) = 31.5081 , Sig = 0.000 , $F_{Calculated}$ = 9.090						

Note : Presence of *G. lamblia* with trophozoite stage was higher than its presence with cyst stage while *E.histolytica* appeared with cyst stage more than its appeared with trophozoite.

Table (3): Percentage of parasitic contamination of vegetables in markets according to months of study

Markets / Months	Markets of Nassiriyah			Markets of Suq-AL – Shuyukh			Markets of Nassiriyah and Suq-AL – Shuyukh		
	Examined samples	Contaminated samples	Percentage of contamination	Examined samples	Contaminated samples	Percentage of contamination	Examined samples	Contaminated samples	Percentage of contamination
November	12	12	100%	12	12	100%	24	24	100%
December	10	8	80%	10	8	80%	20	16	80%
January	10	8	80%	10	8	80%	20	16	80%
February	10	6	60%	10	8	80%	20	14	70%
March	12	11	91.7%	12	12	100%	24	23	95.8%
April	10	10	100%	10	10	100%	20	20	100%
$_{Calculated}$ = 1.411, d.f = 5, Sig. = 0.217 $_{Tabulated}$ = 2.015 T T							$T_{Calculated}$ = 16.970 , d.f = 5 , $T_{Tabulated}$ = 2.015		

Decision

A study was conducted on the prevalence of parasites in vegetables in southwestern Saudi Arabia , where its results were *A. vermicularis* was the most common parasite in Radish with percentage (25%) and (15%) in Garden cress , while *G. lamblia* didn't record any percentage apart from in Lettuce with rate (5%) . The highest rate of contamination of vegetables appeared in April and December with rate (15.9%) for each month while in November and January and May appeared with the lowest rate of contamination (8%) for each month.[10] In another study on the infection of vegetables contaminated with parasites that taken from markets in Metro Manila , Philippines , *E. vermicularis* appeared in Lettuce with rate (2.5%) and *T. trichiura* (2.5%) and *A. lumbricoides* (27.5%) while *G. lamblia* (0.0%).[11] A study on parasitic contamination of fresh vegetables was erected in Tabriz , Iran , where the highest percentage of pollution (44%) appeared in September and the lowest rate (6%) in July while rate of contamination in April was (19%).[1] A study of vegetable , fruits and soil contamination with eggs of worms in Boland and the result was presence of *A. lumbricoides* with rate (8.3%) in Leek while this parasite didn't record any rate in Lettuce and Celery, as for *T. trichiura* didn't record any percentage in Leek , Lettuce and Celery.[12]

G. lamblia was the dominant parasite in most vegetables especially in Leek and this result disagreement with[10,11], and also *T. hominis* concentrated on Leek while *A. duodenale* concentrated on Basil. Dominion of certain parasite in a particular type of vegetable is probably due to that the parasite needs a specific substance or vitamin presence in that kind of vegetable specifically or his attraction towards a certain flavor or perhaps that kind of vegetable provides appropriate environmental conditions for that parasite . While the reasons of dominion one type or two types of parasites in certain month are unknown . While dominion of parasite *G. lamblia* in most vegetables and most months perhaps due to acclimate and adapt that parasite to most circumstances .

The highest percentage of contamination (100%) appeared in November and April and the lowest percentage (70%) in February which is disagreement with.[1,10] Presence high percentage of pollution in these months compare with another studies perhaps due to be marketing of vegetable near to regions of cultivated areas and thus vegetables didn't need to long time in order to reach to the consumer and thus parasite doesn't has been subjected to harsh conditions (such as drought) when transport over long distances between the provinces . Non – significant differences between Nassiriyah and Suq-AL – Shuyukh perhaps belong to

that they consumed the vegetables that watered from the same source (which is not free from sewage).

It is worth mentioning that the species of parasites that need to intermediate host appeared in April and March months that may be belong to that these two months represent the date of coming out host of those parasite from its hibernation . As for presence of parasites that need to intermediate host not exist in Iraq especially some types of Bilharziasis and fish tape worm may return to arrivals from outside Iraq to work in organizations and companies who may be infected with these parasites, so the use of their feces (through the use of sewage) in fertilizing agricultural soils lead to contamination the vegetable with those parasites and fortunately its presence is limited to the stage that comes out of the final host and thus it cannot be transmitted from one person to another where the intermediate host doesn't exist to evolution that parasite.

The study recommends the obligation to correct environmental rules and non – use of sewage water in the watering and fertilizing farmland . It also recommends on working a study on the impact of these vegetable extracts on the vitality of these parasites and working a comparative study between the types of vegetables included in this study from its elements or chemical compounds as well as study the role of each element or compound in an inhibition or activate each parasite.

REFERENCES

1. Garedaghi, Y.; Hashemzade Farhang, H. and Pooryagoobi, S. (2011). Parasitic Contamination of Fresh Vegetables Consumed in Tabriz, Iran. *Res. J. Biol. Sci*., 6(10): 518 – 522.
2. Robertson, L. J., and Gjerde, B., (2000). Isolation and enumeration of *Giardia* cysts, *Cryptosporidium* oocysts and *Ascaris* eggs from fruits and vegetables. *J. Food Port.*, 63(6): 775-778.
3. Northrop-Clewes C.A.& Shaw C. (2000). Parasites. *Br. Med. Bull*., 56: 193-208.
4. Robertson L.J.& Gjerde B.(2001). Occurrence of parasites on fruits and vegetables in Norway. *J. Food Prot*., 64: 1793-1798.
5. Azazy, Ahmed A. and Al- Tair, Abdullah . (1999), A study survey on intestinal and blood parasites among school children in Sana'a province, *Yemen, Saud. Med. J.*, 20(6): 422-424.

6. Birch, C.L. and Anast, B.P. (1957). The changing distribution of helminthic diseases in the United States. J. Am. Med. Assoc., 164: 121-126.
7. Markell, E.K.; John, D.T. & Krotoski, W.A. (1999). Medical Parasitology 8th ed. *W.B. Saunders Company*, Philadelphia.
8. Daryani, A.; Ettehadm, G.; Sharif, M., Ghorbani L. & Ziaei, H. (2008). Prevalence of intestinal parasites in vegetables consumed in Ardabil, *Iran. Food Cont.*, 19: 790-794.
9. Al- beldawi A. A. (2009). Manners of statistics .First edition**.** Jordan, D. W. for Publishing and Distribution.
10. AL-Binali, A.M.; Bello, C.S.; El-Shewy, K.& Abdulla, S.E. (2006). The prevalence of parasites in commonly used leafy vegetables in South Western Saudi Arabia . *Saud. Med. J.*, 27(5): 613-616.
11. Su, G.L.S.; Mariano, C.M.R.; Matti, N.S.& Ramos, G.B. (2012). Assessing parasitic infestation of vegetables in selected markets in Metro Manila, Philippines. *Asian Pac. J. Trop. Dis.*, 51-54. journal homepage:www.elsevier.com/locate/apjtd.
12. Klapeca, K.& Borecka, A. (2012). Contamination of vegetables, fruits and soil with geohelmints eggs on organic farms in Poland. *Ann. Agricultural and Environmental Med.*, 19(3): 421-425.