Türkiye Parazitol Derg 2019;(43)1:16-20
DOI: 10.4274/tpd.galenos.2019.6278

Prevalence of Parasitic Intestinal Infections Among Food Handlers in Qazvin, İran

İran'ın Kazvin Şehrihdeki Yemekhane Personellerinde Parazitik Bağırsak Enfeksiyonlarının Prevelansı

Mojtaba Shahnazi[1,2], Mahboobeh Sadeghi[1,3], Mehrzad Saraei[1,2], Mahmood Alipour[4], Elham Hajialilo[1,5]

[1]Qazvin University of Medical Science Faculty of Medicine, Deparment of Medical Parasitology and Mycology, Qazvin, İran
[2]Qazvin University of Medical Science, Medical Microbiology Research Center, Qazvin, İran
[3]Qazvin University of Medical Science, Student Research Committee, Qazvin, İran
[4]Qazvin University of Medical Science, Department of Social Medicine, Qazvin, İran
[5]Qazvin University of Medical Sciences, Cellular and Molecular Research Center, Qazvin, Iran

Cite this article as: Shahnazi M, Sadeghi M, Saraei M, Alipour M, Hajialilo E. Prevalence of Parasitic Intestinal Infections Among Food Handlers in Qazvin, İran. Turkiye Parazitol Derg 2019;43(1):16-20.

ABSTRACT

Objective: Food handlers play an important role in the production and distribution of parasitic contaminations in these societies. The aim of this study was to assess the prevalence of intestinal parasitic infections among the food handlers in Qazvin, Iran.
Methods: Totally, 1530 stool samples were collected from food handlers in Qazvin, Iran. Direct feces examination and formalin-ethyl acetate concentration method followed by Trichrome staining were performed to detect the parasites.
Results: The prevalence of intestinal parasites was 82 (5.4%) among food handlers. The species of protozoan parasites found were *Blastocystis hominis, Giardia lamblia, Entamoeba coli*, and *Endolimax nana*. The outbreaks of *Blastocystis hominis* (2.9%), and *Endolimax nana* (0.3%) were the most and the least protozoan infections observed among the specimens, respectively. Also, there was no helminthic infection detected among the samples. The prevalence of intestinal parasites among the food handlers, based on variables including sex, age, job, and education, did not differ, whereas the prevalence of intestinal symptoms was shown to be higher in infected food handlers ($p<0.05$).
Conclusions: Despite a decrease in the incidence of intestinal parasites, the protozoan infections are still among the health concerns in these areas. Therefore, continuous monitoring and training of food handlers by local health authorities should be performed on a regular basis.
Keywords: Food handler, intestinal parasites, İran, stool samples, trichrome staining

ÖZ

Amaç: Bir toplumda parazit enfeksiyonlarının ortaya çıkması ve yayılmasında yemekhane personelleri önemli bir rol oynar. Bu çalışmada, İran'ın Kazvin şehrindeki yemekhane personellerinde, parazitik bağırsak enfeksiyonlarının prevalansı araştırılmıştır.
Yöntemler: İran'ın Kazvin şehrindeki yemekhane personellerinden toplam 1530 dışkı örneği toplanmıştır. Parazitleri tespit etmek için;doğrudan dışkı incelemesi ve formalin-etil asetat konsantrasyonu metodunu takiben Trichrome boyama yapılmıştır.
Bulgular: Örneklerin 82 tanesinde bağırsak paraziti tespit edilmiştir ve yemekhane personellerinde bağırsak paraziti prevalansı %5,4 olarak hesaplanmıştır. Tespit edilen protozoa parazitleri şunlardır: *Blastocystis hominis, Giardia lamblia, Entamoeba coli* ve *Endolimax nana*. Örneklerde en sık saptanan protozoa paraziti *Blastocystis hominis* (%2,9) iken, en az saptanan *Endolimax nana* (%0,3) olmuştur. Örneklerin hiçbirinde helmint enfeksiyonuna rastlanmamıştır. Yemekhane personellerinde bağırsak paraziti prevalansı; cinsiyet, yaş, meslek ve eğitim düzeyine göre değişmezken, intestinal semptomların prevalansı enfekte yemekhane personellerinde daha yüksek saptandı ($p<0,05$).
Sonuç: İntestinal parazitlerin insidansı azalsa da protozoa enfeksiyonları halen önemli bir sorun teşkil etmektedir. Bu yüzden, yemekhane çalışanlarının düzenli ve devamlı olarak bölgesel sağlık otoriteleri tarafından izlemi ve eğitilmesi gerekmektedir.
Anahtar Kelimeler: Yemekhane personeli, bağırsak parazitleri, İran, dışkı örneği, trichrome boyama

Received/Geliş Tarihi: 15.01.2019 **Accepted/Kabul Tarihi:** 24.02.2019

Address for Correspondence/Yazar Adresi: Elham Hajialilo MD, Qazvin University of Medical Science Faculty of Medicine, Deparment of Medical Parasitology and Mycology, Qazvin, İran
Phone/Tel: +98 2833334971 **E-mail/E-Posta:** e.hajialilo@qums.ac.ir **ORCID ID:** orcid.org/0000-0003-2159-4066

Türkiye PARAZİTOLOJİ Dergisi

INTRODUCTION

Parasitic infections are considered as one of the health problems, especially in developing countries. According to the World Health Organization (WHO) it is estimated that more than 2 billion people are infected with intestinal parasites, worldwide (1,2).

Among the protozoan parasites, *Giardia lamblia*, *Entamoeba histolytica*, and a number of helminthes such as hook worms (*Necator americanus* and *Ancylostoma duodenale*), *Ascaris lumbricoides*, and *Enterobius vermicularis* could contaminate food and water sources (3,4). Considering the climate, geographical location, culture characterizations and the use of human and animal fertilizers in farms, the developing countries are the most susceptible regions to parasitic infections (5-10).

The major rout of transmission to human by intestinal parasites is the fecal- oral pathway i.e. the parasite infection could be easily produced in human host through contaminated food and water supplies (11-14).

The most common symptoms of food poisoning including vomiting, gastroenteritis, and diarrhea occur by consumption of raw food and unsafe sources of foods (15) followed by contaminated finger, fingernail, money, fruits, and vegetables which could easily transmit the intestinal parasites to human (13).

Foodborne diseases are among the major concerns of public health system and therefore improving the safety of foods is a substantial obligation in different societies. Food handlers have a major role in the production, processing, and distribution of foods and are considered as the main agents for human infections. Moreover, the asymptomatic carries of infection can also be the source of contaminations among people (4,12,16).

Improper food handling and poor sanitation among food workers are of important risk factors for the occurrence of pathogenic infections by food handlers (11,17).

Considering the significant role of food handlers in transmitting widespread parasitic infections in a society, every effort to determine the parasitic contamination among the workers of food industry is extremely valuable, and this leads to establish better prevention and control programs to deal with such contaminations within the food chain production. Numerous studies have been performed regarding the prevalence of intestinal parasites among the food handlers, worldwide (12,16,18,19).

However, the number of research conducted in Iran is limited in this regard. In addition, there is no such study reported from Qazvin dealing with the parasitic infections among the local food handlers. Therefore, this study was designed to determine the prevalence of intestinal parasites among the food handlers in Qazvin, Iran.

METHODS

Study area and sample collection

This was a cross-sectional study performed from April to September 2016. Totally, 1530 stool samples were collected from the local food handlers including 1275 (83.3%) male and 255 (16.67%) female with an age range of 14-75 years (mean age 35±11 years), who were referred to either Shahid Bolandian health center or the laboratory at 22 Bahman hospital both in Qazvin province (36°15'N, 50°0'E) located in the northern margin of central Iran. Ethical approval of the study was obtained from the Medical Ethics Committee of Qazvin University of Medical Sciences (IR. QUMS. REG. 1396. 293).

Stool examination

A questionnaire was designed to contain the following information including the level of education, age, gender, occupation, residence, gastrointestinal symptoms (abdominal pain, diarrhea, weight loss and fever) and also the stool consistency of each individual. The research was approved by the Ethics Committee of Qazvin University of Medical Sciences.

Fecal samples were collected in clean stool containers, and then transferred to the parasitology laboratory at Qazvin Medical School. Direct wet mounts prepared with normal saline and lugol were used for microscopic observation of eggs, cysts, and trophozoites of parasites. Formalin-ethyl acetate concentration.

Formalin-ethyl acetate concentration method was performed for all specimens. Using an applicator, an approximate weight of 1 g of fresh feces was transferred into a clean 15 mL conical centrifuge tube containing formalin saline. The sample was immediately mixed and the suspension filtered into a new tube. Following discarding the entire debris, 3 mL ethyl acetate was added to the filtered specimen, mixed thoroughly, centrifuged at 2000 x g for 3 minutes, and the supernatant discarded. The pellet was placed on a glass slide, covered with a cover slip, and examined under a light microscope (× 400).

Trichrome staining

Trichrome staining was performed to confirm protozoa positive specimens. Before staining, a smear was prepared using horse serum to bind feces specimen to the slide. Finally, each slide was cleaned in xylene and mounted with Canada balsam. Microscopic examination was done at 1000x magnification (20).

Statistical analysis

Statistical analyses were performed by statistical tests including chi-square test and independent t-test using SPSS software version 18 (SPSS Inc., Chicago, IL, USA). A p-value of < 0.05 was considered as significant, statistically.

RESULTS

The Prevalence rate of intestinal parasites was 82 cases (5.4%) out of 1530 stool samples collected from the food handlers. All positive samples were found to be protozoan infections without any helminths contamination. The highest outbreaks of protozoan infections were related to *Blastocystis hominis* whereas *Endolimax nana* showed the lowest incidence (Figure 1). The prevalence rates of contamination in male and female specimens were 4.9% and 7.8%, respectively. There was no significant difference in the presence of infection among the two genders however; *Blastocystis hominis* was significantly higher in specimens taken from the female individuals. The incidence rates of parasite infections were found 3.5 times higher in females compared to males (Table1). According to the results of this study, the highest and lowest frequency of parasite contamination was seen in illiterates (12.3%) and people with associate's degree, (2.8%) respectively. Also, there was no significant difference in parasitic infections among different education groups. Food Production Company workers showed the highest level of infection (7.3%) while those working in dairy plant were found to be infection free (0%).

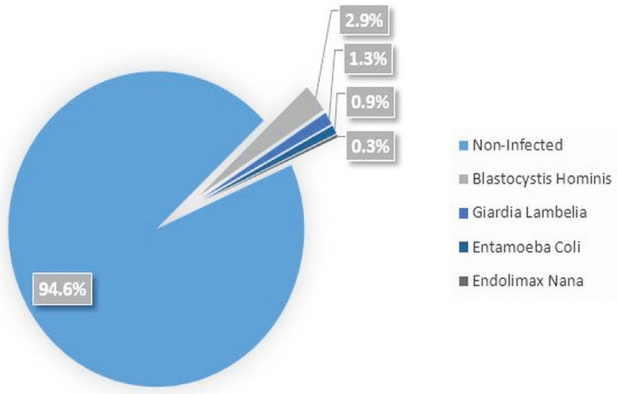

Figure 1. Frequency of food handler contamination with intestinal parasite in Qazvin, Iran from April to September 2016.

However, no significant correlation between the occupation and parasite infection among food handlers was established. The prevalence for abdominal pain was 90.2% which demonstrated the highest level compared to other symptoms. Meanwhile, it has to be emphasized that intestinal symptoms demonstrated a significant correlation with all study variables including gender, age, education, and job (p= 0.00) (Table1).

DISCUSSION

In the present study, the contamination rate of intestinal parasites among food handlers was 5.4% (82 cases) in which all positive samples was associated with protozoan infections, with no helminth infection. According to the results of our study, a lower incidence of infectivity was observed in these areas compared to the infectivity incidence rate (74%) reported from neighboring provinces with the same climate and geographical characteristics (21).

Variation in sample size may be to the reason for this difference found in two studies (22). However, low incidence rate of contamination among the food handlers in some parts of the country has been reported with 3% and 6% parasite infection in northwest and north of Iran, respectively (6, 23).

A decline in the incidence rate of infectivity may be due to the improvement of cultural conditions in different societies which could be attributed to the expansion of health care system, increased health awareness, education, and familiarity with antiparasitic drugs.

Despite low incidence rate of *Blastocystis hominis* infection in this study (2.9%), it was the most prevalent infection among those with positive specimens. Similar to our result, *Blastocystis* infection has been shown to have a low incidence rate in several studies (2, 24-25).

In contrast, high incidence rate for *Blastocystis* protozoan infection has also been reported in a number of studies (3,10,26).

Another protozoa infection after *Blastocystis hominis* was *Giardia lamblia,* a pathogenic protozoon with a low incidence rate of 1.3% among the food handler of the present study. Our findings are similar to some reports from Ethiopia, Nigeria, and Iran (2,19,23, 27)

Table 1. Socio-demographic features of food handler working in Qazvin, Iran from April to September 2016

Vaiable	Numbers (Percentage)	Number of infected (Percentage)	Odds ratio	P. valve
Male	(83.33) 1275	(4.9) 62	0.78-2.8	0.054
Female	(16.67) 255	(7.8) 20		0.000
<30	(35) 536	24 (4.5)		
30-39	556 (36.4)	(5.2) 29		
40-49	268 (17.5)	(6.7) 18		
50-59	129 (8.4)	6 (4.7)	1	0.529
>60	41 (2.7)	(12.2) 5		
Illiterate	57 (3.72)	7 (12.3)		
Primary School	556 (36.43)	(4.8) 27		
Diploma	615 (40.2)	(5.5) 34		
Associate's degree	141 (9.2)	4 (2.8)	1	0.115
Master	161 (10.5)	10 (6.2)		
Company of foods production	193 (12.6)	(7.3) 14		
Restaurant	271 (17.7)	15 (5.5)		
Confectionary	117 (7.6)	8 (6.8)		
Bakery	273 (17.8)	15 (5.5)		
Fast Foods Center	167 (10.9)	8 (4.8)		
Butcher shop	30 (2)	1 (3.3)	1	0.980
Dairy	51 (3.4)	0 (0)		
Super Market	(19) 290	17 (5.9)		
Kindergartens	(6.9) 105	3 (2.8)		
chicken shop	(2.1) 33	1 (3)		
Abdominal pain	(2.7) 41	37 (90.2)	30	
Diarrhea	10 (0.7)	10 (100)	21	
Weight Loss	2 (0.1)	2 (100)	19	
Fever	2 (0.1)	0 (0)	1	0.00
Feeds Symbols	1475 (96.4)	33 (2.2)	-	

Entamoeba coli with a frequency of 0.9% showed a trend similar to other studies (23,24) although in some investigations a high prevalence of this nonpathogenic protozoon has been shown (2, 26).

Finally, *Endolimax nana* (0.3%) demonstrated the lowest frequency among the study isolates. The decrease in helminthic contamination was reported to be associated with improvement in health standards in the area under the study (28).

The variation in incidence rate of parasite in the current study and those of other surveys could be attributed to various factors such as drinking water supplies, health information of individuals, and weather conditions in different regions.

Based on the results found in the current study, the prevalence rate of intestinal parasites among the food handlers was insignificant when variables such as sex, age, job, and education were taken into account. The intestinal symptoms observed in this study were abdominal pain, diarrhea, weight loss, and fever. Our results showed that gastrointestinal symptoms were the most significant symptoms seen in different groups ($p<0.05$).

In this study, a higher infectivity rate was seen among females compared to isolates collected from males nevertheless the difference was insignificant. Consistent with our study, in a number of studies lack of significant correlation between infectivity rate and gender was reported, while some have found a quite opposite result i.e. a significant correlation between gender and infectivity was revealed (6,29).

Higher rate of infectivity in female participants in our study could be related to variations in sample size, gender differences in various jobs associated with production and distribution of foodstuffs although this suggestion needs further investigations. We did not observe any significant difference regarding the age variable, but the highest level of contamination was found in group older than 60 years (12.2%) and individuals aged 30 (4.5%) demonstrated the lowest contamination rate. Also, in some studies, the highest infectivity was reported in groups with age over 50 (16,23). It should be noted that in a number of other studies, contrary to our study, the highest frequency of intestinal parasites was seen at lower ages (2, 30) a finding that may be due to the employment of people at different ages in food preparation workshops and food associated industries in different parts of the country. Although the incidence of intestinal parasites was insignificant when job variation considered as a variable \ nevertheless, the highest prevalence for *Giardia lamblia* infection was found in the workers associated with food Production Company. Considering the important role of these jobs in public health, strict and accurate monitoring of food workers is of vital priority within such food industries. In the present study, although the highest frequency of intestinal parasites was found among the illiterate individuals, nevertheless this relationship was not significant (6,23,24,26).

Therefore, more investigations are suggested to illustrate the role of education in promoting general public health.

CONCLUSION

This study revealed a decrease in the incidence of intestinal parasite infection among the food handlers of Qazvin. Also, no helminth contamination was observed in the study isolates. The reason for this could be due to increased individual and professional health in different businesses associated with food preparation and distribution industry in the area. However, regarding the presence of some protozoan infections, in particular *Giardia lamblia*, among the food handlers and the risk of their transmission via the chain of associated businesses, the continuous and strict monitoring of food-handlers by the local health authorities is of prime importance.

* Ethics

Ethics Committee Approval: Ethical approval of the study was obtained from the Medical Ethics Committee of Qazvin University of Medical Sciences (IR. QUMS. REG. 1396. 293).

Informed Consent: Patient was not informed.

* Authorship Contributions

Surgical and Medical Practices: M.S., Concept: M.S., Design: E.H., M.S., Data Collection or Processing: M.S., Analysis or Interpretation: M.S., M.A., Literature Search: M.S., E.H., Writing: E.H.

Conflict of Interest: No conflict of interest was declared by the authors.

Financial Disclosure: The authors declared that this study received no financial support.

* Acknowledgments

The project was supported financially by Deputy of research and technology of Qazvin University of Medical Sciences. The present study was a part of thesis for receiving the degree of MSc in medical parasitology at the Qazvin University of Medical Sciences, Qazvin, Iran.

REFERENCES

1. World Health Organization. Prevention and control of intestinal parasitic infections.1987; http://apps.who.int/iris/handle/10665/41298.
2. Motazedian M H, Ebrahimi-pour M, Asgari Q, Mojtabavi S, Mansouri M. Prevalence of Intestinal Parasites among Food-handlers in Shiraz, Iran. Iran J Parasitol 2015;10:652-57.
3. Saki J, Khademvatan S, Masoumi K, Chafghani M. Prevalence of intestinal parasitic infections among food handlers in Khuzestan, southwest of Iran: A 10-year retrospective study. Afr J Mi-crobiol Res 2012;6:2475-80.
4. Ayeh-Kumi PF, Quarcoo S, Kwakye-Nuako G. Prevalence of intestinal parasitic infections among food vendors in Accra, Ghana. J Trop Med Parasitol 2009;32:1-8.
5. Hazrati TK, Mostaghim M, Khalkhalli HA, Badr AM. The prevalence of intestinal parasitic infection in the students of primary schools in Nazloo region in Urmia during 2004- 2005. Urmia Medical Journal 2004;16:212-17.
6. Balarak D, Modrek MJ, Bazrafshan E, Ansari H, Kord Mostafapour F. Prevalence of Intestinal Parasitic Infection among Food Handlers in Northwest Iran. J Parasitol Res 2016;2016:8461965.
7. Daryani A, Ettehad GH, Sharif M, Ghorbani L, Ziaei H. Prevalence of intestinal parasites in vegetables consumed in Ardebil, Iran. Food Control 2008;19:790-4.
8. Bahmani P, Maleki A, Sadeghi S , Shahmoradi B, Ghahremani E. Prevalence of Intestinal Protozoa Infections and Associated Risk Factors among Schoolchildren in Sanandaj City, Iran. Iran J Parasitol 2017;12:108-16.
9. Anvari Tafti MJ, Mirjalili MM, Aghabagheri M. Prevalence of Intestinal Parasites in Children Attending Day–Care Centers in Yazd City, Iran. Journal of Community Health Research 2014;3:96-102.
10. Shojaei Arani A, Alaghehbandan R, Akhlaghi L, Shahi M, Rastegar LARI L. Prevalence of intestinal parasites in a population in south of Tehran, Iran. Rev. Inst. Med. trop. S. Paulo 2008;50:145-9.

11. Scott E. Food safety and foodborne disease in 21st century homes. Can J Infect Dis 2003;14:277-80.
12. Zaglool DA, Khodari YA, Othman RA, Faroog MU. Prevalence of intestinal parasites and bacteria among food handlers in a tertiary care hospital. Niger Med J 2011;52:266.
13. Ayeh-Kumi PF, Quarcoo S, Kwakye-Nuako G, Kretchy JP 'Osafo-Kantanka A, Mortu S. Prevalence of intestinal parasitic infections among food vendors in Accra, Ghana. J Trop Med Parasitol 2009;32:1-8.
14. Shahnazi M, Sharifi M, Kalantari Z, Allipour Heidar M, Agamirkarimi N. The study of consumed vegetable parasitic infections in Qazvin. The Journal of Qazvin University of Medical Sciences 2009;12:83-9.
15. Kassania A, Shaterianb M, Sharifiradc G, Menatid M, Abbastabara H, Ebrahimipourf M, et al. The Prevalence of some Intestinal Parasites in Food- Handlers of Asian and African Countries: A Meta-Analysis. Arch Hyg Sci 2015;4:49-56.
16. Babiker MA, Ali MSM, Ahmed ES. Frequency of intestinal parasites among food-handlers in Khartoum, Sudan. East Med Health J 2009;15:1098-104.
17. World Health Organization: Food safety and food borne illness. Geneva: WHO; 2007.
18. Abu-Madi MA, Behnke JM, Ismail A. Patterns of infection with intestinal parasites in Qatar among food handlers and housemai ds from different geographical regions of origin. Acta tropica 2008;106:213-20.
19. Andargie G, Kassu A, Moges F, Tiruneh A, Huruy K. Prevalence of bacteria and intestinal parasites among food-handlers in Gondar town, northwest Ethiopia. J Health Popul Nutr 2008;26:451.
20. Garcia LS. Diagnostic medical parasitology. 5th.ed. Washington: ASM Press. 2007.
21. Fallah M, Sadeghian S, Taherkhani H , Habibi F, Heidar Barghi Z. Study of parasitic and bacterial infections in the food-handling personnel, Ramadan, Iran. Journal of Research in Health Sciences 2011;4:3-10.
22. Molavi G, Masoud J, Moubedi I, Hassanpour GH. Prevalenceof intestinal parasites in Esfahan municipal workers. Journal of School of Public Health and Institute of Public Health Research 2007;5:43-50.
23. Koohsar F, Amini A, Ayatollahi AA, Noshak GH, Hedayat Mofidi HS, Namjoo M. The Prevalence of intestinal parasitic Infections in food handlers in Gorgan, Iran. Med Lab J 2012;6:26-34.
24. Abdel-Dayem M, Al Zou'bi R, Hani RB, Amr ZS. Microbiological and parasitological investigation among food handlers in hotels in the Dead Sea area, Jordan. J Microbiol Immunol Infect 2014;47:37780.
25. Kheirandish F, Tarahi MJ, Haghighi M, Nazemalhosseini – Mojarad E, Kheirandish M. Prevalence of Intestinal Parasites in Bakery Workers in Khorramabad, Lorestan Iran. Iran J Parasitol 2011;6:76-83.
26. Sharif M, Daryani A, Kia E. Prevalence of intestinal parasites among food handlers of sari, northern Iran. Rev Inst Med Trop Sao Paulo 2015;57:139-44.
27. Ifeadike CO, Ironkwe OC, Adogu PO, Nnebue CC, Emelumadu OF, Nwabueze SA, et al. Prevalence and pattern of bacteria and intestinal parasites among food handlers in the Federal Capital Territory of Nigeria. Niger Med J 2012;53:166-71.
28. Takizawa MD, Falavigna DL, Gomes ML. Enteroparasitosis and their ethnographic relationship to food handlers in a tourist and economic center in Parana southern Brazil. Rev Inst Med Trop Sao Paulo 2009;51:31-5.
29. Salary S, Safizade H. Prevalence of intestinal parasite of intestinal parasite infestation in the food suppliein of kerman city,Iran, in 2010. JHSS 2013;1:315-22.
30. Manan WS. Intestinal Parasites from Fingernails of Sidewalk Food Vendors. Univ Med 2011;30:120-5.