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INVESTIGATION OF THE PRESENCE OF PARASITES THAT CONTAMINATE SOME FRUITS AND VEGETABLES IN THE SAMARRA CITY IN IRAQ

[1]Ouhood Mozahim Shakir, [2]Khadija khleaf Abdulla, [3]Aseel Ahmed Mustafa and [4]Mohammed Ahmed Mustafa

[1]Samarra University, Iraq; [2]Anbar University, Iraq; [3]Ministry of Education, Iraq; [4]Samarra University, Iraq
Email : marwan.walady@yahoo.com

Abstract

The study included the detection of parasites that contaminate the fruit and vegetables in Samarra city, were collected randomly from the local markets of Samarra for the period between November 2017 and February 2018 at 250 gm of each type. The vegetables included *Lactuca sativa*, *Beta vulgaris*, *Lycoperson esculentum*, *Cucumis sativus*, *Daucus carota*, *Raphanus sativus* and *Apium graveolen*s. The fruit included grape *Vitis vinifera*, *Pyrus communis* and apple *Pyrus malus*. The samples were placed in plastic cysts, separately labeled and transferred to the laboratory to diagnosis eggs and worms during the six hours of the collecting. The results showed that the total percentage of contamination of vegetables 34.2% and 35% of fruits. Three types of eggs worms were isolated, and two types of protoza included *Ascaaris lumbricoid* egg (0.7%) on vegetables, (2.4%) *Hymenolepis nana* egg on vegetables, (6.6%) on fruit, *Echinococcus granulosus* egg on vegetables (0.7%) and *Entamoeba histolytica* cyst for (22.1%) on vegetables, (20%) for fruit and *Giardia lamblia* for(6.4%) on vegetables and(8.3%) on the fruit, this study showed that the cucumber *Cucumis sativis* and *Lactuca sativa* (55%) and (50%) respectively, while the fruits was the highest grape by 45%. The results showed significant differences in the percentage of contamination of vegetables and fruits at the level of P <0.05 where significant differences in infection with *Entamoeba histolytica* and *Giardia lamblia* between the fruits and vegetables did not show significant differences.

Key words : Parasites, Samarra, Iraq.

Introduction

The vegetables and fruits are an important source of food because they contain many important vitamins such as E, C, A, in addition to the mineral elements such as sodium, potassium, calcium, iron and iodine, in addition it has low calories and does not contain cholesterol (Oboh *et al*., 2009) some of vegetables help to protect the human body against oxidative stress and thus enhance immunity (Kalia *et al*., 2006) and Leaf foliage in vegetables improves red blood cells and reduces the risk of neural tube defects during fetal growth in Pregnant women, vitamins in vegetables heal wounds, help absorb iron and promote health, Oral and dental fiber can help digestion and prevent constipation (Daryani *et al*., 2008) and reduce chronic diseases such as heart disease, diabetes and cancer (Oranusi and Braide, 2012) the World Health Organization (WHO, 2002) notes that eating fruits and vegetables reduces the incidence of heart disease by 31% and 11% of stroke., and devise eat about 400 grams of fruits and vegetables daily except potatoes and starches. In spite of the benefits mentioned for fruits and vegetables, the use of improperly leads to great damage, as reports have increased in recent years, indicating that there is a large number of parasitic infections resulting from eating fresh vegetables, as many countries in the world used to eat vegetables raw or just expose them to sunlight As a way to preserve its taste and this increases the likelihood of parasites and thus easy access to humans (Erdogrul&Sener,2005) It is the normal to be food the use of animal manure by farmers to fertilize the soil without exposing it to sunlight for a period of time leads to soil pollution and thus to make vegetables and fruits carrying different types of parasites. This plays a role in the transmission of parasites and their infection to humans. (Halablab *et al.,* 2011). On the other side, the use of sewage water to irrigate crops is also an important source of the spread of parasites of various types to the soil and to animals and humans (Beiromvard *et al*., 2013). The Studies show that contaminated food and water caused 3-5 million person and snow and nearly 1.8 million deaths per year, especially in young children (WHO, 2007). According to the Center for Disease Control, 76 million the state of food transported annually in the United States with approximately 5000 cases of deaths (CDC, 2009).

The Parasites are widespread throughout the world, The incidence of infection is 60% and is more likely to occur in communities with low health awareness. The human is infected with these parasites

through polluted water or through meat or through contaminated fruits and vegetables. Some of them are transmitted by arthropods and some are transmitted from mother to fetus. Adding more than 100 n A variety of parasites may be roundworms, stripes, punches or primates, and they affect the tissues and organs of the human being, causing various symptoms such as diarrhea, bloating, lack of absorption of nutrients, fatigue, dysentery, anemia, some of which lead to arthritis and skin ulcers. The survey on parasites associated with fruits and vegetables in many countries of the world, including the study (AL-Binali, *et al*., 2006) in the Kingdom of Saudi Arabia has isolated eggs hookworms *Ancylostoma duadenale* and the cysts phase of *Entamoeba histolytica.*

In each of the cress, radish, lettuce and melons in Iran, while in Tabriz managed (Garedaghi *et al.,* 2011) to diagnose both *Fasciola hepatica*, *Ascaris lumbricoid*, *Dicrocoelium* and *Giardia* cyst from the plant of cress, lettuce, leek and shark. In Nigeria (Ali *et al.,* 2011) study aimed at identifying and diagnosing worm eggs Which included apple, karzo, banana, orange and melon, He pointed out that there were both *Aneclostoma duadenale* eggs and *Ascaris lumbricoid*, *Strongyloides stercoralis*, he pointed out that apples recorded the highest percentage of the eggs of these parasites and in Poland between (Klapce & Boreck, 2012) he explained the presence of eggs of both *Ascaris lumbricoid* and *Toxocara* in his study of many types of vegetables was including cauliflower and onions, for the absence of previous studies on the parasites associated with fruits and vegetables in the Samarra city, the father of the current head was aimed at investigating the eggs of worms and eccentric Sarcocystis for some types of fruits and vegetables in this city.

Materials and Methods

Collection of Samples

Some fruits and vegetables were randomly collected from the local markets of Samarra and 250 g each for four months, vegetables included *Lactuca sativa*, *Beta vulgaris*, *Lycopersicon esculentum*, *Cucumis sativus*, *Daucus carota*, *Raphanus sativus* and *Apium graveolens*.

The fruit was included in grapes *Vitis vinifera*, *Pyrus communis* and apple *Pyrus malus,* the samples were placed in plastic cysts separately and were quoted and transferred to the laboratory to search for the leaching stages of protozoa and worms eggs within six hours of collection

Examination of Samples

The vegetables and fruits are washed with a quantity of distilled water of each type, after that, the washing water is filtered through a medical gauze to remove the large and coarse material, the sediment is then allowed to precipitate gradually. The net water is poured and 5 ml of the precipitate is taken. It is placed in the test tubes and placed in the centrifuge for 5 minutes in 2000 cycle/minute is then poured into the net and a quantity of precipitate is taken and placed on a glass slide with a diameter of iodine dye and examined under the microscope at 40,100,400 magnification to investigate the deposition phases of the protozoa and the worm eggs (Al-Mayali, 2015).

Results and Discussion

During the period between November 2017 and February 2018, ten types of vegetables and three types of fruits were collected. The laboratory test showed three worm eggs included both *Ascaris lumbricoid* eggs, *Hymenolepis nana* eggs, eggs *Echinococcus granulosus* eggs, the *Entamoeba histolytica* cysts, and *Giardia lamblia* cysts.

The results of the present study showed that, as indicated in Table (1), the total percentage of the contamination of vegetables with worms eggs and spawning stages was (34.2%) (Al-Hindia *et al*., 2016) compared to in the Gaza, (36.9%) in Palestine, in Vietnam (UGA *et al*., 2009) (31%) and (El-Said, 2012) in Egypt (Alexandria) was (31.7%) and was higher than recorded (Anna, 2013) in the city of Diwaniyah, where it reached (11.77%) and also higher than the ratio recorded by (Omowaye & Falola, 2012) in Nigeria, which amounted to (4.6%) in its study of various types of vegetables and also higher than the proportion of (AL-Binali *et al*., 2006) in the Kingdom of Saudi Arabia, which amounted to (7.8%), which used tap water in the washing vegetables and the percentage of contamination of vegetables with parasitic eggs and concentric stages was (27.2%) in the case of saline solution in the washing of vegetables and higher than the study (Adanir & Tasci, 2013). in Turkey, (6.3%) (Balarak *et al*., 2016) in Tabriz, Iran (19.5%), and (Sylvia *et al*., 2016). in Egypt and it is lower than in Nigeria (71.2%), in South Nigeria (73.5%), Kenya (65.6%)% (Nyarango *et al*., 2008), Libya (58%) and Sulaimaniyah (49.7%) (Ali & Ameen, 2013).

As shown in the table that most vegetables were contaminated with *E. histolytica* cysts where the percentage of contamination of vegetables by (22.1%) (as in Figure 1), which is much higher than recorded (Anna, 2013). In the city of Diwaniyah, where it reached 4.4% and (Al-Kubaissi *et al.,* 2014).

Karbala was found on the lettuce plant (2.3%) and higher than the percentage recorded (Garedaghi *et al.,* 2011) in Saudi Arabia and 20% in Nigeria, which reached 3.1% and 0.6% respectively in their study of

different types of vegetables and also higher than (16% in Gaza, 3% and 13%) in Nigeria, 14%, and South Nigeria (Fagbenro *et al*., 2016). the injury rate was 4.9%, the study was 23% in Egypt, 3.2%, and Iran 3.7%. Between P <0.05) and parasites at a potential level (P <0.05). The spread of amoeba parasites may be attributed to the condition of most of the parasites because the bags are resistant to environmental conditions and remain long-lived in soil and water. During this study, *G. lamblia* was isolated from some types of vegetables with a percentage of cyst contamination (6.4%) as in Fig. (2).

Significant differences between it and other parasites at a potential level (P <0.05). This is higher than study (Al-Mayali., 2015) in Gaza (1.5%) and (Al-Kubaissi *et al.,* 2014). in Karbala when recorded pollution contamination (3.8%) in *Lactuca sativa* and (3.2%) in *Apium graveolens*.

Table 1 : Numbers and percentages of parasites (eggs - cysts) polluted vegetables in the city of Samarra

Kind of vegetables	**examined number**	**Number of infected *E.histolytica***	**%**	**Number of infected G lamblia**	**%**	**H nana Egg**	**%**	**Ascaris egg**	**%**	**E.g**	**%**	**Rate of pollution**	**%**
Carrots	20	3	15	1	5	**-**	-	-	**-**	**-**	**-**	4	20
Radish	20	6	30	2	10	**-**	-	-	**-**	**-**	**-**	8	40
White beet	20	2	10	1	5	**-**	-	-	**-**	**-**	**-**	3	15
Lettuce	20	8	40	-	-	**-**	-	1	5	1	5	10	50
Celery	20	3	15	2	10	**-**	-	-	**-**	**-**	**-**	5	25
Cucumber	20	5	25	-	-	**6**	30	-	**-**	**-**	**-**	11	55
Tomato	20	4	20	3	15	**-**	-	-	**-**	**-**	**-**	7	35
Total	140	31*	22.1	9*	6.4	**6***	4.2	**1**	**0.7**	**1**	**0.7**	48	4.2

* Indicates significant differences at the probability level (P <0.05).

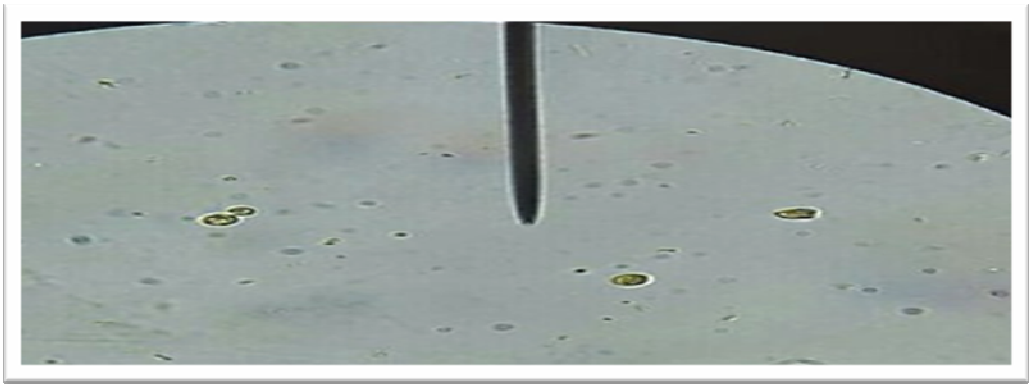

Fig. 1 : Cysts amoeba parasite fabric case (x100)

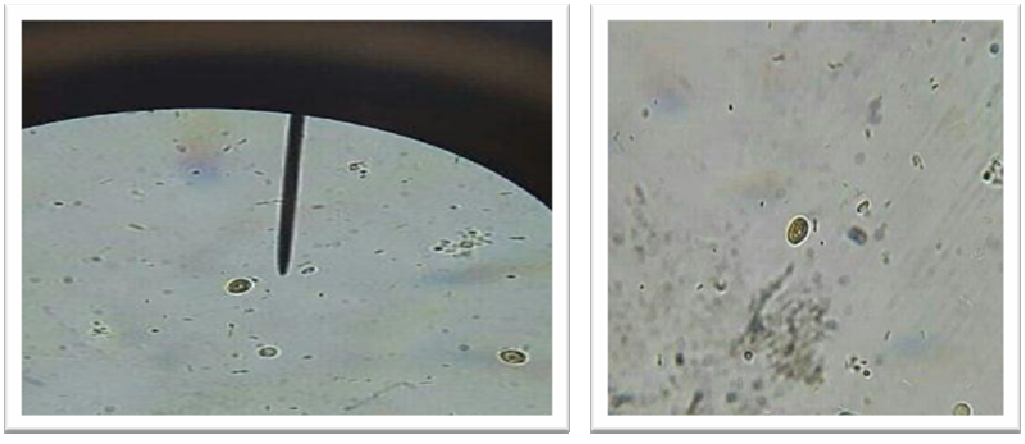

Fig. 2 : Giardia parasite cysts (x100)

As for the eggs of dwarf worms, the percentage of contamination of vegetables by 4.2%, characterized by these eggs as a spherical shape transparent surrounded by the fetus Corticosteroids containing the inside of the intruding polarized 8 strings spread in the space between the two shells (as in Figure (3) This corresponds to the description (P <0.05), which is higher than that recorded by (Anna, 2013). in Diwaniyah and (Garedaghi *et al.,* 2011). in Iran, where it reached 1.77% and 1%, respectively, and (Ali *et al.,* 2011). Nigeria with 2.4% and Iran (Rahmati *et al*., 2017) with injury rate of 0.5%.

Fig. 3 : Egg of dwarf Worm *Hymenolips nana*

The study found that vegetables were polluted with eggs of *Ascaris lumiricoides* by (0.7%) (Figure 4). This percentage is lower than that recorded by (Anna, 2013). in Diwaniyah (4.6%) and less than by some researchers (Garedaghi *et al.,* 2011). in Iran by 1% and (AL-Binali, *et al*., 2006). Saudi Arabia (5.8%), Gaza (16%), Gaza (1.5%), Nigeria (9.3%), Egypt (3.2%), Nigeria (25%), Nigeria (68.6%) and Nigeria (13%). (55.0% and 27%) in Liba. The results showed that there were no significant differences between the at the potential level (P <0.05) and the result show that the eggs of *Echinococcus granulosus* On vegetables (as in Figure (5) by (0.7%), and this study was agreed with (Balarak *et al*., 2016). in Iran where record the infection in the same worms in vegetables was (0.5%).

Fig. 4 : Eggs of the worm *Ascaris lumbricoides*

In general, the difference in pollution rates can be explained by the number of specimens studied, sampling areas, methods used to isolate these parasites and the quality of water used in watering plantations and fertilizers used in soil fertilization. These factors play a major role in the increase or decrease in the percentage of contamination with worm eggs or stages Larvae and cysts phases of protozoa (Omowaye & Falola, 2012).

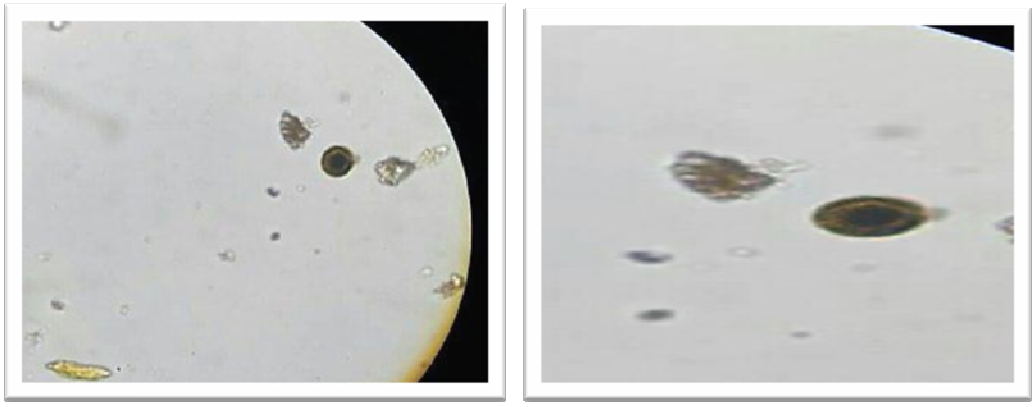

Fig. 5 : Eggs of *Echinococcus granulosus* (x 40)

As for the vegetables more polluted with parasites, the cucumber showed the highest percentage of pollution by 55% followed by lettuce by (50%). This study was similar to that of lettuce more polluted than other vegetables with (Anna, 2013) In the Kingdom of Saudi Arabia which amounted to (17%) and less than recorded (Abougrain *et al*., 2010) in Libya where the incidence rate was (75%) option and (96%) for lettuce. As for the plant *Veta vulgaris* was the lowest percentage of vegetables was infected by 15% and was more than (Anna, 2013) has reached a percentage of 8% was found cysts of *Entamoeba histolytica* and *Giardia lambilia*.

Table 2 : Numbers and proportions of parasites (eggs - cysts) Polluted to the fruit in the Samarra city.

Kind of fruit	examined number	Number of infected *E.histolytica*	%	Number of infected *G. lamblia*	%	H nana Egg	%	Ascaris egg	%	E.g	%	Rate of pollution	%
Grape	20	5	25	-	-	4	20	-	-	-	-	9	45
Apple	20	4	25	2	10	-	-	-	-	-	-	6	30
Pear	20	3	15	3	15	-	-	-	-	-	-	6	30
Total	60	12*	20	5*	8.3	4*	6.6	-	-	-	-	21	35

* Indicates significant differences at the probability level (P <0.05).

As for the fruits shown in Table (2), the percentage of total contamination was 35% and the highest infection was in the cysts of parasite *Entamoeba histolytica*, where it reached 20%. The results indicate significant differences between it and other parasites at the level of probability (P <0.05), this result near with (Ali *et al.,* 2011).

In Nigeria which reached 35.4%, which is higher than that recorded in Diwaniyah (4.6%). This percentage is lower than that recorded by (Omowaye & Falola, 2012).

In Nigeria, which amounted to (62.5%), which is lower than the percentage recorded in vegetables during This may be due to the fact that the vegetables are more sensitive to the surface of the soil as well as the plethora of folds Paper in vegetables, which carries a lot of pollutants in them, which may be peacocks or troughs in addition to the quality of water used and the climate of those countries

The results showed that the infection rate of Giardia was (8.3%) and agreed with (Omowaye & Falola, 2012) by 8.1% and did not agree with (Al-Hindia *et al*., 2016).

In Gaza by 1.5%, followed by 6.6% with dwarf worms, (Uneke, 2007). in Nigeria recorded (2.4%). The results showed that there were significant differences between the parasites and the other parasites at a probability level (P <0.05)

The results showed that the grapes *Vitis vinfera* are more polluted, followed by *Pyrus communis* and apples *Pyrus malus*. The results of the study were (Anna, 2013; Omowaye & Falola, 2012).

The reason for the contamination of fruits and vegetables is that of the worms 'eggs and the lethargy of the fertilizers. This can be attributed to the farmers' use of wastewater in watering the plantations without sunlit for a period of time in soil fertilization increases the chances of the presence of eggs, worms larvae and lethargy of the protozoa and thus their transfer to vegetables and fruits and thus become a source of infected to the most paper crops such as vinegar, Touch the surface of the soil and thus become a constant source of exposure in those parasites.

References

Oboh, O.J.; Mosodje, H.I. and Enabulele, S.A. (2009). Nutritional and Antimicrobial Properties of *Ocimum gratissum leaves*. J. Biol. Sci., 9: 377-380.

Kalia, A.; Gupta, R.P.; Fruit microbiology in Hur Y.H.J.; Cano, M.P.; Gusek, W.; Sidhu, J.W. and Sinha, N.K. (2006). Handbook of fruit and fruit processing 1st Edn, Blackwell publishing, 3-28.

Daryani, A.; Ettehad, G.H.; Sharif, M.; Ghorbani, L. and Ziaei, H. (2008). Prevalence of intestinal parasites in vegetables consumed in Ardabil Iran. *Food control*; 19(8): 790-794.

Oranusi, U.S. and Braide, W. (2012). A study of microbial safety of readyto- eat foods vended on highways: Onitsha-Owerri, south east Nigeria. Int. Res J. Microbiol. 3(2): 066-071.

WHO (2002). Prevention and control of schistosomiasis and soil transmitted helminthiasis: report of a WHO expert committee. *WHO, Geneva, Technical Report Series,* 912: 1–57.

Erdogrul, O. and Sener, H. (2005). The contamination of various fruit and vegetables with *Enterobius vermicularis*, *Ascaris* eggs, *Entamoeba histolytica* cysts and *Giardia lamblia* cysts. J. Food control., 16: 527-560.

Halablab, M.A.; Sheet, I.H. and Holail, H.M. (2011). Microbiological quality of Raw vegetables grown in Bekae valley, Lebanon. *America Journal of Food Technology*., 6(2): 129-139

Beiromvard, M.; Akhlaghi, L. and FattahiMassom, S.H. (2013). Prevalence of Zoonotic Intestinal parasites in domestic and stray dogs in a rural area of Iran. *Prev Vet Med.*; 109(1-2):162-167.

WHO (2007). Food safety and foodborne illness. Fact Sheet N°237. WHO.

CDC (2009). Food-borne diseases. CD Alert, Monthly Newsletter of National Centre for Disease Control, Directorate General of Health Services, Government of India.; 13(4): 1-12.

AL-Binali, A.M.; EL-Shewy, K. and Abdulla, S. (2006). The prevalence of parasites in commonly used eafy vegetables in south Western Saudi Arabia. Med. J., 27(5).

Garedaghi, Y.; Hashemzade, F. and Pooryagoobi, S. (2011). Parasitic contamination of fresh Vegetables consumed in Tabriz, Iran. Research Journal of Biological Sciences.,6(10): 518-522.

Ali, J.A.; Abolode, G.O.; Olade, A.O.; Salako, C.J.; Mghbakor, M.T.; Ogundel eA. J.; O-yewo, A.J. and Agboolo, M.O. (2011). Prevalence of intestinal parasites on fruits, Available in Ibadan Market. Oyo State, Nigeria. Acta. Parasitological. Globalis., 2(1):6-10.

Klapce, T. and Borecka, A. (2012). Contamination of vegetables, fruits and soil with geohhelmints eggs on organic farms in Poland. Annals of Agricultural and Environmental Medicine., 19(3): 421-425

Al-Mayali, HadiMadlu. (2015). Laboratory evidence for the diagnosis of medical and verterinary parasites.

Al-Hindia, A.I.; Elmanamaa, A.A. and Khalafb, S. (2016). Prevalence of intestinal parasites and microbial contamination in common edible vegetables used in Gaza Governorate, Palestine, *J Food Safe & Hyg,* 2(1-2).

Uga, S.; Hoa, N.T. and Noda, S. (2009). Parasite egg contamination of vegetables from a suburban market in Hanoi, Vietnam. Nepal Med Coll J; 11: 75-78.

El-Said, D. (2012). Detection of parasites in commonly consumed raw vegetables. *Alexandria J Med.*; 48(4): 345-52

Anna, S.A. (2013). Determination of spread and distribution of contaminated parasites for some types of fruits and vegetables in the city of Diwaniyah. Journal of science. 3(10).

Omowaye, O.S. and Falola, O.O. (2012). Prevalence of helminthic and protozoal. cyst and ova on Vegetables and fruits sold in Middle–Belt Nigeria. Cibtech Journal of Bioprotocols.,1(1): 37-43.

Adanir, R. and Tasci, F. (2013). Prevalence of helminth eggs in raw vegetables consumed in Burdur, Turkey. *Food Control.*; 31(2): 482-4.

Balarak, D.; Ebrahim, M.; Modrek, M.J.; Bazrafshan, E.; Mahvi, A.H. and Mahdavi, Y. (2016). Investigation of Parasitic Contaminations of Vegetables Sold in Markets in the City of Tabriz in 2014. Global Journal of Health Science; 8(10): ISSN 1916-9736.

Sylvia, O.; Ahmad; El-Fadaly, H.A.; Mona, S.Z. and Barakat, A.M. A. (2016). Incidence of Zoonotic Parasites In Egyptian Raw Vegetable Salads. Life Science Journal; 13(2).

Uneke, C.J. (2007). Potential for geohelminth parasite transmission by raw fruits and vegetables in Nigeria: Implication for a risk profile. J Nutr Environ Med; 16: 59-68

Fagbenro, M.T., Mogaji, H.O.; Oluwole, A.S.; Adeniran, A.A.; Alabi, O.M. and Ekpo, U.F. (2016). Prevalence of Parasites found on Vegetables and Perception of Retailers and Consumers about Contamination in Abeokuta Area of Ogun State, Nigeria. Journal:Clinical Microbiology

Nyarango, R.M.; Aloo, P.A.; Kabiru, E.W. and Nyanchongi, B.O. (2008). The risk of pathogenic intestinal parasite infections in Kisii Municipality, Kenya. *BMC Public Health.*; 8: 237.

Abougrain, A.K.; Nahaisi, M.H.; Madi, B.S.; Saied, M.M.; Ghenghesh, K.S. (2010). Parasitological contamination in salad vegetables in Tripoli-Libya. *Food Control.*; 21(5): 760-762

Ali, S.A. and Ameen, H.A. (2013). Prevalence of human intestinal parasites in selected vegetables in Sulaimani city. *J Sulaimani Med Coll.*; 3: 75-9

Al-Kubaissi, A.H.; Hadi, S.M.; Al-Kuraishi, A.M. and AL-Rhellani, M.A. (2014). Study of the contamination of vegetables leaves in micro organism (bacteria and parasite) in Karbala province. J. university of karbala scientific, Vol. 12, No. 2.

Rahmati, K.; Fallah, M.; Maghsood, H.M.; Ehsan, T. and Matini, M. (2017). The Prevalence of Parasitic Contamination of Vegetables Consumed in Malayer City, West of Iran, in 2014 Avicenna J ClinMicrobInfec.; 4(2): e42380.