Is Ritual Cleansing a Missing Link Between Fatal Infection and Brain-Eating Amoebae?

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Is ritual cleansing a missing link between fatal infection and brain eating amoeba?

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Every summer, we witness the death of young males due to single-celled protist, *Naegleria fowleri*, also known as “brain-eating amoeba” [1-3]. Amoebic encephalitis is reported in people who swim in freshwater during summer months [4-6]. Amoeba invades the nervous system via the nose, when contaminated water is deeply inhaled. Invasion of the nasal mucosa is followed by migration along nerve fibers, and invasion of the olfactory bulb. Amoeba travels along the olfactory neuroepithelium route through the floor of the cranium via the cribriform plate and into the brain to produce haemorrhaging resulting in fatal consequences within days [4-6]. Within a week of contracting infection, the victim develops symptoms such as headache, fever, nausea, stiff neck, confusion, seizures, and hallucinations [4-6]. The brain image analyses of PAM patients are unremarkable. The death almost always follows within days, even with pre-mortem diagnosis, due to lack of effective treatment.

In addition to exposure to warm recreational waters, ritual ablution is a potential risk factor in contracting PAM in Muslim communities. This religious practice involves repeated irrigation of mouth, ears, face, arms, feet and nostrils for cleansing. Some people irrigate their sinuses vehemently by pushing water forcefully up the nostrils even though it is not required as part of the ablution practice. The developing countries such as Pakistan face serious water scarcity and thus increased public reliance on water storage tanks/wells that are breeding grounds for pathogenic free-living amoebae such as *N. fowleri*. The water supplied by municipalities suffers from older plumbing and poor maintenance/treatment [7-8]. The situation is exacerbated by a warm climate that favors growth amoebae. For the first time in Karachi, Pakistan, Shakoor et al., [9] reported 20 deaths due to *N. fowleri* infection from a small hospital in 2010 alone. All patients were males but none of them had a history of swimming. All patients were devout Muslims, who performed ritual ablution regularly. Although Muslims comprise the largest
population in Karachi, it is a cosmopolitan city with people of all faiths being exposed to common water supplies, yet Muslim communities only were the target of this fatal infection. Thus it is tempting to speculate that ritual ablution is a potential risk factor in contracting PAM. The poor water quality combined with rigorous ablution practice could be a deadly combination. It is disturbing that such an alarming number of deaths were reported from a private hospital in Karachi suggesting that state of affairs must be calamitous in poor rural communities. It is likely that a vast number of infections are undetected and the actual burden is significantly higher. Notably, \textit{N. fowleri} and \textit{Acanthamoeba} spp. were isolated in our laboratory from water supplies in Karachi.

Ritual ablution with clean water supplies can have immense medical benefits in decontaminating body of pathogenic microbes, heavy metals etc. but it is only effective when clean water is used. The use of safe water (at least boiled) together with cautious ablution and/or sinus irrigation is desired to prevent fatal brain infection due to pathogenic free-living amoebae.
References


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