South Health and Policy. 2022; 1:12
doi: 10.56294/shp202212

SHORT COMUNICATION

Brief review of human infections by free living amoebae in Argentina

Breve reseña sobre infecciones humanas por amebas de vida libre en Argentina

Sebastian Leonardo Godoy[1], Gerardo Laube[1]

[1]Universidad Abierta Interamericana, Facultad de Medicina y Ciencias de la Salud, Carrera de Medicina. Buenos Aires, Argentina.

Cite as: Leonardo Godoy S, Laube G. Brief review of human infections by free living amoebae in Argentina. South Health and Policy. 2022; 1:12. https://doi.org/10.56294/shp202212

Submitted: 02-02-2022 **Revised:** 06-05-2022 **Accepted:** 10-08-2022 **Published:** 11-08-2022

Editor: Dr. Telmo Raúl Aveiro-Róbalo

Corresponding author: Sebastian Leonardo Godoy

ABSTRACT

Free-living amoebae (FLA) are protozoa that are present in nature and fulfill their life cycle in the environment. Some genera of this group, such as Acanthamoeba spp., Naegleria sp., Balamuthia sp. and Sappinia sp. can occasionally cause serious diseases in humans. There are few documented reports on the pathologies caused by AVL in man and their epidemiology in Argentina. There are numerous cases of Acanthamoeba spp. keratitis, many of which were resolved with corneal transplantation; at least six cases of Granulomatous Amebic Encephalitis (GAE) produced by Balamuthia sp. and recently, in February 2017, a first report with fatal consequences of Primary Amebic Meningoencephalitis (PAME) caused by Naegleria fowleri in the province of Buenos Aires. As a consequence of this case, the protozoan was isolated from the pond where the deceased child had bathed the previous week. No cases caused by Sappinia fowleri were reported in the province of Buenos Aires.

Keywords: Free-Living Amoebae; Acanthamoeba; Naegleria Fowleri; Amoebic Encephalitis; Keratitis; Free-Living Amoebae; Keratitis.

RESUMEN

Los Amebas de Vida Libre (AVL) son protozoos que están presentes en la naturaleza y cumplen su ciclo de vida en el ambiente. Algunos géneros, de este grupo como Acanthamoeba spp., Naegleria sp., Balamuthia sp. y Sappinia sp. pueden producir ocasionalmente, enfermedades graves en el hombre. Existen pocos reportes documentados sobre las patologías que las AVL provocan en el hombre y su epidemiología en Argentina. Hay numerosos casos de queratitis por Acanthamoeba spp., muchos de los cuales se resolvieron con trasplante de córnea; al menos seis casos de Encefalitis Amebiana Granulomatosa (EAG) producidos por Balamuthia sp., y recientemente, en febrero de 2017, un primer reporte con consecuencias fatales de Meningoencefalitis Amebiana Primaria (MEAP) provocada por Naegleria fowleri en la provincia de Buenos Aires. Como consecuencia de este caso, se aisló al protozoo de la laguna donde el niño fallecido se había bañado la semana previa. No se reportaron casos provocados por Sappinia.

Palabras clave: Amebas de Vida Libre; Acanthamoeba; Naegleria Fowleri; Encefalitis Amebiana; Queratitis.

BACKGROUND

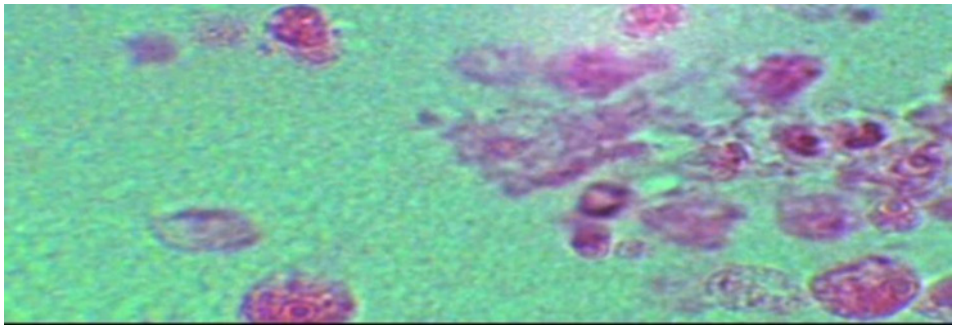

Figure 1. Argentine child died from 'brain-eating' amoeba; first case in the country

Naegleria fowleri amoeba, known as the 'brain-eating' amoeba, caused the death of an eight-year-old boy in Argentina. The event occurred in February 2017 after the little boy swam in a lagoon in Vedia, about 350 kilometers west of Buenos Aires. The diagnosis was made public in Argentine mass media this week. Sixto Costmagna, the doctor in Biochemistry and specialist of the scientific group that detected, diagnosed, and investigated the case, assured CNN en Español that this is the first autochthonous case registered in Argentina of amebic meningoencephalitis, the disease caused by Naegleria fowleri.[1] However, Costamagna assures that climate change, through the increase in global temperature, may lead to a rise in the number of people infected with the amoeba. He recalled that three factors provide an ideal habitat for Naegleria fowleri: increased environmental temperatures, increased rainfall, and the release of sewage waste into water sources. The area where the lagoon where the deceased minor was infected is located meets these requirements. "They may increase because the temperature is rising, the contamination of the lagoons is increasing, and there is a greater frequency of going to bathe in places where it is not appropriate," said the Argentine scientist to CNN en Español.[1] This infection has not been frequent in the world until now. In the United States, in 54 years (between 1962 and 2016), there have been 143 reported cases, according to information from the Centers for Disease Control and Prevention (CDC).

Situation in Argentina

In Argentina, different clinical cases of AVL have been documented and published. In 1991, a case of encephalitis was reported. Still, later studies carried out at the Center for Disease Control (CDC) by Visvesvara ruled out Acanthamoeba or Naegleria fowleri since it was a pathology caused by an amoeba belonging to the Leptomyxida order, but not by the two species mentioned.[2] In 2002, four cases of GSD caused by Balamuthia mandrillaris were reported at the Neurosurgery Department of the National Pediatric Hospital Dr. JP Garrahan of Buenos Aires, diagnosed by histopathological studies.[3] Also, in 2002, references were made to the same cases, but another publication [4] mentioned that Visvesvara, the CDC, typed them. In 2010, at the 14th International Congress on Infectious Diseases (ICID), a case of encephalitis was presented in an Argentine child with symptoms compatible with AVL encephalitis upon his return from Peru, but without being able to demonstrate its etiology. [4] In 2013, at the 31st Annual Meeting of the European Society for Paediatric Infectious Diseases, they presented a fatal case of a child from Northern Argentina, diagnosed at the CDC and caused by B.[5] Another case of Balamuthia sp. was informally reported by relatives during the VI Argentine Congress of Parasitology (VI CAP) in Bahía Blanca in 2012. It was a 23-month-old boy, diagnosis confirmed by Visvesvara at the CDC, with unclear site and origin of infection. In 2017, the first case of MEAP caused by Naegleria fowleri was presented [6,7] and the first isolation in the waters of the province of Buenos Aires. There are also communications on keratitis caused by Acanthamoeba sp.[8,9,10,11,12] Concerning publications in refereed journals, national or international, and indexed worldwide, taking as a source the PubMed database and using as keywords: free-living amoebae and/or free-living amoebae (AVL), Acanthamoeba, Naegleria, Sappinia and Balamuthia, in the period from 1913 (date on which the first citation appears) to the present (August 2018), the total number of publications in 105 years was 6219). As time went by, it can be observed how the number of communications on these protozoa increased, probably due to a greater knowledge of the pathologies they produced in humans, especially Acanthamoeba and Naegleria. Let us analyze publications with the exact keywords, taking PubMed, Scielo.org.ar, and SIIC databases as sources. We can observe that, in Argentina, there were only eleven, of which seven correspond to the working group of the author of this publication: two in the Revista Argentina de Microbiología; two in Salud (i) Ciencia; two in Acta Bioquímica Latinoamericana and one in the Revista Argentina de Parasitología. To these communications must be added that of presenting the first recognized case, in Argentina,[2,8] of Acanthamoeba keratitis associated with the use of contact lens cleaning and preservation solution, that of [10] with a case of keratitis not related to contact lens use, that of [13] with eleven cases of Acanthamoeba keratitis, occurring between 2000 and 2016 in patients with corneal pathology, at the Hospital de Clínicas de Córdoba. To these

publications should be added four more that do not appear in the aforementioned databases.[3,14,15,16]

REFERENCES

1. Khan NA, Maciver S, Siddiqui R. Opportunistic free-living amoebal pathogens. Pathog Glob Health. 2022 Mar;116(2):70-84.

2. Kofman A, Guarner J. Infections caused by free-living amoebae. J Clin Microbiol. 2022 Jan;60(1):e0022821.

3. Kofman A, Guarner J. Infections caused by free-living amoebae [Internet]. J Clin Microbiol. 2022 Jan [citado 13 de julio de 2023];60(1). Disponible en: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8769735/

4. Siddiqui R, Khan NA. Pathogenesis of amoebic encephalitis: are the amoebae being credited to an "inside job" done by the host immune response? Acta Trop. 2015 Aug;148:72-6.

5. Berger JR. Amebic infections of the central nervous system. J Neurovirol [Internet]. 2022 Dec [citado 14 de julio de 2023];28(4-6). Disponible en: https://pubmed.ncbi.nlm.nih.gov/36098909/

6. Visvesvara GS, Moura H, Schuster FL. Pathogenic and opportunistic free-living amoebae: Acanthamoeba spp., Balamuthia mandrillaris, Naegleria fowleri, and Sappinia diploidea. FEMS Immunol Med Microbiol. 2007 Jun;50(1):1-26.

7. Schuster FL, Visvesvara GS. Opportunistic amoebae: challenges in prophylaxis and treatment. Drug Resist Updat. 2004 Feb;7(1):41-51.

8. Schuster FL, Guglielmo BJ, Visvesvara GS. In-vitro activity of miltefosine and voriconazole on clinical isolates of free-living amebas: Balamuthia mandrillaris, Acanthamoeba spp., and Naegleria fowleri. J Eukaryot Microbiol. 2006;53(2):121-6.

9. Wang Y, Jiang L, Zhao Y, Ju X, Wang L, Jin L, et al. Biological characteristics and pathogenicity of Acanthamoeba. Front Microbiol. 2023;14:1147077.

10. Balczun C, Scheid PL. Detection of Balamuthia mandrillaris DNA in the storage case of contact lenses in Germany. Parasitol Res. 2016 May;115(5):2111-4.

11. Solís-Castro ME. Lethal encephalitis due to free-living amoebae in three members of a family, in Tumbes, Peru. Rev Peru Med Exp Salud Publica. 2021;38(2):291-5.

12. Cabello-Vílchez AM, Chura-Araujo MA, Anicama Lima WE, Vela C, Asencio AY, García H, et al. Fatal granulomatous amoebic encephalitis due to free-living amoebae in two boys in two different hospitals in Lima, Perú. Neuropathology. 2020 Apr;40(2):180-4.

13. Tootla HD, Eley BS, Enslin JMN, Frean JA, Hlela C, Kilborn TN, et al. Balamuthia mandrillaris Granulomatous Amoebic Encephalitis: The first African experience. J Pediatr Infect Dis Soc. 2022 Dec 28;11(12):578-81.

14. Peng L, Zhou Q, Wu Y, Cao X, Lv Z, Su M, et al. A patient with granulomatous amoebic encephalitis caused by Balamuthia mandrillaris survived with two excisions and medication. BMC Infect Dis. 2022 Jan 15;22(1):54.

15. Holguín H. Un niño argentino murió por ameba «come cerebros»; es el primer caso en el país [Internet]. CNN en Español. 2018 [citado 23 de julio de 2023]. Disponible en: https://cnnespanol.cnn.com/2018/02/21/ameba-come-cerebros-argentina-preguntas-respuestas/

16. Solís R. Breve reseña sobre infecciones humanas por amebas de vida libre en Argentina. Rev Argent Microbiol. 2018;7.

FINANCING

None.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

AUTHORSHIP CONTRIBUTION

Conceptualization: Sebastian Leonardo Godoy, Gerardo Laube.
Data curation: Sebastian Leonardo Godoy, Gerardo Laube.
Formal analysis: Sebastian Leonardo Godoy, Gerardo Laube.
Research: Sebastian Leonardo Godoy, Gerardo Laube.
Methodology: Sebastian Leonardo Godoy, Gerardo Laube.
Project Management: Sebastian Leonardo Godoy, Gerardo Laube.
Resources: Sebastian Leonardo Godoy, Gerardo Laube.
Software: Sebastian Leonardo Godoy, Gerardo Laube.
Supervision: Sebastian Leonardo Godoy, Gerardo Laube.
Validation: Sebastian Leonardo Godoy, Gerardo Laube.
Visualization: Sebastian Leonardo Godoy, Gerardo Laube.
Writing - original draft: Sebastian Leonardo Godoy, Gerardo Laube.
Writing - proofreading and editing: Sebastian Leonardo Godoy, Gerardo Laube.

https://doi.org/10.56294/shp202212 ISSN: 3072-7677