Korean J Parasitol. Vol. 47, No. 3: 265-268, September 2009 DOI: 10.3347/kjp.2009.47.3.265

Intestinal Parasitic Infections among Inhabitants of Karaj City, Tehran Province, Iran in 2006-2008

Vahid Nasiri[1,*], Kasra Esmailnia[1], Gholamreza Karimi[2], Mehdi Nasiri[3] and Omid Akhavan[4]

[1]Protozoology Department of Razi Vaccine and Serum Research Institute, Ghazvine Ave, Hesarak, Karaj, Tehran, Iran; [2]Parasitology Department of Razi Vaccine and Serum Research Institute, Ghazvine Ave, Hesarak, Karaj, Tehran, Iran; [3]Ministry of Education, Part 2 Office of Education, Yadegar Imam High School, Karaj, Iran; [4]Society Securing Medical Centers, Karaj, Iran

Abstract: Karaj is an area with large influx of refugee people in Iran. To increase knowledge about parasitic infections, we carried out this research during 2006-2008. We recorded the stool examination results and some of their personal characteristics. A total of 13,915 human stools were examined, and 649 (4.7%) were positive for intestinal parasites. Among them, 13 (0.09%) had worm and 636 (4.6%) had protozoan infections. Maximum infections belonged to *Giardia intestinalis*, and 534 (3.8%) samples had this infection. Other parasitic infections included *Entamoeba coli* (0.39%), *Entamoeba histolytica* (0.021%), *Blastocystis hominis* (0.08%), *Trichomonas hominis* (0.1%), *Iodamoeba bütschlii* (0.06%), *Chilomastix mesnili* (0.007%), *Endolimax nana* (0.05%), *Enterobius* spp. eggs (0.028%), *Taenia* proglottids (0.028%), and *Strongyloides stercoralis* larvae (0.03%). The maximum numbers of referred people to laboratories were in July and the maximum percentage of infections was in August. There is a point that all 5 *Strongyloides stercoralis* infections were pertained to 2008. With attention to the rate of parasitic infections (4.7%), it seems that we should take additional educational information to wide spectrum of people living in this city.

Key words: *Giardia, Entamoeba, Blastocystis, Trichomonas, Iodamoeba,* intestinal parasite, Karaj, Iran

INTRODUCTION

Intestinal parasitic infections are amongst the most common infections worldwide. It is estimated that some 3.5 billion people are affected, and that 450 million are ill as a result of these infections, the majority being children. These infections are regarded as serious public health problem, as they can cause iron deficiency anemia, growth retardation in children, and other physical and mental health problems [1,2].

In public imagine Karaj city is commemorated as small Iran and this point completely shows the status of our city in Iran and thus the condition of this area is a symbol of all part of our country and results of every epidemiologic research that performed in Karaj almost shows the status of the whole parts of the country. 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 [3,4]. Geographical conditions and poor nutritional and socioeconomic status contribute to making the Islamic Republic of Iran favorable area for parasitic infections. The prevalence of intestinal parasitic infections has been found to vary in different parts of the Iran, with 47.2% in Kerman [5], 22.4% in Shahrekord [6], 21.9% in Mazandaran [7], 65.5% in Amol [8] and 32.2% in Tabas [9]. A review of 300 cases of intestinal parasitic infection in Kerman, a city in south east of Iran, showed that *Ascaris lumbricoides* was the most common nematode and *Giardia intestinalis* and *Entamoeba histolytica* the most common unicellular microorganisms causing intestinal parasitic infections [5]. In addition, many refugees from different provinces of Iran come to this city to work and living, so we performed present research in this place.

The aim of our study was to describe the occurrence of intestinal parasitic infections in our area, considering all people, including hospitalized, outpatients, and healthy people, with the suspect of intestinal parasitosis whose fecal samples were sent to our laboratory during the years 2006-2008.

MATERIALS AND METHODS

Study population

We examined 13,915 stool specimens submitted from peo-

• Received 22 January 2009, revised 21 February 2009, accepted 3 March 2009.

* Corresponding author (toxocara_vahidd@yahoo.com; v.nasiri@rvsri.ir)

ple, not belonging to a selected population, collected from March 2006 to February 2008. The population samples were chosen by randomized cluster sampling from all areas of Karaj city that located in the central part of Iran. The study design was cross-sectional. By concordance with society securing medical centers, 3 hospitals (Shahid Madani, Imam Ali, and Alborz Hospitals) and diagnostic medical laboratories of Karaj give essential education to them, and we recorded the stool examination results and some personal characteristics of refers that were under examination.

Intestinal parasitic examination

The stool specimens (0.5-1.5 g) were collected in labeled plastic vials without preservatives and immediately (less than 2 hr) examined after collection. Stool samples were subjected to macroscopic examination, to check the consistency and to point out the presence of blood, mucus, or adult helminth parasites. Moreover, we performed the modified formalin-ethyl acetate sedimentation technique that was accompanied with trichrome stain for all specimens to demonstrate the presence of worm eggs and larvae, and protozoan trophozoites and cysts.

Table 1. Prevalence of intestinal parasitic infections among the inhabitants of Karaj city, Tehran, Iran (2006-2008)

Parasite species	No. infected	Prevalence (%)
No. of people examined (n = 13,915)		
Giardia lamblia	534	3.8
Entamoeba coli	55	0.39
Trichomonas hominis	15	0.10
Blastocystis hominis	12	0.08
Iodamoeba bütschlii	9	0.06
Endolimax nana	7	0.05
Strongyloides stercoralis larvae	5	0.03
Taenia proglottids	4	0.028
Enterobius eggs	4	0.028
Entamoeba histolytica	3	0.021
Chilomastix mesnili	1	0.007
Total*	649	4.7

*5 cases have co-infection with more than 1 species of parasites.

Table 2. Sex-related prevalence of intestinal parasitic infections among the inhabitants of Karaj city, Tehran, Iran (2006-2008)

Gender	No. infected	%
Male	317	6.0
Female	332	3.9
Total	649	4.7

$\chi^2 = 0.05$, $P = 0.03$.

Statistical analysis

A computer program, SPSS for Windows (Release 11.5.0), was used for data analysis. The descriptive data was given in mean ± standard deviation (SD). The chi-square test, Student's *t*-test, and Fischer's bicaudal exact test were used for the analytical assessment. The differences were considered to be statistically significant when the *P*-value obtained was less than 0.05.

RESULTS

Among 13,915 persons referred to laboratories for performing stool examinations, 5,304 samples (38.1%) were male and 8,611 (61.8%) were female. Among these numbers, 649 (4.7%) were positive for parasitic infections, that included 13 (0.09%) worm and 636 (4.6%) protozoan infections. At all, 5 cases had co-infection with more than 1 species of parasites. Eleven species of parasites were found in the population studied; maximum infections belonged to *Giardia intestinalis* int 534 (3.8%) of persons had that infection (Table 1). The next prevalent species

Table 3. Age-prevalence of intestinal parasitic infections among the inhabitants of Karaj city, Tehran, Iran (2006-2008)

Age group (year)	No. infected	%
0-9	104	5.2
10-19	185	4.7
20-29	82	3.7
30-50	178	4.4
>50	100	5.9
Total	649	4.7

df = 5, $\chi^2 = 0.32$, $P = 0.23$.

Table 4. Seasonal (monthly) prevalence of intestinal parasitic infection among the inhabitants of Karaj city, Tehran, Iran (2006-2008)

Month	No. infected	%
January	59	4.9
February	50	4.7
March	40	4.2
April	49	4.3
May	48	4.1
June	53	4.4
July	63	4.8
August	74	5.7
September	56	4.6
October	48	4.8
November	55	4.7
December	54	4.6
Total	649	4.7

df = 5, $\chi^2 = 0.92$, $P = 0.55$.

were *Entamoeba coli* (0.39%) and *Trichomonas hominis* (0.1%). Maximum numbers of referred people to laboratories were in July and the maximum percentage of infections was in August. Analytical results of 2 years were similar, with a point that all 5 *Strongyloides stercoralis* infections pertained to 2008. Distribution of infection with intestinal parasites in the population according to sex, age, and month are illustrated in Tables 2-4.

DISCUSSION

Intestinal parasitosis represents a relevant clinical problem, especially in developing countries, where they are responsible for morbidity and mortality in adults and children and many epidemiological data are available for these areas [22]. The prevalence in the communities may be altered because of changes in social behavior and life styles during years. Different epidemiological studies of such infections will provide better understanding of the health status of these countries. In recent years, several researches have been conducted in different parts of Iran to reveal the status of prevalence of intestinal parasitic infections. All these studies indicated that there is a sharp decline in the prevalence of intestinal parasites compared to those studies of previous 3 decades or before that [10-14]. The structure of Karaj city has been founded less than 50 years and made by immigration from different parts of the country with continuing immigration from endemic regions. Therefore, screening for intestinal parasitic infections has remained an important priority in Karaj. Many studies on the prevalence of intestinal parasitic infections have been performed in all continents due to their wide diffusion in human communities.

In our study, the cumulative positive infection rate for all species was 649 (4.7%), and like other researches in Iran, *G. intestinalis* (3.8%) was the most common species among protozoa and *S. stercoralis* larvae (0.03%) was the most common among worms that were detected in people. *E. coli* was the next common intestinal protozoa among the study population. *G. intestinalis* and *E. coli* can be transmitted orally by drinking infected water and both are environmental contaminants of the water supply. The water supply is really an important risk factor, for giardiasis, and several large outbreaks of giardiasis have resulted from contamination of municipal water supplies with human waste [19]. In Mexico city, up to 18% of acute diarrhea and dysentery in children requiring hospitalization were found to be associated with *G. intestinalis*, as well as 10% with *E. histolytica* and 7% with *Blastocystis hominis* [19]. In 1983, in the US, *G. intestinalis* was identified as the cause of 68% of waterborne outbreaks of diarrhea [20].

In our study, the prevalence of intestinal parasitic infections was slightly higher in males than in females, which is in agreement with the findings of a study in Nigeria [17] and previous studies in local regions of the Islamic Republic of Iran, in Tabas [9], Kerman [8], and Shahrekord [6]. However, population studies of the northern part of the Islamic Republic of Iran in Nour, Beshehr [18], and Amol [8], and a research in the Philippines [2] showed a higher prevalence of infection in females than in males. This may be explained by environmental factors as more women are occupied in farming in these areas compared with other parts. In some months of the year, we saw the effects of social behaviors on patterns of parasite distribution because we found that in months with religious (Ramezan in October) or national (Norooz in March) ceremonies in Iran the rate of referring people and also the number of infected people during the 2 years of our research were obviously decreased.

In conclusion, intestinal parasitic infections are still important public health problems in our region, and screening and treatment of infected people, as well as improving sanitary conditions and interventions, including health education on personal hygiene to the students and to the parents, especially to mothers, will help health authorities in strategy of control programs for intestinal parasites. At all it seems that a multisectoral control approach is needed and should be used in Iran.

REFERENCES

1. World Health Organization. Control of Tropical Diseases. Geneva, Switzerland. WHO. 1998.
2. Kim BJ, Ock MS, Chung DI, Yong TS, Lee KJ. The intestinal parasite infection status of inhabitants in the Roxas city, the Philippines. Korean J Parasitol 2003; 41: 113-115.
3. Gamboa MI, Basualdo JA, Kozubsky L, Costas E, Cueto RE, Lahitte HB. Prevalence of intestinal parasitosis within three population groups in La Plata, Argentina. Eur J Epidemiol 1998; 14: 55-61.
4. Phiri K, Whitty CJ, Graham SM, Ssembatya-Lule G. Urban/rural differences in prevalence and risk factors for intestinal helminth infection in southern Malawi. Ann Trop Med Parasitol 2000; 94: 381-387.
5. Nasser ZA, Jafar M. Prevalence of intestinal parasites in the city of Kerman. Iran J Parasitol 1997; 11: 129a.
6. Koroosh MN. Prevalence of intestinal parasitic infestations in patients attending the Parasitology Laboratory in Shahrekord. Iran J Parasitol 1997; 11: 131a.
7. Azam S. Frequency distribution of intestinal worms in Behshar and Nour cities. Tehran, Iran. Tehran University School of Health

Sciences and Research Institute. 1995.
8. Ali HZ. Prevalence of intestinal parasites in Amol city. Tehran, Iran. Tehran University School of Health Sciences and Research Institute. 1999.
9. Saied HM. Prevalence of intestinal parasites in Tabas city. Tehran, Iran. Tehran University School of Health Sciences and Research Institute. 1999.
10. Mohammad K, Zalie MR, Shadrokh S, Masjedi MR. Intestinal parasites in Iran. Iranian J Pub Health 1994; 24: 9-26.
11. Mahvi AH, Kia EB. Helminth eggs in raw and treated wastewater in the Islamic Republic of Iran. East Mediterr Health J 2006; 2: 137-143.
12. Farahani H. Study on human taeniasis by administering anti-*Taenia* drug in rural areas of Mazandaran provinces. Medical Thesis, Faculty of Medicine, Tehran University of Medical Sciences, Tehran, Iran. 2006.
13. Nematian J, Nematian E, Gholamrezanezhad A, Asgari AA. Prevalence of intestinal parasitic infections and their relation with socio-economic factors and hygienic habits in Tehran primary school students. Acta Trop 2004; 92: 179-186.
14. Kia EB, Hosseini M, Nilforoshan MR, Meamar AR, Rezaeian M. Study of intestinal protozoan parasites in rural inhabitants of Mazandaran province, Northern Iran. Iran J Parasitol 2008; 1: 21-25.
15. Chan MS. The global burden of intestinal nematode infections-fifty years on. Parasitol Today 1997; 13: 438-443.
16. Lee KJ, Bae YT, Kim DH, Deung YK, Ryang YS, Kim HJ, Im KI, Yong TS. Status of intestinal parasites infection among primary school children in Kampongcham, Cambodia. Korean J Parasitol 2002; 40: 153-155.
17. Agi PI. Pattern of infection of intestinal parasites in Sagbama community of the Niger Delta, Nigeria. West Afr J Med 1995; 14: 39-42.
18. Ashrat BK, Hossein H, Erag M. Assessment of human intestinal parasites in Iran during the last 50 years. Abstracts of the 2nd National Congress of Parasitic Diseases, Tehran, Islamic Republic of Iran, October 19-22, 1997. p 137.
19. Diaz E, Mondragon J, Ramirez E, Bernal R. Epidemiology and control of ntestinal parasites with nitazoxanide in children in Mexico. Am J Trop Med Hyg 2003; 68: 384-385.
20. Weniger BG, Blaser MJ, Gedrose J, Lippy EC, Juranek DD. An outbreak of waterborne giardiasis associated with heavy water runoff due to warm weather and volcanic ashfall. Am J Public Health 1983; 73: 868-872.
21. Garg PK, Perry S, Dorn M, Hardcastle L, Parsonnet J. Risk of intestinal helminth and protozoan infection in a refugee population. Am J Trop Med Hyg 2005; 73: 386-391.
22. Peruzzi S, Gorrini C, Piccolo G, Calderaro A, Dettori G, Chezzi C. Prevalence of intestinal parasites in the area of Parma during the year 2005. Acta Biomed 2006; 77: 147-151.