

Contamination of Swimming Pools and Park Ponds to Free Living Amoebae in Tehran - Iran

Mafi M*, Niyiyati M, Haghghi A, and Lasjerdi Z

Abstract— Free-living amoebae (FLA) include various genera which could habitat in water sources and some could lead to severe complications in high risk people. The present study aimed to isolate free living amoebae using morphological methods in recreational water sources of Tehran. This cross sectional study was performed in 2014 during 8 months. Seventy five samples were collected and filtered. Samples were cultured and then monitored for the presence of amoebae daily and positive plates were cloned. In the present study identification were based on morphological criteria and page key. The page key is based on morphological character of free living amoebae such as trophozoites shape, pseudopodia shape and amoebae nucleus, endo and ecto-cysts in the cystic form. These criteria could lead to identification of amoeba at the family and genus level. Out of 75 water samples, 18 (24 %) were positive for free living amoebae. Of 40 pond waters, 13 (32.5%) were positive including *Acanthamoeba*, *Hartmannella* and *Vahlkampfiids* (*Naegleria*) and out of 35 samples 5 (14.2%) strain belonging to *Acanthamoeba* were identified based on morphological criteria. According to presence of free living amoebae in recreational water sources it is necessary to alert swimming pools authorities and high risk people. Additionally, posting of alarming sign and education to high risk people is of utmost importance to prevent free living amoebae-related infections.

Index Terms— *Acanthamoeba*, *Naegleria*, *Hartmannella*, *Water sources*, *Tehran*.

I. INTRODUCTION

Free-living amoebae (FLA), ubiquitous and widely distributed protozoa, has symbiotic relationship with human beings [1]. These amoebae are common cause of cornea and nervous system infection resulting in blindness and death[2]. Free-living amoebae include such families as Acanthamoebidae, Vannellidae and Vahlkampfiidae. Among them, *Acanthamoeba spp.* are an opportunistic amphizoic protozoa, commonly found in the environment. Researchers showed that *Acanthamoeba* can be found in different environmental sources such as water, soil, sewage, and swimming pool [3]. *Acanthamoeba keratitis* is a

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vision-threatening infection caused by pathogenic species of the genus *Acanthamoeba* and is increasing in Iran [4], [5]. Central nervous system infection with free-living amoebae is rare [6]. Recent studies on free living amoebae infection of water sources in Tehran revealed that 27% of these sources were infected by free living amoebae among which *Acanthamoeba* accounted for 80% of infection [7]. There are also similar reports in various regions in Iran [8], [9]. *Acanthamoeba* infection is also associated with disease in immunocompetent children [10]. Since infection of water sources by free living amoebae causes damage to public health, this study was exerted to determine the contamination of water sources with free living amoebae in Tehran – Iran.

II. MATERIAL AND METHODS

This cross sectional study was performed in 2014 during 8 months. Seventy five samples in Tehran were collected and filtered. Samples were cultured in 1.5 % non-nutrient bacto-agar. Plates were then monitored for the presence of amoebae daily and positive plates were cloned. In the present study identification were based on morphological criteria and page key. The page key is based on morphological character of free living amoebae such as trophozoites shape, pseudopodia shape and amoebae nucleus, endo and ecto-cysts in the cystic form. These criteria could lead to identification of amoeba at the family and genus level [11]-[13].

III. RESULTS

Out of 75 water samples, 18 (24 %) were positive for free living amoebae. Of 40 pond waters, 13 (32.5%) were positive including *Acanthamoeba*, *Hartmannella* and *Vahlkampfiids* (*Naegleria*) and out of 35 samples 5 (14.2%) strain belonging to *Acanthamoeba* were identified based on morphological criteria (Figures I - IV).

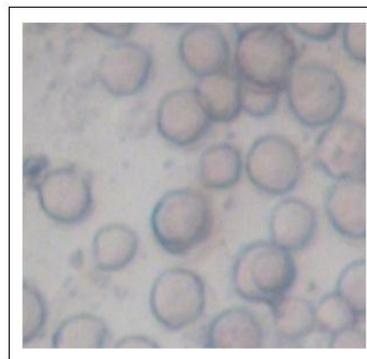


Fig.I. *Naegleria* Cysts (×40)

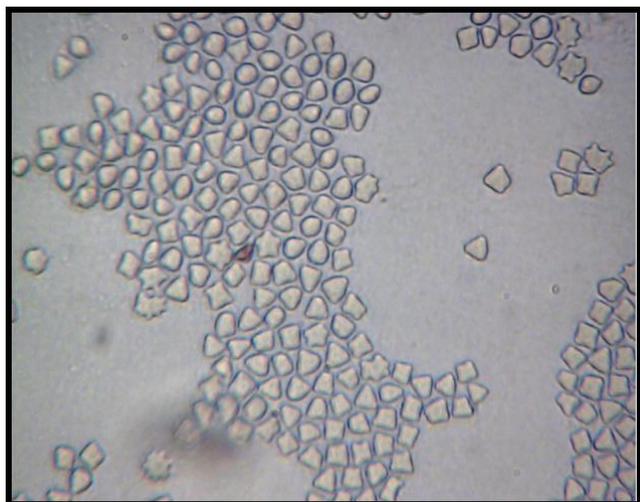


Fig.II. Acanthamoeba Cysts (×40)



Fig.III. Hartmannella Cysts (×40)

IV. DISCUSSION

This study indicated the considerable contamination of recreational water sources in Tehran, Iran with free living amoebae. In line with our findings there are studies reporting the presence of free living amoebae including *Acanthamoeba* in drinking water, swimming pools, and rivers [8], [14]- [16] in Iran. Our finding also reveals that even chlorinated swimming pools may contain free living bacteria endangering human health. In the study carried out to investigate the distribution of free-living amoebae in a treatment system of textile industrial wastewater, the amoebae could not form cysts [17], while in our study *Acanthamoeba* infection was observed more than other amoebae infections. In line with this finding there are other reports indicating that higher frequency of *Acanthamoeba* infection [19].

V. CONCLUSION

According to presence of free living amoebae in recreational water sources it is necessary to alert swimming pools authorities and high risk people. Additionally, posting of alarming sign and education to high risk people is of utmost importance to prevent free living amoebae-related infections.

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