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INTESTINAL PARASITIC INFECTIONS AMONG PRIMARY SCHOOL CHILDREN IN JEDDAH, SAUDI ARABIA

By

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Abstract

The prevalence of intestinal parasitic infections among primary school children, were studied by selection of seven male and seven female schools to cover different parts of Jeddah city. A total of 1000 questionnaire were distributed to primary school children, filled by the child's guardian and stool samples were collected from those who agreed to participate in the study. Two hundred and thirty one stool samples were collected. These were analyzed by the formaline-ether technique. Of the 231 stool samples, only 22 (9.5%) samples had parasites. *Giardia lamblia* was the most reported parasite. Double infection was seen in only 3 samples. The low prevalence of intestinal parasites among the study group reflects the outstanding health and hygienic care in primary schools visited.

Introduction

Human intestinal parasites are found world wide both in developing and industrialized countries. Pathogenic intestinal parasites produce disease by infecting the small and/or large intestine. Some intestinal parasites have their major impact on children, while others infect all age groups but have their most profound effect on adults. Different factors contribute to the

prevalence of intestinal parasitic infections. Hygiene and sanitation are of the most important factors. Others such as cultural, economical and ecological factors may also play an important role in determining the prevalence of intestinal parasitic infections. A search through the past 15 years revealed very little information about intestinal parasitic infections in children in Saudi Arabia. In Al-Baha region, one fifth of children were found to harbor intestinal parasites. The most affected age group was 5-9 years and the sex distribution was almost equal. *Entamoeba histolytica* and *Giardia lamblia* recorded the highest prevalence among protozoa while *Enterobius vermicularis* and *Hymenolepis nana* were highest among helminthes (Al-Eissa *et al.*, 1995). In another study in Abha, one quarter of children attending primary schools were infected with intestinal parasites. *E. histolytica* and *G. lamblia* recorded the highest prevalence among protozoa while *H. nana* recorded the highest prevalence among helminthes. Prevalence of *E. histolytica* was found to increase with age whereas *Giardia* infections were less common among older children (Omar *et al.*,1991). Socio-economic factor is a very important factor in determining the prevalence of intestinal parasitic infections. This was confirmed by Ahmed and El-Hadi (1989) in a group of school children from Riyadh examined for intestinal parasites. One tenth of the children examined had intestinal parasites. The low infection rate was explained by the good physical and nutritional status and better sanitary and living conditions. In Riyadh, and with a larger scale, it was found that approximately 1/4 of the samples examined were positive for intestinal parasites. Selectivity in obtaining stool samples was a great draw back since all samples were obtained from patients visiting three medical centers in Riyadh (Abdel-Hafez *et al.*, 1986).

In this study, the prevalence of intestinal parasitic infections among male and female Saudi children attending primary schools were examined and correlate the prevalence with socio-economic factors.

Materials and Methods

Seven male and seven female primary schools were randomly selected. The map of Jeddah City was used to divide

the city into seven areas. A male and a female school in the center of each area were selected. Permissions to visit schools and obtain samples from students were obtained from the Ministry of Education. A questionnaire was designed by the research team. The questionnaire was composed of three main sections. The first section contains general information about the participant (student). The second section required the student's guardian to approve his/her participation in the research. The third part of the questionnaire contained some questions that should be answered by the student's guardian and will be used in the data analysis of this study. A code was given to each questionnaire and was designed to identify the school, the year, and the participant. This code was also written on the samples. Each school was visited by the research group and 70-90 students were randomly selected from each school and were given stool collection bottles and copies of the questionnaire. Stool samples were collected the following day after obtaining the guardians permission. Stool samples were fixed in 10% formol saline solution and stored at 4°C.

Stool samples were analysed by the formaline-ether concentration technique (Cheesbrought, 1995). Twenty mg of stool samples stored in 10% formol saline were placed in a 50 ml plastic tube and mixed with 30 ml of normal saline. The mixture was passed through 2 layers of wet gauze and the suspension was centrifuged at 500 g for 10 minutes. The supernatant was removed and the sediment was washed twice with normal saline. After the last wash, the supernatant was removed and the sediment was mixed with 10 ml of 10% formol saline. This was left standing for 10 minutes then 3 ml of ether was added to the tube. The mixture was shaken vigorously for 2-3 minutes and the tube then centrifuged at 500 g for 10 minutes. After centrifugation, the top three layers were removed and the sediment was mixed with 2 drops of iodine. A drop of the sediment was placed on a glass slide, covered with a glass coverslip and examined under the microscope for the presence of ova, cysts, and larvae. All data were fed into a personal computer in a Microsoft excel file. Statistical analysis were performed using SPSS. Data were analyzed using Chi square test.

Results

Two hundred and thirty one students participated in this study and 85 (36.8%) were males and 146 (63.2%) were females. Their age distribution was between 6-14 years. The families that students lived with them sized from 2-20 persons with an average of 7.2 persons. Analysis of the questionnaire is summarized in table 1. When asked about the family income 51.1% answered that the income was less than 3000 SR per month, 29.4% get 3000-8000 SR and 19.5% get more than 8000 SR per month. Hygienic precautions after using the toilet was reported in 95.7% of the studied population. Abdominal pain, vomiting, diarrhea, and constipation were reported in 41.6%, 14.7%, 4.3% and 18.2% of studied population, respectively. Stool analysis revealed the presence of intestinal parasites in 22 (9.5%) samples with *Giardia lamblia* as the most frequently seen parasite.

Discussion

In this study, the prevalence of intestinal parasitic infections in Saudi children in the primary school in the city of Jeddah was studied and correlate hygienic problems with socio-economical factors that may play a major role in this regard. Less than 10% of stool samples were positive for parasites. This reflects the high hygienic standard in Jeddah City in general. Furthermore, the low prevalence of intestinal parasites and especially helminthes reflects the outstanding health and hygienic care in primary schools visited.

Increased family income has no significant role in the health status of children ($p=0.08$). Furthermore, eating non-home made meals have no effect on the presence of intestinal parasites ($p=0.10$). This could be explained by the fact that almost all restaurants and food handlers in Jeddah city are regularly inspected. With regard to eating habits, hand washing before meals is considered as a major precaution against infection with intestinal parasites ($p<0.05$). Also, water source is one major contributing factor to infection with intestinal parasites. Many participants with intestinal protozoa reported use of tap water

Table 1. Analysis of the questionnaire.

(n=231).	Number	%
Family income (SR)		
<3000	118	51.1
3000-8000	68	29.4
>8000	45	19.5
Student eats most of the meals in the house		
Always	104	45.0
Sometimes	108	46.8
Never	19	8.2
Eats fresh fruits and vegetables		
Yes	201	87.0
No	30	13.0
Wash hands before meals		
Always	164	71.0
Sometimes	64	27.7
Never	3	1.3
Wash hands after meals		
Always	218	94.4
Sometimes	12	5.2
Never	1	0.4
Wash fruits and vegetables		
Always	222	96.1
Sometimes	8	3.5
Never	1	0.4
Water supply		
Tap water	32	13.9
Ionized bottled water	61	26.4
Non-ionized bottled water	128	55.4
Multiple sources	10	4.3
Washes hands after going to the toilet		
Yes	221	95.7
No	10	4.3
Appetite		
Good	114	49.4
Fair	101	43.7
Lost	16	6.9
Abdominal pain (n=231)		
Yes	96	41.6
No	135	58.4
Vomiting (n=231)		
Yes	34	14.7
No	197	85.3
Diarrhea or constipation (n=231)		
Diarrhea	10	4.3
Constipation	42	18.2
Neither	179	77.5

Table 2. Intestinal Parasites found.

Parasite	Number of cases
Giradia lamblia cyst	13
Entamoeba coli cyst	6
Iodamoeba buetschlii cyst	1
Chilomastix mesnili cyst	1
Hookworm egg	1

water as their man drinking water source ($p<0.05$). There was no correlation between abdominal pain, vomiting, diarrhea or constipation with infection with intestinal parasites.

The present data correlates well with data in Abha area (Ahmed *et al.*, 1990) and also agrees with data of a study in Riyadh city (Ahmed, 1991). This study included only Saudi children. Higher prevalence in other studies (Shoura and Morsy, 1974; Abdel-Hafez *et al.*, 1986; Omar *et al.*, 1991; Al-Eissa, *et al.*, 1995) may be explained by the participation of children from different nationalities or due to selectivity in obtaining the stool specimens. The most common parasite in the present study was *G. lamblia*. This fact agrees with Awadallah and Morsy (1974). They reported that giardiasis was the commonest protozoal parasite among pre-school and school aged children. In general, giardiasis is the commonest protozoal parasite in many schoolchildren and institutions for the developmentally disabled (Morsy *et al.*, 1991). Infection may be more severe or prolonged in persons with hypogammaglobulinaemia or malnutrition (Wilson, 1991). AIDS patients exhibit impaired immune responses to *Giardia* (Chute et al., 1987).

On the other hand, the presence of one hookworm egg is an indication of more infection. Since the cycle of hookworm is man----soil----man. Besides, humans are the main reservoir for human infection which is worldwide in distribution especially common in rural tropical areas. The acquisition of infection is by penetration of intact skin or mucosa by infective larvae or ingestion of foods contaminated with the hookworm, *Ancylostoma duodenale* larvae (Wilson, 1991).

It is recommended that this study should be performed on a national level to ensure better life for all children. Analysis of

blood for haemoglobin and other heamatological indices and the correlation of these with intestinal parasitic infections and socio-economic factors will be of great value.

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