

## THE PARASITIC PROFILE AMONG SCHOOL CHILDREN IN EI-WADI EL-GADDED GOVERNORATE, EGYPT

By

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### Abstract

Parasitic infection is still a serious public health problem in the world, especially in developing countries including Egypt. It represents a major cause of morbidity and mortality in childhood and among high-risk groups in most parts of the world. This study detected the prevalence of parasitic infection among school children in El-Wadi El-Gadded (the New Valley Governorate).

A total of randomly chosen 1615 students aged from 6-16 years, (771 males & 844 female) from 12 primary schools and 12 preparatory schools related to four centers (El Dakhala, El Farfra, Paris and Platt) from the New Valley Governorate. Each child was subject to: A questionnaire sheet, Urine examination through sedimentation methods, Stool examination using: Direct smear, Simple sedimentation method and Modified Ziehl-Neelsen Stain, Blood samples were collected randomly from 450 children and examined for Seropositivity of toxoplasmosis using (On-SiteToxoIgG/IgM Rapid Test-Cassette) and examination of hair & clothes for ectoparasites (lice).

The overall prevalence of parasites was (39.1%) among primary and preparatory school children. The helminthes were *E. vermicularis* (15.2% & 17.1%); *A. lumbricoides* (1.3% & 1.9%) and then *H. nana* (0.9% & 0.6%) and the protozoa were *E. histolytica* (14.1% & 13.2%), *Giardia lamblia* (3.8% & 3.9%), and then *Cryptosporidium parvum* (0.09%) and seropositivity of toxoplasmosis was in (3.0% & 2.7%) among primary and preparatory school children respectively. Mixed infection was in (0.4%) among primary school children. Head lice infestation was more prevalent among primary school children than preparatory school ones with a ratio (3.5% & 0.2%) respectively, was nil among males.

**Key words:** Egypt, New Valley Governorate, School children Intestinal parasites; Rural and urban community.

### Introduction

Intestinal parasites are endemic worldwide constituting mortality and morbidity mainly in developing countries (Mehraj *et al*, 2008), particularly children (Nematian *et al*, 2008). The prevalence depends on socio-economic level, habitats, sanitary and environmental conditions, personal hygiene, water supplies and climatic factors (Kvalsvig, 2003). On the other hand, *Toxoplasma gondii* is a protozoan parasite of worldwide distribution (Furtado *et al*, 2011; Saleh *et al*, 2014). It is horizontally transmitted to man by ingestion of oocysts in water, food and/or soil contaminated with cat's feces, or by cysts in raw or undercooked meat (Fayer *et al*, 2004). Head lice (*Pediculus h. capities*) are the blood-sucking ecto-parasite of man worldwide (Amanzougaghene *et al*, 2016).

The present study aimed to detect the prevalence of parasites among the school children in El-Wadi El-Gadded (The New Valley) Governorate.

### Subjects, Materials and Methods

The study was carried out in The New Valley Governorate which is located at the South Western part of Egypt and shares the international borders with Libya to the West and Sudan to South. According to population estimates from 2015 the majority of residents in the governorate live in rural areas, with an urbanization rate of only 48.0%. Out of 225,416 people residing in the governorate, 117,180 people live in rural areas as opposed to only 108,236 in urban areas. The governorate is divided into five centers (El Kharga, Capital, El Dakhla, El Farfra, Paris and Platt). Consisting of roughly a third of

Egypt's area, the New Valley Governorate is the country's largest governorate and one of the biggest on the African continent. Consisting of roughly a third of Egypt's area, the New Valley Governorate is the country's largest governorate and one of the biggest on the African continent. The capital is at the Kharga Oasis. The area is an almost rainless plateau of the eastern Sahara embracing the east-central sector of the Libyan Desert. It is composed mainly of Nubian sandstone, which has weathered to undulating plains, in places extensively covered with sand. Al-Wādī al-Jadīd is highest in the extreme southwest, where Mount Bābayn rises to 3,622 feet (1,104 metres). From there the plateau falls gently away to the north, to the areas of Siwa and the Qattara Depression, which is partly below sea level. In the east and north, limestone escarpments diversify the landscape. In the depressions, shallow wells tap the aquifers of the underlying Nubian sandstone. Deep-well drilling extended the cultivable land of the habitable oases considerably, but later this was found to have lowered the water table. There have been discussions about raising the water table by flooding an uninhabited depression west of Aswān with water from Lake Nasser.

A total of 1615 children from twelve primary schools and twelve preparatory schools from the four centers; El Dakhla, El Farfra, Paris and Platt were randomly selected.

The class density ranged between 10-30 children. All children were subjected to the following: 1- A questionnaire filled out by an interview with the child and/or one of his parents. 2- Stool samples were collected individually in labeled cartoon box with fixed cover. 3- Stool samples were examined macroscopically for gravid segments and adult *Enterobius*. 4- Samples were then microscopically examination by a- direct smear and b- simple sedimentation methods (CDC, 2013). 5- Smears were examined with hematoxylin and eosin stain and a duplicate smear was stained with modified Ziehl-Neelsen stain mainly for *Cryptosporidium parvum* (Casemore *et al*, 1985). 6- Head inspection for lice. 7- Venous blood samples were aseptically obtained for separating sera to be examined for the anti-*Toxoplasma* antibodies (IgG/IgM rapid test Cassette, CTK, Biotech, USA),

### Results

A total of 631/1615 (39.1%) children were infected. Parasites were *E. vermicularis* 255 (15.8%), *E. histolytica* 223 (13.8%), *G. lamblia* 62 (3.8%), *A. lumbricoides* 24 (1.5%), *H. nana* 12 (0.8%), *C. parvum* 1 (0.06%) and head lice 40 (2.5%). Anti-*Toxoplasma* antibodies were positive in 13 (2.9%) and 4 primary school children had mixed infection (0.2%). Overall rate was 39.5% (446/1130) among primary school children and 38.1% (185/485) in preparatory school ones. Details were in tables (1, 2 & 3).

Table 1: School children in primary and preparatory schools in different centers

Centers	Primary school	No.	Preparatory School	No.
Paris	Old Paris	46	Old Paris	30
El-Farfra	El-Farfra	94	El-Farfra	93
Platt	Old Platt	137	Old Platt	20
Total	3	237	3	143
El-Dakhla	El-Salam	20	El-Salam	34
El-Dakhla	El-Saddeeq	22	El-Saddeeq	33
El-Dakhla	El- Rashda	380	El- Rashda	18
El-Dakhla	Mubarak	83	Mubarak	36
El-Dakhla	El-Dohos	37	El-Dohos	81
El-Dakhla	Budkholou	142	Budkholou	80
El-Dakhla	El-Shahied Abd EL Moneim Reyad	130	El-Shahied Abd EL Moneim Reyad	29
El-Dakhla	El-Kasr	24	El-Kasr	16
El-Dakhla	El-Owaina	15	El-Owaina	15
Total	9	893	9	342
Grand total	12	1130	12	485

Table 2: Prevalence of parasites among primary &amp; preparatory school children

Parasites	Total	%	Primary (1130)	70%	Preparatory (485)	30%
<i>Hymenolepis nana</i>	13	0.8	10	0.9	3	0.6
<i>Ascaris lumbricoides</i>	24	1.5	15	1.3	9	1.9
<i>Enterobius vermicularis</i>	255	15.8	172	15.2	83	17.1
<i>Entamoeba histolytica</i>	223	13.8	159	14.1	64	13.2
<i>Giardia lamblia</i>	62	3.8	43	3.8	19	3.9
<i>Cryptosporidium parvum</i>	1	0.06	1	0.09	-	-
<i>Toxoplasma</i> seropositive	13	2.9	7	3.0	6	2.7
<i>Pediculus h. capitis</i>	40	2.5	39	3.5	1	0.2
Mixed infection	4	0.2	4	0.4	-----	0%
Total parasites	631	39.1	446	39.5	185	38.1
Non infected	984	60.9	684	60.5	300	61.9

Table 3: Prevalence of parasites among school children according to sex

Parasites	Male (771)		Female (844)		Total (1615)	
	No	+ve %	No	+ve %	No	+ve %
<i>Hymenolepis nana</i>	7	0.9	6	0.7	13	0.8
<i>Ascaris lumbricoides</i>	13	1.7	11	1.3	24	1.5
<i>Enterobius vermicularis</i>	144	18.7	111	13.2	255	15.8
<i>Entamoeba histolytica</i>	100	13	123	14.6	223	13.8
<i>Giardia lamblia</i>	30	3.9	32	3.8	62	3.8
<i>Cryptosporidium parvum</i>	1	0.1	-	-	1	0.06
<i>Toxoplasma</i> seropositive	7	3.0	6	2.7	13	2.9
Head lice	-	-	40	4.7	40	2.5
Mixed infection	3	0.4	1	0.1	4	0.2
Total infected	302	39.1%	329	39%	631	39.1
Non infected	470	60.9%	514	61%	980	60.7

## Discussion

In the present study, the selected cases were 1130 primary schoolchildren from five centers of whom 237 were from Paris, El-Farfra and Platt, the other 893 children were from El-Dakhla Center, the Capital and the others were 143 preparatory schoolchildren from the three mentioned centers and 234 from El-Dakhla. The parasites recovered by macro and microscopic examination of the morning collected stools in a descending order of abundance were *Enterobius vermicularis* was (15.2%) in primary schoolchildren and (17.15) in preparatory school ones. *Entamoeba histolytica* was (13.8%) and (13.2%) respectively. *Giardia lamblia* was (3.8%) and (3.9%) respectively. *Ascaris lumbricoides* was (1.5%) and (1.9%) respectively. *Hymenolepis nana* was (0.8%) and (0.6%) respectively. *Cryptosporidium parvum* was (0.06%) and none in males respectively. Mixed infection was (0.2%) and none respectively. As to the ecto-parasites or the lice infestation was (2.5%) in the primary schoolchildren and (0.25) in the preparatory ones. The anti-*Toxoplasma* antibodies were (2.9%) and (2.7%) respectively. The overall

parasites were (60.5% in the primary schoolchildren and (61.9%) in the preparatory schoolchildren.

The worldwide prevalence of the intestinal parasites is estimated to be more than 3.5 billion with around 4.5 million clinical cases (Okuyay *et al*, 2004) mainly in the tropical and subtropical regions (Melo *et al*, 2010; Grande *et al*, 2011).

In Egypt, the prevalence rate of parasitic infection among school children was studied by many authors. In El Wadi El Gaded schoolchildren Rifaat *et al*. (1962) found that the intestinal parasitic infection was 78.8% El Dakhla Oasis and 84.4% in El Kharga Oasis. This high prevalence was related to low standard of living, bad hygienic conditions, no proper sewage disposal and abundance of flies at that time.

In the present study, the prevalence of parasites did not show significant difference among boys (39.1%) and girls (39.0%). The results agreed with Hussein (2011) in Palestine, Heidari and Rokni (2003) and Masoumeh *et al*. (2012) in Iran and Fan *et al*. (2012) in West Africa who found no significant difference between sexes. Also, there

was no significant difference of parasitic rates among children of primary (39.5%) and preparatory (38.1%) schools.

In the present study, *E. vermicularis* and *E. histolytica* were the commonest nematode and protozoan parasite respectively among all the children. These results agreed with El-Gindy *et al.* (1986) in Cairo, Hassan (1994) Giza, and Mohammad *et al.* (2012) in Damietta.

Rifaat *et al.* (1962) and Makhlouf *et al.* (1994) reported *E. vermicularis* was the commonest helminthic infection among the children. Abroad, same results were reported by Pérez-Armengol *et al.* (1997) in Spain, Pezzani *et al.* (2004) in Argentina, Requena *et al.* (2007) in Venezuela, Ammoura (2010) in South Jordan and Mamunur-Rashid *et al.* (2011) in Bangladesh.

In the present study, 255/1615 (15.8%) of the children had *E. vermicularis*, they were 172/1130 (15.2 %) in primary school children and 83/485 (17.1%) among preparatory school ones. These results agreed with Gurses *et al.* (1991) in Turkey who reported 10.5% among children between 7 & 13 years old and Flores *et al.* (2002) in Argentina reported 14.8% in middle-class children. In general, *E. vermicularis* is transmitted by auto-infection and/or person to person directly. Thus, the high prevalence of *E. vermicularis* in this study might be due to improper hygiene including improper washing hands with soap after defecation, before eating and preparing food. The higher prevalence of *E. vermicularis* could also explained by the high infectious nature of the parasite.

In the present study there was a slight difference in the prevalence of *H. nana* and *A. lumbricoides* among primary and preparatory school children with a ratio (0.9% & 0.7%) and (1.7% & 1.3%) respectively. The results agreed with Hassan (1994) who reported the prevalence of *A. lumbricoides* among primary and preparatory schools was 1% & 2.1% respectively as well as in Iraq (Raza and Sami, 2009) and in Albania

(Raza and Sami, 2009) and in Albania (Sejdini *et al.*, 2011).

As regards *H. nana*, in Iraq Al-Saeed *et al.* (2001) recorded a lower rate 0.5% in children 11-20 years and Raza and Sami (2009) reported 1.1% in age-groups 1-5 years. Aly and Mostafa (2010) in Saudi Arabia reported 0.6% in 8 years old children and Kanoa *et al.* (2006) in Gaza Strip recorded 0.5% in pre-school children. The low incidence might be due to the available water pipes in-doors in the modern housing and thus good hygienic habits.

In the present study, low prevalence of *A. lumbricoides* might be due to the desert environmental conditions of El-Wadi El Gaded. Also, dry atmosphere did not favor the spread of *E. histolytica* infection was the commonest protozoal infection among all children and was higher in primary than preparatory children. It was reported in 223 children out of 1615 with a prevalence of 13.8%. It was detected in 159 children among primary school children of 14.1% and 64 students with a prevalence of 13.2% among preparatory school children. El-Gholmy *et al.* (1968) in Egypt reported significantly higher prevalence among school aged children. Also, Hassan (1994) reported that there was significant difference in amebic infection between primary and secondary school students. Sayyari *et al.* (2005) in Iran reported 33% prevalence of *E. histolytica* in children of 0- 2 years and followed by 27% in 20-29 years. Noor Azian *et al.* (2007) in Malaysia reported that *E. histolytica* was high in 0-19 aged group (52%) and lowest above 60 years (3.8%).

In the present study, *Giardia lamblia* was (3.8%) and (3.9%) respectively. Addy and Aikins-Bekoe (1986) in Ghana reported a rate of 11% among diarrheal children not correlated to age groups. Al-Hindi and El-Kichaoi (2008) in Gaza Strip reported a rate of 10.3% in pre-school children not related to their ages. Tigabu *et al.* (2010) in North-western Ethiopia reported 26.7% & 28.8% among children with age 1-15 years and 6-

14 years respectively. Paudel *et al.* (2014) in Nepal detected 12.92%. On the other hand, El-Sherbini and Abosdera (2013) in Giza, Egypt reported a rate of (2.5% & 4.8%) among the primary and secondary school-children respectively. while El-Sahly *et al.* (1990) and Shubair (2000) reported that infants and children were prone to acquire giardiasis two to three times more than adults.

In the present study, one primary school child in El-Dakhla center had *C. parvum* (0.06%). El-Naggar *et al.* (2006) in Cairo found a rate of 3% among children. El-Sherbini and Mohammad (2006) in Giza reported a positive significant correlation between farmers and their farm animals infected with *C. parvum*. Abroad, Aly and Mostafa (2010) in Saudi Arabia recorded a rate of 0.6% among children and., Sejdini *et al.* (2011) in Albania reported a prevalence of 0.3%.

In the present study, lice infestation was high in the primary schoolchildren (2.5%), and dropped to 0.2% in the preparatory schoolchildren. No doubt, the old children are mature and take care of their feature mainly the hair. This result agreed with Morsy *et al.* (1991) in Cairo they found that the younger children were more infested than older ones. Al-Shawa (2006) in Gaza Strip reported high lice infestation among 6-12 years aged children. On the other hand, Değerli *et al.* (2013) in Turkey reported 20% in 6-11 years old children and 5.3% in 13-15 years old ones. Also, Morsy *et al.* (2000) in Cairo reported lice infestation in orphan, and secondary school students (Morsy *et al.*, 2001).

The low prevalence rate of pediculosis in the studied community may be due to nationwide strict screening programs in students and education of students and families about prevention and early detection of infestation.

In the present study, anti-*Toxoplasma* antibodies were 13/1615 (2.9%). Rifaat *et al.* (1963) by toxoplasmin skin test reported zero% and attributed this to the fact that El-Wadi El-Gadded was a secluded district de-

pending on their own food sources. Again, Rifaat *et al.* (1964) by skin test, agglutination test and Sabin Feldman dye test reported a very low incidence. Generally speaking, *T. gondii* is one of the most successful parasitic protozoa that cause an important zoonosis worldwide, which incidence differs from one country to another and even in the same country (Elsheikha and Morsy, 2009). Abroad, Khadre and El Nageh (1987) in Tripoli (Libya) reported higher rate (43.7%) among schoolchildren 7-18 years of age. Taylor *et al.* (1997) in Ireland reported 12.8% among school children aged 4-18 years and Konishi *et al.* (2000) in Indonesia recorded less than 10% at ages over 10 years. Hong *et al.* (2011) in Korea also recorded 4.3% in age 10 years old and 20.6% in age 70 years old. Fan *et al.* (2012) in West Africa detected that the older age group of 10 years had a higher seroprevalence 69.9% than that of the younger age group of 8 year olds 67.7%. In latent phase of toxoplasmosis, the organisms persist in the tissues of infected individuals such as brain, skeletal muscle, and heart (Basavaraju, 2016).

### Conclusion

Generally speaking, the World Health Organization estimated that the one-fourth of world's population harbors one or more intestinal parasites. The intestinal parasites are among the commonest infections of school age children causing the nutritional deficiency, chronic dysentery, rectal prolapse, poor weight gains, retarded growth and mental retardation. These parasitic infection or infestation can occur in children of all ages

In the present study, the prevalence of the parasites among children was more or less low as compared to other countries. This prevalence can be decreased more by increasing health education and improving sanitary conditions.

### Recommendation

Health education is a must. The school staff are requested to give hygienic illustrative lessons to the school-children, which would be better in included the children

families and the pre-school aged children as well.

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