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Prevalence, Risk Factors and Impacts of Schistosomal and Intestinal Parasitic Infections Among Rural School Children in Sohag Governorate

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Abstract

Parasitic diseases represent a major cause of morbidity and mortality in childhood in most parts of the world. Hygiene and play habits make children especially vulnerable to schistosomal and parasitic infections. The aim of this study is to define the prevalence of different types of parasitic infections, to define their risk factors and to determine their impacts on health and scholastic absenteeism and achievement of rural school students in Sohag Governorate, Egypt. A cross-section, analytical study design was chosen to perform this research on 960 rural school students. All the students were interviewed and examined clinically and laboratory. The study showed that 38.5% of the students were infected by parasites. *Entaemoeba histolytica, Enterobius vermicularis* and *Giardia lamblia* had the highest percentages, 20.4%, 16.6% and 15.2%, respectively. Male sex, last birth order, poor personal hygiene, low socioeconomic level, ≥3 infected siblings, previous parasitic infections and no early consultation for therapy were important risk factors (ORs=1.41, 2.32, 2.63, 2.86, 4.17, 9.80 and 10.83, respectively). Also, 29.2% and 31.6% of infected students were below the 5th percentiles as regard weight-for-age and height-for-age, respectively. Anemia was present among 52.4% of infected students. Further, 3.2% of them had hepatomegaly. Also, 37.8% and 41.1% of infected students had 0-3 and 4-6 days/month absent, respectively, while, 34.3% of infected students had a scholastic achievement <50.0%. Improving personal and environmental hygiene and regular screening, treatment and health education for students as regard parasitic infections in Egypt is recommended.

Introduction

Although all infectious agents in humans are parasites, by convention, parasitic diseases are defined as those caused by protozoa or helminthes (Chacon-Cruz and Mitchell, 2007). The burden of disease caused by infection with schistosomiasis and soil-transmitted helminthes (STH) remains enormous. About 2 billion people are affected worldwide, of whom 300 million suffer associated severe morbidity. These infections represented more than 40.0% of the disease burden caused by all tropical diseases, excluding malaria (WHO/WER, 2006). Hygiene and play habits make children especially vulnerable to schistosomal and STH infections. There are about 400 million school-age children infected. They are often physically and intellectually compromised by anemia, leading to attention deficits, learning disabilities, school absenteeism and higher dropout rates (WHO, 2001). The failure to treat school-age children therefore hampers child development, yields a generation of adults disadvantaged by the irreversible sequelae of infection, and compromises the economic development of communities and nations (WHO/WER, 2006). So, parasitic diseases represent a major cause of morbidity and mortality in childhood in most parts of the world, as parasites are endemic in many parts of the world with no specific area is spared. Although, infections due to protozoa and helminthes have received relatively little attention (Mahmoud, 1983). So, unfinished agenda for the fight against infectious parasitic diseases might never come to an end (Remme, 2007).

School children are considered one of the most important sectors of population due to their continuous growth and development at all levels. They are a vulnerable group and great attention should be paid for them (Abdel-Wahab and Mahmoud, 1987). Also, parasitic infection is a major public health problem in children worldwide, especially in developing societies. It produces nutritional deficiencies, especially among chronically infected children (Khalil, 1982 and El-Shobaki *et al*., 1990).

Un-hygienic living conditions give rise to increased prevalence of parasitic infections. Intestinal parasites are transmitted either directly or indirectly (Mahmoud, 1983 and Gamboa *et al*., 1998). Moreover, the prevalence of parasitic infection differ in different communities according to many factors, which include social and environmental characters of the community, health habits of the community personnel and technical methods used in diagnosis of parasites (El-Gammal *et al*., 1995).

It is estimated that the prevalence of parasitic infections allover the world from 1975 to 1995 were the following: 20.0% (1.3 billion) of the world population infected with ascariasis, 20.0% (1.3 billion) infected with hookworms, 3.3% (200 million) infected with giardiasis, 2.5% (150 million) infected with schistosomiasis, 1.08% (65 million) infected with cestodes, 1.0% (60 million) infected with amebiasis and 0.6% (35 million) infected with stronglyoidsias (Michael, 1997).

In Egypt, 56.0% and 47.0% of children are worryingly suffering from intestinal parasites and anemia, respectively (UNICEF, 2000). In further details; 40.4%, 22.4%, 8.9%, 8.7%, 6.3%, 5.4% and 1.9% of the Egyptian school children were suffering from *Enterobius vermicularis, Schistosoma (S.) haematobium, Giardia lamblia, S. mansoni, Ascaris lumbricoides, Entamoeba (E.) histolytica and Ancylostoma duodenale*, respectively (El-Gammal *et al*., 1995).

Growth in childhood is determined by environmental factors such as nutrition (which is influenced by infection) and illness (Heald and Gong, 1999). Nutritional anthropometric measures remain the most practical and useful mean for the assessment of the nutritional status of the population particularly children. It is the single universally applicable, inexpensive and non-invasive method and reflects both health and nutrition and predicts performance (DeOnis and Habicht, 1996). The height and weight retardation could be used as a useful indicator to identify high-risk children with poor health, under nutrition and low socioeconomic status (Habicht *et al.,* 1974; Delgado *et al.,* 1991 and Kafafi & Abdel-Mottaleb, 1992).

Study Objectives

A- Ultimate objective:

Improving quality of health of the school children in Egypt.

B- Immediate objectives:

1- To determine the prevalence of parasitic infection among rural school children in Sohag Governorate, Egypt.
2- To determine the sociodemographic and environmental risk factors for parasitic infection among rural school children in Sohag Governorate, Egypt.
3- To determine the impact of parasitic infection on the health and scholastic achievement of rural school children in Sohag Governorate, Egypt.

Subjects And Methods

A- Technical Design

I- Study Setting: This study was conducted in El-Huridyh village, a randomly selected village in Tahta District, Sohag Governorate.

II- Study Sample: One primary and one preparatory school in the village were included in the present study. In each school all of the students were included. The total number of students was 960. The students aged from 6 to 16 years. For each positive case a control case was chosen from the students' class list, the name after the positive case. Siblings of positive cases and controls were also examined to define percent of the positives among them.

III- Study Design: A cross-section, analytical study design was chosen to investigate the current research problem.

IV- Study Tools and Methods:

1- Interview questionnaire: It was used to collect data relevant to topic of the study. Student's parents, also, were submitted to an interview. Scholastic achievement was determined according to results of the first term exam; excellent (≥85.0%), very good (≥75.0%), good (≥65.0%), passed (≥50.0%) and failed (<50.0%). Sanitary measures were assessed by observation and asking about presence of pure water supply, private latrines and sewage carriage system inside houses of the examined students and classified accordingly to bad (only one of them was present), fair (2 of them were present) and good (all of them were present).

2- Diagnosis of childhood parasitic infections: All students included in the study had undergone full laboratory examinations for stool and urine. Fresh stool samples were taken from all students in morning and examined carefully by microscope. The following methods were used: a) Direct smears to detect any type of parasitic infection (Garcia and Bruckner, 1997). This test includes a wet preparation with/ without iodine (must be performed within 30 minutes of collection) to identify motile trophozoites and a formalin-ethyl acetate concentration step to identify amebic cysts and trophozoites. *E. histolytica* is indisting-uishable from the noninvasive and more prevalent *E. dispar*, with the exception that *E. histolytica* trophozoites may contain ingested red blood cells (RBCs) (Nesbitt *et al*., 2004 and Chacon-Cruz & Mitchell, 2007). b) Modified Kato thick smear technique (Peters *et al*., 1980). c) Examination of *Enterobius vermicularis* was done by scotch tape method. While, urine samples were examined for *S. haematobium*.

3- Clinical examinations: Physical examinations; both general and local were done; pelvi-abdominal ultra sonography was done for cases with hepato-splenomegaly and/or schistosomiasis. Anthropometric measurements (height and weight to define height-for-age and weight-for-age) and hemoglobin level were done. Weight (kg) was measured by using a portable balance, with a child wear light outer garment and without shoes. Height (cm) was measured in standing position by using a measuring stick, which was fixed to a vertical wall. Values of weight and height were applied to the percentiles, where normal values were considered 5^{th} -95^{th} percentiles (Vaughan III, 2004). The calculation of percentiles was based on normalized curves. Percentiles from the reference population have a uniform distribution and are useful since they are easy to interpret (Van Den *et al*., 1996). Weight-for-age reflects body mass relative to chronological age. It is the most widely used indicator, because the simplicity of collecting only one measurement (Gorstein, 1989). Height-for-age reflects achieved linear growth and its deficits indicate long-term cumulative inadeq-uacies of health or nutrition (WHO, 1995). Grams of hemoglobin per liter of blood are an index of blood oxygen-carrying capacity. Measurement of hemoglobin in whole blood is the most widely used screening test for anemia. Hemoglobin concentration (gram/ deciliter, g/dl) was estimated by using Drabkin's photometric method (Boehringer kit) to determine the anemic students. Anemia is considered corresponding to a level of hemoglobin concentration of <11 g/dl (EI-Zanaty *et al*., 2000).

B- Operational Design

I- Preparatory Phase:

1- Administrative phase: Permission to implement the study was obtained from Health Insurance Affairs.

2- Pilot study: Before starting the practical phase a pilot study was done on 50 students and siblings of the positive cases to test the questionnaire. The questionnaire was accordingly modified. The pilot study was guided by the following tasks:

i. Testing the form design, content and language at the study sites.

ii. Measuring the time and resources needed for the fieldwork.

II- Practical Phase: This phase took about 3 months. The data were collected through field visits. Every positive case and his/her controls were visited in their homes to observe the domestic sanitary conditions and to examine their sibling(s).

III- Analysis and Reporting Phase: Odds ratio (OR) with 95% confidence interval (CI) and Yates corrected chi-square (χ^2) were used as tests of significance. The significance level for χ^2 was accepted if the P-value ≤0.05.

Results

The overall percentage of parasitic infections among the studied school child-ren (table 1) was 38.5%. By species, the rate for *Entamoeba histolytica* was 20.4%, *Enterobius vermicularis* 16.6%, *Giardia lamblia* 15.2%, *H. nana* 14.9%, *Ascaris lumbricoides* 6.5%, *S. haematobium* 5.7%, *Ancylostoma duodenale* 5.1% and *Trichuris trichiura* 2.1. Mixed infections constituted 12.7%.

As regard sociodemographic risk factors (table 2), the low level of paternal education (illiterate and read & write), low level of paternal occupation (unskilled labor) and low social class were significant risk factors for parasitic infections (OR= 2.86, 95% CI: 2.08-3.93; OR=3.27, 95% CI: 2.31-4.61 and OR= 2.86, 95% CI: 2.06-3.97, respectively).

In respect life style and health care behavior risk factors (table 3); the improper hygienic food handling, poor personal hygiene, delayed consultation for treatment and incompliance with therapy were risk factors (OR=2.10, 95% CI: 1.42-3.09; OR=2.63, 95% CI: 1.85-3.74; OR=10.83, 95% CI: 7.33-16.05 and OR=1.07, 95% CI: 0.78-1.47, respectively). Also, no sibling's referral for treatment was risk factor (OR=2.14, 95% CI: 1.43-3.19). Water contact activities were risk factor, (OR= 1.90, 95% CI: 1.38-2.61).

In respect of personal characteristics risk factors (table 4); small age groups 6-8 years, male sex and the last birth child were risk factors (OR=1.12, 95% CI: 0.82-1.52; OR=1.41, 95% CI: 1.05-1.91 and OR=2.32, 95% CI: 1.76-3.23, respectively). Also the following represent significant risk factors; student having ≥4 siblings (OR=1.39, 95% CI: 1.02-1.90), having crowding index >4 (OR=1.45, 95% CI: 1.06-1.98), having houses with bad sanitary conditions (OR=1.94, 95% CI: 1.40-2.67), students with 1-2 and ≥3 infected siblings (OR=1.51, 95% CI: 1.11-2.04 and OR= 4.17, 95% CI: 2.80-6.23, respectively) and having previous parasitic infections OR= 9.80, 95% CI: 4.01-24.80. While, students with no infected sibling represent a significant protective factor (OR=0.20, 95% CI: 0.14-0.28).

As regard the clinical characteristics and impacts of parasitic infections (table 5), 60.3%, 52.4%, 51.9%, 45.4%, 34.3%, 32.7%, 28.4%, 26.5%, 21.4% and 2.4% of the students with positive parasitic infections suffered from headache, fatigue, pallor, loss of appetite, abdominal pain/colic, polyphagia, pruritus ani, fever, diarrhea and hematuria, respectively. These figures were significantly higher than those with negative parasitic infections. In respect to weight-for-age and height-for-age, 29.2% and 31.6%, respectively of positive parasitic infection students were <5th percentiles compared with 17.6% and 3.0%, respectively of negative parasitic infections. These differences are statistically significant. Anemic students with positive parasitic infections (52.4%) were significantly higher than those with negative infections (32.7%). In respect to scholastic achievement, 34.3% and 21.9% of positive and negative parasitic infection students respectively had results of the first term exam <50.0% (P=0.00). Lastly, hepatomegaly was detected clinically in 3.2% and 0.8% of positive and negative parasitic infections, respectively. However, by ultra-sonography no case of periportal fibrosis (PPF), splenomegaly, bladder wall lesions or obstructive uropathy was detected in cases with hepatomegaly and/or schistosomiasis.

Table (1): Distribution of parasitic infections among the studied school children.

Parasitic infection	No. (n=960)	Percent
Entamoeba histolytica	196	20.4
Enterobius vermicularis (worm/ova)	159	16.6
Giardia lamblia (cyst)	146	15.2
Hymenolepis (H) nana (ova)	143	14.9
Ascaris lumbricoides (ova)	62	6.5
S. haematobium (ova)	55	5.7
Ancylostoma duodenale (ova)	49	5.1
Trichuris trichiura (ova)	20	2.1
Mixed infection	122	12.7
Total	370	38.5

Table (2): Distribution of positive and negative parasitic infection in students according to sociodemographic risk factors.

Sociodemographic risk factors	Positive cases (n=370)		Negative cases (n=370)		OR (95% CI)
	No.	%	No.	%	
Paternal educational level:					
Illiterate, read & write	267	72.1	176	47.6	2.86 (2.08-3.93)
Elementary	72	19.5	119	32.2	0.51 (0.36-0.72)
Secondary & university	31	8.4	75	20.2	0.36 (0.22-0.57)
Paternal occupational level:					
Unskilled	300	81.1	210	56.8	3.27 (2.31-4.61)
Semi-skilled & skilled	54	14.5	106	28.6	0.43 (0.29-0.62)
Professional	16	4.4	54	14.6	0.26 (0.14-0.49)
Social level:					
Low	283	76.5	197	53.3	2.86 (2.06-3.97)
Middle	62	16.8	107	28.9	0.49 (0.34-0.72)
High	25	6.7	66	17.8	0.33 (0.20-0.56)

Table (3): Distribution of positive and negative parasitic infection among students according to life style and health care behavior risk factors.

Life style and health care behavior risk factors	Positive cases (n=370)		Negative cases (n=370))		Odds Ratio (OR) (95% CI)
	No.	%	No.	%	
Follow hygienic measures in food handling:					
Yes	274	74.1	317	85.7	0.48 (0.32-0.70)
No	96	25.9	53	14.3	2.10 (1.42-3.09)
Personal hygiene:					
Good	234	63.2	303	81.9	0.38 (0.27-0.54)
Poor	136	36.8	67	18.1	2.63 (1.85-3.74)
Water contact activities:					
Yes	264	71.4	210	56.8	1.90 (1.38-2.61)
No	106	28.6	160	43.2	0.53 (0.38-0.27)
Early consultation for treatment:					
Yes	148	40.0	325	87.8	0.09 (0.06-0.14)
No	222	60.0	45	12.2	10.83 (7.33-16.05)
Compliance with therapy:					
Yes	126	34.1	132	35.7	0.93 (0.68-1.27)
No	244	65.9	238	64.3	1.07 (0.78-1.47)
Sibling referral for therapy:					
Yes	49	13.2	91	24.6	0.47 (0.31-0.70)
No	321	86.8	279	75.4	2.14 (1.43-3.19)

Table (4): Distribution of positive and negative parasitic infection in students according to personal characteristics risk factors.

General characteristics	Positive cases (n=370)		Negative cases (n=370)		OR (95% CI)
	No.	%	No.	%	
Age:					
6-8	154	41.6	144	38.9	1.12 (0.82-1.52)
9-11	124	33.5	119	32.2	1.06 (0.77-1.46)
12-16	92	24.9	107	28.9	0.39 (0.28-0.53)
Sex:					
Male	203	54.9	171	46.2	1.41 (1.05-1.91)
Female	167	45.1	199	53.8	0.71 (0.52-0.95)
Birth order:					
First	100	27.0	178	48.1	0.40 (0.29-0.55)
In the middle	116	31.4	105	28.4	1.15 (0.83-1.60)
Last	154	41.6	87	23.5	2.32 (1.67-3.23)
Number of siblings:					
0-1	87	23.5	134	36.2	0.54 (0.39-0.76)
2-3	127	34.3	109	29.5	1.25 (0.91-1.73)
≥4	156	42.2	127	34.3	1.39 (1.02-1.90)
Crowding index:					
<2	91	24.6	138	37.3	0.55 (0.39-0.76)
2-4	127	34.3	112	30.3	1.20 (0.87-1.66)
>4	152	41.1	120	32.4	1.45 (1.06-1.98)
Housing sanitary conditions:					
Bad	152	41.1	98	26.5	1.94 (1.40-2.67)
Fair	135	36.5	154	41.6	0.81 (0.59-1.10)
Good	83	22.4	118	31.9	0.62 (0.44-0.87)
Previous parasitic infections:					
Yes	255	68.9	107	28.9	9.80 (4.01-24.80)
No	115	31.1	263	71.1	0.10 (0.04-0.25)
Number of infected siblings:					
0	61	16.5	186	50.3	0.20 (0.14-0.28)
1-2	178	48.1	141	38.1	1.51 (1.11-2.04)
≥3	131	35.4	43	11.6	4.17 (2.80-6.23)

Table (5): Distribution of positive and negative parasitic infections in students according to clinical characteristics and impacts.

Clinical characteristics and impacts	Positive cases (n=370)		Negative cases (n=370)		χ^2	P-value
	No.	%	No.	%		
Complaint:						
Headache	223	60.3	83	22.4	109.2	0.000
Fatigue	194	52.4	94	25.4	56.85	0.000
Pallor	192	51.9	66	17.8	94.47	0.000
Loss of appetite	168	45.4	79	21.4	48.14	0.000
Abdominal pain/colic	127	34.3	57	15.4	34.44	0.000
Polyphagia	121	32.7	45	12.2	44.86	0.000
Pruritus ani	105	28.4	56	15.1	19.06	0.000
Fever	98	26.5	71	19.2	14.46	0.000
Diarrhea	79	21.4	49	13.2	8.50	0.004
Weight-for-age:						
<5th percentile	108	29.2	65	17.6	13.95	0.000
5th–95th percentile	251	67.8	289	78.1	9.89	0.001
>95th percentile	11	3.0	16	4.3	0.96	0.433
Height-for-age:						
<5th percentile	117	31.6	69	18.7	16.55	0.000
5th–95th percentile	242	65.4	271	73.2	5.34	0.021
>95th percentile	11	3.0	30	8.1	9.32	0.002
Hematuria:						
Yes	9	2.4	1	0.3		
No	361	97.6	369	99.7	4.97	0.025
Anemia:						
Yes	194	52.4	121	32.7		
No	176	47.6	249	67.3	28.65	0.000
Hepatomegaly:						
Yes	12	3.2	3	0.8		
No	358	96.8	367	99.2	4.35	0.036
School absenteeism:						
0-3 day/month	152	41.1	194	52.4	9.12	0.003
4-6 days/month	140	37.8	112	30.3	4.39	0.036
≥7 days/month	78	21.1	64	17.3	1.47	0.225
Scholastic achievement:						
≥85.0%	81	21.9	102	27.6	3.20	0.074
≥65.0%	54	14.6	66	17.8	1.43	0.231
≥50.0%	108	29.2	121	32.7	1.07	0.301
<50.0%	127	34.3	81	21.9	14.15	0.000

Discussion

As regard distribution of parasitic infections among the studied school children (table 1), the overall percentage of parasitic infections was 38.5%. This was similar to El-Gammal *et al*. (1995) who reported that the prevalence of parasitic infection among Egyptian school children in Malames village in Lower Egypt was 31.9%. However, our result was less than that reported in Upper Egypt by Shalaby *et al*. (1986) and El-Gammal *et al*. (1995) who reported that the prevalence of parasitic infections among Egyptian school children in Tamouh and Demo villages were 60.2% and 88.5%, respectively. Rim *et al*. (2003) collected 29,846 stool specimens from primary school children in Laos and the cumulative egg positive rate for intestinal helminthes was 61.9%.

Pathogenic intestinal protozoan parasites include five groups: the flagellates (*Giardia lamblia* and *Dientamoeba fragilis*); the amebae, or *Sarcodina* (*Entamoeba histolytica* and, possibly, *Blastocystis hominis*); coccidia (*Cryptosporidium, Isospora, Cyclospora*); a ciliate (*Balantidium coli*) and microsporidia (Voorhis and Weller 2002). An estimated 10.0% of the world's population is infected with *E. histolytica;* the highest prevalence is in developing countries with the lowest levels of sanitation. *G lamblia* is the most commonly isolated intestinal parasite throughout the world. Rates of 20.0-40.0% are reported in developing countries, especially in children (Chacon-Cruz and Mitchell, 2007). In this study *E. histolytica* and *G. lamblia* were reported in 20.4% and 15.2% respectively and no evidence of other protozoa. Mahmoud (1983) agreed with our result. Also, Oluwafemi (2003) reported that prevalence of *E. histolytica* was 24.0%. Rashid *et al*. (2002) reported similar result as regard *G. lamblia*. While, El-Gammal *et al*. (1995) reported 5.4% and 8.9% prevalence of *E. histolytica* and *G. lamblia*, respectively. Kandeel (1998) found that prevalence of *E. histolytica* and *G. lamblia* in school children in rural areas of Qalubia was 39.5% and 2.2%, respectively. Ungar (1990) reported a two fold prevalence of *G. lamblia* (30.0%). Because infection derives from fecally excreted organisms and is spread by direct fecal-oral passage or by food borne or water borne transmission (Voorhis and Weller, 2002), these differences of prevalence in different locations may be attributed to different levels of sanitation, types of water supply, hygienic measures and food behaviors.

Enterobius vermicularis is a nematode and has the broadest geographic range of any helminthes. Since the first evidence of pin worm infection from Roman-occupied Egypt (Horne 2002), it has been known to be the most common intestinal parasite seen in the primary care setting (Petro *et al.,* 2005). *H. nana* is the smallest tape worm that infects humans. This parasite has worldwide distribution (Ismail *et al*., 2007). Children between the ages of 4 and 10 years are the most frequently affected (Macariola *et al*., 2002). Both *E. vermicularis (*16.6%) and *H. nana* (14.9%) represented the highest prevalence of nematode and cestode infections, respec-tively in this study. Both characterized by transmission secondary to contamination of the hands and can cause autoinfection denoting the role of personal hygiene and contact with infected individuals either in the school or within their families. In school children in rural areas of Qalubia, Kandeel (1998) found that prevalence of *Enterobius vermicularis* and *H. nana* were 3.5% and 5.8%, respectively. While, El-Gammal *et al.* (1995) reported 40.4% prevalence of *Enterobius vermicularis*. Also, a survey, in Laos, by cellophane anal swab detected *Enterobius vermicularis* eggs in 35.7% of school children aged 6-8 years (Rim *et al*., 2003).

Infection with intestinal round worms constitutes the largest group of helminthic infections in humans worldwide (Hökelek and Lutwick, 2006). STH is widespread in most poverty-stricken areas in the developing world; it affects more than 2000 million people worldwide. STH caused by infection with the nematodes; *Ascaris lumbricoides* (round worm), *Ancylostoma duodenale* and *Necator americanus* (hook worm) and *Trichuris trichiura* (whip worm) (WHO, 2006). Infection is caused by ingestion of eggs from contaminated soil (*Ascaris lumbricoides* and *T. trichiura*) or by active penetration of the skin by larvae in the soil (hook worms) (Crompton and Savioli, 2006). In this study, the rate for *Ascaris lumbricoides* was 6.5%, *Ancylostoma duodenale* 5.1% and *T. trichiura* 2.1%. El-Gammal *et al*. (1995) found that prevalence of *Ascaris lumbricoides* was 6.3% and *Ancylostoma duodenale* was 1.9%. Kandeel (1998) found that *Trichuris trichiura* had the lowest percentage, 2.1%, in his study. Our result was lower than that of Lindo *et al.* (2002) who reported that prevalence of *Ascaris lumbricoides* was 18.8%, and Rim *et al*. (2003) who showed a higher prevalence (>70%) of STH; by species, the rate for *Ascaris lumbricoides* was 34.9%, hook worm 19.1% and *T. trichiura* 25.8%.

Schistosomiasis is an endemic disease in Egypt (El-Khoby *et al*., 2000) and it constitutes a major health problem (Abdel-Wahab and Mahmoud, 1987). In the present study the prevalence of *S. haematobium* infection as determined by ova in the urine was 5.7%. Similar results were reported by recent studies in many governorates in Upper Egypt; the overall estimated prevalence of *S. haematobium* in Assuit Governorate was 5.21% (Hammam *et al*., 2000a), Qena Governorate 4.8 ± 0.7% (Hammam *et al*., 2000b) and Minya 8.8% (Gaber *et al*., 2000). Although there was variation in prevalence of *S. haematobium* between these governorates, the highest prevalence was lower than figures reported by independent researchers as recently as 1982. At that time, some villages had prevalence estimates in excess of 60.0% (King *et al*., 1982). Kitron and Higashi (1985) noted that among the most intensely infected male school children, infection rates were decreasing sharply at every 6-month follow-up of their cohort. Webbe and El Hak (1990) stated that by 1988, the prevalence had decreased to 10.3%. Our result supported that of Hammam *et al*. (2000b) and suggested that the prevalence has continued to decrease to about half of the 1988 level denoting the success of National Bilharzia Control Program in Upper Egypt. The general decline in schistosomiasis rates in Egypt in recent decades is in contrast to the situation in most other African countries where rates have increased, apparently due to the intensive schistosomiasis control and water supply programs (Bergquist, 1998). Also, our result, as regard prevalence of *S. haematobium* were less than El-Gammal *et al*. (1995) (22.4%), El-Hak (1987) (6.2% in Delta, 7.8% in Middle Egypt and 11.0% in Upper Egypt) and El-Hawy *et al*. (1990) who found that 19.3% of rural children were infected by *S. haematobium*. These differences could be due to the different circumstances in period, place, main irrigation systems and the progress of mass treatment against schistosomiasis at national level.

At the same time, mixed infection constitutes 12.7%. *Trichuriasis* often occurs concurrently with hock worm infections and so may well accelerate the onset of iron-deficiency anemia (WHO, 2002). *G. lamblia* infection, *Dientamoeba fragilis* trophozoites and *H. nana* ova were identified in the same individual (Macariola *et al*., 2002).

As regard sociodemographic risk factors (table 2), we showed that the low level of paternal education, low level of paternal occupation (unskilled labor) and low social class were significant risk factors for parasitic infections. These were in accordance with El-Gammal *et al*. (1995) who reported that 43.0% of their students were belonging to low socioeconomic standard in Lower Egypt. Also, parasitic infections were more common in rural areas and among lower socioeconomic groups (Mahmoud, 1983 and Markell *et al*., 1999). As regard life style and health care behavior risk factors (table 3), we cleared that the improper hygienic measures in food handling, poor personal hygiene, water contact activities delayed consultation for treatment, incompliance with therapy and no sibling's referral for treatment were risk factors. Mahmoud (1983) agreed with our results in that poor personal hygiene encourages person-to-person transmission, and also poor food handling hygienic measures, presence of flies and cockroaches as vectors of transmission of infection and contaminated water encourage transmission. Water contact activities represented significant risk (Farag *et al*., 1993). Children playing or swimming in canals had significant rate of infection and morbidity by *S. haematobium* (Hammam *et al.*, 2000b).

In respect of distribution of positive and negative parasitic infection students according to personal characteristics risk factors (table 4), we noticed that small age groups 6-8 and 9-12 years were risk factors. This was in agreement with Mahmoud (1983), Farag *et al*. (1993) and Demetrio *et al*. (2002), and comparable to that of Yassin *et al*. (1999) who cleared that infection with *G. lamblia* was more common among young children. At the same time, male sex was found a risk factor. This is in agreement with Farag *et al*. (1993) and Hammam *et al*. (2000b) who cleared that schistosomiasis was more common among boys; this might be due to more contact with polluted water. While, Oluwafemi (2003) showed that some parasitic infections as *E. histolytica* was higher in girls than boys, and some parasitic infections as *Ascaris* was higher in boys than girls. Moreover, the last birth child, student having ≥4 siblings, a student having crowding index >4 and bad housing sanitary conditions were found significant risk factors. In general, parasitic infections are more prevalent under crowded conditions (Markell *et al*., 1999). The prevalence, severity and incidence of complications of most enteric parasitic infections vary inversely with the level of sanitary conditions. They are more common in rural areas (Markell *et al*., 1999). STH is widespread in most poverty-stricken areas in the developing world (WHO, 2006). Also, our results are in accordance with Mahmoud (1983) and Gamboa *et al*. (1998) who cleared that intestinal parasites are transmitted directly through the contaminated water, soil and food by feces, or indirectly through unsanitary living conditions.

As regard the clinical characteristics and impacts of parasitic infections (table 5), 60.3%, 52.4%, 51.9%, 45.4%, 34.3%, 32.7%, 28.4%, 21.4% and 2.4% of students with positive parasitic infections suffered from headache, fatigue, pallor, loss of appetite, abdominal pain/colic, polyphagia, pruritus ani, diarrhea and hematuria, respectively. These figures are significantly higher than those with negative parasitic infections. Intestinal invasion may be asymptomatic (small number) or presented by various symptoms as abdominal pain (usually vague), abdominal cramps/colic, diarrhea, vomiting (rarely) and constipation (occasionally). However, the most common symptom in pin worm infection is nocturnal perianal pruritus (Hökelek and Lutwick, 2006). Most of the parasitic infections causing acute or chronic diarrhea with mal absorption (Mahmoud, 1983 and Alberton *et al*., 1995). The most frequent associating symptoms were diarrhea and distension (Mahmoud, 1983 and Current & Garcia, 1991). However, chronic symptoms such as dyspepsia, epigastric pain, nausea and anorexia may be present (Mahmoud, 1983; Addis *et al*., 1992 and Fayad *et al*., 1992). El-Hawy *et al.* (1992) and Markel *et al.* (1999) cleared that, through effect on the intestinal flora, children infected with enteric parasites may suffer from colitis that lead to vague, non-specific abdominal symptoms. So, they usually lose their food interest to prevent these symptoms. Hematuria was significant presenting finding among those infected by *S. haematobium* (Hammam *et al*., 2000a &b and El-Khoby *et al*., 2000).

In respect to weight-for-age and height-for-age, 29.2% and 31.6%, respectively of positive parasitic infection students were <5th percentiles compared with 17.6% and 3.0%, respectively of negative parasitic infection. Also, anemic students (52.4%) with positive parasitic infections were significantly higher than those with negative infection (32.7%). These findings were in accordance with CasapÃa et al. (2006) and WHO/WER (2006). Our results were expected, as parasitic infections are thought to contribute to child malnutrition, micronutrient deficiency and protein loss through subtle reduction in digestion and absorption, chronic inflammation and loss of nutrients. Childhood is the time of intense growth; it is the period in which the velocity of individual's growth had a rapid increase (Abdel-Rahman, 1988; Heald & Gong, 1999 and Rees *et al*., 1999). Parasites may decrease food intake, loss of appetite, the maintenance of nutrient pools and anemia secondary to blood loss (El-Hawy *et al.*, 1992 and Hesham *et al*., 2004). So, impairment of the anthropometric measures and anemia were more prevalent among these children. About 43.0% of children in developing countries were stunted and 9.0% were wasted (DeOnis and Habicht, 1996). In Egypt, during 1995-2002, 11.0%, 5.0% and 21.0% of children were suffering from underweight, wasting and stunting, respectively (UNICEF, 2004). Our results were in accordance with Khalil (1982) and Shalabi (1991) who showed that enteric parasitic infections had significant effect on weight and height. Also, El-Baroudy *et al.* (1993) observed that *Giardia* infection might lead to impairment in anthropometric measures of the infected children. On the other hand, Kandeel (1998) did not find any effect of parasitic infections on children growth, but he attributed this to the recent, light intensity of infection or infection for a short period. Also, Shalaby *et al*. (1986); El-Shobaki *et al.* (1990); Hassan (1990); Rozeik and El-Moselhy (1997); WHO (1998) and WHO/WER (2006) cleared that parasitic infections were commonly associated with anemia.

Regarding school absenteeism, 37.8% and 41.1% of positive parasitic infection students had 0-3 and 4-6 days/month absent, respectively. WHO (2002) stated that no doubt that poor iron status and iron-deficiency anemia are closely linked to diminished educational performance. Absenteeism was more frequent among infected than uninfected children. El-Hawy *et al*. (1990) and Rozeik & El-Moselhy (1997) noted higher incidence of absent-eeism rate among their rural bilharzial groups. In respect to scholastic achieve-ment, 34.3% and 21.9% of positive and negative parasitic infection students respec-tively had results of the first term exam <50.0%. About 400 million school children infected with parasites are often physically and intellectually compromised by anemia, leading to attention deficits, learning disab-ilities, school absenteeism and higher dropout rates (WHO/WER, 2006). Moreover, our result was in accordance with Khalil (1982); El-Hawy *et al*. (1990); Kimura *et al*. (1992); Rozeik & El-Moselhy (1997) and Steinmann *et al*. (2006) who observed marked increase in examination failure rate among their bilharzial groups. This might be attributed to anemia and malnutrition (Khalil, 1982; El-Shobaki *et al*., 1990; Hassan, 1990 and WHO/WER, 2006). Iron deficiency anemia lowers resistance to disease and weakens a child's learning ability and physical stamina. Many factors cause iron deficiency anemia including inadequate diet, blood loss and parasitic infections as hook worm (WHO, 1998 and WHO/WER, 2006).

Hepatomegaly was detected clinically and by ultra-sonography in 3.2% of positive parasitic infections versus 0.8% of negative parasitic infections. This result is in agreement with Rozeik and El-Moselhy (1997). However, no case of PPF, splenomegaly, urinary bladder wall lesions or obstructive uropathy was detected. These may be attributed to the absence of *S. mansoni* infection and more or less early infections of young students. Urinary bladder lesions and liver PPF, which can be determined only by ultra-sonography, were very infrequent and present only in adults (Hammam *et al.*, 2000a&b).

Conclusion And Recommendations

We can conclude that 38.5% of rural students were infected with parasites and 29.2% and 31.6% of them were <5th percentiles as regard weight -and height-for-age, respectively. Also, 52.4% of students were anemic. The most important risk factors, which affect the prevalence of parasitic infections, were low socioec-onomic level, high number of infected siblings, previous parasitic infections and no early consultation for therapy. Parasitic infections had a significant negative impact on scholastic absenteeism and achievement of the infected students. We recommend improving personal and environmental hygienic measures, regular screening and treatment for parasitic infections and more studies on big number of students in rural and urban areas of Egypt. School health team with good equipment should be focused on and school health programs should be integrated in medical and nursing curriculums.

References

1. **Abdel-Rahman AH (1988):** Socioeco-nomic impacts of human schistosomiasis. M.D. Thesis in Tropical Medicine, Faculty of Medicine, Al-Azhar University.
2. **Abdel-Wahab MF and Mahmoud SS (1987):** Schistosomiasis in Egypt. Clin Trop Med Communic Dis., 2: 371-95.
3. **Addis DC, Davis JP, Roberts JM and Masty MM (1992):** Epidemiology of Giardiasis in Wisconsin: Increasing incide-nce of reported cases and unexplained seas-onal trends. Am.J.Trop.Med. Hyg.,47: 13-9.
4. **Alberton F, Newman CP and Casemore DP (1995):** An outbreak of waterborne cryptosporidiosis associated with public water supply in UK. Epidemiol Infect., 115: 123-31.
5. **Bergquist R (1998):** Schistosomiasis in the world. Paper presented at the SRP 1998 International Conference on Schistos-omi-asis. The Schistosomiasis Research Project, Ministry of Health, Cairo, 15-19.
6. **CasapÃa M, Joseph SA, NÃºÃ±ez C, Rahme E and Gyorkos TW (2006):** Parasite risk factors for stunting in grade 5

students in a community of extreme poverty in Peru. Int J Parasitol, 36 (7): 741-7.

7. **Chacon-Cruz E and Mitchell DK (2007):** Intestinal protozoal diseases. http://www. emedicine.com/ped/TOPIC1914.HTM
8. **Crompton DWT and Savioli L (2006):** Handbook of helminthiasis for public health. Boca Raton, Florida - Taylor and Francis Group, LLC.
9. **Current WL and Garcia LS (1991):** Cryptosporidiosis. Clin Microbial Rev., 3: 325-58.
10. **Delgado H, Plama P and Fischer M (1991):** The use of the height census of school children in Central America and Panama. Food Nutr Bull., 13 (1): 17-29.
11. **DeOnis M and Habicht J (1996**): Anthropometric references data for international use: Recommendation from a WHO Expert Committee. Am J. Clin. Nutr, 64: 650-8.
12. **El-Baroudy R, Sayed M and Rashid S (1993):** Interaction of multiple parasitic infections and nutrition. Med. J. Cairo University, 61 (3): 569-82.
13. **El-Gammal N, Sayed El-Ahl S, Osman FH and Salem HS (1995):** Comparative study of parasitic infections among school children in two rural areas in upper Egypt (Demo village) and lower Egypt (Malames village). The Egypt J Comm Med., 3 (1): 25-30.
14. **El-Hak S (1987):** Schistosomiasis in Egypt. National control programme on goi-ng projects-future policy. Schistosomiasis Symposium in Cairo.
15. **El-Hawy AM, Wahib AA and Rozeik MS (1990):** Impacts of schistosomiasis on scholastic achievement of school children in two Egyptian rural communities. The Egypt J Comm Med., 7 (2): 27-40.
16. **El-Hawy AM, Abdel-Rahman MM, Rozeik MS, Rageb KH and Pypers M (1992):** Study of physical fitness in adult bilharzial mansoni patient versus athletes. Menoufia Med. J., 4: 63-7.
17. **El-Khoby T, Hussein MH, Galal N and Miller ED (2000):** Epidemiology of schis-tosomiasis in Egypt: Summary findings in nine - 1, 2, 3: Origins, objectives, organiz-ation and implementation. Am. J. Trop. Med. Hyg., 62 (2): 2-7.
18. **El-Shobaki FA, El-Hawary ZM and Salem NA (1990):** Competing anemia am-ong school children using a highly available on preparation. The Egypt J. Comm Med., 7 (2): 81-94.
19. **EI-Zanaty FH, Sayed SA and Way AA (2000):** Nutritional status of children: Demographic and Health Survey, Egypt 2000, National Population Council, Cairo.
20. **Farag O, Hafes M and Kamel M (1993):** Morbidity from *Schistosoma mansoni* in an Egyptian village: A community based study. The Egypt J. Comm. Med., 11 (1): 125-33.
21. **Fayad ME, El-Khattib AH, Abd-Elkader S and Sabry H (1992):** Parasitic infections among children attending the gastroentrology clinic in King Faisal Hospital, Holy Mecca, Saudia Arabia. Sci Med. J. Cai. Synd., 4: 63-70.
22. **Gaber NS, Hammad TA, Orieby A, Shawky E.Khatab MA and Strickland GT (2000):** The Epidemiology of Schistos-omiasis in Egypt: Minya governorate. Am J. Trop. Med. Hyg., 62(2): 65–72.
23. **Gamboa M, Basualdo J, Kozubusky L, Costas E and Cueto R (1998):** Prevalence of intestinal parasitosis within the popul-ation groups in La Plata, Argentina. Eur. J. Epidemiol, 14: 55-61.
24. **Garcia LS and Bruckner DA (1997):** Diagnostic medical parasitology. Am Soc Microbiol. 7 (2): 30-40
25. **Gorstein J (1989):** Assessment of nutriti-onal status: Effect of different methods to determine age on the classification of under nutrition. Bull WHO, 67: 143-50.
26. **Habicht JP, Martorell R, Yarbrough C, Malina MR and Klin RE (1974):** Height and weight standards for preschool children are there really ethnic

differences in growth potentials? Lancet, 1: 1611-5.

27. **Hammam HM, Sallam FA, Moftah FM, Abdel-Aty MA and Hany AH (2000a):** The Epidemiology of Schistosomiasis in Egypt: Assuit Governorate. Am. J. Trop. Med. Hyg., 62(2): 73–9.
28. **Hammam HM, Zarzour AH, Moftah FM, Abdel-Aty MA, Hany AH, El-Kady AY, Nasr AM, Abd-El-Samie A, Qayed MH, Mikhail NH, Talaat M and Hussein MH (2000b):** The Epidemiology of schist-osomiasis in Egypt: Qena Governorate. Am J Trop Med Hyg, 62(2): 80–7
29. **Hassan YM (1990):** Nutritional status and its relation to scholastic achievement in preschool and school children in Cairo. M.D. Thesis in Public Health, Faculty of Medicine, Al-Azhar University.
30. **Heald FP and Gong EJ (1999):** Diet, nutrition and adolescence. In: Modern nutrition in health and disease, Williams and Wilkins, Maryland, USA.
31. **Hesham MS, Edariah AB and Norhayati M (2004):** Intestinal parasitic infections and micronutrient deficiency. Med J Malaysia, 59 (2): 284-93.
32. **Hökelek M and Lutwick LI (2006):** Nematode infections. Nematode infections. htm, eMedicine Specialties>Medicine, Ob/Gyn, Psychiatry, and Surgery> Infectious Diseases.
33. **Horne PD (2002):** First evidence of enterobiasis in ancient Egypt. J. Parasitol., 88:1019-21.
34. **Ismail HI, Hamouda HE, Baalash AA, Haiba AA, Ismail GM and Shamloula MM (2007):** Immunohistochemical and neurotransmitter changes in brain of mice infected with *Hymenolopis nana*. Tanta Med Sc. J., 2 (1): 117-23.
35. **Kafafi A and Abdel-Mottaleb AM (1992):** Effects of socioeconomic standard on growth of school children in Cairo. Al-Azhar Med. J., 21 (B): 53-64.
36. **Kandeel A (1998):** Assessment of growth pattern of Egyptian rural school children at Shebin Al-Kanater, Qalubia, Egypt. M.Sc. Thesis in Public Health, Faculty of Medicine, Ain-Shams University.
37. **Khalil SA (1982):** Parasitic infection among school children and its impact on their growth and scholastic achievement in an Egyptian rural community. M.Sc. Thesis in Public Health, Faculty of Medicine, Al-Azhar University.
38. **Kimura E, Moji K, Uga S, Kiliku F, Megwi D, Mutua W, Muhoho N and Aoki Y (1992):** Effects of *Schistosoma hematobium* infection on mental test scores of Kenyan school children. Trop Med Parasitol., 43: 155-8.
39. **King CL, Miller FD, Hussein M, Barkat R, Monto AS (1982):** Prevalence and intensity of *Schistosoma haematobium* infection in six villages of Upper Egypt. Am J. Trop. Med. Hyg., 31: 320–7.
40. **Kitron UD and Higashi GI (1985):** *Schistosoma haematobium* in Upper Egypt: Analysis of dispersion patterns. Am J. Trop. Med . Hyg., 34: 331–40.
41. **Lindo J, Validum L and Ager A (2002):** Intestinal parasites among young children in the interior of Guyana. West Indian Med. J., 51 (1): 25-7.
42. **Macariola DR, Jr Dee Daniels RN and Staat MA (2002):** Intestinal parasites in an international adoptee. Infect Med 19 (1): 13-6.
43. **Mahmoud AF (1983):** Parasitic infections. In: Nelson textbook of pediatrics. WB Saunders Company, Philadelphia.
44. **Markell EK, John DT and Krotoski WA (1999):** Medical parasitology book. WB Saunders Publications, Philadelphia.
45. **Michael GF (1997):** This wormy world: Fifty years on. Parasitol Today, 13 (11): Poster insert.
46. **Nesbitt RA, Mosha FW and Katki HA (2004):** Amebiasis and comparison of micr-oscopy to ELISA technique in detection of *Entamoeba histolytica* and *Entamoeba dispar*. J. Natl. Med. Assoc., 96 (5): 671-7.
47. **Peters PA, Alamy M, Warren KS and Mahmoud AF (1980):** Quick Kato smear for field

quantification of *S. mansoni* eggs. Am. J. Trop. Med. Hyg., 29: 217-19.

48. **Petro M, Iavu K and Minocha A (2005):** Unusual endoscopic and microscopic view of *Enterobius Vermicularis*. South Med. J., 98(9): 927-9.
49. **Oluwafemi O (2003):** Parasitic infestation and anemia: The prevalence in a rural hospital setting. J Indian Acad Clin Med., 4 (3): 281-7.
50. **Rashid SM, Nagaty IM, Maboud AI, Fouad MA and Shebl A (2002):** Comparative study on ELISA, IFA and direct methods in diagnosis of giardiasis. J. Egypt. Soc. Parasitol., 32 (2): 381-9.
51. **Rees JM, Neumark-Sztainer D, Kohn M and Jacobson M (1999):** Improving the nutritional health of adolescents- Position statement- Society for adolescent medicine. J. Adolescent Health, 24: 461-2.
52. **Remme J (2007):** Strategic emphases for tropical diseases research: A TDR perspective. Trends Parasitol., 18: 421-6.
53. **Rim HJ, Chai JY, Min DY, Cho SY, Eom KS, Hong SJ, Sohn WM, Yong TS, Deodato G, Standgaard H, Phommas-ack B, Yun CH, Hoang EH (2003):** Prevalence of intestinal parasite infections on a national scale among primary schoolc-hildren in Laos. Parasitol Res.,91(4):267-72.
54. **Rozeik MS and El-Moselhy EA (1997):** Effect of schistosomiasis on scholastic achievement of preparatory school children in two Egyptian villages. The Egypt J. Comm. Med., 18 (1): 1009-16.
55. **Shalabi AN (1991):** The effect of parasitic infestation on growth curve in pediatric age groups. M.Sc. Thesis in Pediatrics, Faculty of Medicine, Cairo University.
56. **Shalaby S, Labib N and Amer N (1986):** Epidemiological pattern and haematolo-gical findings of parasitic infestations in Egypt: Comparative study between rural and urban primary school children. The Egypt J. Comm. Med., 2 (1): 99-112.
57. **Ismail HI, Hamouda HE, Baalash AA, Haiba AA Ismail GM and Shamloula MM (2007):** Immunohisto-chemical and neurotransmitter changes in brain of mice infected with *Hymenolopis nana*. Tanta Med. Sc. J., (2), (1); 117-123.
58. **Steinmann P, Keiser J, Bos R, Tanner M and Utzinger J (2006):** Schistosomiasis and water resources development: Systematic review, meta-analysis, and estimates of people at risk. The Lancet Infectious Diseases, 6: 411-425.
59. **Ungar BLP (1990):** Cryptosporidiosis in human. In: Cryptosporidiosis of man and animals. Boca Raton, Florida, CRC Press.
60. **UNICEF (2000):** Egypt demographic and health survey report. UNICEF Egypt.
61. **UNICEF (2004):** The state of the world's children 2004: Girls education and develo-pment. UNICEF Publication.
62. **Van Den JB, Eeckels R and Massa G (1996):** Validity of single weight measur-ement to predict current nutritional status and mortality in children. British J Nutr., 126: 113-20.
63. **Vaughan III VC (2004):** Growth and development. In: Nelson textbook of pedia-trics. WB Saunders Company, Philadelphia.
64. **Voorhis WC and Weller PF (2002):** Protozoan infections: Intestinal protozoan infections.http://www.medscape.com/viewarticle/534941.
65. **Webbe G and El Hak S (1990):** Progress in the control of schistosomiasis in Egypt 1985–1988. Trans R. Soc. Trop. Med. Hyg., 84: 394–400.
66. **WHO (1995):** Physical status: The use and interpretation of anthropometry. Report of a WHO Expert Committee. WHO Technical Report Series No. 854, Geneva., WHO.
67. **WHO (1998):** The state of the world's children: A UNICEF report. Nutrition Reviews, 56 (4): 115-23.
68. **WHO (2001):** Control of schistosomiasis and soil-

transmitted helminthes infections: Report by the Secretariat, Executive Board 107th session, Provisional agenda item 3.3 (EB107/31), Geneva, WHO.

69. **WHO (2002):** Prevention and control of schistosomiasis and soil-transmitted helmi-nthiasis: WHO Technical Report Series No. 912, Geneva, WHO.
70. **WHO (2006):** Preventive chemotherapy in human helminthiasis *(*Manual). World Health Organization, Preventive Chemot-herapy and Transmission Control (PCT), Department of Control of Neglected Tropical Diseases (NTD), 1211 Geneva 27, Switzerland.
71. **WHO/WER (2006):** Schistosomiasis and soil-transmitted helminthes infections: Preliminary estimates of the number of children treated with albendazole or mebendazole. Weekly epidemiological record., 81 (16): 145–64.
72. **Yassin MM, Shubair ME, Al-Hindy AI and Jadallah S (1999):** Prevalence of intestinal parasites among school children in Gaza city. J Egypt Soc Parasitol., 29 (2): 365-73.

معدل الانتشار وعوامل الخطورة والتبعات للعدوى بالبلهارسيا والطفيليات المعوية بين أطفال المدارس القروية فى محافظة سوهاج

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أطفال -* متوطنة -** تمريض طب المجتمع -*** طب المجتمع -****الطتفيات

طب الأزهر – كلية التمريض جامعة الزقازيق

تمثل الأمراض الطفيلية سببا رئيسيا للمرضة و الوفيات فى الأطفال فى معظم ارجاء العالم. و يعتبر عدم الإلتزام بالعادات الصحية و اللهو من أسباب أصابة الأطفال بالأمراض الطفيلية . كان الهدف من هذه الدراسة هو تحديد مدى انتشار مختلف أنواع الطفيليات و تحديد عوامل خطورتها و تحديد تأثيراتها على الصحة وكذلك على غياب التلاميذ وتحصيلهم الدراسى وذلك بين تلاميذ المدارس فى المناطق الريفية فى محافظه سوهاج فى مصر. وقد أُختير نمط الدراسة المقطعية - التحليلية لإجراء هذا البحث على 960 تلميذاً قروياً. و قد تم مقابلة كل التلاميذ و كذلك تم إجراء فحصاً إكلينيكياً و معملياً لكل منهم.
و قد أوضحت الدراسة أن نسبة 38.5% من التلاميذ كانوا مصابين بالطفيليات. وكانت أكثر الإصابات شيوعاً هى الانتاميبا هيستوليتيكا (20.4 %)، إنتيروبيس فيرميكيولاريس (16.6%) و جيارديا لامبليا (15.2%). وكانت الذكورة كجنس والطفل الأخير وضعف النظافة الشخصية والمستوى الاجتماعى الاقتصادى المنخفض ووجود 3 أو أكثر من الأخوة المصابين بالطفيليات وعدم الاستشارة الطبية المبكرة لعلاج الطفيليات من أهم عوامل الخطورة (نسبة أودز= 1.41 ، 2.32 ، 2.63 ، 2.86 ، 4.17 ، 9.80 ، 10.83 على الترتيب). أيضاً كان 29.2% من التلاميذ المصابين يعانون من نقص الوزن على منحنى الوزن عند مقارنه الوزن بالسن ووجد أن 36.6% من التلاميذ كانوا يعانون من نقص الطول عند مقارنه الطول بالسن على منحنى الطول. و قد وجدت الأنيميا بين 52.4% من التلاميذ المصابين. كما وجد أن 3.2% من التلاميذ كانوا يعانون من تضخم بالكبد. وكذلك كان 37.8%،41.1% من التلاميذ المصابين لديهم 0-3 ، 4-6 يوم/شهر كغياب من المدرسة وكذلك كان 34.3% من التلاميذ المصابين لديهم تحصيل دراسى أقل من 50%. وقد أوصى البحث بتحسين النظافة الشخصية والبيئية وعمل المسوحات والعلاج والتثقيف الصحى بشكل منتظم للطفيليات بين التلاميذ فى مصر.