

The Transmission and Diagnosis of Silent Mind Intruder: *Naegleria fowleri*

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ABSTRACT

Primary Amebic Meningoencephalitis is a zoonotic disease which widely distributed in tropical areas. The causative agent of PAM is *Negleria (N.) fowleri* which is named a brain-eating amoeba. This amoeba is important in both the medical and veterinary fields. The nasal route is most important for the transmission of disease. It can cause death within a week. No specific treatment is available for PAM. Prevention and mitigation actions are key in controlling *N. fowleri*.

Introduction:

N. fowleri is an amoeba that causes primary amoebic meningoencephalitis (PAM). Only 1 species of the genus *Naegleria* is considered as pathogenic. Heat-loving *Naegleria* grows best at temperatures above 115°F. It shows 3 forms in its life cycle including flagellated form, amoeboid form, and cyst form. It causes an infection in the central nervous system that shows its signs 24 hours after contact with the amoeba (1). In Pakistan, *N. fowleri* took its 1st life in Punjab in 2008. Mustafa shafique 30 year 30-year-old patient who was affected by *Naegleria* passed away at the services hospital in Lahore. Molecular genotype studies revealed that Pakistani *N. fowleri* belongs to type 2.

Route of Transmission

N. fowleri enters the body through nasal routes only it cannot cause infection when enter the body through oral route. Amoeba penetrates the nasal epithelium and start moving towards the olfactory nerves causing PAM and spread in brain through binary fission [2] and also produce encyst along with flagellated form which cannot further reproduce and spread to whole brain and cause destruction. It occurs when head is under water or get into nose by such activities such as in swimming, ablution, sinus rinsing with contaminated water moreover while deep diving in water. [3]

Signs and Symptoms

N. fowleri shows its symptoms in 24 hours after the inflammation of brain and destruction of brain cell occur that's why it is known as brain eating amoeba which can lead to death within 7days. Moreover, it causes rise in body temperature, nausea, vomiting, loss of coordination, rigidity of neck muscle, intolerance to light, awful headache, delusion, lethargy or somnolence, puzzled etc [4]

Prevention

People should avoid swimming and diving deep into the warm fresh water and thermally polluted water. Wash household water tanks with chlorine at the concentrations of 1mg/L at weakly basis. People should also use sterile or boiled water. Water filter can also be used to prevent PAM.

Diagnose

Following methods of diagnosis are available for *N. fowleri* [6]

Antigen Detection: Specific antibodies can be used in conjugation with immunohistochemistry or immunofluorescence to directly check the *N. fowleri* antigen. **Magnetic resonance Imaging (MRI):** MRI gives the best soft tissue contrast. Through Radiofrequency field and magnetic resonance, we can get comprehensive information about the presence of amoeba.

Computed tomography (CT): Computed tomography uses X-rays to give cross-sectional images of different body parts. It may show evidence of its presence in three-dimensional images of the brain. **Microscopy:**

Cerebrospinal fluid is taken out through lumber puncture which is taken out through the vertebrae to put it on slide *naegleria* can be seen under the microscope. **PCR:** PCR can be used to amplify the DNA of *N. fowleri* in CSF or brain tissue. **Amoeba Culture:** Water samples can be collected and contrated material put into the culture to grow amoeba and check.

Medication

The survival rate of *N. fowleri* affected is very low. It can be treated if detected at early stages otherwise very difficult to treat. There is no specific treatment of *N. fowleri* present yet but treatment with combination includes Amphotericin B, Azithromycin, Fluconazole, Rifampin, and Miltefosine [7].

Conclusion

As *N. fowleri* is an emerging parasite that can cause fatal diseases of the central nervous system all over the world. Concretely, the adoption of control strategies is key element in reducing disease transmission. As there greater risk of mortality symptomatic treatment should be started as soon as

possible. It can be prevented by cleaning swimming pools and household water tanks with chlorine.

References

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