

## Prevalence of *Hymenolepis nana* in Erbil City - North of Iraq

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### ABSTRACT

Intestinal parasitic infection represent a considerable medical and public health problem in the developing countries and up to 10% of the population of the developing world is infected with intestinal worms. This study was initiated to investigate the prevalence of *H. nana* infection in Erbil City. This study includes 4062 persons in Erbil City from July 2016 till March 2017 of all age groups, stool sample was collected from each person and examined by direct wet mount preparation with either normal saline or Lugol's iodine stain.

From 4062 persons only 164 (4.04) were positive, females have a higher rate (6.59%) than males (3.33%). Other parasitic species found in fecal sample of patients in association with *H. nana* infection were *Giardia lamblia* (0.34%) and *Entamoeba histolytica* (0.123%). According to months March showed the highest rate of infection 16.98% (45/265) while no infected sample was observed in July and August. Central Lab. showed the higher percentage of infection (4.14%) while percentage of infection (3.7%) decreased in Rzgari Lab., our data showed that the prevalence of *H. nana* infection was low in Erbil City, also recorded double infection with other parasites in this study.

**Keywords:** *Hymenolepis nana*, Prevalence, Erbil City.

### INTRODUCTION

Hymenolepiasis is the most common intestinal tapeworm infection of humans with an estimated 50 to 75 million infection worldwide, caused by *Hymenolepis nana* which is commonly known as dwarf tapeworm, this tapeworm is endemic in Asia, Africa and southern and eastern Europe [1,2].

Adult worms are vary in length from approximately 15-40 mm and 1 mm wide, the scolex bears a retractable rostellum with a single row of 20-30 hooks and has four suckers [3].

Development of cysticercoid larvae in the intestine of human causes little or no pathological changes, large number of worms in heavy infections may cause mechanical irritation of the intestine, and various allergic manifestations such as anal and nasal pruritus by releasing toxic metabolites [4]. Morbidity is uncommon, only occurring when parasite burden is very high. Death has not been reported in association with this infection [5].

Hymenolepiasis occurs more commonly in children. Most infections are asymptomatic. In

heavy infections, symptomatology include irritability, diarrhea and abdominal pain, sleep disorders, nausea, loss of appetite and weight, weakness, vomiting and anal itching anal pruritus and nasal pruritus. The most important complications include bloody diarrhea and behavioral disturbances [4,6].

Transmission of infection occurs through fecal-oral route by ingestion of eggs from contaminated hands, frequently by contamination of food and water, and rarely from ingestion of food contaminated with fleas harboring the cysticercoid larvae [4,7].

Diagnosis is based on the demonstration of the characteristic eggs in the faeces by direct smear, the eggs can readily be concentrated by the salt flotation and formalin-ether sedimentation methods [8,9].

### Aims of the Study

1. To investigate the prevalence of *H. nana* infection in Erbil city.
2. To detect *H. nana* infection in male and female.

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3. To find the prevalence of infections according to location and months.

### MATERIALS AND METHODS

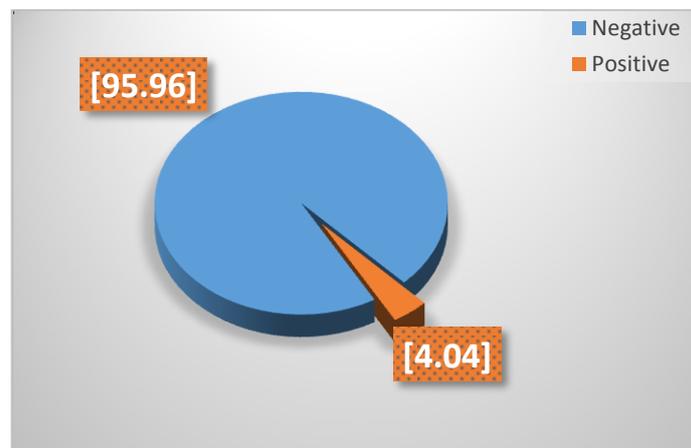
In period from July 2016 till March 2017 a surveillance study was done at Erbil city. The study was part of the routine diagnostic work carried out in (Central Lab and Rzgari Lab), 4062 persons of all age groups are included in the study, a single stool sample was collected from each person, and examined the sample by a direct smear (normal saline and Lugol's iodine). Stool samples were inspected for the presence of parasitic forms (scolex, segments and eggs), all information about; location and gender were collected from persons. The stool sample should be collected in a clean, dry screw-top container [10].

Examination first is done macroscopically to note the color, consistency, Abnormal features and if there was adult worm or segment, and second microscopically examination which is used to detect egg, scolex and segments under microscope.

### RESULTS AND DISCUSSION

Hymenolepiasis is considered an important public health problem in the developed and developing countries [11].

A total of 4062 stool samples were examined in current study to detect *H. nana*. The overall percentage of infection was 4.04%, from 4062 specimens investigated, as shown in (Figure 1) and egg of *H. nana* shown in (Figure 2).



**Figure1.** Total infection by *Hymenolepis nana*



**Figure2.** Egg of *Hymenolepis nana* 40X

Our result is lower than the previous studies in Erbil governorate [12,13], in Sulaimani [14], in Baghdad [15] and other studies in different countries like Pakistan [16]. While our finding

was higher than Cape Town in South Africa [17] and southern Spain [18].

Generally, the differences among our results and other studies that carried out in different

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countries in the world may be due to, either lack of laboratories technicians education on parasitic infections, or lack of techniques which has efficiency to diagnose parasites, or that different studies may be using different methods to diagnose parasites or there are differences of the experience of laboratories technicians. The rate of *H. nana* infection in the present study could be related to a number of factors such as poor health hygiene and toilet training, overcrowding, low education of children, low socioeconomic status and climatic conditions

[19]. Another important factor which affects the rate of *H. nana* prevalence is the presence of asymptomatic patients in the community who can be considered as the main source of infection through continuously excreting the eggs with their stools [19,20].

The frequency of *H. nana* infection in Males were 106/3183 (3.33%) while in Females were 58/879 (6.59%) as seen in (Table1).

**Table1.** Distribution of *H. nana* infection according to gender in Erbil city

Sex	No. sample	No. +ve (%)	No. -ve (%)
Male	3183	106 (3.33)	3077 (96.67)
Female	879	58 (6.59)	821 (93.41)
<b>Total</b>	<b>4062</b>	<b>164 (4.04)</b>	<b>3898 (95.96)</b>

In this study, the percentage of infection in female (6.59%) was higher than infection in male (3.33%). our results are in agreement with Malheiros *et al* [21] in which they found the prevalence in female was 6.45 and in male was 1.84. Whereas our results are in disagreement with Abdel Hamid *et al* [22] in which they observed the prevalence in male was 59% and in females were 41% who showed that the infection with the *Hymenolepis nana* was higher in males than in females.

Higher rates of infection among females is justified by that children females may be spend their time in the cleaning to helps their mothers either in the garden or kitchen more than males, and these may lead to contact with several things that could be contaminated with eggs of *Hymenolepis nana*.

Prevalence of *H. nana* was highest in Central Lab (4.14%). While the lowest prevalence of *H. nana* found (3.68%) in Rzgari Lab (Table 2).

**Table2.** Distribution of *H.nana* infection according to location in Erbil city

Sample	No. of Sample	No.+ve (%)	No.-ve (%)
Rzgari Lab	924	34 (3.68)	890 (96.32)
Central Lab	3138	130 (4.14)	3008 (95.86)
<b>Total</b>	<b>4062</b>	<b>164 (4.04)</b>	<b>3898 (95.96)</b>

According to location, our results showed that various prevalence of infection in different places. This result is in agreement with Al-Jeboori and Shafiq [23], and disagreement with Kadhim [24] who found there were no difference in prevalence of infection according to locations.

While according to months March showed the highest rate of infection 16.98 (45/265 samples) followed by September 12.32 (50/406), while no infected sample was observed in July and August (Table 3 and Figure 3).

**Table3.** Distribution of *H. nana* according to months

Months	No.samples	No.+ve (%)	No.-ve (%)
July	333	0 (0)	333 (100)
August	753	0 (0)	753 (100)
September	406	50 (12.32)	356 (87.68)
October	482	23 (4.77)	459 (95.23)
November	454	10 (2.20)	444 (97.79)
December	369	7 (1.89)	362 (98.10)
January	593	25 (4.22)	568 (95.78)
February	407	4 (0.98)	403 (99.02)
March	265	45 (16.98)	220 (83.02)
<b>Total</b>	<b>4062</b>	<b>164 (4.04)</b>	<b>3898 (95.96)</b>

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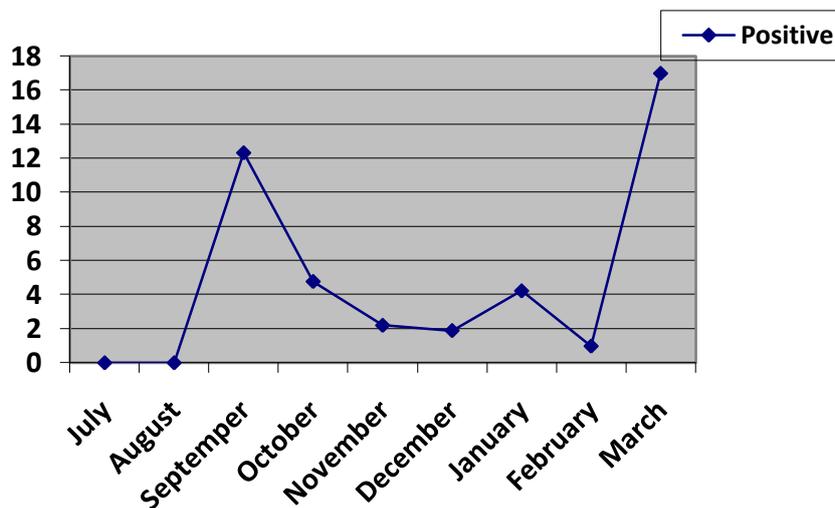


Figure 3. Prevalence of *Hymenolepis nana* according to months

In our study we found a significant difference in rate of infection among months, we observed March had highest rate of infection. Our results were close to finding of Al-Jeboori and Shafiq in Baghdad where they found difference in rate of infection according to months, and they imputed these results to some reasons, that the parasite could be more active in warm weather

in addition to the presence of increased number of rats at hot weather which help in spread of infection [23].

Other types of intestinal parasites were found in this study. The percentage of infection by *Entamoeba histolytica* was (8.52%) higher than percentage of infection by *Giardia lamblia* (4.26%) as seen in (Table 4).

Table 4. Distribution of other intestinal parasites (out of 4062).

Organisms	No. +ve	(%)
<i>Entamoeba histolytica</i>	346	8.52
<i>Giardia lamblia</i>	173	4.26
Total	519	12.78

Beside *H. nana*, *Entamoeba histolytica* and *Giardia lamblia* were detected in Central

Lab. and Rzgari Lab. as other intestinal protozoan detect in this study (Table 5).

Table 5. Distribution of single intestinal parasitic infection in Erbil city (out of 4062).

Parasites	No.+ve	(%)
<i>Hymenolepis nana</i>	164	4.04
<i>Entamoeba histolytica</i>	346	8.52
<i>Giardia lamblia</i>	173	4.26
Total	683	16.81

Double infections with intestinal protozoa in combination with *H. nana* were identified, *H. nana* was combined with *Entamoeba histolytica*

in (0.123%) whereas *Giardia lamblia* in (0.34%) (Table 6).

Table 6. Distribution of double intestinal parasitic infection in Erbil city (out of 4062).

Parasites	Number of double infection (%)
<i>H. nana</i> + <i>E. histolytica</i>	5 (0.123)
<i>H. nana</i> + <i>G. lamblia</i>	14 (0.34)

*Entamoeba histolytica* and *Giardia Lamblia* that were found to be combined with *H. nana* infection as double infection. This was in contrast to a study done in Kalar in which a

significant number of co-infections of *H. nana* were found with *Entamoeba histolytica*, *Giardia lamblia* and *Entamoeba coli*. This could be due

to more hygienic state of food and water in big cities like Erbil [25].

## CONCLUSIONS

We can be concluded from the present study. Prevalence of *H. nana* infection in Erbil city very low, and the females had the highest percentage of *H. nana* infection than male. Finally our results shown differences of infection according to location and months.

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