



The Prevalence and Associated Risk Factors of Intestinal Protozoan Parasites in Iranian Children with Hypereosinophilia

*Hossein Mahmoudvand*¹, *Maryam Sepahvand*², *Bahram Nasiri*², *Mehrdad Khatami*³,
**Ebrahim Badparva*⁴

1. Department of Laboratory Sciences, School of Allied Medicine, Lorestan University of Medical Sciences, Khorramabad, Iran
2. Student Research Committee, Lorestan University of Medical Sciences, Khorramabad, Iran
3. Bam University of Medical Sciences, Bam, Iran
4. Department of Medical Parasitology and Mycology, Lorestan University of Medical Sciences, Khorramabad, Iran

***Corresponding Author:** Email: ebrbadparva@yahoo.com

(Received 09 Dec 2019; accepted 24 Dec 2019)

Dear Editor-in-Chief

Intestinal parasitic infections are considered as one of the most widespread infections in humans around the world especially in developing countries (1). Eosinophilia (peripheral blood eosinophils >500 cells/ μl , or $>7\%$ of the white blood cells) can be caused by some pathogenic parasites such as *Cryptosporidium parvum*, *Cystoisospora belli*, *Giardia lamblia*, *Entamoeba histolytica*, *Ascaris lumbricoides*, *Hymenolepis* spp., *Trichostrongylus* spp., *Strongyloides stercoralis*, hookworms parasites in human (2).

We aimed to assess the prevalence of the intestinal protozoan parasites among children with hypereosinophilia compared to healthy children from Lorestan province, western Iran.

The present case-control investigation was performed from Jun 2016 to Sep 2017 on 260 children (ranging from 2 to 15 yr old) including 130 children with peripheral blood eosinophils greater than 1000 per microliter who referring to health centers of Lorestan Province, Iran (case group) and 130 healthy children with normal peripheral blood eosinophils, referring the health centers during the above time period for routine examination (control group).

The exclusion criteria were: subjects who did not agree to sign an informed consent, patients who have taken systemic antibiotics in the last three month and also immunocompromised individuals. A planned questionnaire was provided to get demographics data and some risk factors linked to protozoan infections, such as age, sex, residence, hand washing habit before eating, and consumption of raw or unwashed vegetables and fruits. All collected stool samples were tested by microscopic examination using the direct smear technique (wet mount and Lugol's iodine), formal-ether concentration methods. In the next step, after preparing the slide smear from the fresh stools, they were stained with trichrome staining to exact separates intestinal protozoa (*Entamoeba*, *Giardia*, *Blastocystis* sp. etc.). Moreover, to detect the parasites of coccidian family such as *Cryptosporidium* sp., we used Zeihl-Neelsen staining after the sucrose flotation (Sheather' technique) procedure (3). SPSS 24.0 software (SPSS Inc., Chicago, IL, USA) was utilized to perform data analysis.

Table 1 shows some demographic and risk factors among participates in this study. Out of 130 children with eosinophilia (case group), intestinal



protozoan infection were found in 28 (21.5%) children; whereas from 130 health children in control group, intestinal protozoan parasites were found in 15 (11.5%) children; indicating the sig-

nificant difference ($P < 0.001$) in the prevalence intestinal protozoan infections among the children in case and control group.

Table 1: Demographic characterization of participants in case and control groups

Variable		Group		Total No. (%)
		Case (children with eosinophilia) No. (%)	Control (healthy children) No. (%)	
Age	<7 yr	51 (39.2)	48 (36.9)	99 (38.1)
	≥7 yr	79 (60.8)	82 (63.1)	161 (61.9)
Gender	Male	83 (63.8)	77 (59.2)	160 (61.5)
	Female	47 (36.2)	53 (40.8)	100 (39.5)
Residence	Urban	81 (62.3)	88 (67.7)	169 (65.0)
	Rural	49 (37.7)	42 (32.3)	91 (35.0)
Hand washing before eating	Yes	104 (80.0)	101 (77.7)	205 (78.8)
	No	26 (20.0)	29 (22.3)	55 (21.2)
Consumed unwashed fruits/vegetables	Yes	50 (38.5)	42 (32.3)	92 (35.4)
	No	80 (61.5)	88 (67.7)	168 (64.6)

The most common protozoan parasites were *Giardia lamblia* (8.1%), *Blastocystis hominis* (3.1%), *Cryptosporidium* sp. (1.53%), *Sarcocystis hominis* (0.77%), *Cystoisospora belli* (0.77%), *Entamoeba histolytica* (0.77%), *Iodamoeba butschlii* (0.77%), and *E. coli* (0.77%), respectively. The statistical analysis showed the significance stat of different variables shoed in Table 2. In line with our results previous studies demonstrated that eosinophilia can cause by *B. hominis* and *G. lamblia* not only in people with symptom but also in asymptomatic people (4, 5).

Considering the coccidian protozoan parasites, among the protozoan parasites in this family, *C. belli* and *Sarcocystis* spp. are probably more associated with eosinophilia(6). The prevalence of intestinal protozoan parasites among children with hypereosinophilia in Lorestan Province, Western, Iran was significantly high compared to the healthy children. The findings of this work proposed that physicians pay more attention to intestinal protozoan parasites as an important factor for eosinophilia.

Table 2: Frequency of intestinal protozoan infections in patients with hypereosinophilia based on the demographic characteristics and associated risk factors

Variable	Microscopic test		P value	
	No. (%) of positive	No. (%) of negative		
Age (yr)	<7	10 (19.6)	41 (81.4)	0.56
	≥7	18 (22.7)	61 (77.3)	-
Gender	Male	22 (26.5)	50 (73.5)	0.021*
	Female	6 (12.7)	39 (88.7)	
Residence	Urban	16 (19.7)	65 (80.3)	0.71
	Rural	12 (24.5)	37 (75.5)	
Hand washing before eating	Yes	19 (18.3)	85 (81.7)	<0.001*
	No	9 (34.6)	17 (65.4)	
Consumed unwashed fruits/vegetables	Yes	16 (32.0)	34 (68.0)	-
	No	12 (15.0)	68 (85.0)	<0.001*

* Difference was statistically significant

Conflict of interest

The Authors declare that there is no conflict of interest.

References

- World Health Organization (2014). The World Health Report 2008: Primary Health Care (Now More than Ever).
- Kovalszki A, Sheikh J, Weller PF (2013). Eosinophils and Eosinophilia. In: Rich RR, editor. *Clinical immunology principles and practice*. 4th ed. London: Elsevier Saunders; pp. 298–309.
- Mahmoudvand H, Tace N, Faraji Goodarzi M, Ebrahimzadeh F (2018). Prevalence and risk factors of intestinal protozoan infections in children (2–15 yr old) from Lorestan Province, western Iran. *Trop Biomed*, 35(1): 259–266.
- Ashrafi K, Tahbaz A, Rahmati B (2010). *Strongyloides stercoralis*: The Most Prevalent Parasitic Cause of Eosinophilia in Gilan Province, Northern Iran. *Iran J Parasitol*, 5(3): 40–47.
- Sheehan DJ, Raucher BG, Mckitrick JC (1986). Association of *Blastocystis hominis* with Signs and Symptoms of Human Disease. *J Clin Microbiol*, 24 (4): 548-550.
- O'Connell EM, Nutman TB (2015). Eosinophilia in Infectious Diseases. *Immunol Allergy Clin North Am*, 35(3): 493–522.