INTESTINAL PARASITES AMONG PRIMARY SCHOOL CHILDREN IN URBAN AND RURAL TANTA, GHARBIA, GOVERNORATE, EGYPT

ABSTRACT:
The parasitic infections are the result of multiple factors, such as, socioeconomic, cultural, historical, and political conditions. The purpose of this study was to determine the prevalence of different types of parasitic infections among rural and urban school students in Tanta, Egypt. This study was done in five primary schools children in Tanta. Ages of pupils sample in urban and rural Tanta schools, ranged between 6-12 years and 820 (53.9%) pupils living in rural Tanta and 700 living in urban area. From September 2010-September 2011, 1520 stool samples were investigated for the presence of intestinal parasites. Stool specimens were examined using direct wet mount and the formal ether concentration techniques. Data were analyzed using the SPSS statistical software. Four species of intestinal parasites were identified with an overall prevalence of 22.43%. The prevalence of intestinal parasite infections in rural areas in Tanta was 14% while it was 26% in urban areas. The predominant parasites involved were Entamoeba histolytica, Enterobius vermicularis, Giardia lamblia, Ascaris lumbricoides and Schistosoma mansoni with percentages 11.1%, 7.03 %, 4.46%, 0.19%, and 0.19%, respectively. The overall infection was 645 (46%) for males and 825 (54%) for females.

INTRODUCTION:
Parasites affect billions of people worldwide of all races and demographic regions. These intruders live in and feed off the host, depriving them of vitamins, nutrients, and amino acids; altering natural pH levels, decreasing energy levels, and creating a more acidic environment within the body. Intestinal parasitic infections are among the most common infections worldwide (Kang et al., 1998; Ukpai and Ugwu, 2003). However, the prevalence of intestinal parasitic infections varies considerably from place to place in relation to the pattern of transmission of the disease (Luka et al., 2000). Public health specialists are concerned that these infections impair children's growth and development (Dickson et al., 2000; Munis and Ferreira, 2002).

Cryptosporidium spp. and Giardia duodenalis are two protozoan parasites that affect humans and a wide range of domestic and wild animals (Abaza et al., 1995; Adam, 2001; Miller et al., 2003). These parasites are a major cause of diarrheal disease in humans and animals worldwide, causing high morbidity in their hosts, in immunocompromised hosts and children and they can lead to death (Noureldin et al., 1999; Faubert, 2000).

Soil-transmitted helminthiases affected more than two billion people worldwide. In 2001, the World Health Assembly resolved to attain by 2010 minimum target of regular administration of chemotherapy to at least 75% and up to 100% of all school age children at risk of morbidity from the disease (WHA, 2001). Because of physiological and immunological reasons children are more susceptible to parasitic diseases that may have deteriorating effects of their physical and mental growth. In addition, age plays an important role in Giardia lamblia, Enterobius vermicularis and Hymenolepis nana infections (Markell and Voge, 2006).

The helminthes Trichiurus trichiura, Ascaris lumbricoides and the hookworms as well as the protozoa Entamoeba histolytica have been observed to cause infection in 800, 1400, 1200, and 48 million people respectively, worldwide. Multiple infections by
these parasites, e.g hookworm, roundworm and amoeba also occur (Ikon and Useh, 1999; Ukpai and Ugwu, 2003).

Several reports on intestinal helminthiases and schistosomiasis in Egypt include those of Hesham et al. (2000), El-Shobaki et al. (1989), Ismail et al. (2007), and Ibrahim (2011).

The public health importance of gastrointestinal parasites is due to their high morbidity in school children and women during their child-bearing years. Children are the most affected due to the heavy infections they harbor and because of their vulnerability to nutritional deficiencies (Luka et al, 2000).

This study was undertaken to determine the prevalence of intestinal parasites and infection patterns among school children in Tanta city, Gharbia governorate.

MATERIAL AND METHODS:

Study area:

Tanta city is situated in the north region of Delta, which lies in northeast Egypt some 95 km from the capital city, Cairo.

The town has a commercial downtown or "urban region", surrounded by a rural area. Tanta city represents urban area where Semila and Kunysa villages represent rural areas.

Selected population:

This study was done on students who attended a primary school. The study was carried out from September 2010 - September 2011. This study has been done in five primary schools (two schools in urban (Tanta city) and three schools in rural (one of school in Kunysa and two schools in Semila village). Age of pupils in urban and rural schools, ranged between 6-12 years and 820 (53.9%) pupils were living in rural area and 700 (46%) in Urban one.

A total 1520 stool specimens were collected randomly in five primary school pupils.

Parasitic analysis:

Personal information as age, sex, and place of residence were collected, as well as socio-cultural and environmental information. Labeled sample bottles containing 5% formaldehyde were distributed to the school children for a little portion of their early morning feces (Samn et al., 2012). In the laboratory, each collected sample was examined using direct wet mount and the formal ether concentration techniques. All microscopic observations were done with 10x objective and, when required, 40x objective lenses. Egg counts were recorded as no. of eggs/g of feces was determined (De A, 2013).

RESULTS:

Prevalence of intestinal parasites among school children in Tanta:

The over all percentage of parasitic infections among the studied school children was 22.43% (Table 1).

<table>
<thead>
<tr>
<th>No. of pupils infected</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of pupils infected with E. histolytica</td>
<td>170 (11.1%)</td>
</tr>
<tr>
<td>No. of pupils infected with Giardia</td>
<td>68 (4.46%)</td>
</tr>
<tr>
<td>No. of pupils infected with Enterobius</td>
<td>106 (7.03%)</td>
</tr>
<tr>
<td>No. of pupils infected with Ascaris</td>
<td>3 (0.19%)</td>
</tr>
<tr>
<td>No. of pupils infected with Schistosoma</td>
<td>3 (0.19%)</td>
</tr>
<tr>
<td>Total No. of primary school pupils</td>
<td>1520</td>
</tr>
</tbody>
</table>

Table 1 illustrates that E. histolytica infection recorded the highest prevalence (11.1%) followed by Enterobius (7.03%) and Giardia lambilia (4.46%), while Ascaris and Schistosoma mansoni recorded the least prevalence (0.19%).

Distribution of intestinal parasites among sex group of primary school children in Tanta city:

The distribution of parasites species among sex groups is given in figure 1 and table 2. Among males and females, the prevalence of E. histolytica and Enterobuis vermicularis revealed the highest prevalence (p <0 .01). Males recorded higher prevalences of Entamoeba histolytica (14.6%), Entrobius (9.2%), Giardia (5.3%) and Ascaris (0.28%) than females while females recorded higher prevalence of schistosoma mansoni (0.24%) than males, however, these differences were not significant (P>0.05).
Table 2. Prevalence of intestinal parasites among school children in Tanta city according to sex

<table>
<thead>
<tr>
<th>Parasitic species</th>
<th>Males (N=695)</th>
<th>Females (N=825)</th>
<th>Both sex (N=1520)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entamoeba histolytica</td>
<td>N=102 (13.8%)</td>
<td>N=68 (8%)</td>
<td>N=170 (11.1%)</td>
</tr>
<tr>
<td>Enterobius vermicularis</td>
<td>N=64 (9.2%)</td>
<td>N=42 (5.2%)</td>
<td>N=106 (7.03%)</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>N=37 (5.3%)</td>
<td>N=31 (3.7%)</td>
<td>N=68 (4.46%)</td>
</tr>
<tr>
<td>Ascaris lumbricoides</td>
<td>N=2 (0.28%)</td>
<td>N=1 (0.12%)</td>
<td>N=3 (0.19%)</td>
</tr>
<tr>
<td>Schistosoma mansoni</td>
<td>N=1 (0.14%)</td>
<td>N=2 (0.24%)</td>
<td>N=3 (0.19%)</td>
</tr>
</tbody>
</table>

Fig. 1. Prevalence of intestinal parasites among school children in Tanta city according to sex

Comparing the prevalence of parasites among the urban and rural communities in Tanta, the prevalence of *E. histolytica*, *Giardia lamblia* and *Enterobius vermicularis* were higher in urban than in rural communities. The prevalence of *E. histolytica* was the highest compared with other species (p<0.01) followed by *Giardia lamblia* (p<0.01) and *Enterobius vermicularis* (p<0.05). The prevalence of the remaining parasites in the urban and rural communities were similar; p >0.05 (Table 3 & Fig. 2).

Table 3. Prevalence of intestinal parasites in urban and rural communities surveyed in Tanta city

<table>
<thead>
<tr>
<th>Parasitic species</th>
<th>Urban (N=700)</th>
<th>Rural (N=820)</th>
<th>Total (N=100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entamoeba histolytica</td>
<td>N=145 (20.7%)</td>
<td>N=25 (3.04%)</td>
<td>N=170 (11.18%)</td>
</tr>
<tr>
<td>Enterobius vermicularis</td>
<td>N=59 (8.4%)</td>
<td>N=47 (5.73%)</td>
<td>N=106 (6.97%)</td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>N=43 (6.14%)</td>
<td>N=25 (3.04%)</td>
<td>N=68 (4.47%)</td>
</tr>
<tr>
<td>Ascaris lumbricoides</td>
<td>N=0 (0%)</td>
<td>N=3 (0.36%)</td>
<td>N=3 (0.19%)</td>
</tr>
<tr>
<td>Schistosoma mansoni</td>
<td>N=0 (0%)</td>
<td>N=3 (0.36%)</td>
<td>N=3 (0.19%)</td>
</tr>
</tbody>
</table>

Fig. 2. Prevalence of intestinal parasites in urban and rural communities in Tanta city

Entamoeba histolytica and Ascaris lumbricoides showed the highest prevalences in all age groups (p<0.01). Children aged between 10-12 years had the highest prevalence of Ascaris lumbricoides (p<0.01), while those aged between 8-10 years had the highest prevalence of *E. histolytica* (p<0.01).

The prevalence of the recorded species was insignificantly differ among the 10-12 years age groups (X²=43.22, P>0.05). A summary of the results is given in table 4 and figure 3.

Table 4. Prevalence of intestinal parasite in relation to age groups in Tanta city

<table>
<thead>
<tr>
<th>Parasitic species</th>
<th>6-8 years</th>
<th>8-10 years</th>
<th>10-12 years</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Entamoeba histolytica</td>
<td>N=68 (11%)</td>
<td>N=63 (14%)</td>
<td>N=39 (7.95%)</td>
<td></td>
</tr>
<tr>
<td>Enterobius vermicularis</td>
<td>N=48 (8.27%)</td>
<td>N=28 (6.22%)</td>
<td>N=30 (6.12%)</td>
<td></td>
</tr>
<tr>
<td>Giardia lamblia</td>
<td>N=19 (3.1%)</td>
<td>N=28 (6.22%)</td>
<td>N=21 (4.28%)</td>
<td></td>
</tr>
<tr>
<td>Ascaris lumbricoides</td>
<td>N=1 (0.17%)</td>
<td>N=2 (0.66%)</td>
<td>N=3 (0.4%)</td>
<td></td>
</tr>
<tr>
<td>Schistosoma mansoni</td>
<td>N=0 (0%)</td>
<td>N=1 (0%)</td>
<td>N=3 (0.4%)</td>
<td></td>
</tr>
</tbody>
</table>

Fig. 3. Prevalence of intestinal parasite in relation to age groups in Tanta city
DISCUSSION:

Tropical and subtropical regions of the world usually involving school children are associated with unsanitary conditions such as lack of sanitation facilities especially latrines. These results are in the contamination of the soil with eggs and larvae of the parasite.

In the present study, the overall percentage of parasitic infections among the studied school children was 22.43%. However, the present result was less than that reported in upper Egypt by Ibrahim (2011) who reported 29.3% prevalence of parasitic infection among Egyptian school children in El-Minia governorate village and so less than that reported in lower Egypt by El-Shobaki et al. (1990) and El-Gammal et al. (1995) who reported that the prevalence of parasitic infections among Egyptian school children in Sohag governorate villages were 60.2% and 88.5%, respectively. Prevalence of parasitic infection among school children in this study suggests a generally low standard of living and poor environmental sanitation in the study areas (Ukoli, 1984; Smyth, 1996).

The distribution of parasites among sex groups showed that males were more infected than females. This agrees with the findings of Ikon and Useh (1999) during an epidemiological study of gastrointestinal helminths among pupils in urban and suburban communities in Nigeria. This high prevalence associated with males may be due to the fact that they are more often engaged in predisposing activities such as playing in streams or ponds.

The highest prevalence of E. histolytica and Enterobius vermicularis, observed in this study occurred mostly in males (14.6%) and urban region (20.7%) of Tanta, may be due to high occurrence of unhygienic habits in urban region. The prevalence of E. histolytica was the highest in urban compared with other species (p<0.01) followed by Giardia lamblia (6.14%); p<0.01 and Enterobius vermicularis (8.4%); p <0.05. The prevalence of the rest parasites in the urban and rural communities was similar. Idowu and Rowland (2006) reported that prevalence of Enterobius vermicularis, Giardia lamblia and Ascaris lumbricoïdes in the urban centre and rural communities possibly shows no difference among the communities in environmental sanitation and personal hygiene of the school children.

The unhygienic practices among food vendors in the study area might have contributed to the occurrence of Ascaris lumbricoïdes and some other helminthes among the school children. El-Gammal et al. (1995) recorded 5.4% and 8.9% prevalence of Entamoeba histolytica and Giardia lamblia, respectively.

Giardia have been revealed as one of the most common parasites causing acute diarrhea with nonspecific signs such as dehydration, fever, anorexia, weakness, and progressive loss of weight may be accompanied. Diarrhea is usually self-limiting in immunocompetent humans; however, it can be life threatening in children and immunocompromised humans (Atwill et al., 1998; Abaza et al., 1995).

The prevalences of Enterobius vermicularis and Schistosoma mansoni were low in the study area. This might have been due to the diagnostic methods used in this study; particularly for Enterobius vermicularis which is best diagnosed using cellophane tape smear methods (Shoup, 2001). 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). Enterobius vermicularis represented the highest prevalence of nematode infections (7.3%), in this study, Kandeel (1998) found that prevalence of Enterobius vermicularis was 3.5% in school children in rural areas of Qalubia.

In this study, the rate for Ascaris lumbricoïdes was 0.19%. Ibrahim (2011) found 3.2% prevalence of Ascaris lumbricoïdes. 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 Schistosoma mansoni infection as determined by ova in the stool was 0.19% which disagrees the reports by recent studies in many governorates in Egypt and supports that of Hammam et al. (2000) who suggested that the prevalence has continued to decrease to about half of the 2000 level denoting the success of National Bilharzia Control Program in Egypt. The general decline in schistosomiasis rates in Egypt, in recent decades, is apparently due to the intensive schistosomiasis control and water supply programs (Bassey and Umar, 2007).

The present study indicated that younger children (below 10 years) recorded higher prevalence of E. histolytica infection (6-8 years; 11%), (8-10 years; 14%) than older ones (10-12 years; 7.95%). Pupils in these age groups often spend more of their leisure time out doors, playing and or foraging in garbage dumps and eating discarded food remains on the street. They are also more often in contact with soil and eat indiscriminately with unwashed hands. Children aged between 10-12 years had the statistically highest prevalence of Ascaris lumbricoïdes (p < 0.01). In sharp contrast the
low prevalence of *E. histolytica* infection observed in the 10-12 years age group may be due to the fact that at this age young people become more hygiene-conscious about their looks as compared to the lower age group and hence is able to avoid as much as possible what would lead to one being infected. This is consistent with the findings observed in Kaduna and Abia States of Nigeria (Luka et al., 2000)

**CONCLUSION AND RECOMMENDATION:**

The present study showed that Males were more infected with *E. histolytica* and *Enterobius vermicularis* than females in some parasitic infection as Prevalences of *E. histolytica*, *Enterobius vermicularis* and *Giardia lamblia* were higher in urban than in rural regions, Prevalence of *Ascaris* increased significantly with age, and *E. histolytica* was the highest prevalence in Children aged below 10 years.

The study recommends 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 must be done to avoid and control parasitic infections among children.

**ACKNOWLEDGEMENTS:**

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**REFERENCES:**


الإصابة بالطفيليات المعوية بين طلاب المدارس الابتدائية في المناطق الحضرية والريفية بطنطا،
محافظة الغربية، طنطا، مصر

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من المعروف أن الإصابة بالطفيليات أكثر شيوعًا في الأطفال وذلك لعدم إدراكهم خطورة عدم النظافة وأمراض طفيلية تظهر عليهم أعراض مختلفة مثل نقص الطفولة مع أم في البطن مع صعوبة وشفافية المرض. على ذلك أن هؤلاء الأطفال مصدر عديم للمجتمع. ترجع الأصابة بالطفيليات إلى عوامل عديدة منها الظروف الاجتماعية والاقتصادية وثبوت هذه الدراسة إلى معرفة مدى انتشار الإصابة بالأنواع المختلفة لطفيليات بين تلاميذ المدارس الابتدائية في ريف وحضر مدينة طنطا. وقد نتمت هذه الدراسة في الفترة من سبتمبر 2011 إلى ديسمبر 2012 وكان عدد التلاميذ 1520 تلميذ منهم 820 تلميذ من ثلاث مدارس في ريف طنطا و 700 تلميذ من مدرسين في حضر طنطا وكانت أعمار هؤلاء التلاميذ تتراوح بين...