
PREVALENCE OF INTESTINAL PARASITES AMONG PRIMARY SCHOOL CHILDREN IN FARSKOUR CITY, DAMEITTA GOVERNORATE

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ABSTRACT

Background: Intestinal parasitic infections are one of the common health problems. It is estimated that about 3.5 billion people worldwide are affected, and that 450 million are ill as a result of these infections, the majority of sufferers are children. Two main types of intestinal parasites are helminthes and protozoa. So the purpose of this study was to detect the prevalence of intestinal parasites in primary school children and its related risk factors beside the impact of intestinal parasites on general health and children nutritional status.

Patient: A total number of randomized 200 childrens from 6-11 years old were selected from Farskour City; Dameitita Governorate from December 2010 to May 2011 from Bany Farskour primary school at Farskour City. All childrens were subjects to the following: detailed history, thorough clinical examination, anthropometric measurements, complete blood count, microscopic stool analysis, and serodiagnosis of schistosomiasis by indirect haemagglutination test. **Results:** The results of present study were reveled that the prevalence of infection regardless its type was 55%. The intestinal parasites among the 200 children's included in this study 12(6%) were infected with *Ascaris* only, 18 (9%) were infected with *Entameaba trophozoite* only, 17 (8.5%) were infected with *Giardia*, 41(20.5%) were infected with *Oxyuris*, 7(3.5%) were infected with *Bilharziasis* and 20(10%) have mixed infections. As regard sociodemographic data, we found that intestinal parasites were associated with low social class and poor mother education, while there was no significant difference regarding age and sex. Regarding nutritional state, wasted students represent 19.0% and stunted students represent 1.5% while there were no wasted and stunted students and there was significant increase of wasted students in infected in comparison to non-infected students. Decresed hemoglobin level and elevated esinophilic count is observed among infected children with statistically significant difference.

Conclusion: Intestinal parasitic infection is an important public health problem in children between 6-11years living in Farskour City, Damietta Governorate with high Prevalence rate (55.0%). The most common type of parasitic infection was *Oxyuris* and the least one was *Ancylstoma*. Intestinal parasites were more frequent among low social classand poor maternal education. Intestinal parasitic infestations were associated with the presence of anemia and might be one of the reasons of anemia in these studied students. **Recommendations:** More interest should be paid about the early detection and treatment of children who was carrier or infected with parasite, family education about the self-hygienic

control and the effect of environmental factors in transmission of diseases and improving the system of sewage disposal and water supply with health promotion campaigns and regular follow up is needed to ensure the efficacy of management of a new infection. Large scaled survey are recommended to include more ages for discovering the epidemiological distribution of such parasites in Damietta governorate and elucidate risk factors for their prevalence.

INTRODUCTION

Intestinal parasitic infections are one of the common health problems. It is estimated that about 3.5 billion people worldwide are affected, and that 450 million are ill as a result of these infections, the majority of sufferers are children (*Okay et al., 2004*).

Studies on human parasitic infections have demonstrated a common relationship between parasitic infections and lower socioeconomic status (*Balcioglu et al., 2007*).

The two main types of intestinal parasites are helminthes and protozoa (*Steven and Ehrlich, 2010*).

Protozoan (PTZ) infections like Amoebiasis and Giardiasis are considered important causes of childhood morbidity and mortality in developing countries. Intestinal helminthes infections are the main causes of disease burden in children in developing countries (*Montresor et al., 2002*).

The greatest obstacle to effective control of parasites in at-risk populations is inadequate knowledge of the geographical

distribution of infection and the demographic variables that influence the prevalence of infection (*Brooker et al., 2006*).

A well organized health education program on personal hygiene and community health coupled with mass treatment is desirable and recommended in preschool children (*WHO, 2003*).

AIM OF THE WORK

To evaluate the prevalence of intestinal parasites in primary school children and the Impact of intestinal parasites on general health and children nutritional status.

PATIENTS AND METHODS

The present study was a cross-sectional study that consisted of 200 children, aged 6-11 years, who were chosen from Bany Farskour primary school at Farskour City, Damietta Governorate, by systemic random sampling, during the period from December 2010 to May 2011.

Inclusion criteria:

- 1- Primary school children from six to eleven years.
- 2-Both Sexes.
- 3-Both rural and urban areas.

Each child was submitted to the following:

1. Careful history: including

- A) Personal and socio-demographic histories.
- B) Any associated symptoms as abdominal pain, vomiting, peri anal itching and lack of appetite.

2. Clinical examination:

A) General examination: with consideration for pallor, jaundice, cyanosis, vital signs and manifestation of hypovitaminosis (eg. pitriasis alba, angular stomatitis, xerophthalmia, etc.).

B) Systemic examination with consideration for abdomen, CVS, Chest, etc.

3. Anthropometric measurements:

1. Height: Using a measuring stick which was fixed to the wall. Height was measured in standing position (*Chumlea et al., 1990*).

2. Weight: Using spring scale sensitive to 100 grams (*Chumlea et al., 1990*).

From the data of weight and length using National Center for Health Statistics (NCHS) percentile curves and normal values are considered between 5th to 95th (*EL-Mougy, 2008*).

4. Laboratory examination: Blood samples were obtained from each child by venipuncture and collected in a vacutainer tube swabbed with EDTA and another plain tube for bilharzial antibody assay (*Wilson and Weller, 2006*).

A) Complete blood count (Automated):

The used instrument for CBC is Celldyn cell counter (*Wilson and Weller, 2006*).

B) Stool examination:

Three stool samples were taken at certain times

1. Macroscopic examination.

Stool examined for presence of frank blood, mucus, color, consistency and visible worms.

2. Microscopic examination.

A piece of fresh stool is diluted with 2ml saline 0.9% and left for precipitation. After concentration, the precipitant was microscopically examined for parasitic infestation (detection of ova, cyst, or trophozoites), occult blood, fat, or fiber (*Hill, 2005*).

C) Serological tests for schistosomiasis

Serodiagnosis of schistosomiasis by indirect haemagglutination.

The reaction is performed in U-micro plate (*Sayed & Abbas, 1996*).

Reading of results:

a) Positive reaction (haemagglutination).

Presence of a reddish-brown film in well bottom; sometimes, presence of a thin peripheral ring.

b) Negative reaction (no haemagglutination).

Interpretation of the results:

1. Titer < 1:160 (Non significant reaction of acute infection) It may correspond with a past or an already treated infection.
2. Titer \geq 1:160 (Significant reaction) Presumption of acute infection.

STATISTICAL ANALYSIS

The collected data were organized, tabulated and statistically analyzed, using Statistical Package for Social Science (SPSS) version 19 (SPSS Inc, Chicago, USA), running on IBM compatible computer with Microsoft [®] Windows 7 Operating System. Frequency and percentage were used as descriptive, Fisher exact tests was used for testing significance of observed differences between studied children and spearman correlation and regression analysis used to test the most correlated

items. The level of significance was adopted at $p < 0.05$ (*Dawson and Trapp, 2001*).

RESULTS

The results of the present study are demonstrated in tables 1-5.

Table (1): Show prevalence of intestinal parasites infections among studied children. We found that helminthes infection alone was reported in 62 cases out of 200 cases (31.0%), while protozoal infection alone reported in 36 cases (17.5%) and finally mixed protozoal and helminthes infection was reported in 12 cases (6.0%)

Table (2): It shows frequency of intestinal parasites among studied children. We found that it was in the form of oxyuris alone in 20.5%, ascaris alone in 6.0%, H Nana alone in 0.5%, ancylestoma in 0.5%, oxyuris plus ameba in 1.5%, oxyuris plus giardia in 2.0%, oxyuris plus ascaris in 1.0%, oxyuris plus H. Nana in 1.0%, ascaris plus ameba in 2.0%, H Nana plus ameba in 0.5%, giardia alone in 8.5%, ameba alone in 9.0%, giardia plus ameba in 2.0% with statistically insignificant difference between males and females, and schistosomal antibo-

dies were positive in 7 cases (3.5%).

Table (3): The table demonstrated that, there was no significant difference between infected and non infected cases as regard age and gender as they were nearly comparable among both groups. On the other hand, there was significant difference between infected and non infected cases as regard social standard and mother education. Infection is associated with low social standard and low educational level of mother.

Table (4): Demonstrate nutritional status among infected and non infected children, wasted children represent 19.0% and stunted children represent 1.5% while there were no wasted and stunted

children and there was significant increase of wasted cases in infected in comparison to non infected children (30.9% vs. 4.4% respectively).

Table (5): Show blood count parameters among infected and non infected children:

- There was statistically significant decrease of hemoglobin, Mean corpuscular volume and Mean corpuscular hemoglobin. There was significant increase of eosinophils in infected cases in comparison to non infected cases, while there was no significant difference regarding total leukocytic, other differential counts or platelets.

Table (1): Prevalence of intestinal parasites infections among studied children.

All Children:	No. = 200	%
Not infected	90	45
Infected	110	55
Helminthes	62	31
Protozoal	36	18
Protozoal plus helminthes	12	6
Total	200	100.0

Table (2): Frequency of specific intestinal parasites infections among studied children.

	No.	%
Oxyuris	41	20.5%
Ascaris	12	6.0%
H. nana	1	0.5%
Ancylstoma	1	0.5%
Oxyuris + Ameba	3	1.5%
Oxyuris+Giardia	4	2.0%
Oxyuris+ ascaris	2	1.0%
Oxyuris + H.Nana	2	1.0%
Ascaris + Ameba	4	2.0%
H Nana + Ameba	1	0.5%
Giardia	17	8.5%
Ameba	18	9.0%
Giardia + Ameba	4	2.0%
Sch. mansoni (serology)	7	3.5%

Table (3): Sociodemographic status among infected and non infected children

	Non Infected (n=90)		Infected (n=110)		Statistics	
	No.	%	No.	%	Ttest	p
Age(years)	7.51±0.93		7.40±0.82		0.73	0.83
Gender:						
Male	48	53.3%	59	53.6%	0.002	0.96
Female	42	46.7%	51	46.4%		
Social standard:					22.58	<0.001*
Low	23	25.6%	60	54.5%		
Medium	32	35.6%	35	31.8%		
High	35	38.9%	15	13.6%		
Mother education:					44.67	<0.001*
Illiterate	1	1.1%	10	9.1%		
Middle	30	33.3%	75	68.2%		
University	59	65.6%	25	22.7%		
Pure water supply	89	98.9%	93	84.5%	12.43	<0.001*

*significant

Table (4): Nutritional status among infected and non-infected children.

	Non infected		Infected		Total		Statistics	
	No.	%	No.	%	No.	%	X ²	P
Normal	86	95.6%	73	66.4%	159	97.5%	25.88	<0.001*
Wasted	4	4.4%	34	30.9%	38	19.0	22.5	<0.001*
Stunted	0	0.0%	3	2.7%	3	1.5%	2.5	0.11

*significant NB. No one was wasted and stunted among studied cases

Table (5): Complete blood counts in infected and non-infected children.

	Non Infected	Infected	Statistics	
	Mean± SD	Mean±SD	Test	p
Hemoglobin (g/dl)**	12.21±0.779	11.11±0.84	9.56	<0.001*
Red cell count (x 10⁶)	4.45±1.2	3.67±1.7	8.54	<0.001*
Mean corpuscular volume (fl)	81.2±3.8	72.8±4.9	3.9	0.004*
Mean corpuscular hemoglobin (pg)	32.1±4.4	21.1±4.9	4.5	0.002*
Total leukocytic count (x 10³)	6.53±1.9	7.12±2.1	1.52	0.12
Neutrophils (%)	55.3±10.43	53.78	0.82	0.62
Lymphocytes (%)	37.2±8.23	39±9.2	0.64	0.41
Monocytes (%)	4.3±1.2	4.5±1.1	0.5	0.8
Basophils (%)	1.3±0.4	1.4±0.43	0.45	0.75
Eosinophils (%)***	3.22±3.64	8.55±5.76	7.61	<0.001*
Platelets (x 10³)	345±56.3	328±62.5	0.9	0.35

*significant ** anemia = hemoglobin <11.5 g/dl *** Eosinophilia = >7%

DISCUSSION

Intestinal parasitic infections regarded as serious public health problem, as they cause iron deficiency anemia, growth retardation in children and other physical and mental health problems (*Ulukanligil & Seyrek, 2004*).

Children are among the most vulnerable to environmental threats as they are in a dynamic state of growth with their cells multiplying fast and their organ systems developing at a rapid rate, also children have proven to be more susceptible to acquire intestinal parasites, due to the facility of interpersonal contact (child-child, child-functionary), poorly-trained staff and inadequate hygiene conditions inherent in children (*Mehraj et al., 2008*).

Epidemiological research carried out in different countries has shown that the social and economical situation of the individuals is an important cause in the prevalence of intestinal parasites. In addition, poor sanitary and environmental conditions are known to be relevant in the propagations of these infectious agents (*Pickering, 2008*).

In the present study, we aimed to determine the prevalence of intestinal parasites in a population of schoolchildren in Faraskour city, Damietta governorate.

In the present study, the prevalence of infection regardless its type was 55.0%. This is higher than that reported by **Daryani et al. (2012)** who reported that, examination of the 1100 stool specimens revealed that 367 (33.3%) were parasitised. The possible explanation for decreased prevalence of parasitic infection in their study when compared to our study may be due to increased their sample size and inclusion of older children than the present study. In addition, increased prevalence of intestinal parasites in schoolchildren age group may be attributed to the risky behavior and relatively poor hygiene in this age group. Finally, differences in reported prevalence may be the result of different study populations and the years in which these surveys were conducted.

The results of the present study are in agreement with studies conducted in schoolchildren in Turkey, that have found the prevalence of intestinal parasites to be 28.9–64.4% (**Aksoy et al., 2007; Tas-Cengiz et al., 2009**).

As regard mixed parasitic infection, it was reported in 20 cases in our study; **Daryani et al. (2012)** reported that, the observed multiple or mixed infections could be explained by poor hygiene and the fact that many species of protozoa have the same mode of transmission.

As regard frequency of different parasitic infection, it was in the form of Oxyuris alone in 20.5%, ascaris alone in 6.0%, H Nana alone in 0.5%, ancylestoma in 0.5%, Oxyuris plus ameba in 1.5%, oxyuris plus giardia in 2.0%, oxyuris plus ascaris in 1.0%, oxyuris plus H Nana in 1.0%, ascaris plus ameba in 2.0%, H Nana plus ameba in 0.5%, giardia alone in 8.5%, ameba alone in 9.0%, giardia plus ameba in 2.0% with statistically insignificant difference between males and females, and schistosomal antibodies were positive in 7 cases (3.5%).

These results are comparable to those reported by **Curtale et al. (1998)** who conducted a survey to estimate anemia and associated parasitic infestation in Behera governorate, Egypt, and they found that, protozoa appeared to be more prevalent than helminths. Cysts of *G. intestinalis* and *E. histolytica* were present in 24.7 and 17.5 per cent of the screened children, respectively.

In the present study, single infection was reported in 45% of children (81.8% of infected cases), while two infections were reported in 10% of children (18.2% of infected cases). These results agreed with that reported by **Daryani et al. (2012)** who reported that, the overall prevalence of at least one parasite species in the study participants was

85% (n=312), the prevalence of two parasites was 13.9% (n=51) and the prevalence of three parasite species was 1.1% (n=4).

In their work, **Okyay et al. (2004)** reported that, in all, 145 students (31.8%) were infected with one or more intestinal parasites. 29 (6.4%) of the students were infected with more than one parasite, 26 (5.7%) with two parasites and 3 (0.7%) with three parasites. This distribution is similar to that of the present work, where the majority of cases had single infection, small percent had two infections and none had three or more parasites.

In the present work, there was no significant difference between infected and non infected cases as regard age and gender. On the other hand, there was significant difference between infected and non infected cases as regard social standard, mother education and mother education. These results agreed with that reported by **Daryani et al. (2012)** who reported that, age and sex were not significant risk factors for intestinal parasitic infections ($p>0.05$). In addition, they reported that, factors related to intestinal parasitism included parental education level, household income level and hand washing prior to eating, after using the toilet, or in both situations.

Similar findings have been reported by other studies in Turkey (Aksoy et al., 2007), Kyrgyzstan (Steinmann et al., 2010) and Cuba (Wördemann et al., 2006), although Uga's et al. study (2005) in Vietnam reported a negative association. Intestinal parasites are significantly associated with environmental conditions, such as the contamination of soil and water sources with human faeces and poor sewage disposal, including the use of night soil as fertiliser. When soil becomes contaminated, parasite eggs in the soil can be transferred to vegetables, then on to hands and thence directly into the mouth or ingested by eating raw vegetables (Mustafa et al., 2001).

As regard nutritional status, wasted children represent 19.0% and stunted children represent 1.5% while there were no wasted and stunted children and there was significant increase of wasted cases in infected in comparison to non infected cases (30.9% vs 4.4% respectively). In their study, Sackey et al. (2003) reported that, nearly 40 per cent of the children in the sample had stunted growth, 21.5 per cent had global malnutrition and 4.1 per cent were wasted. Children with intestinal parasitic infections were twice as likely as non-infected children to suffer from growth stunting or chronic malnutrition.

These results agreed with that of the present work.

In the present study, there was statistically significant decrease of hemoglobin and significant increase of eosinophils in infected cases in comparison to non infected children. Going with results of the present work, Sackey et al. (2003) reported that, children infected with *G.intestinalis* and other parasites had significantly reduced mean serum hemoglobin levels compared with the non infected. Iron deficiency anemia was detected in 26.4 per cent of the total sample. In addition, Curtale et al. (1998) reported that, paired blood and stool results were available from 1066 children by direct smear and 1035 children by Kato- Katz technique. Of the two protozoal infections detected, only giardiasis appeared to be associated with a significant difference in haemoglobin levels. For intestinal helminths, the presence of single or multiple infections, as detected by positive Kato-Katz test, was associated with significantly lower levels of haemoglobin.

CONCLUSION

1. Intestinal parasitic infection is an important public health problem in students between 6-11 years living in Farskour City, Damietta Governorate with high Prevalence rate (55.0%)

2. The most common type of parasitic infection was Oxyuris and the least one was Ancylostoma.
3. Intestinal parasitic infestations were associated with the presence of anemia and might be one of the reasons of anemia in these studied students.

RECOMMENDATIONS

1. More interest should be paid about the early detection and treatment of parasitic infection in school children.
2. Education of the family about the self hygienic control and the effect of environmental factors in transmission of diseases like numbers of room, bath rooms, and water supply by mass media .
3. Improving the system of sewage disposal, and water supply.
4. The ratio of un-educated women should decline with specific programs. A multisectorial approach is needed.

There is a need to promote mass scale deworming and health promotion campaigns to create awareness about health and hygiene.

5. Regular follow up is needed to ensure the efficacy of

management and diagnosis of new infection.

6. Large scale survey to include more ages for discovering the epidemiological distribution of such parasites in Damietta governorate and elucidate risk factors for their prevalence.

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دراسة معدل انتشار الطفيليات المعوية في أطفال إحدى مدارس التعليم الأساسي في مدينة فارسكور محافظة دمياط

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***بكالوريوس الطب والجراحة

مقدمة: تعتبر الإصابة بالطفيليات المعوية واحدة من أهم المشاكل الصحية . فهناك 3.5 بليون نسمة مصابون بها منهم 450 مليون يعانون بسبب الإصابة بها معظمهم من الأطفال .و تعتبر الإصابة بالطفيليات المعوية مشكلة صحية عامة حيث أنها تسبب مرض فقر الدم بسبب نقص الحديد وتأخر فى النمو ومشاكل أخرى صحية وجسدية وعقلية للأطفال. وهناك نوعان من الطفيليات المعوية هما الديدان المعوية والطفيليات احادية الخلية (الاولى الحيوانية). فالديدان متعددة الخلايا وتنقسم إلى الديدان الشريطية والديدان الحبلية أو السليكية والديدان المنبسطة أو المتقبات . تحتوى الطفيليات احادية الخلية (الاولى الحيوانية) على خلية واحدة وتتكاثر داخل جسم الإنسان وتسبب له العديد من المشاكل. وتنتقل الطفيليات المعوية من شخص لآخر عن طريق الاحتكاك بترربة أو طعام أو ماء ملوث ببراز شخص مصاب . تعتبر الإصابة بأحادية الخلية مثل الاميبا المعوية والجيارديا من أهم أسباب أمراض ووفيات الأطفال فى الدول النامية.

الغرض من البحث: دراسة معدل انتشار الطفيليات المعوية فى أطفال إحدى مدارس التعليم الأساسي وها وتأثير هذه الطفيليات على الصحة العامة ونمو الأطفال وكذلك أهمية برامج المعايير الصحية فى الحد من معدل الإصابة .

طريقة البحث : كانت هذه دراسة مقطعية على 200 طفل فى الأعمار من 6 إلى 11 سنة حيث تم اختيارهم من مدرسة بنى فارسكور الابتدائية بمدينة فارسكور بدمياط فى الفترة من ديسمبر 2010 حتى مايو 2011. وقد خضع كل طفل فى هذه الدراسة إلى : دراسة التاريخ المرضي ، الفحص الإكلينيكي بدقة شاملا قياس الطول والوزن، عمل بعض التحاليل الطبية (صورة دم كاملة ، فحص

البراز تحت المجهر ، والتشخيص المصلى للبلهارسيا عن طريق اختبار التلاصق الدموى الغير مباشر).

النتائج: أسفرت نتائج الدراسة عن الآتى :- معدل انتشار الطفيليات المعوية فى الأطفال من 6 إلى 11 سنة فى مدرسة بنى فارسكور الابتدائية بدمياط حوالى 55%. وقد وجدنا انه من بين 200 طفل فى هذه الدراسة 9% مصابين بالانتاميبا هستوليكيا و8.5% مصابين بالجيارديا و6% مصابين بالإسكارس و20.5% بالدودة دبوسية و3.5% مصابين بالبلهارسيا و10% متعددى الإصابة. لم يكن هناك فارق إحصائى بين التلاميذ المصابين وغير المصابين فى السن ونوع الجنس . من ناحية أخرى، كان هناك فارق إحصائى بين التلاميذ المصابين وغير المصابين من حيث الحالة الاجتماعية ومستوى التعليم بين الأمهات. أما بالنسبة للحالة الغذائية بين التلاميذ المصابين وغير المصابين فان 19.0% يعانون من فقد الوزن و 1.5% يعانون من التقزم. ولا يوجد بين تلاميذ الدراسة من يعانون بفقد الوزن والتقزم معا. وكان هناك فارق إحصائى كبير بين التلاميذ المصابة وغير المصابة من حيث فقد الوزن. وأخيراً لوحظ انخفاض نسبة الهيموجلوبين وارتفاع نسبة الخلايا الازينوفيليا بالدم فى الأطفال المصابين مع وجود دلالة إحصائية.

الاستنتاجات: تعتبر الطفيليات المعوية مشكلة صحية عامة فى التلاميذ من سن 6 إلى 11 سنة فى مدينة فارسكور ، محافظه دمياط بمعدل انتشار مرتفع (55%) . وكانت الإصابة بالدودة دبوسية هى النوع الأكثر شيوعا بين عدوى الطفيليات المعوية والإصابة بالانكلستوما هى الأقل شيوعا. كانت الإصابة بالطفيليات أكثر انتشارا بين الأطفال ذوى المستوى الاجتماعى المنخفض وانخفاض مستوى تعليم الأمهات. وترتبط الإصابة بالطفيليات المعوية مع وجود فقر الدم(الانيميا) و قد تكون هذه الإصابة واحده من أسباب فقر الدم فى هؤلاء التلاميذ الذين تمت عليهم الدراسة.

التوصيات: لابد من زيادة الاهتمام بتشخيص وعلاج الأطفال المصابين والحاملين للعدوى بالطفيليات المعوية. استخدام وسائل الإعلام (التلفزيون - الراديو - المجلات) فى توعية الأسرة عن طرق النظافة الشخصية وتأثير العوامل البيئية فى انتشار هذه الأمراض مثل عدد الحجرات ودورات المياه ومصادر المياه فى المنازل. تحسين وسائل الصرف الصحى ومصادر المياه. الحد من نسبة الأمية فى الأمهات عن طريق برامج خاصة واستخدام وسائل متعددة الاتجاهات. الحث على عمل برامج مسح كلى للديدان وبرامج صحية تحث على زيادة الوعى الصحى والنظافة . الكشف الدائم والفحص المعملى للأطفال للاكتشاف المبكر بالإصابة بالطفيليات المعوية. يجب عمل دراسة اكبر لتشمل المزيد من الأعمار ومن المدن لاكتشاف مدى انتشار عدوى الطفيليات المعوية فى محافظه دمياط وتوضيح عوامل الخطر التى تؤدى لانتشارها.