

Original Research Article

THE PREVALENCE OF *HYMENOLEPIS NANA* IN AL-MUTHANNA PROVINCE

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Abstract.

current research is considered the first investigation of parasitic infections with the dwarf tapeworm (*Hymenolepis nana*), which was conducted in the city of Samawah/Muthanna province. It is clear from the current results that children (males and females) are most susceptible to infection with these worms. 170 samples were collected and it was found that the number of samples infected with the worm was 20, with an overall prevalence rate of (11.76%) (males 11, 55%; females 9, 45%). There are no statistically significant differences between infected males and females. The parasite infects ages between (5-16) years, the highest prevalence rate was recorded in age group, (9-12) was (44.12%, 45%), while the lowest percentage was recorded in the age group (5-8) was (23.53%, 20%). There was a significant difference between the rate of infection with this parasite between the first age group and the two age groups (second and third). no statistically significant differences were found between the second and third age groups. Most of the affected patients suffered from loss of appetite, insomnia, persistent vomiting and anal itching. The current study recorded the highest prevalence of tapeworm infection based on contact with animals (60%) compared to non-contact with animals (40%), and these differences are significant at ($P \leq 0.05$). The drug praziquantel is considered a successful treatment for this worm.

Keywords: dwarf ; definitive host ; prevalence ; eggs ; asymptomatic.

1.Introduction

Infection by *H.n.* is most communal in children aged four-ten years, in dry or warm districts of the advanced world, this parasite affects many millions of individuals, especially children at a very young age all over the world, incidence rates of disease in various areas range from 0.10- eighty percent. It is valued to have fifty – seventy five million transferors of this parasite with five to twenty five percent prevalence in youngsters worldwide, which can be as high as fifty percent in children among one - four age group (Paniker, 2013 and Percy, *et al.* 2017).

A person becomes diseased by coincidence eating eggs of tapeworm parasite. This can occur by eating nutrients or liquid contaminated with stool by touching mouth by contaminated limbs, or by eating contaminated earth, Individuals be able to also become diseased if they by coincidence eat an infected insect such as arthropod for example small or large beetle that has caught into the nutrition, adult parasite (*H.n.*) are so very minor compared to further tapeworms belong to class Cestoda and may be up to fifteen-fourty mm long, adult parasite are made up of various small strobilia, when the dwarf tapeworm parasite develops within the human digestive system, specifically in the small intestine, its parts disintegrate and are transmitted to the stool, this parasite can live for 21- 42 days. However, once you become infected, the dwarf tapeworm may multiply within the body (self-infect) and continue to infect (CDC, 2017).

Because most human disease by this tapeworm stay asymptomatic, except there is severe infections, a clinical identification of infestation remains indefinable, this is confirmed by a new report of a related finding of the adult parasite observed through a colonoscopy at Parson's, which was diagnosed from a (fifty six, year-old) patient presented with farm work and contact with some

animals such as sheep, cattle, cow, domestic dog, wild and domestic birds and some rodents (Mahande and Mahande 2016).

There are many studies that have been conducted on the phenotypic and epidemiological aspect of the dwarf tap worm(Mahande and Mahande 2016 , Taher 2017)). Given the lack of a study that specialized in the prevolance aspect of this worm, the research, was designed to, study the prevolance of this worm which infects humans in in this city.

2. Materia ls and Meth ods.

170 stool samples, were collected on consecutive days to examine the presence of helminths in people with abdominal pain from different areas of Al-Muthanna province. Samples are placed in sterile plastic bottles containing 10% formalin , a ccording to the methods described by (Migue *et al.*, 2016 and Wali *et al.*2018). The samples were transported to the Environment and Pollution Laboratory at the College of Education for Pure Sciences using boxes designated for transporting samples.

The samples were mixed well and using two methods, the first method : direct smear and the second method: flotation techniques , then two drops were placed on the glass slide for the purpose of detecting parasites. The process was repeated 4 times for each sample for the purpose of conducting a complete survey to confirm the presence of tapeworms. Lugol`s iodine was used to stain the samples.the parasite was observed in the microscopic preparations using anovex-hollandcompound microscope40xand100x to study of results of present research.

Patients are treated using the treatment suggested by the specialist doctor (the treatment is mentioned in the search results).

The prevalence of infection with the parasite (*H.n.*) was calculated, using the eggs number methods for each (eggs / gm) gram of stool, and the disease condition was classified as follows:

- 1- From one egg to 1,999, the prevalence of the infection is classified as mild.
 - 2 - From two thousand eggs to 9,999, the prevalence of the infection is classified as moderate.
 - 3- Equal to or more than ten thousand eggs, the prevalence of the infection is classified as heavy
- Based on a study Chero *et al.*(2007) and astudy Matthys *et al.*(2011).

Statement of ethics. It was approved to complete this current research by submitting the research proposal to the Biology Department / College of Education for Pure Sciences / Al-Muthanna University for inclusion in the scientific plan.

Statistical analysis of results.The Spss program, version 20, was used to reveal the nature of the differences between male infections and female infections.

3. Results

3.1. The Percentage of infection with *Hymenolepis nana* according to sex.

Table (1) illustrations that the total number of samples collected through existing research was 170 samples, and that the total number of infections was 20 samples (11.76%) for both sex (55% (11) , 45% (9) respectively.There are no statistically significant differences between males and females infected with tapeworm

Table 1:The Percentage of infection *Hymenolepis nana* with according to sex.

Total Samples	No of total infection (P)	% of total Infection	% of infection (NO.M) From total P.	% of infection (NO.F) From total P.
170	20	11.76	11(55)	9(45)
Statistical analysis				P≤ 0.05

3.2. Distribution of patients infected with tapeworm *H.n.* according to age groups.

By observing Table (2), Shows that this parasite infects ages between (5-16) years, and that the highest percentage of prevalence was recorded in the age group (9-12) was (44.12% , 45%), while the lowest percentage was recorded in the age group (5-8) (23.53% , 20%), followed by the age group (13-16) (32.35% , 35%), and there, was a significant difference between the percentage of prevalence with this parasite between the first age group and the two age groups (second and third). no statistically significant differences stuck between the second and third age groups

Table 2: Distribution of patients infected with tapeworm *H.n.* according to age groups.

Age group (year)	No.	% form the total samples	p.	% form the total p.
5-8	40	23.53	4	20
9-12	75	44.12	9	45
13- 16	55	32.35	7	35
Total	170	100	20	100
Statistical analysis		P≤ 0.05		

3.3. Table (3): The most important symptoms recorded in patients infected with tapeworm.

It is clear from Table (3) that most patients infected with tapeworm suffer from loss of appetite (Anorexia) , insomnia, constant vomiting, especially when eating, and anal itching. These symptoms are considered among the most important symptoms recorded in the patients of the current study.

Table 3: The most important symptoms recorded in patients infected with tapeworm.

site of inflammation in the mouth	Patients	
	Yes	prevalence of infection
Anorexia	√	+++++
Insomnia (inability to sleep)	√	+++++
Vomiting	√	+++++
Anal Itching	√	+++++

+++++ indicates the severity (**prevalence**) of the symptoms, as we note that the most severe symptoms were anal itching, while the least severe was insomnia (inability to sleep).

3.4. Percentage of infection prevalence based on contact with animals.

The current study recorded the highest prevalence of tapeworm infection based on contact with animals, and it was (60%) compared to the tapeworm infection prevalence based on no contact with animals(40%). These differences are statistically significant at the probability level $P \leq 0.05$., Table (4).

Table 4 :Percentage of infection prevalence based on contact with animals.

No of total infection (P.)	% of infection prevalence based on contact with animals	% of infection prevalence based on no contact with animals
20	12 (60%)	8 (40%)
Statistical analysis		$P \leq 0.05$

3.5.Treatment of parasite *H. nana* .

After identifying the parasitic infection that occurred as a result of tapeworm infection (*Hymenolepis nana*) a prescription called praziquantel, (a single oral dose of 25 m g/kg)was given. The drug causes the dwarf tapeworm to dissolve inside the intestine. The drug (praziquantel) is

considered a successful treatment for this worm. Other treatments may be used to treat infections such as Zentel.

4. Discussion

The worm is transferred from one person to another through the mouth and feces, without the presence of an intermediate host. During the worm's life cycle, rodents play the role of the definitive host for both species (*Hymenolepis nana* and *Hymenolepis diminuta*), but the first species is more common than the second species. *H.n.* infection, occurs through ingestion of food polluted with worm eggs, the infection is characterized by initial stages without symptoms until it develops into the chronic stage, which is characterized by the appearance of a group of symptoms, including diarrhea, abdominal pain, nausea, and other symptoms. Infection with dwarf worms usually causes anemia as a result of their absorption of vitamin B12, which is a vitamin that is very important for the formation of red blood cells (Niwa, *et al.*, 1998, Steinmann *et al.*, 2012, Soares *et al.*, 2013, Mohamed, Hegazy, 2007, Garedaghi and Khaki, 2014 and Przemysław *et al.*, 2014).

The worm lives from (four to six weeks), the eggs are infectious when they are released, and the host can be infected more than once, leading to chronic infection with this species of parasite.

A study by Maria *et al.* (2010) conducted between (1997 and 2006) concluded that (3523) cases of infection with the following tapeworms (*aenia saginata*, *T. solium*, *Taenia species*, *Hymenolepis nana*, *Hymenolepis diminuta*, *Diphyllobothrium latum*, *Dipylidium caninum*, *cystic echinococcosis* and *cysticercosis*) (8, 3, 5, 11, 20, 41, 350, 533, 2748) respectively. The worksheet showed a decrease in percentage (%) of intestinal infections compared to previous years.

Other studies indicated the possibility of humans being infected with the species that belongs to the genus Hymenolepis, including a study (Watwe and Dardi (2008)) that indicated the possibility of humans being infected with the *Hymenolepis* species: *diminuta* in females at the age of 12 years during a study conducted in Deoghar city in India.

External factors play a role in the transmission and spread of infection, as they cause many symptoms that indicate infection with parasites, including lack of awareness of personal hygiene, not washing, Some nutrients (fruits and vegetables) before eating them, and not washing hands after defecation, these factors may increase the chance of infection compared to correct traditional practices (Gungoren *et al.*, 2007, Pakdel, *et al.*, 2013, Gul liver *et al.*, 2014; Eliyana *et al.*, 2016 and Al-Mekhlafi, 2016)

Worm infestation with all its symptoms is considered mild, and this may be due to the elimination of insects that carry the eggs of this parasite, and the continuous control of mice, as most of the homes in which children live are characterized by urban design, which reduces the chance of mice remaining near humans, in addition to their availability

Many studies have indicated the role of rodents in the life of many tapeworms, and therefore (they play an important role in the prevalence) infection among the population, as they cause so-called zoonotic diseases and thus infect both sexes if appropriate conditions are provided through contaminated food or contaminated drink, in addition to, there are other ways to ensure that the eggs of these worms reach the host to complete the life cycle (Reperant *et al.*, 2009, Mikhail *et al.*, 2009, Thompson, 2015 and Eliyana *et al.*, 2016)

A study by Wali *et al.* (2018) indicates that the worm causes tapeworm disease and may cause death to humans and is considered one of the causes of economic losses that may affect human society, this study included 188 infected children whose age ranged between 6 and 15 years. The infected kids in the first group were treated with albendazole (400 mg), oral dose, and the study found that 6.08% were infected with the *H.nana* parasite and 10.5% were infected with the parasitic infection. The study recorded that the two drugs used in the study had an effect of 83% and 75%, respectively. This indicates that Zentel treatment is the most effective in parasitic infections.

A study conducted by Maysam *et al.* (2019) indicates the occurrence of human infection with one of the tapeworm genera: *Hymenolepis* in Iran. This study included 15 infected children. The diagnosis

was made based on morphological aspects. Praziquantel treatment was successful in eliminating the worm.

150 children infected with the *Hymenolepis nana* were treated with an oral dose using the treatment called (praziquantel), which is an effective compound for many tapeworm infections. The affected children were distributed into 3 groups and were treated with different doses of the medication. The treatments were

1- Parasitological treatments (97.5%) of 65 infected children were treated with (25 mg/kg).

2- Parasitological treatments: 61 (93.8%) of 65 infected children were treated (15 mg/kg)

3- Parasitological treatments: 19 (76.0%) of 25 infected children were treated (10 mg/kg).

the drug was well tolerated, and no side effects were observed among patients. Sample tests (blood, urine) conducted in 30 patients treated with a dose of 25 mg remained within unsatisfactory values that are considered normal, drug tolerance was good, no side effects were seen, a series of the (blood and urine) tests during (before and after) treatment in thirty five people who received (twenty five mg/kg) remained within normal values (Hugo, 1980 and Wali *et al.* 2018).

The appropriate treatment for this parasite, results are somewhat reliable with another results of previous readings.

The results of the current research are consistent with the results of previous research, which indicate that the dwarf tapeworm infects males and females, and children are more susceptible to infection. The infection is accompanied by abdominal pain, Anorexia, insomnia, vomiting, and anal itching, in addition to the occurrence of injuries resulting from contact with animals.

5. Conclusion

The infection with *H. n.* is an infection with dwarf tapeworms that occurs intermittently in Al-Muthanna Governorate, Samawah City. Parasitic infestation is usually diagnosed by chance during a field review. The diagnosis result is usually somewhat convincing, and it is not necessary to use treatment because its effectiveness has not been proven to change the result, and this parasite does not lead to human death.

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