

Letter to the editor

***Giardia lamblia* infection is associated with lower body mass index values**

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While low and poor food intake are the major recognized causes of protein-energy malnutrition in children worldwide the only parasitic infection implicated in influencing the condition is *Giardia lamblia* [1-3]. Some studies have suggested this association with different anthropometric variables (*e.g.*, height for age, weight for age) [1-4], while others have reported higher *G. lamblia* infection rates in undernourished children [5,6] (classified according to a body mass index [BMI] < 14 kg/m² or below percentile 10 according to the national reference value [Venezuelan Growth and Development Foundation, 1996]). Furthermore, these studies have not reported mean lower BMI values in those individuals infected with *G. lamblia* [1-6]. Based on these observations, we have evaluated the relationship between BMI values and *G. lamblia* infection in a cohort of children and adults, from 6 months to 59 years old, in a population living in areas of north central Venezuela.

We studied randomly selected 3,388 apparently asymptomatic individuals (1,656 male, 1,732 female; mean age 13.05 ± 0.22 years old), in the context of a probabilistic national study on growth and development. Of these, 97.7%, were from similar geographical areas and socioeconomic status (national stratification III/V, IV/V and V/V [Venezuelan Growth and Development Foundation, 1996], poorest levels). Body mass index (kg/m²) was calculated from measurements of weight (kg) and the height (m) obtained by trained anthropometrists.

Giardia lamblia was microscopically determined in freshly collected stool samples which were preserved in merthiolate-iodine formaldehyde (MIF) media.

Most individuals (68.8%) had normal BMI values while 21.8% had values above normal and 9.4% below normal. *Giardia lamblia* was detected in 10.3% of the individuals with a higher prevalence in people with a deficit in weight in relationship to age (below 10%) compared with those with a normal or excess in weight for age (above 10%): 9.5% (32/338) versus 5.9% (177/2976) (OR = 1.65, CI 95% 1.15 –

Figure 1. Comparative values of Body Mass Index (kg/m²) in individuals from north central Venezuela considering their status regarding *G. lamblia* infection.

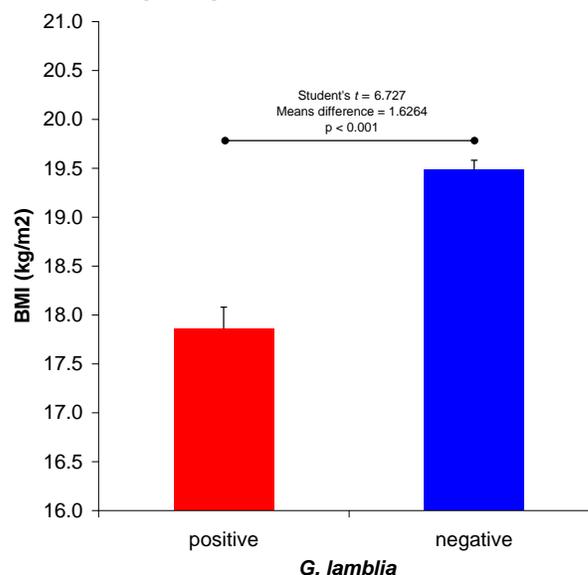
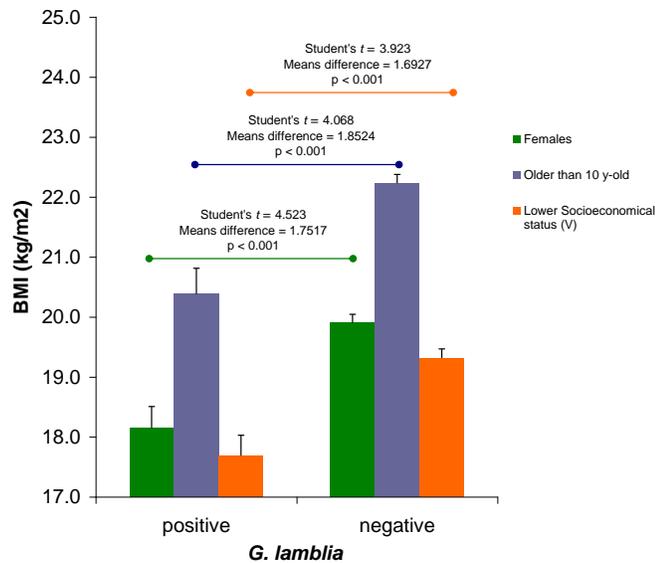


Figure 2. Comparative values of Body Mass Index (kg/m²) in individuals from north central Venezuela according to the status of *G. lamblia* infection among females, persons older than 10 years old, and individuals from lower socioeconomic status (V).



2.45; $\chi^2 = 5.783$; $p = .016$). The average BMI of the infected people was significantly lower than that of the non-infected people (17.86 ± 0.22 kg/m² versus 19.49 ± 0.097 kg/m², Student's *t* test = 6,727; means difference = 1.6264; $p < .001$) (Figure 1). Significant differences between mean BMI values between infected and non-infected individuals were found in the case of women (difference = 1.7517; $p < .001$), those over 10 years old (difference = 1.8524; $p < .001$), and those from the very lowest socioeconomic status level (difference = 1.6297; $p < .001$) (Figure 2).

Previous studies have demonstrated that there is a higher prevalence of *G. lamblia* infection in malnourished patients which might be due to the parasite interfering with intestinal absorption leading to malnutrition [5,6]. This was shown by a weight deficit in relationship to the age of the individual and by low BMI values, as was observed in this study. Thus our observations support the hypothesis that treatment of *G. lamblia* may improve nutritional status by allowing better intestinal absorption and may reduce early and late consequences of malnutrition [1,3,6]. Therefore, coproparasitological studies in malnourished individuals could be a useful tool in detecting infected and re-infected patients and optimizing nutritional interventions.

These preliminary findings, which should be confirmed in further studies, suggest that *G. lamblia* infection may influence nutritional status in children, teenagers and adults (particularly women and individuals older than 10 years-old); previous studies have examined these potential associations only in children [2-4,6]. Considering the prevalence of *G. lamblia* infection detected in the individuals included in this study and its influence on nutritional status, detection of this parasite would be of importance in the integral evaluation of individuals under nutritional assessment.

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Conflicts of interest: The authors declare no conflicts of interest.

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