

## Giardia lamblia affecting humans in Sohag governorate and its relation with some physical measurements

Hanaa A. El-Hady\*, Amal M. Ahmed\*, Noha S. Ahmed\*, Hesham I. Osman\*

\*Medical Parasitology department, Faculty of Medicine, Sohag University, Egypt.

Correspondence to Hesham I. Osman, Department of Medical Parasitology, Faculty of Medicine, Sohag University, Egypt

### Abstract

**Background and study aim:** Giardiasis is a gastrointestinal disease, caused by the protozoan parasites *Giardia lamblia*. This infection occurs through ingestion of contaminated water or food by *Giardia lamblia* cysts. The aim of this study was to correlate between the presence of *Giardia lamblia* and some physical measurements.

**Subjects and methods:** experimental study was performed at the laboratories of Parasitology Department, Faculty of Medicine, Sohag University from October 2016 to October 2017. It was done on 93 patients, who had *Giardia* from different localities in Sohag governorate after examination of stool samples by saline and iodine wet mount. History taking and some physical measurements, as weight and height, using a meter, a scale and growth charts were taken for cases included in this study.

**Results:** There was a decrease in height, 50 (53.8%), weight for height, 49 (52.7%), body mass index, 45 (48.4%), and weight, 33 (35.5%), of cases with *Giardia lamblia* infection by different proportions.

**Keywords:** Giardiasis, *Giardia lamblia*, gastrointestinal disease, physical measurements.

### Introduction

*G. lamblia* is one of the most common intestinal protozoa present in humans, both in Egypt and worldwide [1]. The rate of human infection with *G. lamblia* in Egypt varies between 10% - 34.6% [2]. Children, and immunocompromised individuals are the most affected by *Giardia* in children. There are many effects by *Giardia lamblia* on growth, nutrition and cognitive functions have been reported [3]. The World Health Organization (WHO) recognized giardiasis as a neglected disease associated with poverty and impaired development [4]. **Transmission** of infection occurs by ingestion of viable cysts with contaminated food or drink [5]. Clinical presentations of giardiasis vary, ranging from asymptomatic infection to chronic symptomatic infection. Infected patients present with diarrhea, steatorrhea, flatulence, and malabsorption [6].

**Subjects and methods:**

This experimental study was conducted from October 2016 to October 2017 at the laboratories of Parasitology Department, Faculty of Medicine, Sohag University.

#### • **Stool sample collection and examination and preservation:**

Stool samples had been collected from 525 patients who had diarrhea from different cities in Sohag Governorate, 93 stool samples only had *Giardia* after examination by saline and iodine wet mount using the light microscopic. Every positive sample for *Giardia lamblia* had been divided into two parts and put in eppendorf tubes. The first one of them was examined immediately, the second put in formalin 10% in a ratio 1 to 3.

- **Measurement of some physical measurements**, as weight and height using a meter and scale for cases included in the study.
- **Growth charts for weight, height, weight for height and body mass index for every case included in the study.** These growth charts were according to the world health organization site. (www.who.com).

**Statistical analysis:**

Data were organized, tabulated, and statistically analyzed using SPSS version, 23.00. P values were calculated. Chi-square test ( $\chi^2$ ) was used to compare the frequency data. P value < 0.05 indicates significant (S) values. P value < 0.01 indicates highly significant (HS) values. P value > 0.05 Non significant (NS).

**Results**

- out of 93 cases there were 60 (64.5%) male and 33 (35.5%) female. The P value for gender distribution using legacy dialog non parametric test was 0.05 (significant). And the Chi-square ( $\chi^2$ ) test for gender distribution was 7.83.
- The age of patients ranged from 9 months to 18 years. The cases with *Giardia lamblia* included in this study was classified to 4 age groups as shown in table (1).

Age group	Giardia lamblia	P value	Chi-square ( $\chi^2$ ) test
Age < 2 years	5 (5.4%)	0.001 (HS)	116.84
Age 2-6 years	67 (72.1%)		
Age 6-12 years	19 (20.3%)		
Age 12-18 years	2 (2.2%)		

**Table 1: The relation between age groups and Giardia lamblia:**

- The relation between locality and *Giardia* is shown in table (2)

Locality	Giardia lamblia	P value	Chi-square ( $\chi^2$ ) test
Urban	19 (20.4 %)	0.001(HS)	32.52
Rural	74 (79.6 %)		

**Table 2: The relation between locality and Giardia lamblia:**

- The relation between weight and *Giardia lamblia* is shown in table (3).

Weight	Giardia lamblia	P value	Chi-square ( $\chi^2$ ) test
Weight > 50 percentile	36 (38.7%)	0.28 (NS)	2.516
Weight < 50 percentile	33 (35.5%)		
Weight equal to 50 percentile	24 (25.8%)		

**Table 3: The relation between weight and Giardia lamblia:**

- The relation between height and *Giardia lamblia* is shown in table (4).

Height	Giardia lamblia	P value	Chi-square ( $\chi^2$ ) test
Height > 50 percentile	31 (33.3%)	0.001 (HS)	23.29
Height < 50 percentile	50 (53.8%)		
Height equal to 50 percentile	12 (12.9%)		

**Table 4: The relation between height and Giardia lamblia:**

- The relation between weight for height and *Giardia lamblia* is shown in table (5).

Weight for height	<i>Giardia lamblia</i>	P value	Chi-square ( $\chi^2$ ) test
Weight for height > 50 percentile	36 (38.7%)	0.001 (HS)	28.323
Weight for height < 50 percentile	49 (52.7%)		
Weight for height equal to 50 percentile	8 (8.6%)		

**Table 5: The relation between weight for height and *Giardia lamblia*:**

- The relation between body mass index and *Giardia lamblia* is shown in table (6).

Body mass index	<i>Giardia lamblia</i>	P value	Chi-square ( $\chi^2$ ) test
Body mass index > 50 percentile	37 (39.8%)	0.001 (HS)	20.387
Body mass index < 50 percentile	45 (48.4%)		
Body mass index equal to 50 percentile	11 (11.8%)		

**Table 6: The relation between body mass index and *Giardia lamblia*:**

## Discussion

The intestinal protozoan *Giardia lamblia* was frequently found in diarrheal disease throughout the world affecting humans and other mammalian species [7].

This study was done on 93 patients, who had *Giardia* from different localities in Sohag governorate after examination of stool samples by saline and iodine wet mount. History taking and some physical measurements, as weight and height, using a meter, a scale and growth charts were taken for cases included in this study.

In the current study, 93 positive stool samples for *Giardia lamblia* by microscopy were detected.

As regards the relation of sex to the prevalence of giardiasis, out of the 93 positive samples there were 60 (64.5 %) males while 33 (35.5 %) female. The variation in sex distribution was found to be statistically highly significant (PV = 0.005). This agreed with **Julioet al.[8]**, **Mohran.[9]** and **De Lucioet al.[10]**, who stated that the incidence of giardiasis is higher in males than in females. These

results disagreed with **Duldovaet al.[11]**, who stated that the prevalence in females was higher than males. They assumed that due to caring of these females to their own children or from working in nursing homes or care-day centers.

As regards relation of age to the prevalence of giardiasis in the present study, the highest incidence was between 2 - 6 years represented 72.1 % then 6 - 12 years represented 20.3 % then < 2 years represented 5.4 % lastly 12 - 18 years represented 2.2 %. The variation in age distribution was found to be statistically highly significant (PV = 0.001).

This study showed that, the highest group was 2 - 6 years and this can be explained by highly active attitude of these children who play outside home and this makes them more subjected to highly polluted surrounding area by *Giardia* cyst not only from humans as a source of infection but also from animals as another source of infection.

These results agreed with **Bernard et al. [12]**, who stated that the highest

prevalence was between 3 to 5 years, and **Mohran.[9]**, who stated that, the highest prevalence was between 1 - 10 years.

These results disagreed with **Heehonget al. [13]**, and **El-Badryet al. [14]**, who stated that giardiasis was highest in children aged 6 to 12 years.

The results of this study showed that there was a decrease in weight, height, weight for height, and body mass index of children with *Giardia* infection by different proportions.

This was consistent with previous findings in many different studies as in: **Niehaus et al., (2002)** in Brazil, **Simsek et al., (2004)** in Peru **Al-Mekhlafiet al.,(2005)** in Malaysia, **Sadjadi and Tanideh, (2005)** in Iran,**Botero-Garces et al., (2009)** in Colombia, and **Koruketal., (2010)** in Turki. All these results found a strong association between *Giardia* infection and undernutrition, wasting and stunting among children but without determining genotypes of *Giardia lamblia*. Also there was a previous study among Brazilian children showed that *Giardia*-infected children had a double risk for stunted growth as compared to other children (**Muniz and Queiroz, 2008**).

The results in this study disagreed with **Lunnet et al., (1999)** in Gambia and **Hollmet et al., (2008)**, that they found that there was no significant association between *Giardia lamblia* infection and malnutrition.

The difference with these results could be attributed to the low prevalence of *G. duodenalis* reported by these studies as compared to the present study.

The results in this study showed that there was an association with some physical features like underweight, stunting and wasting with *Giardia lamblia* infection. However, it is very probable that *Giardia* infection is one of the several factors associated with low nutritional status, together with sanitary and socioeconomic conditions.

## Conclusion

We concluded that However diarrhea was the first complaint that affected all cases, abdominal colic was the second most common complaint affecting 84 (90.3 %) cases, followed by failure to thrive affecting 32 (34.5 %) cases, followed by abdominal distension affecting 26 (28 %) cases, and vomiting affecting 6 (6.6 %) of cases.

## References

1. **Ismail MA, El-Akkad DM, Rizk EM, El-Askary HM, El-Badry AA. Molecular seasonality of *Giardia lamblia* in a cohort of Egyptian children: A circannual pattern. *Parasitol Res*, 2016; 115(11): 4221-4227.**
2. **Bayoumy, A.M., Mohammed, K.A., Shahat, S.A., Ghannam, M.M. and Gazy, M.S. (2010): "Role of parasites among chronic diarrheic patients." *Journal of the Egyptian Society of Parasitology*. 40 (3): 679-698.**
3. **Rogawski, E.T., Bartelt, L.A., Platts-Mills, J.A., Seidman, J.C., Samie, A., Havt, A., et al., (2017): Determinants and impact of *Giardia* infection in the first 2 years of life in the MAL-ED birth cohort. *J. Pediatr. Infect. Dis. Soc.* 6(2): 153-160.**
4. **Savioli, L., Smith, H., and Thompson, A., (2006): *Giardia* and *Cryptosporidium* join the 'Neglected diseases initiative. *Trends Parasitol*. 22(5): 203-208.**
5. **Budu-Amoako, E., Greenwood, S.J., Dixon, B.R., Barkema, H.W., Hurnik, D., and Estey, C., (2012): Occurrence of *Giardia* and *Cryptosporidium* in pigs on Prince Edward Island, Canada. *Vet Parasitol*. 28 (1): 1-9.**
6. **Nematian J, Gholamrezaezhad A, Nematian E. (2008). Giardiasis and other intestinal parasitic infections in relation to anthropometric indicators of malnutrition: a large, population based survey of schoolchildren in Tehran. *Ann Trop Med Parasitol*, 2008; 102(3): 209-214.**
7. **Ryan, U. and Caccio, S. M. (2013): Zoonotic potential of *Giardia*. *Int.J. Parasitol*. 43 (12-13): 943-956.**
8. **Julio, C., Vilares, A., Oleastro, M., Ferreira, I., Gomes, S., Monteiro, L., Nunes, B., Tenreiro, R., and Angelo, H. (2012): Prevalence and risk factors for**

- Giardia duodenalis infection among children: A case study in Portugal. *Parasites & Vectors*, 27 (5):22-29.
9. **Mohran, (2013):** Genotyping of Giardia lamblia in human and animal feces in Qaliopiagovernate. *Thesis, Benha University.*
10. **De Lucio, A., Martínez-Ruiz, R., Merino, F.J., Bailo, B., Aguilera, M., Fuentes, I., and Carmena, D. (2015):** Molecular genotyping of Giardia duodenalis isolates from symptomatic individuals attending two major public hospitals in Madrid, Spain. *PLoS One* 10 (12): e0143981.
11. **Duldova, A. Juris, P. Jurisova, S. Jarcuska, P. and Krcmery, v. (2016):** Epidemiology and geographical distribution of gastrointestinal parasitic infection in humans in Slovakia. *Helminthologia*. 53 (4): 309 – 317.
12. **Bernard N. and Samuel B. N. (2011):** Giardia lamblia: a major parasitic cause of childhood diarrhoea in patients attending a district hospital in Ghana. *Parasit Vectors*. 4 (1): 163-170.
13. **Heehong, S., Davaasuren, A., Young, J., Davaajav, A., Shin-Hyeong, C., Won-Ja, L. and Sang-Eun, L. (2014):** Molecular characterization of Giardia duodenalis and Cryptosporidium parvum in fecal samples of individuals in Mongolia. *Am. J. Trop. Med. Hyg.* 90 (1): 43-47.
14. **El-Badry, A.A., Mohammed, A.F., Abdul Gawad, E. (2017):** Predominance of Giardia intestinalis assemblage B in diarrhoeic children in Sharkia, Egypt. *Parasitologists United Journal. ISSN: 1687-7942, Vol. 10, No. 1 & 2.*