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Original Article

Prevalence of Intestinal Parasitic Infections among Individuals Referred to the Medical Centers of Coastal Cities, Guilan Province, Northern Iran, 2015-2017

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Abstract

Background: Intestinal parasitic infections (IPIs) are among the major public health problems, especially in developing countries. Northern Iran is highly endemic area for these infections. This study aimed to investigate the prevalence of IPIs among people referred to the medical centers of the coastal cities in Guilan Province, Northern Iran.

Methods: In this descriptive cross-sectional survey, 1232 stool samples were collected during 2015-2017. We used a structured questionnaire to obtain socio-demographic characteristics, and stool examination was performed using direct slide smear, formalin-ether concentration, trichrome and modified Ziehl-Neelsen staining techniques. The results were analyzed using SPSS and Chi-square test.

Results: The overall prevalence of IPs in our study was 17.8% (219/1232). The most common IP was *Blastocystis* sp. 154/1232 (12.59%), followed by *Giardia lamblia* 50/1232 (4.1%) and *Entamoeba hartmani* 45/1232 (3.7%). Out of the 219 positive patients, 82 (55.14%) and 137 (44.85%) were female and males, respectively. Regarding the socio-demographic variables, educational status (P=0.226), contact with domestic animals and soil (P=0.476), age years (P=0.78), Occupation (0.637) and Gender (P=0.417) were not significantly associated to IPIs.

Conclusion: In the past, parasitic infections were more prevalent in different parts of Iran. However, today it has declined indicating a significant improvement in level of individual hygiene, and environmental standards.

Keywords: Frequency; Intestinal parasitic infections; Coastal cities; Iran

Introduction

Intestinal parasite infections (IPIs) are still global health problems, especially in tropical and subtropical areas. These infections cause various gastrointestinal disorders, including diarrhea, dysentery, flatulence, abdominal pain, gripes, constipation, etc. They may cause severe or fatal damages

in humans and may occasionally migrate to other parts of the body such as cerebral amebiasis caused by *E. histolytica*, or appendicitis by *Ascaris lumbricoides* (1). Despite the global efforts to reduce parasitic infections, the prevalence of IPIs has not reduced significantly. Scientific developments and endeavors in drug production and invention of new preventive methods have resulted in a relative decline in morbidity and mortality rates of these infections. However, the negative impact of these parasites is obvious in both developed and developing countries (2, 3). In 2001, approximately 19% of the total 56.554 million deaths occurred in the world was resulted from infectious or parasitic diseases. Poverty, poor sanitation, malnutrition, illiteracy and overpopulation are main risk factors for IPIs. In poor communities, IPIs play a significant role in economic losses and increase of mortality rate (4).

Several prevalence studies on IPIs in the past decades were performed in different regions of Iran (5-9), however, there is no recent comprehensive study on the prevalence of these parasites in northern part of Iran (3). In addition, studies regarding the prevalence of IPIs in Guilan Province is rare. This study can help researchers and planners of the Iranian Ministry of Health and Medical Education to determine the status of parasitic infections and to take steps toward the control and prevention of intestinal parasitic diseases in this province.

Material and Methods

Study area and Population

Guilan Province is located in northern part of Iran (37.28° N, 49.59° E), with an area of 14,711 km^2. It is bounded in the north by Caspian Sea and the Republic of Azerbaijan; in the west by Ardabil province; in the south by Zanjan and Qazvin provinces and in the east by Mazandaran Province. Its climate is known as mild Caspian climate. Guilan has a high precipitation rate and moist air masses from the Mediterranean Sea towards the Caspian Sea cause abundant rainfall.

Sampling

The included participants were the patients with gastrointestinal symptoms referred to medical laboratories from Apr 2016 to May 2017. All participants had one or more gastrointestinal symptoms such as diarrhea, dysentery, abdominal pain, gripes and flatulence. The stool samples were collected and physically examined. Participants given anti-parasitic drugs within the last two weeks were excluded from the study. The study population were from the cities Langroud, Rudsar, Anzali, Astara and Talesh. The sample size was estimated as 1109 concerning the prevalence of parasitic infections in the region (3). To increase the accuracy of the study, 1232 participants were enrolled in the study.

All parts of this study were approved by the Ethics Committee of the Shahid Beheshti University of Medical Science (SBMU), Iran. All the study participants were informed about the study and an informed consent was filled by each individual prior to the sample collection.

Parasitological examination

The diarrheal fecal samples were sent directly to the local laboratory for parasitological examination while formed stool samples were preserved in 10% formalin and transferred to Department of Parasitology and Mycology, School of Medicine, Shahid Beheshti University of Medical Sciences for further analysis. At first, all specimens were mainly examined macroscopically to determine the presence of adult worms, or segment, blood, mucosa, etc. Then stool specimens were examined microscopically using direct slide smear (saline wet mount and Lugol staining), formaldehyde–diethyl ether concentration method, modified Ziehl-Neelsen technique for the detection of *Cryptosporidium* spp., Trichrome staining method for determination of the amoeba parasites. All the slides were observed using 10X, 40X and the stained slides with 100X objectives. The morphological size assessment was used to differentiate between *Entamoeba histolytica/dispar* (10-15 μm) and *Entamoeba hartmani* (6-8 μm) (10).

Data analysis

Data were analyzed using SPSS software ver. 16.0 (Chicago, IL, USA). Pearson-chi square tests and Fisher's exact tests were used to determine the association between IPIs and socio-demographic variables. Statistical values were considered statistically significant when $P<0.05$.

Results

17.7% (219/1232) of the participants were infected with one or more intestinal parasite species. Among these, 133 (10.8%), 57 (4.6%) and 29 (2.3%) were infected with one, two and three or more intestinal parasites. The most prevalent protozoan parasites were *Blastocystis* sp. (154 cases, 12.5%), *Giardia lamblia* (50 cases, 4.1%), *Entamoeba hartmani* (45 cases, 3.5%), and *Entamoeba coli* (29 cases, 2.4%). Prevalence of intestinal helminths was lower than intestinal protozoa. *Dicrocoelium dendriticum* (6 cases, 0.5%) was most prevalent helminthic infection. The prevalence of other IPs is presented in Table 1.

Table 1: Prevalence of intestinal parasites and poly-parasitism among referred patient to the medical centers of coastal cities, Guilan Province, Northern Iran, 2015-2017

Infection	Number Of mono-parasite	Percent (%)	Number Of multi-parasites	Percent (%)	Total number of parasites	Percent (%)
Blastocystishominis	93	(11)	61	(15.8)	154	(12.5)
Giardia lamblia	36	(4.3)	14	(3.6)	50	(4.1)
Entamoeba coli	20	(2.4)	9	(2.3)	29	(2.4)
Entamoeba histolytica/diapar	7	(8)	7	(1.8)	14	(1.1)
Iodamoeba butschilli	15	(1.8)	7	(1.8)	22	(1.8)
Endolimax nana	1	(0.1)	0	(0)	1	(0.1)
Entamoeba hartmani	31	(3.7)	14	(3.6)	45	(3.7)
Cryptosporidium spp.	3	(0.3)	2	(0.2)	5	(0.5)
Strongyloides stercoralis	4	(0.5)	1	(0.3)	5	(0.4)
Enterobius vermicularis	2	(0.2)	3	(0.6)	5	(0.4)
Trichostrongylu ssp	3	(0.4)	2	(0.5)	5	(0.4)
Dicrocoelium dendriticum	5	(0.6)	1	(0.3)	6	(0.5)
Hymenolepis nana	2	(0.2)	2	(0.5)	4	(0.3)

Regarding the risk factors, prevalences of IPIs in females (82/304 cases; 26.9%) were slightly higher than males (137/709 cases; 19.3%). Although this variable (gender) was significant in univariate analysis ($P=0.03$), it was not statistically significant in multivariate analysis ($P=0.47$). Other variables were not statistically significant in both univariate and multivariate analysis. Table 2 showed multivariate analysis of selected socio-economic variable. Prevalence of IPIs regarding the different cities are presented in Table 3.

Table 2: Frequency of the IPIs whit all variables among referred patient to the medical centers of coastal cities, Guilan Province, Northern Iran, 2015-2017

variables	*positive n(%)*	*Negative n(%)*	*OR*	*CI*		*P-value*
				Lower	*upper*	
Gender						0.417
Male	137(16/2)	709(83/8)	0.820	0.508	1.324	
Female	82(21.2)	304(78.8)				
Age(yr)						0.78
<6	3(17.7)	14(82.4)	0.704	0.177	2.80	
6-12	11(13.6)	70(86.4)	0.516	0.216	1.236	
12-18	19(16.2)	98(83.8)	0.637	0.294	1.382	
18-30	62(17.7)	288(82.3)	0.707	0.366	1.366	
30-60	110(18.1)	497(81.9)	0.727	0.386	1.369	
>60	14(23.3)	46(76.7)	0.304			
Educational Status						0.226
illiterate	16(22.2)	56(77.8)	1.550	0.717	3.353	
Primary school	8(11.9)	59(88.1)	0.423	0.122	1.461	
guidance and Secondary school	37(14.7)	215(85.3)		0.436	1.497	
diploma	75(20.7)	287(79.3)		0.860	1.899	
License or higher	83(17.3)	396(82.7)				
Occupation						0.637
Govt employer	50(17.8)	231(82.2)	1.113	0.714	1.733	
student	42(15.8)	225(84.2)	1.167	0.628	2.169	
House wife	42(22.6)	144(77.4)	1.422	0.736	2.748	
other	85(17)	414(83)				
Contact with domestic animal						0.476
yes	54(17)	264(83)	0.868	0.587	1.283	
No	165(18.1)	749(81.9)				
Washed vegetable						0.196
yes	205(17.6)	958(77.6)	0.612	0.290	1.289	
no	14(20.3)	55(79.7)				

Table 3: Prevalence of intestinal parasitic infections among Individuals referred to the Medical Centers of coastal cities, Guilan Province, Iran, 2015-2017

Coastal cities	*Positive*		*Negative*		*Total percent*	
	Number	*Percent (%)*	*Number*	*Percent (%)*	*Number*	*Percent (%)*
Astara	34	21.1	127	78.9	161	100
Anzali	37	23.3	122	76.7	159	100
Roudsar	40	15.9	212	84.1	252	100
Langroud	58	17.8	268	82.2	326	100
Talesh	50	15.0	284	85	334	100
Total	219	17.8	1013	82.2	1232	100

Discussion

Intestinal parasites are the main causes of gastrointestinal symptoms. Millions of people from all the world are infected by these parasites. These infections are associated with a wide range of symptoms. Factors such as overpopulation, suitable weather, poor health facilities, economic poverty and special conditions such as war can spread these diseases. The main objective of our study was investigate the prevalence and risk factors associated of IPs in patients with gastrointestinal symptoms in Guilan Province.

17.7% individuals were infected with IPs. At national level, prevalence rate of IPIs reported in our study (17.7%), is lower than those were re-

cently reported from Tenekabon (27.1%), Jiroft (28%), Nahavand (32.2%) and Zahedan (5, 8, 11, 12), although this rate was more than those reported from Karaj (10%) (13). The higher prevalence of IPs in Guilan Province, compared with Karaj, can be attributed to the low levels of health and educational qualifications, lifestyle, development of agriculture and animal husbandry and consequently more contact with infected animals' stools, contaminated soil and water and it may be even attributed to the different research methodologies used in two studies. At global level, prevalence rate reported here is lower than those reported from Ethiopia (35.5%), India (49.3%) and Palestine (32%), and higher than those reported from Slovakia (2.6%) and Saudi Arabia (4.7%) (3, 4, 14-16). The different prevalence rate in different areas could result from several variables such as different climatic conditions, hygiene status, outdoor activities and water supply (8).

The most common parasite in our study was *Blastocystis* and this finding is in line with previous studies in Iran and other parts of the world (8, 17). The morbidity and pathogenicity of *Blastocystis* spp. have been increased; thus, it must be reported as a pathogenic IP in humans (18). Moreover, infection with *Blastocystis* spp. is significant risk factor to development of irritable bowel syndrome (18). Furthermore, the results of present study demonstrated that in Guilan Province protozoan infections were more prevalent compared to helminths infections. This result is also in agreement with recent studies in Iran, as their results showed a considerable decrease in the occurrence of helminthic infections in close past years in Iran. This decline is resulted from significant progresses in sanitation in Iran in last three decades (19). Due to the improvement of health conditions and activities conducted by the health system, the prevalence of intestinal helminths infection such as *Ascaris*, *Trichocephal*, hookworms, and *Strongyloides* has decreased in urban and rural areas. However, water and food play an important role in the transmission of protozoan infections, especially *G. lamblia*, *blastocystis* and this parasites are transmitted through the fecal-oral rout; thus, health centers, doctors, infectious disease specialists and diagnostic and research centers should pay more attention to these cases, as well.

Considering risk factors, our finding revealed more prevalence of IPIs in females, people with low grade of literacy, older people, and housewife, although none of these variables were statistically significant in both univariate and multivariate analyses. We have found significant *P*-value only for gender (higher prevalence in females) in univariate analysis. Although previous study in Iran and around the world described several risk factors for high occurrence of IPIs, including; poor personal hygiene and inadequate handwashing, unsafe water supply, increase in age, poor sanitation, poverty, low level of education, contact with livestock, close contact with soil and eating raw vegetables (8, 20-23). A possible explanation for non-significant results for such variables in our study could be this fact that the majority of participants in present study were from urban area, therefore they have similar socio-demographic features.

Conclusion

In societies where the issues such as limited access to food, lack of adequate nutritional knowledge, and ignoring family criteria are exist, prevention and control of parasitic diseases should be considered as a healthcare measure. Indeed, in such circumstance, the subject matters like hard work and strive to secure for basic needful could be regard seriously. Undoubtedly, the accurate statistics on the status of infection in different parts of the country can directly effect on improvement of these principles and many other socially standards.

Ethical considerations

Ethical issues (Including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission, redundancy, etc.) have been completely observed by the authors.

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Conflicts of interest

The authors declare no potential conflicts of interest to the research, authorship, and/or publication of this article.

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