New Microbes and New Infections 56 (2024) 101212

Contents lists available at ScienceDirect

New Microbes and New Infections

journal homepage: www.journals.elsevier.com/new-microbes-and-new-infections

Letter to the Editor

Naegleria fowleri, yet again in Pakistan; What should we do about it?

Dear Editor,

Naegleria fowleri (N. fowleri) is the only free-living amoeba (FLA) that causes fatal human disease known as naegleriasis [1]. It is found in contaminated and uncontaminated water sources, swimming pools, hospitals, geothermally heated water, contaminated drinking water and water parks, drinking water distribution systems (DWDS) through pipe wall biofilms, and dental unit waterlines (DUWLs) [2]. Naegleriasis, otherwise known as primary amoebic meningoencephalitis (PAM), is a rare, lethal, necrotizing, fulminant, and hemorrhagic meningoencephalitis with a mortality rate of 95%–97 % [3]. PAM occurs in immunocompetent children and young adults, and death occurs within 3–7 days in unmanaged cases [3]. The term "brain-eating amoeba" is associated with this parasite because its enzymes and toxins cause destruction of neurons in the brain [3]. This acute infection shows similar symptoms to those of viral or bacterial meningitis due to the clinical manifestations presented by a patient such as fever, headache, stiff neck, vomiting, anorexia, and seizures [2].

Unfortunately, this rare and lethal parasite has thrived in Karachi, Pakistan recently, owing to the warm subtropical climate of Karachi, which is its natural habitat [4]. The first recorded case of *Naegleria fowleri* in Pakistan was in 2008, and throughout recent years, is prompting serious concern in the Pakistani population [3]. Karachi recorded 13 occurrences in 2011, with an extra fatal case in 2014 [5]. More recently, another case of PAM was reported in Karachi's Kemari district on May 2nd, 2022, involving a 59-year-old man. Subsequently, towards the end of June, another fatality was reported, followed by the deaths of two patients in July 2022 [4]. In this current year, another case report evidenced a 30-year-old man who died in Lahore, a city housing more than 13 million inhabitants, in early July 2023, after being infected with suspected *Naegleria fowleri*.[4]Additionally, three other cases of *Naegleria fowleri* have been reported in Pakistan in 2023 – all of which were based in Karachi. PAM has only been observed in Muslims in all reported cases in Pakistan [5]. While only two cases were linked to recreational water activities, such as swimming, kayaking, canoeing, etc., [9] the vast majority of cases were not. The infection has also been linked to ablution, a Muslim rite that involves nasal rinsing [3]. Because of the nature of Islamic practices, Muslims, therefore, have a greater incidence of *N. fowleri.* Other nasal irrigation methods, such as sinus cleansing, may also contribute to the infection [4]. The country is already struggling with the aftereffects of monkeypox and COVID-19, and other debilitating diseases like the Marburg virus, etc. So, any additional outbreak would be devastating.

A multistep approach is needed for the Pakistani government to form an infectious expert team to develop standard operating procedures [SOPs] to prevent the spread of Naegleria infections in Pakistan. 'One Health' approach which is an interdisciplinary and multi-professional relationship between human health, animal health, and their shared environment has been helpful in the eradication of diseases like COVID-19, Monkeypox, cholera, etc. [5] Therefore, it is imperative that the Pakistani health authorities follow necessary steps to implement the aforementioned method as a public health policy, through which, physicians, veterinarians, and nutritionists in Pakistan could work together in mitigating the spread and re-occurrence of *N. fowleri* in Pakistan. This approach could be successful by breaking the chain of transmission from the vector to the individuals by developing awareness and continuously promoting healthy habits such as advocating for good food hygiene practices in the household, disinfecting any contaminated water, clearing any stagnant water, cutting down bushes, etc. The team of experts should also be responsible for strategic mass communication, utilizing television, radio, and social media to inform the common people, especially those living in Lahore and Karachi, to always report any signs and symptoms similar to *N. fowleri* as soon as possible. They should be constantly educated that early reports of these symptoms would aid early detection of signs and symptoms of the disease, as well as prompt diagnosis, investigation, and treatment plans for the sufferers. Researchers and scientists in Pakistan should also urge the government to fund further research and aim to develop effective antiparasitic medications against the organism. Our hope is that *N. fowleri* would be put to an end if all our recommendations are implemented by the Pakistani authorities.

Ethics approval and consent to participle

Not applicable.

Consent for publication

Not applicable.

Availability of data and material

Not applicable.

Funding

This research received no specific grant from any funding agency in the public, commercial or not-for-profit sectors.

Research registration unique identifying number (UIN)

1. Name of the registry: not applicable.
2. Unique identifying number or registration ID: not applicable.
3. Hyperlink to your specific registration (must be publicly accessible and will be checked): not applicable.

https://doi.org/10.1016/j.nmni.2023.101212
Received 2 December 2023; Accepted 6 December 2023
Available online 16 December 2023

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Provenance and peer review

Not commissioned, externally peer-reviewed.

Authors' contributions

Conceptualization; MOO and AAK, **Data curation;** AAK, **Formal analysis;** MOO and PB, Funding **acquisition;** MOO and SCU, **Investigation;** AAK, **Methodology;** MOO, **Project administration;** AAK, **Resources; All authors, Software;** MOO, **Supervision;** MOO and PB, **Validation;** All authors, **Visualization; All authors, Roles/Writing - original draft;** AAK, MF, WB, and AJ, **Writing - review & editing;** MOO and PB, **Final approval of manuscript:** All Authors.

Funding

The author did not receive any financial support for this work.

CRediT authorship contribution statement

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Declaration of generative AI and AI-assisted technologies in the writing process

There is nothing to disclose.

Declaration of competing interest

The authors have no competing interests to declare that are relevant to the content of this article.

Acknowledgements

None.

List of Abbreviations

(FLA) Free-living amoebas
(DWDS) Drinking water distribution systems
(PAM) Primary amoebic meningoencephalitis
(SOPs) Standard Operating Procedures.

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Handling Editor: Patricia Schlagenhauf