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Original Article

Prevalence of Intestinal Parasites in Bakery Workers in Khorramabad, Lorestan Iran

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ABSTRACT

Background: Food contamination may occur through production, processing, distribution and preparation. In Iran especially in Khorramabad, 33° 29' 16" North, 48° 21' 21" East, due to kind of nutrition, culture and economic status of people, bread is a part of the main meal and the consumption of bread is high. In this study, the bakery workers were studied for determining of intestinal parasites prevalence.
Methods: The study was carried out during September to November 2010 in Khorramabad. All the 278 bakeries and the bakery workers including 816 people were studied in a census method and their feces were examined for the presence of parasites by direct wet-mount, Lugol's iodine solution, and formaldehyde-ether sedimentation, trichrome staining, and single round PCR (For discrimination of *Entamoeba* spp*)*.
Results: Ninety-six (11.9%) stool specimens were positive for different intestinal parasites. Intestinal parasites included *Giardia lamblia* 3.7%, *Entamoeba coli* 5.5%, *Blastocystis* sp. 2.1%, *Entamoeba dispar* 0.4%, *Hymenolepis nana* 0.1%, and *Blastocystis* sp. 0.1%.
Conclusion: In order to reduce the contamination in these persons, some cases such as stool exam every three months with concentration methods, supervision and application of accurate health rules by health experts, training in transmission of parasites are recommended.

Keywords: Bakery workers, Intestinal parasite, Iran

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Introduction

There is almost no point of the world which is not afflicted with some types of parasitical diseases. Some 3.5 billion people are affected and 450 million become ill as a result of intestinal parasitic infections (1).

Intestinal parasites adhere to fingers, fruits, vegetables, instruments, door handles and money (2). Also, they can contaminate fingernails (3, 4) and be transmitted through flies (5).

From 1998 to 2002, an average of 1329 food borne disease outbreaks were reported to the Center for Disease Control and Prevention (CDC) each year. Approximately 52% of these were attributed to food service establishments (6, 7).

Food contamination may occur through production, processing, distribution and preparation (8, 9). The high incidence of food borne diseases causes global concern about food safety.

At present, parasitic diseases are among the hygiene problems in our society. With regard to social, economic, and geographical conditions of Iran and population changes, this country is an appropriate place for growth and reproduction of all kinds of parasites (10). The reason for the incidence of parasites in some parts of the country is the special climate of the region, local customs, and use of human and animal fertilizers in agriculture (11). Considering the statistics of those afflicted with parasitical diseases and mortalities resulting from those, the importance of their eradication and control becomes evident. This is possible by identifying and studying geographical distribution as well as ratio of contamination and effects of different cultural, social, and geographical factors.

In Iran especially in Khorramabad, due to kind of nutrition, culture and economic status of people, bread is a part of the main meal and the consumption of bread is high. Thus considering the hygiene and health of bread is a great significance.

Thus, it is important to assess the occurrence of bakery workers in this region in order to find a useful guidance to control contamination with intestinal parasites.

That is why, in 2001 the prevalence of intestinal parasites among the bakery workers in Khorramabad bakeries', was studied (12). Because of the importance of subject and the high consumption of bread in this city, in 2010 again all of the bakery workers were studied for determining of changes of the intestinal parasites prevalence.

Materials and Methods

The study was carried out from September to November 2010 in Khorramabad, west of Iran at an altitude of 1147.8 m above sea level and between valleys of Zagros Mountains.

This descriptive study aimed at determining the prevalence of intestinal parasites of bakery workers. The studied population was all the workers of bakeries. Total numbers of bakeries' were 297 and bakery workers who all of them were masculine, were 816. To select the sample, a census method was used so that the feces of all the mentioned staff were taken. A questionnaire was used for collecting information on age, educational level, presence of health cards and awareness of transmission of intestinal parasitic diseases of each bakery workers. Completion of the questionnaires and collecting the samples were performed by the persons who had been trained for this purpose. Stool samples were collected from each subject in a labeled clean stool cup and

transported to the parasitological laboratory within two hours of collection. The different parasitological tests were used for detecting parasites. These were direct wet-mount, Lugol's iodine solution, formaldehyde-ether sedimentation (13), and trichrome staining techniques.

Single round PCR was carried out for distinguishing between *Entamoeba histolytica*, *E. dispar* and *E. moshkovskii*. The sequence of the forward primer used was conserved in all three *Entamoeba* spp., but the reverse primers were specific for apiece. The expected PCR products from *E. histolytica*, *E. dispar* and *E. moshkovskii* were 166 bp, 752 bp, and 580 bp, respectively (14, 15).

The chi-square test was used for evaluation of the relationship between intestinal parasites frequency and qualitative variables. The differences were considered to be statistically significant when the *P*-value obtained was less than 0.05.

Results

A total of 816 bakery workers were screened. Their mean age was 32.63 yr, ranging from 13-80 years. In terms of education 42.4% were illiterate or primary school education, 29% had secondary or high school education, 28.6% diplomas and higher.

The frequency of intestinal parasites among bakery workers with illiterate or primary school education was 9.53 %, secondary or high school education was 13.08% and for diplomas and higher was 14.16 %.

Out of 716 (87.7%) the bakery workers who had health card, 84(11.73%) were contaminated with intestinal parasites and 100(12.3%) of the bakery workers with no health card, the prevalence of intestinal parasites was reported 13(13%).

Out of 630 (77.2%) the bakery workers who were aware of the ways of intestinal parasitic diseases transmission 78 (12.38%) were infected with intestinal parasites and 186(22.8%) had no knowledge in this regard, intestinal parasites prevalence was reported 19 (10.21%).

Totally, 96 (11.9%) of stool specimens were positive for different intestinal parasites. Mixed intestinal parasite infection was detected in 1 (0.1%). The most common intestinal pathogenic parasite and nonpathogenic parasite were *G. lamblia* 3.7% and *Entamoeba coli* 5.5%, respectively. The rate of contamination with intestinal worms was 0.1% and 11.8% for intestinal protozoa.

Three stool specimens' results were suspected with *E. histolytica/ E. dispar/ E. moshkovskii* that single round PCR showed every three samples were contaminated with *E. dispar* (Fig.1). The prevalence of intestinal pathogenic parasites and nonpathogenic parasites were 3.9% and 8%, respectively. Since the stool samples were not been cultured, prevalence of *Blastocystis* sp. (2.1%) was reported low. The frequency of the intestinal parasites is reported in Table 1.

Table1: Prevalence of intestinal parasites among bakery workers in Khorramabad, in 2010 and 2001

Test results	2010		2001	
	Frequency	Percentage	Frequency	Percentage
Negative	719	88.1	810	86.83
Entamoeba coli	45	5.5	27	2.89
Giardia lamblia	30	3.7	66	7.1
Blastocystis sp.	17	2.1	3	0.32
Entamoeba dispar	3	0.4	0	0
Hymenolepis nana	1	0.1	2	0.21
Giardia lamblia & Blastocystis sp.	1	0.1	0	0
Iodamoeba butschelii	0	0	16	1.71
Taenia saginata	0	0	1	0.1
Giardia lamblia & Entamoeba coli	0	0	4	0.43
Giardia lamblia & Taenia saginata	0	0	1	0.1
Taenia saginata & Entamoeba coli	0	0	1	0.1
Giardia lamblia & Iodamoeba butschelii	0	0	2	0.21
Total	816	100	933	100

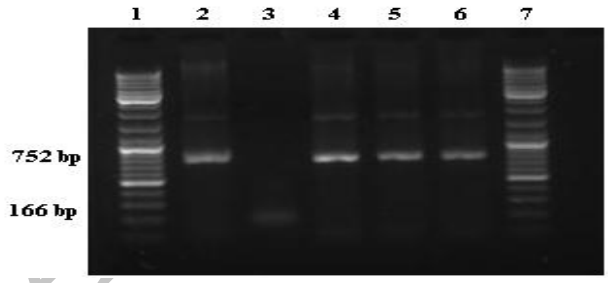

Fig. 1: 1.5% Agarose gel electrophoresis of PCR amplification for detection and differentiation of *E.histolytica* and *E.dispar* by using single-round PCR;
Lane 1 and 7: 100bp DNA ladder marker;
Lane 2: *E.dispar* -positive isolate;
Lane 3: *E. histolytica* -positive isolate;
Lane4-6: *E.dispar* isolates.

Discussion

This study revealed that about 11.9% of bakery workers in the Khorramabad were carriers of one or more of intestinal parasites.

The most common intestinal pathogenic parasite and nonpathogenic parasite were *G. lamblia* 3.7% and *E. coli* 5.5%, respectively.

This result was similar to other studies carried out in Iran (16, 17). Different studies conducted in the field of intestinal parasitic diseases in different parts of the world showed that in spite of the relative improvement in health services, contamination with intestinal parasites is one of the health problems in most countries especially in the developing societies.

Intestinal parasites prevalence varies in different parts of Iran, for instance, 10.7% in Tehran (Capital of Iran) (18), 4.7% in Karaj (Central of Iran) (19), 20.4% in Urmia (Northwest of Iran) (10), and 25% in Mazandaran (North of Iran) (20).

In the present study, the rate of contamination with intestinal worms was 0.1% and with intestinal protozoa was 11.8% indicating an increase in some protozoa compared to intestinal worms. The reason for this increase is transmission and distribution of protozoa through cysts which are more direct and simpler than worms, each needing special conditions (21).

In this study, the rate of contamination with intestinal pathogenic parasites and nonpathogenic parasites was 3.9% and 8%, respectively. Contamination with nonpathogenic parasites is important because it results from health poverty and contact of the persons with contamination sources, and this contamination is regarded as one of the health indices, because in spite of these contaminations in persons, risk of affliction with pathogenic parasites is considered.

Among the pathogenic protozoa, *Giardia Lamblia* was the most common with a rate of 3.7%, and contamination with this parasite in Iran is relatively high and is variable depending on climatic conditions, nutritional status, and observance of personal and social hygienic principles (22). This parasite is usually found in food, water, soil, or contaminated surface with the feces and its mode of transmission is very important to prevent common intestinal parasitic infections. The ratio of contamination with *G. lamblia* may be higher, because *G. lamblia* did not appear in feces of all the contaminated persons (23). Single round PCR was shown that the three contaminated stool samples with *Entamoeba* spp. were *E. dispar* which is comparable with previous studies in Iran that reported the prevalence of *E. dispar* more than *E. histolytica* (15, 24, 25).

No statistically significant relationships were found between incidence of intestinal parasites and education, awareness of ways of parasitic infection transmission and holding health card through chi-square test.

Early study of intestinal parasites prevalence in bakery workers in Khorramabad (12) has reported that out of 933 bakery workers, 123(13.2%) were infected with one or more intestinal parasites. The rate of contamination with intestinal worms was 0.5% and contamination with intestinal protozoa was 12.7% and the most common parasite was *G. lamblia* with a rate of 7.9%, indicating an increase in some intestinal protozoa compared to intestinal worm and frequency of other intestinal parasites consisted of *Iodamoeba butschelii* (1.71%), *Blastocystis* sp. (0.32%), *E. coli* (2.89%), *H. nana* (0.21%), *Taenia saginata* (0.1%), *G. lamblia* and *E. coli* (0.43), *G. lamblia* and *T. saginata* (0.1%), *G. lamblia* and *I. butschelii* (0.21%), *T. saginata* and *E. coli* (0.1%) (12).

In the study in 2001, 11.1% of bakery workers were aware of the ways of intestinal parasitic diseases transmission and 88.9% had no knowledge in this regard (12). While in the current study, 77.2% of bakery workers were aware of the ways and 22.8% lacked awareness of the ways. With comparison of the prevalence of intestinal parasites of bakery workers for years of 2001 and 2010 showed that the prevalence of intestinal parasites in 2010 was decreased that awareness of the ways of intestinal parasitic diseases transmission can affect in this decrease.

Similar studies about the prevalence of intestinal parasites were carried out on food handlers that some results of them are the same and show the more intestinal protozoan especially *G. lamblia* parasite with comparison of intestinal worms (18, 26-28).

In some studies the rate of contamination with intestinal worms was reported much more than intestinal protozoan (29, 30). It seems that the prevalence of intestinal parasites for different regions is affected by society, culture, hygiene, kind of nutrition, climate status.

In order to reduce the contamination in these persons, some cases such as stool exam every three months with concentration methods, supervision and application of accurate health rules by health experts, training in personal and social health, and training in transmission of parasites are recommended. Also training hygiene through mass media can affect the improvement of hygiene of people and society.

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