Original Article

Study of Intestinal Protozoan Parasites in Rural Inhabitants of Mazandaran Province, Northern Iran

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Abstract
Background: Intestinal parasites of humans are important health problems of most communities, especially those situated in tropical and subtropical areas. This study was carried out in rural population of Mazandaran Province, northern Iran, during 2004-2005, with the purpose of achieving a better understanding of the distribution of intestinal protozoan parasites in this province.
Methods: A total of 855 stool specimens were collected randomly from rural inhabitants (384 males and 471 females) and examined by the formalin-ethyl-acetate concentration technique. In addition, a modified version of the Ziehl-Neelsen technique was used for the staining of *Cryptosporidium* and other intestinal coccidian parasites.
Results: The general prevalence of intestinal protozoans was found as 25%. The prevalence of every intestinal protozoan parasite was as follows: *Giardia lamblia* (10.2%), *Entamoeba histolytica/dispar* (1.2%), *Dientamoeba fragilis* (1.1%), *Blastocystis hominis* (9.8%), *Entamoeba coli* (5%), *Endolimax nana* (0.7%), *Iodamoeba butschlii* (1.3%), and *Entamoeba hartmani* (0.4%).
Conclusion: The present study revealed that the prevalence of intestinal protozoan parasites among rural inhabitants of Mazandaran Province are still so high that implies performing special control measures.

Keywords : Intestinal protozoan parasites, Prevalence, *Iran*

Introduction

Parasitic infections have high prevalence rates throughout the world and it is estimated that more than three billion people are infected with intestinal parasites in the world (1). Studies on human parasitic infections have demonstrated a common relationship between parasitic infections and lower socioeconomic status of the region (2-4). Designing any control strategy for any endemic area first necessitates having epidemiological data about different infections.

In spite of present of many risk factors in rural life for exposing people to parasitic agents, unfortunately, there is limited updated data about current situation of human parasitic infections in rural areas in Iran. Therefore, the aim of this study was to assess the prevalence of intestinal protozoan parasites among rural residents of Mazandaran Province, northern Iran that has been an endemic area for such infections. We also aimed to examine the overall influences of some demographic factors on the prevalence of these parasitic infections.

Materials and Methods

Sampling

Mazandaran is an area of 46,645 Km^2 with temperate climate, in north of Iran, at the vicin-

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ity of Alburz Mountain range and Caspian Sea. According to the census of 1996, 45.89% of the population in this province was as urban dwellers and 54.1% villagers (5). In this cross-sectional study, using random sampling, first 21 villages among the total list of Mazandaran Province were selected. Then in every village, 10 households were randomly selected, and from every which at least 4 people from all age groups were examined. Overall, 855 stool samples were collected, during 2004-2005. For every individual a questionnaire including demographic information was also filled.

After the collection of samples, they were transported to "the Department of Medical Parasitology and Mycology, School of Public Health, Tehran University of Medical Sciences", for examination and identification of parasites.

Stool examinations

Every specimen was collected in 10 % buffered formalin in a clean wide-mouthed plastic container and was subjected to concentration by a formalin-ether concentration technique. In addition, a modified version of the Ziehl-Neelsen technique was used for the staining of *Cryptos-*

poridium and other intestinal coccidian parasites (1). The statistical analysis of the data was performed using Chi-Square test.

Results

Eight species of parasites were found in the population studied; the overall prevalence was as 25%. Table 1 is correspondence with the prevalence of every protozoan species. The most prevalent parasite was *Giardia lamblia* (10.2%), followed by *Blastocystis hominis* (9.8%). No *Cryptosporidium* was found in any of 855 stool samples examined.

Distribution of infectivity with protozoan intestinal parasites in the population according to sex, age group, educational level and occupation are illustrated in Tables 2-5, respectively. Statistical analysis revealed that for none of these demographic factors there was significant difference in to the prevalence of infection with intestinal protozoan parasites. Therefore, no correlation was found between any of the groups studied and the overall infection rates.

Table 1: Prevalences of infectivity with different species of intestinal protozoan parasites in 855 people of rural areas of Mazandaran Province, northern Iran (2004-2005)

Protozoan species	No. infected	Prevalence (%)
Giardia lamblia	87	10.2
Entamoeba histolytica/dispar	10	1.2
Entamoeba coli	43	5
Iodamoeba butschlii	11	1.3
Endolimax nana	6	0.7
Dientamoeba fragilis	9	1.1
Entamoeba hartmani	3	0.4
Blastocystis hominis	84	9.8
Total infection*	214	25

* There were also some cases of coinfection with two or three species.

Table 2: Prevalences of infection with protozoan intestinal parasites in rural areas of Mazandaran Province, northern Iran according to the sex (2004-2005)

	Infection status					
Genus	**Infected**		**Non-infected**		**Total**	
	n	**%**	**n**	**%**	**n**	**%**
Male	98	25.5	286	74.5	384	100
Female	116	24.6	355	75.4	471	100
Total	214	25	641	75	855	100

$(\chi^2 = 0.05, p = 0.8)$

Table 3: Prevalences of infection with protozoan intestinal parasites in rural areas of Mazandaran Province, northern Iran according to the age groups (2004-2005)

	Infection status					
Age group (yr)	**Infected**		**Non-infected**		**Total**	
	n	**%**	**n**	**%**	**n**	**%**
0-9	34	27.6	89	72.4	123	100
10-19	62	25.5	181	74.5	243	100
20-29	26	19.1	110	80.9	136	100
30-39	36	27.7	94	72.3	130	100
40-49	24	20.2	95	79.8	119	100
≥50	32	30.8	72	69.2	104	100
Total	214	25	641	75	855	100

$(df = 5, \chi^2 = 6.83, p = 0.23)$

Table 4: Prevalences of infection with protozoan intestinal parasites in rural areas of Mazandaran Province, northern Iran according to the educational level (2004-2005)

	Infection status					
	Infected		**Non-infected**		**Total**	
Educational level	**n**	**%**	**n**	**%**	**n**	**%**
Illiterate	50	25.6	145	74.4	195	100
Elementary school	72	24.6	221	75.4	293	100
Secondary school	42	25	126	75	168	100
High school	22	23.7	71	76.3	93	100
Diploma	20	27	54	73	74	100
Higher than diploma	8	25	24	75	32	100
Total	214	25	641	75	855	100

$(df = 5, \chi^2 = 0.32, p = 0.99)$

Table 5: Prevalences of infection with protozoan intestinal parasites in rural areas of Mazandaran Province, northern Iran according to the occupation (2004-2005)

Occupation	Infection status					
	Infected		Non- infected		Total	
	n	%	n	%	n	%
Children ≤ 6 years	18	26.5	50	73.5	68	100
School students	60	27.8	156	72.2	216	100
Householder	70	26.7	192	73.3	262	100
Farmer and shepherd	34	23.9	108	76.1	142	100
Employed staff	4	14.8	23	85.2	27	100
Others	28	20	112	80	140	100
Total	214	25	641	75	855	100

$(df = 5, \chi^2 = 4.82, p = 0.44)$

Discussion

Intestinal parasites of humans are important health problems of most communities, especially those situated in tropical and subtropical areas. However, patterns of these infections in the population may be altered because of changes in human behavior and life styles during a time. Periodic studies on epidemiology and transmission dynamics of such infections will provide better understanding of the situation. In Iran, several studies have recently been conducted in different cities to reveal the prevalences of intestinal parasites. All these studies indicate that there is a sharp decline in the prevalences of human helminth infections (6-9) compared to those studies of previous three decades or before that (10). In this respect, one of those characteristic features is observed in Mazandaran Province, which had long been an endemic area for human hookworms with infection rates of more than 50 % in rural areas (10). However, recent studies show that those high prevalences have decreased to less than 1% (6, 8). In a study, carried out recently on helminth infections in rural areas of Mazandaran Province, the rate of infectivity with *Trichostrongylus* sp., *Strongyloides stercoralis*, *Hy-* *menolepis nana*, *Taenia*, *Trichuris trichura*, and hook worms was found to be 4.3%, 2.4%, 1%, 0.5%, 0.5% and 0.2%, respectively (8). The results of the current study, however, indicate that protozoan parasites have higher rates of infection and 25% of the people are infected with at least one species of intestinal protozoa. This contradiction is mainly due to the feasibility in transmission of protozoan parasites.

G. lamblia and *B. hominis* were the leading intestinal protozoan parasites. This finding is coincident with the results of some other studies in the country (2, 9).

The results of the current study are an indication of relative decrease in the prevalence of intestinal protozoan parasites compared to the previous decades. Nevertheless, the overall prevalence of infections is still high and people in both sexes and from different occupations and age groups are exposed to the infectious agents. The two main reasons for these findings are as follows:

In rural life of this province, most women are involved in agricultural activities as like as men.

The occupational variation in the study area is low, and most adults are householders and/or farmers.

In conclusion, screening and treatment of infected people as well as improving sanitation

and supplying treated water will lower the infection rates. Similar periodic studies in every endemic area will help health authorities on their decisions in strategy of control programs for intestinal parasites.

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