# Investigation of Parasites in Drinking Water Sources of Three Suburban in Babylon Province

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## Abstracts

A total of 450 water samples collected from three different sources (tank water, rivers and wells water) in three districts (Abi-Gharaq, Al-Kefel and Al-Neil) in suburban of Babylon province during the period from January 2011 till july 2011**.** All of the three drinking water sources was contaminated with cysts, oocysts and eggs of the parasites. The results indicates overall percentage incidence of infection with these parasites of ( 65.5% ) including protozoans ( *Giardia lamblia* 13.54% , *Cryptosporidium* sp. 2.87% , *Entamoeba coli* 19.5% , *Balantidium coli* 5.78% and *Entamoeba histolytica* 18.9%) and one helminth *Hymenolips nana* (4.8%) . The result of the study presents a need of an appropriate source of drinking water to identify the threshold of water sources contamination that requires treatment. Preventing waterborne disease and the health effects of water contamination is vital to public health .

## الخلاصة

جمعت 450 عينة ماء من ثلاثة مصادرمختلفة لمياه الشرب (مياه خزانات المنازل ،الانهار ،الابار ) في ثلاثة مناطق هي (ابو غرق ،الكفل ،النيل ). كضواحي لمدينة الحلة في محافظة بابل ، للمدة من شهر كانون الثاني 2011 ولغاية تموز 2011 ، وكانت جميع مصادر مياه الشرب الثلاثة ملوثة باكياس وبيوض الطفيليات . اظهرت النتائج ان نسبة الإصابة الكلية بالطفيليات( 65.5 %) شملت الاوالي الحيوانية (*Giardia lamblia* بنسبة 13.54 % والبويغي الخبيء .*Cryptosporidium* sp بنسبة 2.87 % واميبا القولون *Entamoeba coli* بنسبة 19.5 % وقريبي القولون الهدبي *Balantidium coli* بنسبة 5.78 % واميبا الزحار *Entamoeba histolytica* بنسبة 18.9 % والدودة الشريطية الفأرية *Hymenolps nana* بنسبة 4.8 %) . بينت نتائج الدراسة الحالية إن هناك حاجة لمصادر مياه مناسبة تستخدم كمياه للشرب ، كما شخصت مدى التلوث الحاصل في هذه المياه والتي تحتاج الى معالجة لمنع الامراض المنقولة ومدى تأثيرها كملوثات مياه حيوية على الصحة العامة .

## Introduction

Water is considered as one of the nutrients, although it yields no calories, yet it enters into structural composition of cell and is an essential component of diet (Baloch *et al.,* 2000). according to WHO ( 2004) more than 80 disease of human are waterborne in developing countries, 60% of population has no access to pure drinking water (Khan *et al.,* 2000). Waterborne diseases occur worldwide, and outbreaks caused by the contamination of community water systems have the potential to cause disease in large number of consumers (Barwick *et al*., 2000).

A number of outbreaks have been associated with drinking and recreational water worldwide including united states (Barwick *et al*., 2000). Water borne parasites are ubiquitous protozoan parasites that affect humans, domestic animals and wildlife throughout the world. At least 325 water associated outbreaks of parasitic protozoan diseases have been reported worldwide (Kramer *et al*., 2001). In industrialized countries, *G . lamblia* and *Cryptosporidium* sp. are major concern as waterborne parasites. Infective cysts are environmentally robust, sufficiently small to penetrate the physical barriers

of water treatment and insensitive to disinfectants used in the water industry (Smith & Grimason, 2003).

*Cryptosporidium* is the most frequent etiologic agent identified in recreational waters in the united states (Dubey *et al*., 2005).Contamination from sewage discharges and wild or domestic animals is important source for untreated water (Dubey *et al*., 2005). It is estimated that up to 30% of the human population, *i.e*. every third person in the world, has been exposed to *Toxoplasma gondii* (Jackson & Hutchison, 1989 ; Wong & Remington, 1993). The rural environment have been provided many reasons to incidence of parasites while the urban environment provided social condition to incidence of these parasites. Therefore the parasites infections increased in our country with different ages of people (Al-Haidari *et al*.,2000).The malnutrition and water contamination with different pollutant responsibly to caused many parasitic infections (Lee *et al*., 2000 ; Abu Mourad,2004) . In spite of intestinal parasites prevalence cosmopolitan especially in tropical and subtropical countries and the insects vector reproduction and outbreak fastness in summer season like a housefly and cockroach (Al-Zubaidy & Aubaid, 1996) The increasing of population density and sanitation condition weakness with using of unhealthy water sources and environmental condition fluctuation all of these reseans work together to increase prevalence of parasites (Sayyari *et al*., 2005). Human fascioliasis has been an underestimated and under-explored disease but is now considered an emerging/reemerging disease(Mass *et al*., 2005) Keeping in view of the above circumstances, the present study was design to carry out prevalence and level of contamination of the zoonotic parasites in different sources of the drinking water in three suburban of Babylon province .

## Aim of study :

1- Prevalence of parasite (protozoa & helminthes) in three different source of water in three suburban of Babylon province .
2- Observe what the parasite that high percentage of infection incidence and their contamination in this three source of water.

## Materials and Methods :

The study was conducted to know the prevalence of the parasites in three different water sources (tank, rivers and wells water), at three districts namely Abi-Gharaq , Al-Kefel and Al-Neil as suburban in Babylon province .A total of 450 water samples were collected from tank, rivers and wells water in clean and sterilized bottles, The samples were labeled with date of collection, nature or source of water, the site of collection and were transported to the medical laboratory of medicine college in Babylon university.

The water samples were processing by filtered through Filta-Max filters (IDEXX , USA) with a pump on the inlet side of the filter according to the recommendation of the manufacturer. The filter was taken out and processed with the aid of a Filta-Max Manual for further elution and concentration process which consisted of decompression of the filter, then centrifugation (3000 rpm/min. A sample pellet was obtained and mixed with 1ml buffer solution and kept at -4C° Refrigerator .

The parasites were detecting and the slides were prepared, stained (lugolś iodine and Giemsa stain for detecting *Cryptosporidium* sp.) and the protozoans were examined under microscope (Olympus Japan) at 10x, 40x and 100x magnification. The prevalence rate of parasites in water samples was determined with the following formula No. of parasite detected in water sample. Prevalence Rate = x100 Total no. of water samples

used statistical analysis data were analyzed using the chi sequare ($X^2$) . P > 0.01 were

| Regions | Abi-Gharaq | | | Al-Kefel | | | Al-Neil | | | total | (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| parasites | tank water | rivers water | wells water | tank water | rivers water | wells water | tank water | rivers water | wells water | | |
| *G.lamblia* | 7 | 8 | 10 | 6 | 3 | 8 | 3 | 6 | 10 | 61 | 18.5 |
| *Crypto.* | 1 | 1 | 2 | 1 | 4 | 2 | 1 | 0 | 1 | 13 | 2.5 |
| *E. coli* | 6 | 16 | 16 | 7 | 14 | 9 | 3 | 9 | 8 | 88 | 19.5 |
| *H.nana* | 3 | 3 | 9 | 1 | 3 | 0 | 1 | 2 | 0 | 22 | 4.8 |
| *B. coli* | 0 | 4 | 4 | 0 | 5 | 3 | 0 | 4 | 6 | 26 | 5.78 |
| *E.histolytica* | 8 | 14 | 12 | 8 | 5 | 11 | 10 | 5 | 12 | 85 | 18.9 |

considered to be statistically significant.

## Result and Discussion :

Table (1) : Prevalence of parasites in drinking water from three different sources at three suburban of Babylon province .

$X^2$ calculated = 101.4

$X^2$ tabulated = 15.09

Table(2): Prevalence and percentage of parasites according to the different regions at three suburban of Babylon province .

| Parasites / Regions | Sample No. | *G.lambelia* | | *Crypto.* | | *E.coli* | | *H.nana* | | *B.coli* | | *E.histoytica* | | Total parasites No. | (%) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Paras. No. | (%) | Paras. No. | (%) | Paras. No. | (%) | Paras. No. | (%) | Paras. No. | (%) | Paras. No. | (%) | | |
| Abi-Gharaq | 150 | 25 | 16.7 | 4 | 2.67 | 38 | 25.3 | 15 | 10.0 | 8 | 5.33 | 34 | 22.67 | 124 | 82.6 |
| Al-Kefel | 150 | 17 | 11.3 | 7 | 4.6 | 30 | 20.0 | 4 | 2.6 | 8 | 5.33 | 24 | 16.0 | 90 | 60.0 |
| Al-Neil | 150 | 19 | 12.6 | 2 | 1.3 | 20 | 13.3 | 3 | 2.0 | 10 | 6.6 | 27 | 18.0 | 81 | 54.0 |

$X^2$ calculated = 113.2

$X^2$ tabulated = 18.48

Table(3) : Distribution of parasites according to the source of drinking water in three suburban of Babylon province .

| Parasites / Source of water | *G.lamblia* | *E.coli* | *Crypto.* | *H.nana* | *B.coli* | *H.histolytica* | total | (%) |
|---|---|---|---|---|---|---|---|---|
| Tank water | 16 | 29 | 5 | 8 | 9 | 18 | 85 | 18.9 |
| Rivers water | 17 | 26 | 3 | 5 | 4 | 32 | 87 | 19.34 |
| Wells water | 28 | 33 | 5 | 9 | 13 | 35 | 123 | 27.34 |
| Average | 61 | 88 | 13 | 22 | 26 | 85 | 295 | 65.5 |

A total of 450 water samples were collected from tank, rivers and wells water located at Abi-Gharaq , Al-Kefel and Al-Neil , the prevalence of *Giardia lamblia, Cryptosporidium* sp. *Entamoeba coli , Balantidium coli, Hymenolips nana and Entamoeba histolytica* in each categories of water samples were determined .

In the present study *Giardia lamblia* and *Cryptosporidium* sp. were found in tank, rivers and wells water in Abi-Gharaq, Al-Kefel and Al-Neil districts as suburban of Babylon province . (Table 1,2,3). The overall percentage incidence of infction (65.5%) contained protozoa and only one cestoda ,amongest these *G.lamblia ,E.histolytica and cryptosporidium* sp.was 13.5% , 18.9% and 19.5% , respectively. The results of the study confirm the findings of clinical studies conducted that had shown the presence of these three protozoa parasites in the human population (Guerrant, 1997), Each of *G.lamblia , E.histolytica* and *Cryptosporidium* sp.was known to cause gastroenteritis and were considered three of the leading causes of waterborne diseases in the united states as reported by Guerrant (1997) and Furness *et al.,* (2000).

Similar studies conducted in Sri Lanka also showed the levels and concentrations of *G.lamblia, E. hitolytica* and *Cryptosporidium* sp. although these were higher than the result of the present studies from other countries (Solo *et al.,* 1998 ; Quintero *et al*., 2000 ; WHO, 2004 ), this could be due to the different environmental and geographical distribution of the country and locality.

In the present study, *Entamoeba coli* and *Balantidium coli* were found in all the water sources and were most numerous in tank , rivers and wells water according to the recent report that water borne transmission of *E.coli* is uncommon but a large human outbreak linked to contamination of a municipal water reservoir in Canada by wild felids and the widespread infection by marine mammals in the united states (Dubey, 2005). In the current study, *Hymenolips nana* eggs were also recovered from all the water sources.The recent longitudinal studies reported the finding of this parasites in the water sources throughout the year (Wallis *et al*., 1996). According to the recent report which had shown *Entamoeba histolytica*, *Giardia lamblia*, and *Cryptosporidium* sp. are three of the major causes of protozoan-induced diarrheal disease (Black *et al*., 1977 ; Walsh,1986 ; Chapman, 1988). *E. histolytica* is responsible for approximately 100,000 deaths worldwide each year, making it second only to malaria as a cause of mortality due to a protozoan parasite (Walsh, 1986). In other studies, *E. histolytic*a and *E. coli* was recovered from the sewage waters and stool (Hernandez-Chavarria and Avendano, 2001).Possible sources of water contamination including both human and animal sources are known to be important in the introduction of protozoa to a water system (WHO, 2004).

The table (2) show the distribution of parasites according to the different regions (three suburban regions) . The highest infection of parasite in water at Abi-Gharaq district for *E . coli* was (25.3 %) , then *E. histolytica* was (22.6%) and the lowest infection for *Cryptosporidium* was (2.67%) , and Al-Kefel with Al-Neil districts results show the highest percentage incidenc of infection for *E. coli* (20.0% , 13.3% ) respectively, then *E. histolytica* was (16.0% , 18.0%) respectively. and the lowest ratio of percentage incidenc of infection was in Al-Kefel district for *H. nana* was (2.6% ) and (1.3%) for *Cryptosporidium* in Al-Neil district . The results may be contributed to the contamination from factories and dumping of wasts and animals feces in Al-Hilla river waters and using of human feces for plant fertilizer then discharging in water sources (Al-Jeboori & Shafiq , 1976 ; Sayyari *et al*., 2005) .

The highest results of infections with this parasites (table 2 , 3 ) and the significant differentces cause the human beings that using rivers,barmaid and creek water as drinking waters sources in their houses with not any processing , contributed to this

water contaminated with many microorganisms and zoonotic parasites , that coming from dumping of human and animals feaces . moreover that the water sterilization mangment were failure in this districs exactly (Al-Khafaji . 1999 ; Schmidt & Roberts ,2000) .

The rural communities with high prevalence in intestinal parasites due to decreased of hygiene. The sanitation and low of personality of cleaning because of many different poverty, ignorant and uneducated peasants (Al-Dulaimi,2007), moreover that using contaminated water polluted with human and animals feaces to fertilizing their vegetables and plantations (Agi, 1995 ; Al-Dulaimi ,1996). Beside of that the behavior of population have important role and many of people living in this areas were countryside and farmers lead to incidence of these parasites (Al-Mosa,2002 ).

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