

# Prevalence of Intestinal Parasitosis in Children with Gastrointestinal Symptoms Associated with Socio-Economic Conditions in Manisa Region

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**SUMMARY:** Intestinal parasitosis is still an important public health problem. The aim of this study was to determine the prevalence of intestinal parasitosis in children with gastrointestinal symptoms, and to evaluate its association with socio-economic and environmental factors. Stool samples of 3,216 children were examined by the saline-iodine method and trichrome staining. The cellophane tape method was also performed on 2,160 children. According to the educational levels and the economic status of families, the patients were classified as coming from underdeveloped, developing and developed areas. In 770 (23.9%) of 3,216 stool samples, various parasites were detected by the saline-iodine method and trichrome staining. The most common parasite was *Giardia intestinalis* (40.1%), followed by *Entamoeba coli* (10.2%). *Enterobius vermicularis* eggs were detected by the cellophane tape method in 221 (10.3%) out of 2,160 patients. The positive cases were evaluated according to the socio-economic and the environmental criteria; and most of them were found to have come from underdeveloped and developing areas. Health care and governmental officers should cooperate in order to improve the living conditions, and also people should be informed about the signs, symptoms and prevention methods of the parasitic diseases.

**Key words:** Childhood parasitosis, gastrointestinal symptoms, socio-economic conditions.

## Manisa Bölgesinde Sosyoekonomik Koşullarla İlişkili Olarak Gastrointestinal Semptomlu Çocuklarda Bağırsak Parazitlerinin Prevalansı

**ÖZET:** Bağırsak parazit hastalıkları hala önemli bir sağlık sorunudur. Çalışmamızda, gastrointestinal yakınması olan çocuklarda intestinal parazitosis prevalansının belirlenmesi, sosyo-ekonomik ve çevresel faktörler ile ilişkisinin tartışılması amaçlanmıştır. 3126 çocuğun dışkı örnekleri nativ-Lugol metodu ve trichrome boyama ile incelendi. 2160 çocuğa Selofan bant yöntemi uygulandı. Ailelerinin eğitim ve ekonomik düzeylerine göre, hastalar az gelişmiş, gelişmekte olan ve gelişmiş bölgelerden olmak üzere sınıflandırıldı. 3216 dışkı örneğinin 770'inde (%23,9) nativ-Lugol metodu ve trichrome boyama ile çeşitli parazitler saptandı. En sık rastlanan parazitlerin *Giardia intestinalis* (%40,1) ve *Entamoeba coli* (%10,2) olduğu saptanmıştır. *Enterobius vermicularis* yumurtaları ise 2160 çocuğun 221 (%10,3)'ünde saptanmıştır. Pozitif olgular sosyo-ekonomik ve çevresel faktörlere göre değerlendirildiğinde, çocukların daha çok gelişmemiş yada gelişmekte olan bölgelerde yaşadığı görülmüştür. Sonuç olarak, Sağlık çalışanları ve hükümet yetkilileri yaşam koşullarını iyileştirmek için işbirliği içinde çalışmalıdır. Ayrıca insanlar parazitler hastalıklarının bulguları ve korunma yöntemi hakkında bilgilendirilmelidir.

**Anahtar Kelimeler:** Çocukluk çağı parazitizmaları, Gastrointestinal yakınma, Sosyo-ekonomik koşullar

## INTRODUCTION

Intestinal parasitosis is still an important public health problem in underdeveloped or developing countries. Incidence of intestinal parasitosis is affected by various factors, such as personal hygiene, dietary habits, education level of the community, socio-economic conditions, climate and environmental factors. Intestinal parasites are more frequently encountered during childhood, since hygienic habits have not been fully developed yet (2, 22).

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Intestinal parasites may cause serious health problems such as diarrhea, malnutrition, malabsorption, mental retardation and even death, especially in children (15). Diarrhea in childhood is an important public health problem; 4 - 4.5 million child deaths have been reported each year in developing countries, due to diarrhea (8). World Health Organization (WHO) emphasizes that majority of these children can be rescued, with appropriate treatment (26). In the present study, the prevalence of intestinal parasitosis was investigated in children with gastrointestinal symptoms, who were admitted to hospital within the last 4 years, and the association of intestinal parasitosis with the socio-economic and the environmental factors is discussed.

## MATERIALS AND METHODS

**Population:** This study was performed in Manisa, which is located in the western Anatolia. Manisa has an almost subtropical climate where as temperature arise about 45°C in summer days. Sanitary conditions are insufficient in large parts of the city, mainly in the slums where poverty is more evident. The stool samples of 3216 children aged between 0 – 15 years [1474 (45.7%) female and 1746 (54.3%) male] were evaluated admitted to Manisa Moris Schinasi Pediatrics Hospital with gastrointestinal symptoms such as diarrhea, abdominal pain, nausea and vomiting between January 2000 and January 2004.

The stool samples were firstly investigated by using saline-iodine method. Cellophane tape method was also performed in 2160 children for investigating *Enterobius vermicularis* and *Taenia spp.* eggs. The size of the detected parasite was evaluated by ocular micrometric method. Formol – ether concentration method was then performed to increase the possibility of finding eggs or cysts forms. Amoeba trophozoites were observed in fresh smears. To identify protozoa species, trichrome staining was performed. No method was used to distinguish *Entamoeba histolytica* and *Entamoeba dispar*. To evaluate the socio-economic and the environmental factors, the following parameters were recorded with a questionnaire form: degree of crowding, education levels of the household, the economical status of the families, presence of health insurance, presence of sewage system, quality of water supply and disposal of excrement. Then according to these parameters the patients were divided into three groups; underdeveloped, developing and developed regions. Informed consents of parents of enrolled children and Ethics Committee approval were obtained prior to the start of the study in accordance with the Helsinki Declaration.

Data were evaluated by SPSS for Windows 11.0.

## RESULTS

The mean age of the children was 6.9±3.2 (ranging from 5 months to 15 years). The distribution of patients according to age and the number of positive cases are shown in Table 1.

Parasitologic examination was positive in 683 (17.5%) children; more than one parasite was detected in 90 children. Cases at least one parasite was detected by saline-iodine method and trichrome staining in 773 (19.1%). Of the 683 cases, 308 (45.1%) were female and 375 (54.9%) were male. *Enterobius vermicularis* eggs were detected by cellophane tape method in 221 (10.3%) of 2160 patients. The parasites detected by both methods are summarized in Table 2. Most common parasites were *Giardia intestinalis* and *Enterobius vermicularis*, followed by *Entamoeba coli*. Parasite positive cases were evaluated according to their socio-economic and environmental criteria; most of the cases were from less-well or moderately developed regions (Table 3).

## DISCUSSION

Intestinal parasitosis is common in Turkey because of its geographical location, climate and soil structure. Low socio-economic conditions, dietary habits, insufficient education and personal hygiene enhance the development of these infections, especially in some regions of the country (16). The rate of intestinal parasitosis ranges from 23.8% to 80%, depending on the geographical region (3,7,11,12,16,23,24). According to studies from the western Anatolia (Aegean region), prevalence of intestinal parasites is between 18.5% and 48.7% (6,13,27). This ratio ranges between 18.4% and 62.9% in different countries. (5,20,21).

**Table 1.** Distribution of positive cases according to age.

Age groups (n=3216)	0 – 1 yrs (n=141)	2 – 5 yrs (n=1140)	6 – 10 yrs (n=1276)	11–15 yrs (n=659)
<b>Positive cases (n= 773)</b>	17 (12.1%)	179 (15.7%)	315 (24.7%)	262 (39.8%)

**Table 2.** Distribution of positive cases according to the parasites.

Parasites	N = 773	%
<i>Giardia intestinalis</i>	309	40.1
<i>Enterobius vermicularis</i>	221	28.7
<i>Entamoeba coli</i>	85	10.2
<i>Blastocystis hominis</i>	51	6.6
<i>Hymenolepis nana</i>	37	4.8
<i>Entamoeba histolytica / Entamoeba dispar</i>	34	4.4
<i>Chilomastix mesnili</i>	13	1.8
<i>Iodamoeba bütschlii</i>	7	0.9
<i>Trichomonas hominis</i>	6	0.8
<i>Endolimax nana</i>	3	0.5
<i>Taenia saginata</i>	3	0.5
<i>Trichuris trichiura</i>	2	0.3
<i>Dicrocoelium dedriticum</i>	1	0.2
<i>Entamoeba hartmanni</i>	1	0.2

**Table 3.** Distribution of positive cases according to socio-economic and environmental criteria.

Region	N = 773	%
Underdeveloped region	421	54.5
Developing region	289	37.4
Developed region	63	8.1

In this study, most frequently detected parasites were *Giardia intestinalis* (40.1%), *Enterobius vermicularis* (28.8%) and *Entamoeba coli* (10.2%). The prevalence of the other parasites were as follows: *Blastocystis hominis* (6.6%), *Hymenolepis nana* (4.8%), *Entamoeba histolytica / Entamoeba dispar* (4.4%), *Chilomastix mesnili* (1.8%), *Iodamoeba bütschli* (0.9%), *Trichomonas hominis* (0.8%), *Endolimax nana* (0.5%), *Taenia saginata* (0.5%), *Trichuris trichiura* (0.3%), *Dicrocoelium dendriticum* (0.2%) and *Entamoeba hartmanni* (0.2%).

The prevalence of intestinal parasites and helminths in Turkey has been reported as follows: *Giardia intestinalis* (9.6-54.8%), *Enterobius vermicularis* (3.6-45.3%), *Entamoeba coli* (0-2.7%), *Blastocystis hominis* (0.26-2.3%), *Hymenolepis nana* (0.03-1.7%), *Entamoeba histolytica* (1.5-3.68%), *Chilomastix mesnili* (0.3-2.0%), *Iodamoeba bütschli* (0.4-1.2%), *Trichomonas hominis* (0.1-1.0%), *Endolimax nana* (0.1-1.0%), *Taenia saginata* (0.1-0.5%), *Trichuris trichiura* (0.03-0.3%), *Dicrocoelium dendriticum* (0.1-0.26%) and *Entamoeba hartmanni* (0.1-0.26%) in previous studies (1,14,18,23,25, 27).

According to a study, reporting prevalence of intestinal parasitosis among the primary school children attending first classes in Poland, the prevalence of the parasites were detected as follows: *Enterobius vermicularis* (16.45%), *Giardia intestinalis* (1.02%), *Entamoeba coli* (0.73%) and *Trichuris trichiura* (0.29%) (19). The results of the investigation of coprological samples from elementary school children in Chile was reported as follows: *Entamoeba coli* (34.0%), *Giardia intestinalis* (27.9%), *Chilomastix mesnili* (0.8%), *Trichuris trichiura* (32.0%), *Enterobius vermicularis* (1.6%) and *Hymenolepis nana* (0.4%). In a study performed in Chile, it is reported that inappropriate environmental factors could evaluate the prevalence of parasitic infections (17). In another study from Gombak (Malaysia), in which stool samples of 456 school children were investigated, the prevalence of the parasites were detected as follows: *Trichuris trichiura* (47.1%), *Giardia intestinalis* (14.7%), *Entamoeba coli* (11.4%) and *Entamoeba histolytica* (9.9%). The prevalence of infection was associated with the socio-economic status, water supply and sanitary disposal of feces and family size (20). In a parasitic prevalence study in El Salvador, stool specimens of 210 children with diarrhea were investigated, and the prevalence of intestinal helminthes and protozoa was 49%. Of the helminthes, 31% were *Trichuris trichiura*, 18% *Hymenolepis nana*, 7% *Giardia intestinalis*, 6% *Entamoeba histolytica*, 4% *Cryptosporidium sp.* and 3% *Blastocystis hominis* (21).

In a descriptive study for the prevalence of intestinal parasites in apparently healthy children, aged between 5-14 years, 44.8% were found to be harboring at least one parasite; among them *Entamoeba coli* (10.43%), *Entamoeba hartmanni* (2.02%), *Endolimax nana* (1.34%), *Enterobius vermicularis* (1.34%) and *Trichuris trichiura* (0.67%). Intestinal parasites are more prevalent in school age children, probably due to the moderate to low socio-economic level, to which this age-group belongs (15).

A parasitologic study was carried out on 381 apparently healthy children from Camiri, Boyuibe and Gutierrez (Italia). Intestinal parasites and protozoa were found in 78.7% of the children. The prevalence of the other parasites were as follows: *Entamoeba coli* (40.7%), *Giardia intestinalis* (30.7%), *Iodamoeba bütschli* (10%), *Chilomastix mesnili* (8.7%), *Enteromonas hominis* (3.4%), *Endolimax nana* (2.1%), *Trichuris trichiura* (19.7%), *Hymenolepis nana* (8.7%), *Taenia saginata* (1.6%) and *Enterobius vermicularis* (1.3%). No significant differences were observed in parasitic prevalence between rural and urban areas. Contamination with human and animal faeces, high population and poor sanitation habits are some of the factors responsible for the parasitosis prevalent (4).

In a parasitologic study from Thailand, stool specimens of 106 pre-school children were investigated and the prevalence of the parasites was as follows: *Blastocystis hominis* (45.2%), *Giardia lamblia* (37.7%) and *Entamoeba histolytica* (3.7%). The prevalence of other non-pathogenic protozoa were as follows: *Trichomonas hominis* (39.6%), *Entamoeba coli* (18.8%), and *Endolimax nana* (3.7%) (22).

In Turkey, studies on giardiasis show that the disease is especially common among children (10). In a study from United Kingdom, 25% of the children with gastrointestinal symptoms had *Giardia intestinalis* infection (9).

It is well known that parasitic diseases are more common in communities with low socio-economic conditions. These infections deteriorate the psychological and physical development of the children. We observed that the majority of the positive cases were from underdeveloped and developing regions where a sewage system was not present and mostly using natural spring water for drinking.

Patients with intestinal parasitosis become an infection focus for the community. If left untreated, serious complications and even death may occur due to parasitic infections. Therefore, public health care employee as well as the officers of municipality and government should cooperate to improve the survival conditions, and also people should be informed about the signs, symptoms and prevention methods of the parasitic diseases.

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