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Letter to Editor

Navigating Naegleria Fowleri: Understanding Pathogenesis, Causes and Preventive Measures

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A B S T R A C T

Exploring Naegleria fowleri's complexities in pathogenesis, causes, and prevention, this study emphasizes the critical importance of awareness and proactive strategies. Primary Amoebic Meningoencephalitis (PAM), triggered by this brain-eating amoeba, necessitates keen attention to transmission risks via water, soil, and dust, particularly in the context of rising global temperatures. While miltefosine and amphotericin display promise in treatment, early diagnosis remains pivotal for enhanced survival rates. The paper also illuminates the under discussed role of the proteasome in Naegleria. By understanding infection sources, pathogenesis, and available treatments, a more effective collective approach emerges to mitigate the impact of this rare yet potent threat to human health.

Keywords: Naegleria fowleri; Pathogenesis; Primary amoebic meningoencephalitis

Dear Editor, I'm writing to raise awareness of Primary Amoebic Meningoencephalitis (PAM), which is brought on by the brain-eating amoeba Naegleria fowleria. To effectively regulate it, its maximum level of prevention and awareness must be properly grasped. Essential amoebic meningoencephalitis (PAM) is an intense and fulminant CNS (Central Nervous System) disease brought about by Naegleria fowleri. Naegleria fowleri is a protist microorganism that can cause destructive frontal cortex infection. The amoebae go through the nose to enter the central tactile framework taking out the host in the blink of an eye, making it perhaps the deadliest spearheading parasite. Naegleria fowleri (N. fowleri) produces microscopic lipid vesicles known as extracellular vesicles (EVs). Rat polyclonal antibodies produced against N. fowleri showed the greatest identification of antigenic proteins in the region around 80 KDa, which had peptidases. Serine proteases were found to predominate in protease activity testing[1]. There are three stages in the biological cycle of the Naegleria, which are common free-living amoebae. These stages are trophozoite, cyst, and flagellate. Only Naegleria fowleri has been identified in this genus as being pathogenic to humans. The most significant structure in charge of the breakdown of intracellular proteins is the multi-catalytic complex known as the proteasome. This structure has something to do with cellular homeostasis maintenance and, in pathogenic bacteria, virulence regulation. The proteasome and its role in the Naegleria genus have not yet been discussed. Protein sequences like those reported for the subunits of the 20S proteasome in other animals were found in the current work using bioinformatic analysis, and virtual modelling was utilized to establish[2].

Primary amoebic meningoencephalitis is primarily transmitted through water, although another method of infection is through soil and dust. Naegleria fowleri is the causative agent of PAM, a severe and rapidly progressive CNS illness. The primary causes of PAM are recreational activities and ritual washing with contaminated warm fresh water. This amoeba poses a higher

threat to human health as surface water temperatures rise due to climate change. Most infections occur when people swim, dive, or submerge their heads in warm freshwater environments like lakes and rivers[3]. Amphotericin B, fluconazole, and rifampicin were administered intravenously for the treatment of Naegleria fowleri meningoencephalitis. The Communities for Infectious prevention and Avoidance (CDC) was reached, and miltefosine, an investigational prescription, was begun. Extra treatment remembered an intraventricular shunt and controlled hypothermia for request to alleviate possible cerebral edema. The chances for prospective techniques in the treatment and diagnosis of these fatal Naegleria fowleri infections, existing chemotherapeutic opportunities are potential for treatment strategy. Early diagnosis (minimal deeper tissue involvement) and intensive antimicrobial chemotherapy were factors in the patient's favourable prognosis. Miltefosine and amphotericin have both been recommended as effective PAM combatants[4].

Primary Amoebic Meningoencephalitis, a devastating but rare disease that primarily affects young adults in wealthy nations but has also lately been reported from poor nations, with a 95%–99% mortality rate. Swimmers and divers are particularly vulnerable to PAM since N. fowleri has evolved best to warm water. Death occurs 3 to 7 days after the brain damage, which causes cerebral hemorrhage. Different treatment regimens have been used to control this potentially fatal infection, but the survival rate is still just 5%, which is attributed to the misdiagnosis of PAM because its symptoms are like those of bacterial meningitis[5].

Treatment for PAM patients with amphotericin, rifampin, azithromycin, fluconazole and forceful strong treatment including dexamethasone. Three of the 34 inhibitors likewise showed inhibitory action against N. fowleri in a cell suitability measure and were 1.6-to 2.5-crease more powerful than the norm of care drug miltefosine. The study gives the main proof of the action of manufactured, little particle cysteine protease inhibitors against N. fowleri. The azole class of chemicals is used in medicine and has a wide range of antibacterial characteristics. Six novel benzimidazole, indazole, and tetrazole derivatives were created and tested in this work against amoebae. The amoebic and static effects of these substances on N. fowleri were examined. Azole compounds show strong action against B. mandrillaris and N. fowleri. The effectiveness of the azole compounds against amoebae was further enhanced by conjugating them with silver nanoparticles[6].

In summary, delving into Naegleria fowleri's pathogenesis, causes, and prevention highlights the crucial importance of awareness and proactive measures. As we confront this brain-eating amoeba, recognizing the risks in recreational water activities and embracing early diagnosis remains pivotal. While treatments like miltefosine and amphotericin show promise, continued research and a collective effort to understand and address this threat are essential for safeguarding public health against Primary Amoebic Meningoencephalitis.

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