

JMS (ISSN 1682-4474) is an International, peer-reviewed scientific journal that publishes original article in experimental & clinical medicine and related disciplines such as molecular biology, biochemistry, genetics, biophysics, bio-and medical technology. JMS is issued eight times per year on paper and in electronic format.

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J. Med. Sci.,
2014

DOI: 10.3923/jms.2014.

Prevalence of Intestinal Parasites among Children Attending the Daycare Centers of Ilam, Western Iran

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The prevalence of intestinal parasites among children in developed and developing countries is striking. We decided to survey the prevalence of intestinal parasites among children in the day care centers of Ilam, Iran, given that this has not been investigated in this region. A cross-sectional study was conducted to determine the prevalence of intestinal parasites in preschool children. For this study, we enrolled 650 children whose parents filled out a consent form. A fresh stool sample was obtained from each child and analyzed using direct methods, including saline and formalin-ether sedimentation techniques. A standardized questionnaire which included demographic information, socioeconomic status, type of drinking water, personal hygiene, parental age and education and number of family members, was prepared for each child. Of the 650 children, 310 were male and 340 were female. All of them were under the age of 6 years. The overall infection rate of intestinal parasites was 14%. The parasites identified in the samples, with their prevalence in parentheses, include *Giardia lamblia* (11.7%), *Hymenolepis nana* (7.84%), *Ascaris lumbricoides* ggs (3.84%), *Entamoeba coli* (10.76%), *Blastocystis hominis* (5.69%), *Dientamoeba fragilis* (4.30%), *Iodamoeba bütschlii* (6.61%) and *Entamoeba histolytica* (2.92%). Mixed infections were seen in 18% of the samples. The highest and lowest prevalence was seen with *G. lamblia* and *E. histolytica*, respectively. The parents' educational level was significantly associated with prevalence of parasites ($p < 0.05$). *E. histolytica*, a deadly parasite, was found during this study. A precise survey of the causes of these infections and the factors related to distribution of parasites, along with periodic testing of children and their educators, health management and staff training, is essential.

Key words: Infection, intestinal parasites, kindergarten, health

INTRODUCTION

Protozoan and worm parasitic infections cause morbidity and mortality among children in the tropics. It is estimated that 3 billion people worldwide are infected with intestinal parasites and the most affected population are children. The prevalence of intestinal parasites varies across different parts of the world (Goncalves *et al.*, 2001; Karadam *et al.*, 2008; Davies *et al.*, 2009). Parasitic diseases usually arise because of poor sanitation, water contamination and poor personal hygiene in developing countries. Moreover, infection with intestinal parasites is an indicator useful in community health assessment (Kang *et al.*, 1998; Menezes *et al.*, 2008). Patients who have parasitic infections present a range of symptoms, such as chronic diarrhea, malnutrition and anemia (Miller *et al.*, 2003). Death has also been reported from infection with *E. histolytica*, a causative agent of amebic dysentery, around the world (Tang and Luo, 2003; Davoudi *et al.*, 2004). Several studies have reported high, medium and low prevalence of intestinal parasites in children throughout the world. A very high prevalence of *G. lamblia* has been reported in a study conducted on children in Spain (Perez Armengol *et al.*, 1997). Studies in Bangladesh and Yemen have reported 80 and 50% intestinal parasite contamination rates, respectively (Al-Ballaa *et al.*, 1993; Hussain *et al.*, 1997). Infection rates of 16.6 and 10.3% were reported for intestinal parasites and *G. lamblia*, respectively, in Gaza (Al-Hindi and El-Kichao, 2008). Several studies have shown that intestinal parasites can be transmitted person to person in children. Given that such a study has not been conducted in west Iran, the authors decided to evaluate the prevalence of intestinal parasites among children attending day care centers in Ilam, Iran.

MATERIALS AND METHODS

A cross-sectional study was conducted. A total of 650 children less than 6 years' age were selected from the nurseries of Ilam. Parents were asked to collect 3 stool samples from each child, in canisters with plastic lids. These samples were immediately transported to the Laboratory of Parasitology at the Ilam University of Medical Sciences. Six slides were prepared from each sample using saline (2 slide) wet mount techniques and logol (2 slides) and sedimentation formalin-ether (2 slides) (Ritchie's method). The slides were then examined by a technician and a parasitologist. The parents completed a standardized questionnaire that included demographic information; socioeconomic status; and data concerning drinking water, personal hygiene, age, parental education,

family size and type of child care. The data were analyzed using SPSS software and significance was tested using the chi-square test.

RESULTS

The 650 children that took part in the study included 310 boys and 340 girls. The overall intestinal parasite infection rate was 14%. Figure 1 show that 5 of the parasites identified in the samples were protozoa and 2 were worms (helminths). The parasites identified in the samples, with their prevalence in parenthesis, include *G. lamblia* (11.7%) (Fig. 2), *H. nana* (7.84%), *A. lumbricoides* eggs (3.84%), *E. histolytica* (2.92%), *Dientamoeba fragilis* (4.30%) (Fig. 3), *E. coli* (10.76%), *B. hominis* (5.69%) (Fig. 4) and *I. bütschlii* (6.61%). Mixed

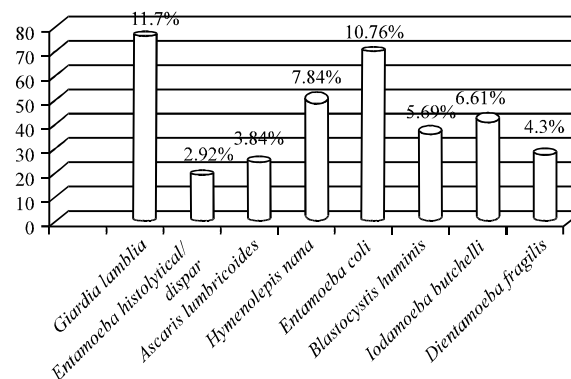


Fig. 1: Prevalence of intestinal protozoan and helminthes infections in Ilam nurseries, Iran

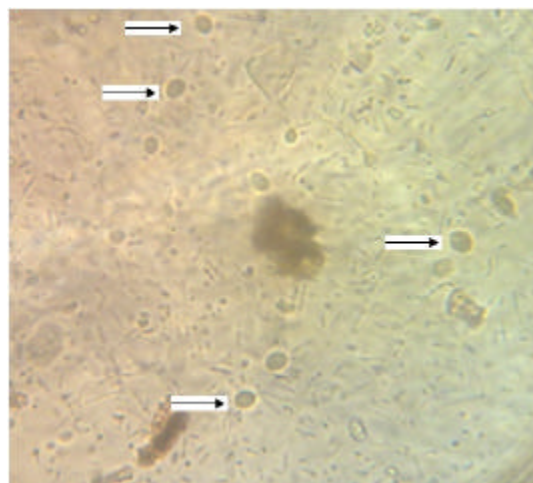


Fig. 2: *Giardia lamblia* in stool exam (X100), Lugol staining

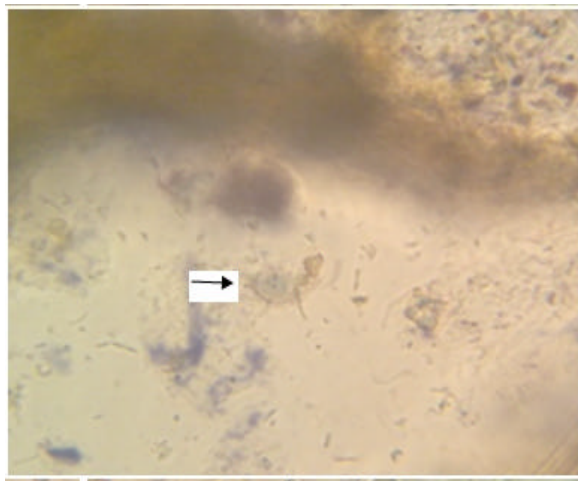


Fig. 3: *Dientamoeba fragilis* in stool exam (X100), Lugol staining

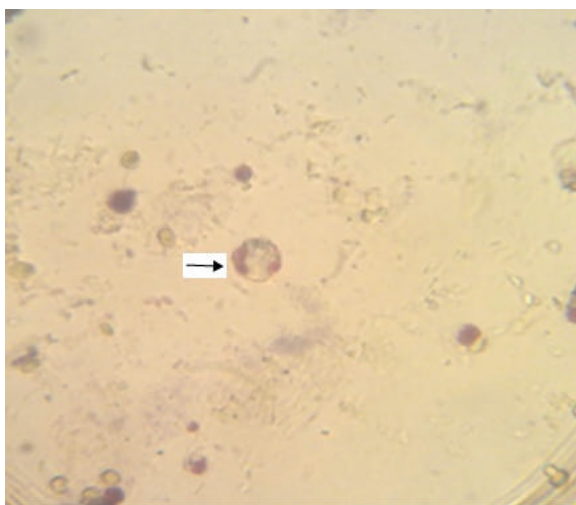


Fig. 4: *Blastocystis hominis* in stool exam (X100), Lugol staining

infections were seen in 18% of the samples. The highest and lowest infection rate was seen with *G. lamblia* and *E. histolytica*. The results show that there is a significant relationship between parents' education and infection ($p < 0.05$). *A. lumbricoides*, *G. lamblia*, *E. histolytica* and *H. nana* are pathogenic parasites while *E. coli* and *B. hominis* are non-pathogenic parasites.

DISCUSSION

This is the first study to estimate the prevalence of intestinal parasites in Ilam nurseries. In comparison with

other studies that have been conducted in other parts of Iran, the prevalence found in this study is high. Parents' education level was significantly associated with the prevalence of parasites. This shows that the children belonging to parents who have a higher education have better health. The prevalence of intestinal parasites in each country is an indicator of poor hygiene, water contamination, poor personal hygiene and high population density. Hence, these factors should be considered when designing methods to prevent intestinal parasite infections in developed and developing countries. Many teachers have expressed the opinion that children should be taken to the parasitology laboratory for testing before entering kindergarten. If they are infected, their entry into kindergarten should be delayed until they are treated. However, this study shows that high sensitivity detection methods do not have to be used. Several studies have been carried out in the world and have achieved varying results. The overall prevalence of intestinal parasites has been reported to be 29.3% in Brazilian nurseries. The parasites reported, with their prevalence in parentheses, include *G. Lamblia* (19.2%), *E. nana* (14.3%), *E. coli* (12%), *E. histolytica* (3.8%), *I. bütschlii* (2.3%), *H. nana* (2.3%) and *E.vermicularis* 1.5% (Gonçalves *et al.*, 2011). In a study of helminth parasite infections among nursery staff and children in Toronto, 19% children and 14% employees were found to be infected with intestinal parasites. The most common parasites were *G. lamblia* and *Dientamoeba fragilis* (Keystone *et al.*, 1984). In a study of intestinal parasite infections in nurseries in Cuba, 71.1% children were infected with at least one parasite (Canete *et al.*, 2012). Studies have also been conducted in different regions of Iran and different results were obtained. Intestinal parasites in children nurseries reviews cover 68.1% of the subjects had at least one type of parasite that may be are pathogen or non pathogen (Heidari and Rokni, 2003). In that study, the highest infection rate (33.8%) was seen with *Enterobius vermicularis*. Unfortunately, due to lack of cooperation from parents in the present study, it was not possible to perform the Scotch tape test for *Enterobius vermicularis*. Kohan and colleagues reported that 56.5% of children under 6 years of age in Tangestan, Bushehr, were infected with at least one parasite (Kohan, 1997). The infection rate of intestinal parasites in Zahedan has been reported 19.1% (Davoudi *et al.*, 2004).

Comparing the research conducted outside Iran and other parts of Iran with the present study, we know that the distribution and prevalence of parasites are not uniform and several factors affect the spread of parasites. Some parasites are highly infective, do not need an intermediate host, spread through a hand-to-mouth route

and do not need much time or specific conditions to reproduce. Hence, in a short time, they can cause an epidemic and cause suffering for many people, thereby increasing the health danger in the region. Our results also show that protozoan parasites are endemic in the study region. Effective measures for reducing the incidence of infection include screening the children and kindergarten staff, treatment of infected children and staff, screening the families of infected children, disinfection of equipment and the environment of children and educating children and staff to wash their hands.

ACKNOWLEDGMENT

The authors would like to thank teachers of kindergartens for cooperation and Ilam University of Medical Sciences for financial support. The authors declare there is no conflict of interest.

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