



Infection rate of *Enterobius vermicularis* (Pinworm) among school children in Sebha, Libya.

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DOI: [10.37375/sjms.v2i2.2541](https://doi.org/10.37375/sjms.v2i2.2541)

ABSTRACT

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Keywords:

Pinworm, scotch tape, Sebha, Libya.

Helminthic infections caused by *Enterobius vermicularis* have a cosmopolitan character and most often affect the paediatric pre-school and school age population. This helminth is the most frequent in Libya, but it is as yet unrecognized, probably due to parasitological laboratories not being consulted. The cellophane scotch tape method was used to investigate the presence of *E. vermicularis* eggs in 115 specimens. The overall infection of this parasite was 11.3%. Out of 115 school children (62 boys and 53 girls) nine (14.51%) boys, and four (7.54%) girls, were found infected with this parasite. There was a significant difference ($X^2=5.39$, $P=0.022$) between both genders. Highest prevalence rate (13.84%), was found among 8 to 10 years old age group. The adhesive scotch tape method appeared to be sensitive and appropriate choice to diagnose infection of *E. vermicularis*.

1.0 Introduction

Gastrointestinal parasitic infections have a widespread distribution across the globe with the highest-burden in developing countries where poor personal hygiene, environmental sanitation, socio-economic, demographic, and health-related behaviours have documented to influence their transmission (Norhayati *et al*, 2003). The most common way of the spread of intestinal parasitic infections is through ingestion of contaminated food and water with human faecal materials, yet they may also spread from human to human via fecal-oral contact (Ayeh-Kumi *et al*, 2009). Globally, intestinal parasites infect approximately one third of the total world population, with the highest burden in tropics and subtropics (Chan, 1997, Le Bailly and Araújo 2016, and Girma and Amerio 2014-2022). In the world, an estimated 1.2 billion, 795 million, 740 million, 500 million, and 2.8 million people are infected with *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm (De Silva *et al*, 2003) *Entamoeba histolytica* and *Giardia lamblia* (Duc *et al*, 2011) respectively.

Enterobius vermicularis is the most common intestinal nematode worldwide infecting predominantly the children age group (Kucik *et al*, 2004; Kang *et al*, 2006 and Fallah *et al*, 2022). Pinworm infection can be facilitated by certain factors such as poor personal or group hygiene, and overcrowding in preschools, schools, orphanages, and family groupings (Cook, 1994 and Burkhart and Burkhart, 2005). These conditions favour pinworm eggs transmission from person to person,

directly via the anus-to-mouth route and finger contamination or indirectly by contaminated objects, e.g., toys, classroom tables, chairs, or the ground (Burkhart and Burkhart, 2005 and Kim *et al*, 2013). Infection transmission of *E. vermicularis* occurs through direct contact, and this infection is especially common among children in kindergartens and primary schools (Park *et al*, 2005).

Enterobiasis re-infection occurs easily (Ng *et al*, 2011). Some infected persons are asymptomatic, while others have clinical manifestations such as malaise, insomnia, peri-anal itching, discomfort and irritability. Following re-infection and chronic infection, this parasite can affect children's cognitive development (Li *et al*, 2015). In rare cases, this infection has involved the kidneys and fallopian tubes, leading to severe outcomes and even death (Pampiglione and Revasi, 2009 and Serpytis and Seinini 2012).

In Libya, relatively low prevalence of intestinal parasites has been reported probably due to high standard of living of people, proper sanitation and good hygiene (Al-Fellani *et al*, 2005, and Gelani *et al*, 2009). Full information about intestinal parasites in Libya is lacking despite some reports (Dar *et al*, 1979; Al-Fellani *et al*, 2005; Saleh, 2007; Sadaga and Kassem, 2007 and Gelani *et al*, 2009). The commonest protozoan infections are *Blastocystis hominis*, followed by *Entamoeba histolytica/Entamoeba dispar* or *Girardia lamblia* and *Entamoeba coli* among Libyan population (Al-Fellani *et*

al, 2005; Al-Kilani *et al*, 2008 and Gelani *et al*, 2009). Moreover, *Cryptosporidium* spp infections have been reported among Libyan people (Bugarara *et al*, 1999; Ali *et al*, 2005 and Kara *et al*, 2006). In Libya, helminthic infections are uncommon and relatively low infection rates have been reported (Dar *et al*, 1979; Al-Fellani *et al*, 2005; Saleh, 2007 and Gelani *et al*, 2009). However, prevalence of intestinal parasites has been found higher in expatriates arriving from developing countries (El-Buni and Khan, 1998 and Khalifa *et al*, 2016).

In the present study, attempts were made to find out the infection of *Enterobius vermicularis* among school children in the city of Sebha, Libya using cellophane scotch tape method.

2. Materials and Methods

During the period of January 2019 to November 2019, a total of 115 school children were screened for *Enterobius vermicularis* infection. Locally available adhesive cellophane plastic tape strips were applied on perianal region at night and were removed in the morning. The plastic tape was placed on glass slide and examined under the microscope in low power (10X) for the presence of eggs of pinworm in high power (40X).

3. Results

The cellophane scotch tape was used to detect eggs of *Enterobius vermicularis* from peri-anal region of school children. Out of 115 specimens collected, thirteen (11.3%) showed eggs of this parasite (Results are shown in Table 1). Pinworm infection was significantly higher in boys than girls ($X^2 = 5.39, P=0.022$). The highest infection rate was 13.84% in the age group 8-10 years of age group. ($X^2 = 5.27, P = 0.200$).

Table 1: *Enterobius vermicularis* infection among school children in Sebha.

Gender	No. of sample examined	No. of samples infected (%)
Boys	62	9(14.51)
Girls*	53	4(7.54)

* $X^2 = 5.39, P = 0.022$

Table 2: *Enterobius vermicularis* infection in different age groups

Age (Years)	No. of samples	No. of infected (%)	Statistic
5-7	44	4(9.09)	$X^2 = 5.27$
8-10	65	9(13.84)	$P = 0.20$
11-13	6	NIL	

4. Discussion

Infection with intestinal parasites result adverse effects on the growth and development of children, and impinge upon their nutritional status and morbidity (WHO, 2003).

Enterobiasis is not considered to be a serious disease, but the morbidity level in the world is significant, especially in children. Deposition of *E. vermicularis* eggs on perianal region may cause irritation, constant perianal itching, possibly leading to potentially debilitating sleep disturbance, impaired concentration, emotional instability, or enuresis (Cook, 1994). Eosinophilia, colitis, appendicitis and inflammatory bowel disease have been reported as a consequence of enterobiasis (Sahand Bhadani., 2006).

In the literature, most of the studies carried out in Libya showed only the prevalence of protozoan parasites in the population or patients (Dar and Friend, 1979; Al-Fellani *et al*, 2005 and Khalifa *et al*, 2016) Relatively low infections rates of intestinal parasites have been reported in Libya (Bolbol *et al*, 1981, Gelani *et al*, 2009 and Khalifa *et al*, 2016). The helminthes infections are uncommon in Libya probably due to hot and dry weather in Southern region of the country (Al-Fellani *et al*, 2005 and Gelani *et al*, 2009). So far, anal swab method has not been used in Libya for the diagnosis of *E. vermicularis*. There are only four studies, who used direct smear microscopy not perianal swab samples for the diagnosis of *E. vermicularis* in Libyan communities (Dar and Friend, 1979 in a closed community in Benghazi; Al-Fellani *et al*, 2005 in outpatients in Sebha, Ben Mousa, 2007 in school aged children in Tripoli and Al-Kilani *et al*, 2008 in Nalout popularity Western Libya).

In this study, overall infection of *E. vermicularis* was found 11.3% in school children in Sebha city, using peri-anal swab samples. The results of present study showed higher infection of pin worm among school children compared to reported 0.8% in Benghazi (Dar and Friend, 1979), 0.17% in Sebha (Al-Fellani *et al*, 2005), 4% in Tripoli (Ben Mousa, 2007), 0.6% in Derna District (Sadga and Kassem, 2007), and 7.5% in Nalout Popularity Western Libya (Al_Kilani *et al*, 2008). They used direct smear microscopy for the diagnosis of *E. vermicularis*. Moreover, other studies also showed lower rate of infection of *E. vermicularis* among preschool children in Taiwan and Japan, using adhesive cellophane perianal swab kit (Shinji *et al*, 2010 and Kuang *et al*, 2018).

The overall positive rate was higher in boys than in girls ($P= 0.022$). Similar findings are reported in region of Tunis (Emna *et al*, 2015); (Walid *et al*, 2021) and Korea (Myoung *et al*, 2023) who, observed that boys were significantly more

infected with *E. vermicularis* compared to girls ($P < 0.05$) using perianal adhesive scotch tape. However, in a study in Iran, there was no significant difference between gender and age ($p < 0.05$) using adhesive cello-tape anal swab method (Seyed *et al*, 2016). Compared to direct smear microscopy of stool samples, perianal swab samples showed higher sensitivity for the diagnosis of *E. vermicularis*. Similar observations were documented in West Bank, Palestine who, found that perianal cellophane tape method was more sensitive than direct smear microscopy (Rasha *et al*, 2015). Moreover, prevalence of pinworm infection is generally underestimated due to the difficulty of detecting pinworm eggs by stool examinations, because usually eggs can be detected in only about 5% of faecal samples, (Kim *et al*, 2013 and Kubiak *et al*, 2017). In contrast, the prevalence of nematodes such as *Ascaris lumbricoides* was found to be higher among school children in Tripoli. However, Bolbol *et al* (1981) used direct smear microscopy of stool samples and did not find infection of pinworm among out patients in Tripoli.

5. conclusion

E. vermicularis seems to be still maintained in Libya in low-grade. Our study suggests employing a scotch tape method for the routine diagnosis of pinworm infection. To improve personal hygiene, implementation of effective health education on enterobiasis and frequent therapy for children may reduce the infection of *E. vermicularis* in the community.

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