



F.1-22/Adv/FEDSD/2019

Field Epidemiology & Disease Surveillance Division

National Institute of Health, Islamabad

Phone: (92-051) 9255237 Fax: (92-051) 9255099

National Focal Point for International Health Regulations

Advisory for the Prevention and Control of Primary Amebic Meningo-encephalitis (PAM) / Naegleriasis

Purpose of the Advisory:

The Primary amebic meningoencephalitis (PAM) also called Naegleriasis is a disease of the central nervous system caused by the free-living ameba *Naegleria fowleri*. Although considered a rare globally, the disease is almost invariably fatal. Deaths related to PAM have been regularly reported from tertiary care hospitals of Karachi during summers since 2008. Despite surveillance limitations, a total of 88 cases are on record in Pakistan in last 10 years with a case fatality rate of 100%.

High temperatures during early summer in Karachi this year have led to 3 reported deaths due to Naegleriasis so far; all being adult males. To mitigate the risks associated with the hot season ahead, it is imperative to undertake immediate and long term preventive measures in mega cities particularly Karachi. Vigilant surveillance is also imperative to pick the suspected cases for disease confirmation and ensuring aggressive measures to interrupt further transmission.

The objective of this advisory is to alert the public health authorities, water and sanitation agencies and other relevant stakeholders to undertake necessary steps for prevention and control of PAM across Pakistan especially Karachi.

Basic Information:

N. fowleri (also known as brain eating ameba) is a single-celled, thermophilic, free-living pathogen found widely in freshwater environments i.e. warm bodies of fresh water, such as lakes, rivers, hot springs and even in soil. Despite lower incidence, the PAM disease is also widely distributed in tropical areas and mostly occurs during hot summer months. Most cases of PAM arise from freshwater sources (lakes, pools) but an increasing number are now linked to drinking water systems.

The infection results from water containing *N. fowleri* entering the nasal cavity, followed by migration of the amebae to the brain via the olfactory nerve. Within the brain, *N. fowleri* causes extensive inflammation, hemorrhage, and necrosis, leading to death in 3 to 7 days.

Clinical presentation:

Incubation period ranges from 2-3 days only to 7-15 days, The Clinical features of PAM are quite similar to meningitis with initial presentation of sudden onset of bifrontal or bitemporal headaches, high fever, nuchal rigidity, anorexia, vomiting, irritability and restlessness. Other symptoms such as photophobia, neurological abnormalities, including altered mental status, ataxia, cranial nerve palsy, hallucinations, delirium, coma usually occur late in the clinical course leading to death in 3-7 days.

Contd on P/2

Diagnosis:

The diagnosis is based on history, clinical examination, signs and symptoms. CSF sample may be collected for microscopy and advanced referral testing. Because of the rarity of the infection and difficulty in initial detection, about 75% of case diagnoses are made after the death of the patient.

Naegleria fowleri infection can be diagnosed in the laboratory by detecting:

- *Naegleria fowleri* organisms in cerebrospinal fluid (CSF), biopsy, or tissue specimens, or
- *Naegleria fowleri* nucleic acid in CSF, biopsy, or tissue specimens, or
- *Naegleria fowleri* antigen in CSF, biopsy, or tissue specimens.

Water samples can also be collected, concentrated, and put into culture to grow and select for *Naegleria fowleri*. Samples can also be tested using the culture or molecular methods described above.

Medical Treatment:

- Suspected cases should immediately be reported to health authorities for corrective measures.
- Rapid diagnosis and intensive supportive care may provide the likelihood of survival. In few such documented cases, the combination of 3 drugs; **Amphotericin B** (IV/Intrathecal), Rifampicin (Oral 10 mg/ Kg/day) and **Fluconazole** (IV/ oral 10 mg/ kg/ day) was used along with **steroids**.
- Azithromycin has both in vitro and in vivo efficacy against *Naegleria fowleri* and may be tried as an adjunct to Amphotericin B. Recently, Miltefosine has also shown some in vitro ameba-killing activity against free-living amebae, including *Naegleria fowleri*.

Prevention & Control measures:

- *Naegleria fowleri* cannot survive in clean, cool and chlorinated water. Chlorine kills *Naegleria fowleri* and is the most effective way to disinfect swimming pools and reticulated water supplies.
- Community education and awareness raising assumes significance in known endemic areas. Key recommended messages may include:
 - Avoid jumping or diving into warm fresh water or thermal pools and keeping the head above water in spas, thermal pools and warm fresh water.
 - Empty and clean small collapsible wading pools daily.
 - Ensure swimming pools and spas are adequately chlorinated and well maintained.
 - If using un-chlorinated water, don't allow water to go up in nose when bathing, showering or washing the face.
- Potentially contaminated water should not be used for any form of nasal irrigation or nasal lavage.

Contd on P/3

Advise for water utilities:

- Water supplies at risk including reticulated raw and drinking water, lakes, dams, bores, tanks, reservoirs, pipelines, and swimming pools that are poorly maintained, under or un-chlorinated.
- Proper design, management and cleaning of assets (e.g. pipes and storage tanks) is required to minimize the sediment (which may harbour *Naegleria* cysts) and reduce water stagnation (which may lead to loss of disinfectant residual).

Chlorination:

- Water supplies at risk of *N. fowleri* must ensure adequate primary disinfection and maintain a chlorine residual of at least 0.5 mg/L at all times, in all parts of the distribution system.
- Regularly monitor the water temperature and chlorine residual throughout the distribution system. Periodic testing for *Naegleria fowleri* can be carried out in at risk systems.

Disease Surveillance and Notification:

Surveillance and notification of PAM infection should be enhanced with the dissemination of standard case definitions and diagnostics to areas of transmission and areas at risk.

Risk Communications:

Symptoms of *N. fowleri* infection are clinically similar to viral & bacterial meningitis and these conditions are much more common than amoebic meningoencephalitis. Making doctors aware about the disease may therefore, improve case detection and provide insight into human or environmental determinants of infection and allow improved assessment of treatment effectiveness.

Health Education:

Awareness and education in the affected areas must also be undertaken to educate people on requisite preventive measures. Households should also be warned of the potential risk, if adequate disinfection cannot be maintained throughout the distribution system

Specific Actions requested by the NIH:

1. The NIH has already alerted about PAM in the 44th issue of Seasonal Awareness and Alert Letter (SAAL) disseminated to the healthcare providers and relevant authorities during March 2019. With the advent of summer, it is imperative that the concerned public sector departments enhance the preventive efforts / steps.
2. The situation may please be continuously monitored and updates along with the actions taken be kindly communicated to the NIH regularly on phone No. +92-51-9255237, Fax: +92-51-9255575, E-mail: eic.nih@gmail.com.
3. The above 'Advisory' may please be circulated widely to all concerned.