

Parasitic Transition *Blastocystis* spp. against *Giardia lamblia* in Mexico 2000-2021

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ABSTRACT

To present the transition and epidemiological relevance of *Blastocystis* spp. since in recent years it has surpassed the behavior of *Giardia lamblia*, positioning itself as the most frequent parasite reported in Mexico.

The prevalence of *G.lamblia* and *Blastocystis* spp. was comparatively analyzed through a retrospective search from 2000-2021, compiling all the articles referring to these agents in 30 different search engines (Pubmed, Scopus, among others). It was used officials of the Consejo Nacional de Fomento Educativo (CONAFE) and the Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) to learn about the behavior of these parasites.

The transition in the prevalence of *Blastocystis* spp. on *G.lamblia*, however the reason is still not clear despite the fact that various hypotheses have been formulated, likewise, due to the limited number of articles in Mexico, the importance of this parasitosis is underestimated.

Keywords

Blastocystis spp., Mexico, Parasitosis, Prevalence, Risk factors.

Introduction

The study and behavior of parasites has been changing over the years thanks to new studies and discoveries; such is the case of *Blastocystis* spp. which was described for the first time in 1911 by Alexeieff, receiving the name of *Blastocystis enterocola* and classified as a commensal yeast, later in 1912 due to the belief that it was associated only with humans, it was called *Blastocystis hominis*, name with which it is known. It was known until 2007, when 9 subtypes were identified in different mammals, demonstrating that humans were not its only host, thus it receives its current name *Blastocystis* spp. From then on, its life cycle, pathogenic role and classification were clarified over time, since today it is known that

it belongs to the *Chromista* kingdom. Despite all the controversy that has surrounded *Blastocystis* spp. since its discovery, it has managed to position itself as a parasite of worldwide importance, being considered a public health problem [1,2].

For decades, *G.lamblia* had been considered the most frequently reported agent in both adults and children, however, in recent years, various studies have shown that *Blastocystis* spp. it has a higher prevalence, reaching and surpassing the epidemiological behavior of *G.lamblia*. Reporting a prevalence of up to 35% in developed countries and 100% in underdeveloped countries. In the case of Latin America, a frequency of 61.6% in the adult population has been evidenced.

In Mexico, as in the world, *Blastocystis* spp. has undergone a

similar transition, becoming the most frequently reported parasite in the Mexican population, reaching a frequency of up to 80%, although epidemiological data regarding its prevalence show fluctuating values, *Blastocystis spp.* it has always been present in the different populations studied over time. Thanks to various investigations, today the main factors and age groups at greatest risk are known, however, the implications of infection by said parasite are still unknown [1,3-8].

The objective of this work is to present the transition and epidemiological relevance of *Blastocystis spp.* because in recent years it has overtaken *G.lambli*a as the most commonly reported parasite in the Mexican population. As well as informing the medical community and corresponding health personnel about the new most common parasitosis.

Materials and Methods

A retrospective bibliographical research was carried out covering the years 2000-2021, compiling all the articles referring to *G.lambli*a and *Blastocystis spp.* in Mexico in 30 different search engines, including Pubmed, Scopus, Mendeley, Elsevier, among others. 148 articles were collected, most of them focused on *G.lambli*a, where only 36 of them refer to *Blastocystis spp.* The different articles obtained were classified by categories according to their content: epidemiology, clinical case, therapeutics and molecular studies that mention *Blastocystis spp.*, in addition to those that compare the prevalence of *G.lambli*a as a whole.

To compare the sociodemographic characteristics shared by the states that report the highest prevalence of *Blastocystis spp.*, the official pages of the Consejo Nacional de Fomento Educativo (CONAFE) and the Consejo Nacional de Evaluación de la Política de Desarrollo Social (CONEVAL) were used [9,10].

Results

In this review it is observed that most of the articles compiled are focused on the study of *G.lambli*a, however over the years *Blastocystis spp.* not only begins its appearance, but also exceeds the epidemiological reports of *G.lambli*a. Subsequently, investigations of both parasites have decreased considerably, which could be due to the majority of studies concerning the current SARS-CoV-2 pandemic, represented in Figure 1.

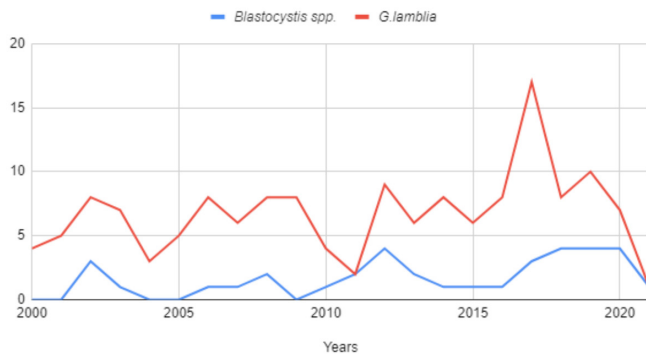


Figure 1: Articles collected over 20 years (2000-2020).

The first articles describing the epidemiology of *Blastocystis spp.* in Mexico they date from the year 2002 in the states of Jalisco and Veracruz, however due to the inadequate standardization of techniques for its identification and the rooted concept of its pathogenicity, it was not given adequate follow-up. Studies in later years make the recommendation to stop treating *Blastocystis spp.* as a commensal organism and it is suspected that the presence of this parasite is greater than previously believed, which is why investigations are initiated regarding the prevalence in different populations and associations are made as factors and risk groups. Throughout this period, giardiasis continued to be the most prevalent parasitosis, until 2008, when records show that the frequency of *Blastocystis spp.* It ranged from 4 to 62%, exceeding the frequency of *G.lambli*a, which was from 2 to 39% [2,11-17].

Despite these data, it was not until 2010 that blastocystosis began to be considered an emerging disease, attributing certain clinical manifestations to this agent. However, it is not until 2015 that reports in Mexico consider this pathogenic agent and, thanks to multiple studies, it has been possible to identify a series of clinical manifestations, which we refer to in Table 1 [2,18-20].

Table 1: Clinical manifestations associated with *Blastocystis spp.*

Clinical manifestations	Frequency
Diarrhea	18%
Abdominal pain	15%
Tympanites	10%
Irritable Bowel Syndrome (IBS)	10%
Nausea	10%
Anorexy	5%
Abdominal distension	5%
Allergic	5%
Vomit	4%
Headache	3%
Hyporexia	3%
Urticaria	3%
Constipation	1%
Iron deficiency	1%
Fever	1%
Insomnia	1%
Anal itching	1%
Rectal bleeding	1%
Tenesmus	1%
Vertigo	1%

Table 2 lists the 19 recovered epidemiological reports, referring to *Blastocystis spp.* and those who compare its epidemiology with *G.lambli*a. Most of these investigations have been carried out in Mexico City, Veracruz, Jalisco and Chiapas, it can be seen that the percentage of this has been variable in the different populations and years studied.

It should be noted that the states with the highest prevalence of *Blastocystis spp.* They are Jalisco, Yucatán, Chiapas, Guerrero and Veracruz, states that have similar characteristics, such as warm weather, type of soil, in addition to the fact that the poverty rate exceeds 49%, or in some it has been increasing in recent years [9,10].

Table 2: Epidemiological documents collected.

Year of publication	Author	State	<i>Blastocystis spp.</i> prevalence	<i>G.lamblia</i> prevalence
Pediatrics				
2002	Larrosa Haro et al.	Jalisco	1.40%	2.40%
2002	Flisser Ana et al.	Veracruz	19%	11%
2003	Díaz Elvia et al.	Estado de México	7%	18%
2006	Velarde del Río et al.	San Luis Potosí	4.30%	8%
2007	Galván-Ramírez et al.	Jalisco	1.40%	2.40%
2008	Rodríguez Elvia et al.	Guerrero	61%	22%
2010	Martínez Barbosa et al.	Veracruz	80%	-
2011	Martínez Zumaya et al.	Veracruz	2%	-
2013	Ochoa-Tapia et al.	Chiapas	17.80%	-
2014	Torres Romero et al.	Yucatán	53.60%	-
2019	Ortega Felipe et al.	Sonora	21%	-
2019	Galván Ramírez et al.	Jalisco	49%	11.50%
2020	Mazariego Arana et al.	Chiapas	10%	4.18%
2021	Orlando Medina et al.	Tamaulipas	13.80%	-
Adults				
2003	Cruz Licea et al.	CDMX	41.70%	1%
2010	Ramírez-Miranda et al.	CDMX	16%	-
2011	Ramírez-Miranda et al.	CDMX	25%	-
2012	Jiménez Balderas et al.	CDMX	-	-
2018	Martínez Barbosa et al.	CDMX	16.60%	7.70%

These data are of vital importance since in this way it is confirmed that the increase in the prevalence of *Blastocystis spp.* it is closely related to the sociodemographic conditions of the population.

Discussion

These data are consistent with research carried out, where the main risk factors are the presence of hot and tropical climates, consumption of food contaminated with fecal matter, areas with inadequate sanitation and sewage services, as well as lower socioeconomic conditions [1,2,11,13,14,21,22].

Despite the limited number of studies on this agent, in the works found we observed a great predominance of these in pediatric ages, unlike works reported in adults, observing in all of them the predominance of *Blastocystis spp.* on *G.lamblia*, however the association between age and the risk of suffering from this parasitosis continues to be uncertain. Likewise, it was observed in this review that the most vulnerable groups were immigrants and immunocompromised patients such as HIV/AIDS and cancer, patients whose main syndrome was the existence of diarrheal disease, which is why this parasite has been considered an agent opportunist [1,11,13,14,21-25].

In turn, other alterations have been referred to blastocystosis such as abdominal pain, bloating, nausea, and anorexia. In severe cases, hemorrhagic colitis with rectal bleeding has been described, and in recent years, it has been related to Irritable Bowel Syndrome (IBS), where even *Blastocystis spp.* has been proposed as an etiologic agent. It has also been sought to establish its relationship with allergic eruptions such as chronic urticaria [26,27].

Although since its discovery *Blastocystis spp.* has been the cause

of multiple controversies, today it is considered one of the most frequent intestinal parasites in the population worldwide, both in symptomatic and asymptomatic patients, becoming a public health problem. Although there is no particular year in which *Blastocystis spp.* would have positioned itself as the most frequent agent, it has been present over the years in the population to a different extent. The reason behind this transition is not yet clear; one of the hypotheses is based on the control of intestinal parasitic infections through the administration of antiparasitic treatment twice a year in children with an effect on *G.lamblia*, which could have facilitated the increase of the prevalence of *Blastocystis spp.* as there is no competition, however, to confirm this fact, further studies would be necessary.

This data agrees with the results obtained in a study carried out in the central zone of Guerrero, where the highest frequency was in stool samples positive for *B. hominis* as a single parasitosis, without association with other parasites. Likewise, it coincides with the data obtained in the 2011-2015 period, where a 38.51% reduction in giardiasis cases was observed throughout the country, where it was speculated that it was related to the improvement of sanitary measures. Due to inadequate monitoring and study of both the areas and this parasitosis, the epidemiological situation in Mexico is uncertain, therefore the prevalence is underestimated [2,20].

Due to this new parasitic transition, it is necessary to consider new adaptations in health services, being of vital importance to update and make the corresponding personnel aware of the epidemiological and clinical impact of *Blastocystis spp.* as well as encourage research and monitoring of the new predominant parasitosis of the coming decades [28].

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