

Soil contamination with intestinal parasites eggs in public parks and playgrounds in Kirkuk city

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Abstract

Intestinal parasites eggs are the most soil contaminated which can cause many health problems after ingestion. The aim of this study was to estimate the presence of intestinal parasites eggs in the soil samples collected from public parks and playgrounds in Kirkuk city.

A total of Fifty-six (56) soil samples were collected from 14 areas (7 public parks and 7 playgrounds) through a period from 1st of March 2016 to 1st of October 2016, samples were examined microscopically using wet mount and zinc sulphate flotation methods for detecting intestinal parasitic eggs.

Ninety-seven (78.6%) of soil sample were positive for presence eggs, include *Toxocara Spp.* (22.2%), *Ascaris lumbricoides* (19.4%), *Hymenolepis diminuta* (16.7%), *Ancylostoma duodenale* (13.9%), *Taenia saginata* (11.1%), *Trichuris trichiura* (8.3%) and *Trichostrongylus Spp.* (8.3%).

The collected data was analyzed using statistical test Chi-square; this study shows the high rate of eggs of parasites which could be a potential source of parasitic infection.

Keywords: Intestinal parasite eggs, Soil contamination, Kirkuk.

Introduction

Soil is one of the most significant ecological factors, which is derived from the transformation of surface rocks; soil gets large quantities of animal, human and bird excrete which constitute the major source of soil contamination with biological agents. Soil transmitted helminthes are transmitted by eggs and larvae that passed in the environment through their feces [1], the eggs of many nematodes are highly resistant, they can survive in the environment for a long period of several months and years[2], the eggs in soil can be transferred on to vegetables, then in to the hands and transferred directly in to the mouth[3] or ingested by eating raw vegetables [4], also people can be infected with these parasites through their contact with the soil when they rest in public parks[5].

Hundreds of millions of people in the world mainly in developing countries, even today are infected with soil-transmitted helminthes (STH) with a significant amount of morbidity and mortality [6], also it can cause significant health problems for human especially for small children [7].

The contamination of soil is different between areas depended on many factors such as characteristics of human population, environmental conditions and the presence of canine and feline [8], contaminated soil play an important role in the spreading of the parasitic diseases in the conditions of Iraq.

The contamination of public squares and parks with parasites has been demonstrated as a source of infection with the parasites.

This study was conducted to estimate the presence of intestinal parasites eggs in public parks and playgrounds in Kirkuk city.

Materials and methods

The study was conducted in kirkuk city between 1st of March 2016 to 1st of October 2016, Fifty- six soil samples were collected from 7 public parks public and 7 playgrounds, each sample consisted

approximately 25 gm. of soil at a depth of (4–7cm) in an area at different points from park and playgrounds. The samples were sealed in plastic bags and transported to a laboratory for microscopic examination.

The samples were analyzed by the modified zinc sulphate (ZnSO₄) flotation technique as described by Giacometti [9]. Briefly, 5 gram of soil sample was mixed thoroughly with distilled water, the suspension was strained through a net mesh to remove coarse particles, the filtrate was centrifuged at 1000 rpm for 3 min and supernatant decanted the resultant sediment was further broken up by shaking and tapping the tube. The sediment was mixed with zinc sulphate solution (specific gravity 1.2), this was added to the brim of the test tube and allowed to a stand for 30 minutes with a cover slip on the top of tube to collect any floating eggs, then coverslip remove and examined under the microscope at 10x and 40x objectives

The statistical analysis was performed using Chi-square test [10].

Results

The total tested samples were 56 collected from the soil of public parks and playgrounds in kirkuk city, 44(78.6%) were positive for intestinal parasite eggs. The parasites eggs detected were *Toxocara Spp.*, *Ascaris lumbricoides*, *Hymenolepis diminuta*, *Ancylostoma duodenale*, *Taenia saginata*, *Trichuris trichiura*, *Trichostrongylus spp.*

Public parks recorded the higher level of soil contamination with parasites eggs 23(41.1%) positive samples while playgrounds recorded the lower contamination with parasites eggs 13(23.2%)(Table 1).

Table (1) Number of tested and positive samples (Intestinal parasite eggs) in different area

Area	Tested samples	Positive samples	Positive samples %
Public parks	28	23	63.9
Playgrounds	28	13	36.1
Total	56	36	100

* Total examined soil samples =56

Eggs of *Toxocara Spp.* were the most parasites eggs found in present study which accounted in (22.2%) of

sample, followed by *Ascaris lumbricoides* 7 (19.4%) of sample, *Hymenolepis diminuta* 6 (16.7%), *Ancylostoma duodenale* 5 (13.9%), *Taenia saginata* 4 (11.1%), *Trichuris trichiura* 3(8.3%), and *Trichostrongylus spp.* 3 (8.3%) of sample collected from public parks and playgrounds. The larger number of parasite eggs was found in area number 1,3 with 5 eggs for each ,while eggs did not recover in area number 5 in public parks (Table 2). Statistically there was no significant difference between the positive presences of intestinal parasite eggs ($P \geq 0.05$) in play grounds.

Table (2): Soil Contamination with intestinal parasites eggs in public parks in Kirkuk city.

Area No.	Intestinal parasites eggs														Total	
	<i>Toxocara Spp.</i>		<i>Ascaris lumbricoides</i>		<i>Hymenolepis diminuta</i>		<i>Ancylostoma duodenale</i>		<i>Taenia saginata</i>		<i>Trichuris Trichiura</i>		<i>Trichostrongylus Spp.</i>		NO.	%
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%		
1	2	8.7	0	0	1	4.3	2	8.7	0	0	0	0	0	0	5	21.8
2	0	0	1	4.3	1	4.3	0	0	1	4.3	0	0	0	0	3	13
3	1	4.3	2	8.7	0	0	1	4.3	0	0	0	0	1	4.3	5	21.8
4	1	4.3	0	0	2	8.7	0	0	0	0	1	4.3	0	0	4	17.4
5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
6	0	0	0	0	0	0	1	4.3	1	4.3	0	0	1	4.3	3	13
7	1	4.3	1	4.3	0	0	0	0	0	0	1	4.3	0	0	3	13
Total	5	21.7	4	17.4	4	17.4	4	17.4	2	8.7	2	8.7	2	8.7	23	100

* $P \geq 0.05$

Table(3) show the results of the distribution of various parasites eggs in playgrounds in Kirkuk city, there was no significant difference between the

positive presence of intestinal parasite eggs ($P \geq 0.05$) in playgrounds.

Table (3): Soil contamination with Intestinal parasites eggs in playgrounds in Kirkuk city

Area No.	Intestinal parasites eggs														Total	
	<i>Toxocara Spp.</i>		<i>Ascaris lumbricoides</i>		<i>Hymenolepis diminuta</i>		<i>Ancylostoma duodenale</i>		<i>Taenia saginata</i>		<i>Trichuris Trichiura</i>		<i>Trichostrongylus Spp.</i>		No.	%
	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%	NO.	%				
1	1	7.7	0	0	0	0	0	0	1	7.7	0	0	0	0	2	15.4
2	0	0	1	7.7	1	7.7	0	0	0	0	1	7.7	0	0	3	23.1
3	1	7.7	1	7.7	0	0	1	7.7	0	0	0	0	0	0	3	23.1
4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
5	0	0	0	0	1	7.7	0	0	1	7.7	0	0	0	0	2	15.4
6	1	7.7	1	7.7	0	0	0	0	0	0	0	1	7.7	3	23.1	
7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total	3	23.1	3	23.1	2	15.4	1	7.7	2	15.4	1	7.7	1	7.7	13	100

* $P \geq 0.05$

Discussion

The present study revealed that the soil which collected from public parks and playgrounds in Kirkuk city were contaminated with high level of parasite eggs (78.6%), this is an indication of soil contamination with human and animals faeces, revealing a substandard sanitation, poor personal hygiene, overcrowding and poverty, this contamination of intestinal parasite eggs in the soil may increase the risk of infection among the residents [11]. The overall rate of parasites found in current study was agreed with those reported in Tehran by Tavalla et al. (2012) [12].

The most prevalent of parasites eggs in this study was *Toxocara Spp.* founded in (22.2%) of samples, which was higher than that reported in Basrah (8.0%)[5], the higher presence of *Toxocara Spp.* in this area may due to presence of stray dogs and cats infected with *Toxocara* and this may because health problems to

humans. Investigation of humans infection with toxocarasis in Iraq was first reported in Baghdad [13] was 7.3% among healthy individuals.

The eggs of *Ascaris lumbricoides* were found in (19.4%) of samples, this parasite is distribution in both temperate and tropical region but it is more common in a tropical countries and is more prevalence when sanitation is poor, and it is common among pre-school and young school children, who frequently exposed to contaminated soil, the infection is mainly transmitted from hand to mouth of children who play with dirt soil [14]. A high level of environmental contamination with the eggs of *Ascaris spp.* observed in many regions of the world is associated with the high fertility of these parasites [15]; Eggs of *Ascaris lumbricoides* may survive in the external environment and maintain their invasiveness for up to 6 years 28.

Eggs of *Hymenolepis diminuta* were detected in (16.7%) of sample, this may be due to the contamination of the soils with the faeces of stray animals (dogs, cats and rodents).

The infection rates with *Ancylostoma duodenale* were (13.9%) of soil samples, this parasite causes ancylostomiasis in a human which is characterized by iron deficiency anaemia and hypoalbuminaemia [16]. *Taenia saginata* were detected in (11.1%) of samples which was lower than that reported in Kalar city in Sulaymaniyah were (78%) in stray dogs [17].

The study revealed that the presence of *Trichuris trichiura* were (8.3%) of samples, and it is finding is similar to prevalent *Trichostrongylus Spp*, the reason of the finding of these parasites in parks and playgrounds may due to infected humans and dogs, also poor personal hygiene.

There was no significant difference between the positive presences of intestinal parasite eggs also it

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did not show significant difference between different locations in the area of public parks and playgrounds .

Conclusions

The results of this study indicated that soil contamination rate with intestinal parasites eggs in public parks and playgrounds was high, and the eggs of *Toxocara Spp.* had the highest prevalence.

Finally, we recommended to use chemical compounds to eliminate the eggs, such as methyl bromide compound, elimination of rats, dogs and cats stray, prevent children from playing with soil to prevent infection by diseases, clean bathrooms with sterile materials and washing hand with soap and water after using it, we need to develop a special health program for citizens in order to define them with parasites and sensitize them to limit their transition.

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تلوث التربة ببيوض الطفيليات المعوية في المتنزهات العامة وساحات اللعب في مدينة كركوك

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الملخص

تعد بيوض الطفيليات واحدة من اكثر ملوثات التربة والتي تسبب الكثير من المشاكل الصحية للانسان بعد ملامستها او ابتلاعها، الهدف من هذه الدراسة هو تقدير عدد البيوض الطفيلية المنتشرة في عينات التربة والتي جمعت من المتنزهات العامة وساحات اللعب في مدينة كركوك.

جمعت 56 عينة تربة من 14 منطقة (7 نماذج من المتنزهات العامة و7 نماذج من ساحات اللعب) خلال الفترة من الاول من شهر مارس 2016 الى الاول من شهر تشرين الاول 2016, تم فحص العينات عينيا ومجهريا مستخدمة طريقة المسحة الرطبة وطريقة التطويف (زنك سلفايت) للكشف عن بيوض الطفيليات المعوية.

تسع وسبعون (78.6%) من عينات التربة كانت تحتوي على بيوض الطفيليات والتي تتضمن:-انواع الديدان السهمية (22.2%)، الصفر الخراطيني (19.4%)، الشريطية الفأرية (16.7%)،الانكلستوما الاثني عشر (13.9%)، البقر الشريطية (11.1%)، السوطية (8.3%)، الاسطوانية الشعرية (8.3%).

حللت البيانات بطريقة الاحصاء مستخدمة مربع كاي، وبينت الدراسة الى وجود معدل عالي لبيوض الطفيليات في عينات التربة المجموعة من المتنزهات العامة وساحات اللعب في مدينة كركوك، وهذا يعني ان التربة تعد مصدر للإصابة الطفيلية.

الكلمات المفتاحية: تلوث التربة، بيوض الطفيليات المعوية، كركوك.