



Enteric Protozoan Parasites in Rural Areas of Bandar-Abbas, Southern Iran: Comparison of Past and Present Situation

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Abstract

Background: The main goal was to address the prevalence of enteric protozoan parasites in rural areas of Bandar-Abbas, southern Iran and to compare the results with the only conducted study in 1978.

Methods: This descriptive study was performed from 2009 through 2010 on the 565 fecal samples. Formalin-ether concentration technique was performed and the analysis was carried out using Chi-square test in SPSS software version 13.5. Finally, the comparison of our results with the only previous study which was accomplished by Sheiban and Rezaeian in 1978 was done.

Results: The overall prevalence of the protozoan parasites was 48.8%. However, the prevalence of pathogen parasites was 23%. Previous research in 1978 showed 80.4% infectivity. The most protozoan parasites were *Blas-tocystis hominis* (25.53%), *Giardia lamblia* (17.2%) and *Entamoeba coli* (15.95%). Previous study in 1978 found *Entamoeba coli* as the most common protozoa. Our finding revealed that the rate of single infectivity was much higher compared to previous research. The most frequency of infection was in children.

Conclusion: The remarkable decrease of protozoan parasites is mainly due to progress in health care in the villages; however more effort should be done with the goal of eradicating infectious agents.

Keywords: Enteric protozoan parasites, Prevalence, Iran

Introduction

Water- food borne gastrointestinal infections are considered as a major public health burden worldwide (1, 2). Intestinal protozoan parasites are a major group leading to gastrointestinal infections especially in tropical and sub-tropical areas (3). There are about 3.5 billion infected people by protozoa and/or helminthes in the world (4) as well as 58 million children suffer from these infections every year (5). Symptoms associated with enteric protozoa include non specific symptoms such as diarrhea, abdominal pain, nausea, vomiting, lack of appetite, weight loss and abdominal distension (5, 6). These infections can be life-threatening in immunocompromised patients and malnourished individuals (5). Although some intestinal parasites such as *Giardia lamblia* remain as a health problem in developed and developing

countries (7) but in the most industrialized countries, there is a decrease in the frequency of parasites by improving health status and standardized control programs (8). Indeed, poor hygienic conditions in developing countries account for the most parasitic infections (8). Climate, poor socioeconomic statuses, life style of inhabitants and human behavior are among the other important factors, which can affect the incidence of parasitic infections in these regions (8-10).

Most prevalent locations for occurrence of intestinal parasitic infections are the tropical and sub-tropical areas including rural zones of southern part of Iran (10-12). Main reasons are socio-economic status, geographic factors (6, 13), poverty, lack of sanitation, lack of healthy toilet training, inadequate personal hygiene and lack of water filtration. A previous national research in Iran (2005) revealed that the preva-

lence of intestinal parasitic infections was estimated 19.3% that 10.9% of them were *Giardia lamblia* and 1.0% was *Entamoeba histolytica* (8). Some recent studies in rural and semirural settings of western, northwestern and north-eastern of Iran in 2006 (14) and in south of Iran in 2004-2006 (12) showed the most common intestinal protozoa were *E. coli* and *G. lamblia*. Other study in 2004 regarding *E. histolytica* cyst passers in several parts of Iran confirmed the highest rate was seen in southern Iran (10). The only research regarding enteric protozoan parasites in villages of Bandar-Abbas was conducted by Sheiban and Rezaeian in 1978 who found 80.4% infectivity with intestinal parasites in inhabitants of rural areas of Bandar-Abbas (11).

The main goal of the present study was to address the prevalence of enteric protozoan parasites in rural areas of Bandar-Abbas, Iran and to compare the results with the only conducted study, held in 1978.

Materials and Methods

This descriptive study was performed from 2009 through 2010 on the 565 fecal samples. Stool samples were collected in clean cups from inhabitants of four rural areas of Bandar-Abbas including Takht, Goduo, Gishan and Chahestan (Fig. 1). For all participants, the questionnaires were filled which included age, gender, medical history and clinical manifestation (such as diarrhea, abdominal pain, fever, vomiting). Initially, stool samples of each person were checked macroscopically and in the case of diarrhea direct examination was performed in order to detect any motile protozoa. In the next step, 10% formalin was added to the samples as preservative and all samples were carried to Parasitology Laboratory, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran. Formalin-ether concentration technique was performed according to Garcia protocol (15). The smears were monitored by staining with Lugol's iodine solution for detection of protozoan parasites (15). Samples found positive for protozoan parasites based on their distinctive morphology. The analysis was carried out using

Chi-square test in SPSS software version 13.5, with a probability (*P*) value of <0.05. Finally, the comparison of our results with the only previous study which was accomplished by Sheiban and Rezaeian in 1978 was done (11).

Results

This study was performed in four villages of Bandar-abbas: Takht, Goduo, Gishan and Chahestan. The samples were collected randomly from 565 inhabitants of the mentioned villages, 72 cases (12.7%) had clinical manifestations such as fever, dyspepsia, abdominal pain, diarrhea and vomiting that 38(52.7%) of these cases were infected with protozoan parasites. From 493 people who were without any clinical manifestations, there were 240 (48.7%) infected cases. Out of the 565 samples, 240 were from female and 325 were from male. Of these, 102 female (42.5%) and 174 male (53.5%) were infected with at least one protozoan parasite. Prevalence of *G. lamblia* was 21% in men and 11.6% in women. In addition, 5.5% of men and 6.2% of women had *E. histolytica/dispar*.

The age range of people included in this study was 1-68 yr and the most frequency of infections was in the range of 11-15 yr (41.3%). Of note, the most common infections in this range were *Blastocystis hominis*. The frequencies of the protozoan parasites in different range of ages in 2009 were shown in Table 1. The rate of single and multiple infections was 55.9% and 44.1%, respectively.

The overall prevalence of the protozoan parasites was calculated as 48.8%. The protozoan parasites were *B. hominis* (25.53%), *G. lamblia* (17.2%), and *E. coli* (15.95%). Overall, 110 infected cases (39.9%) in Takht, 42 infected cases (15.2%) in Goduo, 49 infected cases (17.8%) in Gishan and 75 infected cases (27.2%) in Chahestan were detected.

Table 1: Prevalence of intestinal protozoan parasites in different age groups in four villages of Bandar Abbas in 1978 and 2009

Range of age (year)	<i>E. histolytica/dispar</i> (%)		<i>G. lamblia</i> (%)		<i>E. coli</i> (%)		<i>Blastocystis</i> (%)		<i>I. butschlii</i> (%)		<i>C. mesnili</i> (%)	
	1978	2009	1978	2009	1978	2009	1978	2009	1978	2009	1978	2009
0-5	26.5	0	48.9	21.4	44.8	7.1	NR*	28.6	2	0	0	0
6-10	28.2	4.5	28.2	34.1	55.7	20.5	NR*	22.7	10.3	0	7.1	4.5
11-15	28.1	9.8	27.6	13.1	57.7	29.5	NR*	35	9.7	3.3	13.5	1.6
16-20	39.5	0	25.5	0	60.4	5.6	NR*	22.2	25.5	0	4.6	0
21-40	42.5	6.2	30.3	15.4	61.9	0	NR*	18.5	12.9	0	9.6	0
≥41	57	5.3	17.5	5.3	75.1	5.3	NR*	5.3	13.5	5.3	19.6	5.3
Total	34.6	5.8	28.6	17.2	59.5	15.9	NR*	24.6	11.3	1.6	9.5	2.1

Not Reported

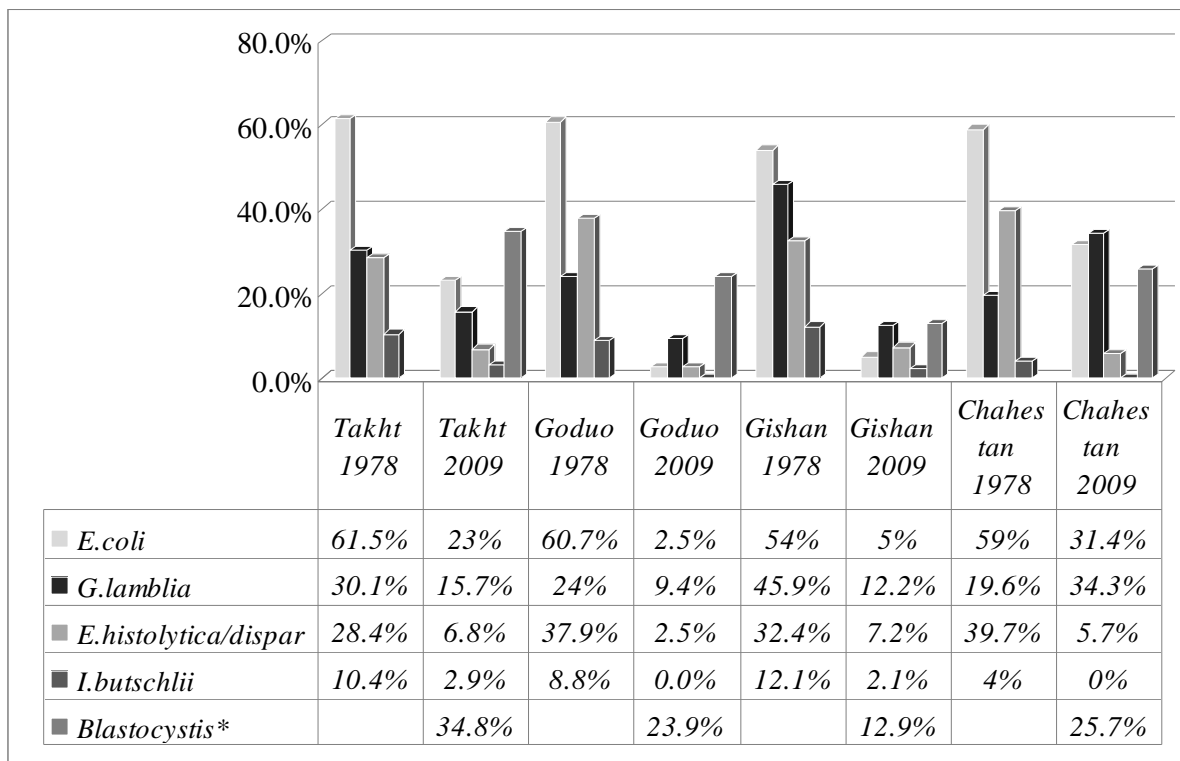
Endolimax nana and *Trichomonas hominis* have not detected in the present study

Table 2: Comparison of single and multiple intestinal protozoan infections in four villages of Bandar-Abbas in 1978 and 2009

Locality	Total	Infection (%)				
		Single		Multiple		
	2009	1978	2009	1978	2009	1978
Takht	39.8	78.2	51.8	32.6	48.2	67.4
Goduo	15.2	81.0	73.8	20.3	26.2	79.7
Gishan	17.8	87.8	59.2	50.8	40.8	49.2
Chahestan	27.2	79.1	50	37.0	50	63.0
Total	48.8	80.4	55.9	35.1	44.1	64.9



Fig. 1: The map of Bandar-abbas and the villages



* *Blastocystis*: Not reported in 1978

Fig. 2: Comparison of intestinal protozoan prevalence in four villages of Bandar-Abbas in 1978 and 2009

Discussion

In the present study 48.8% of people from rural areas of Bandar-Abbas were infected with at least one enteric protozoan parasite. As we expected, there was a clear decrease in the frequency of the intestinal protozoa in these regions compared to the previous research by Sheiban and Rezaeian, who found 80.4% infectivity with protozoan parasites (11). It is worth mentioning that although prevalence has decreased compared to past, 48.8% prevalence reflects a high frequency of parasites in the region indicating a clear need for more sanitary facilities. Of course the frequency of pathogen genera was about 23%. It is interesting that the present study showed a change in the pattern of the protozoan genera compared to the previous study (11). In the previous study the most common protozoa was *E. coli* (59.5%), *E. histolytica/dispar* (34.6%) and *G. lamblia* (28.6%) (11). Our study confirmed that the most prevalent protozoan was *B. hominis* compared to 1978 when *E. coli* was detected as the most

common protozoan parasite (11). It should be noted that *B. hominis* was not reported in 1978 and therefore there is a possibility that this protozoa was also common at that time (Table 1). Besides, the prevalence of all kind of parasites has decreased significantly, for example, prevalence of *E. histolytica/dispar* in Takht changed from 28.4% (11) to 6.38%. Also, in the previous study, there was a high frequency of *E. histolytica/dispar* in Chahestan and *G. lamblia* had the highest frequency in Gishan, but in our study *B. hominis* had the highest frequency in all villages followed by *G. lamblia* and *E. coli* respectively. The prevalence of different protozoan parasites in 1978 and 2009 are shown in Fig. 2.

In previous study, the percentage of single and multiple infections was 32.85% and 63.14%, respectively (11). The difference of percentage of single and multiple infections in 1978 and 2009 was shown in Table 2.

In our study, there was a significant difference between gender and prevalence of disease ($P=$

0.00). This finding was similar to the previous study of (11).

Although the results of our study showed *B. hominis* and *G. lamblia* as the most common parasites, but *E.coli* also had a high frequency in these regions which followed results of other studies in the other parts of country (12, 14, 16). This is important to note that human behavior, customs and life style of the inhabitants can directly affect the infectious agents of these regions (17). One important explanation regarding the obvious decrease between our result and previous findings in 1978 is the recent progresses in socioeconomic statuses in these regions. Three decades ago, the inhabitants of rural area in Bandar-Abbes used to be nomadic without adequate services. Simple transmission rout (oral- fecal) of enteric protozoan parasites coupled with usage of unfiltered water (9) as well as low literacy of inhabitants were all responsible for the high rate of infections in the past 30 yr (11). The findings of Hooshyar et al. suggested that the cyst viability is longer in the tropical zones (10).

There are several studies regarding prevalence of intestinal parasites in different regions of Iran which all revealed that *G. lamblia* is one of the most common parasites (8, 11, 12, 14, 18). However, there was only one study in rural area of Bandar Abbas (11). A previous study in north of Iran showed prevalence of parasites in apparently healthy people was as follows: *Trichostrongylus* sp. 6.4%, *G. lamblia* 3.8%, *Cryptosporidium* sp. 2.5%, *E. coli* 2.5%, *E. histolytica* 1.2% (18). In another study that has been done on 3825 stool specimen from north, south and centre of Iran, *E. histolytica* was detected in only 1.52% of collected stool samples in microscopically examination which 3.45% of them was *E. histolytica* by PCR (19). Although in previous studies *E. histolytica* was one of important and common parasites (8, 14, 15), but according to the present studies we can conclude *E. histolytica/dispar* has a less important role in protozoan intestinal disease (6, 12-14).

In conclusion, in the past 30 yr, there have been no studies in villages of Bandar Abbas and therefore the present study has been the

second one in the region. Epidemiological research conducted regularly is necessary for control and preventive strategy programs. Although the present study showed, a decrease in total prevalence of enteric protozoan parasites but 48.8% prevalence and 23% prevalence of pathogen parasites is still high and there is a clear need for more progress. Inhabitants are in need of more guidance regarding personal and social sanitary precautions. The remarkable decrease of protozoan parasites is mainly due to progress in health care in the villages; however more effort should be done with the goal of eradicating infectious agents.

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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