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EDITORIAL

# Acanthamoeba; A Potential Reservoir for Environmental Transmission of COVID-19 with Public Health Significance: Pros and Corns

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An emergent pneumonia outbreak took place during December 2019, which was spread rapidly worldwide. On January 3, 2020, World Health Organization declared it a public health emergency of international concern worldwide as pneumonia outbreak. The novel coronavirus (SARS-CoV-2 or COVID-19), usually transmitted by means of direct transmission (coughing, droplet inhalation and sneezing) and/or contact transmission (contact with oral, nasal and eye mucous membranes), suggests that the transmission of COVID-19 is not restricted to the respiratory tract only. Furthermore, it has also been proven that COVID-19 is a more stable and viable virus (survives up to 72 hours) compared with SARS-CoV-1 (the most closely related human Coronavirus) based on their aerosol and surface stability. The interaction between various microbes (amoeba, bacteria, fungi and virus, *etc*.) in the same environment (air, soil and water) is not a novel concept. It is well-established notion that Acanthamoeba facilitate bacterial [1] and viral [2] transmission and may provide protection against the human immune system. The capability of Acanthamoeba to tolerate severe extreme temperatures, pH, and osmolarity conditions especially during their cyst stage (which eventually can survive more than 20 years) suggesting their worth as a vector or vehicle for other pathogenic microbes like bacteria and virus. Although there are no such reports available in literature showing the pathogenic potential of virus after hosted by amoeba. But it does demonstrate the bacterial virulence potential after hosted by Acanthamoeba *i.e*., *Mycobacterium avium* revealed increased motility, virulence and drug resistance after being hosted by Acanthamoeba [3].

Acanthamoeba is a free-living protozoan pathogen, widely distributed in nature and plays a predatory role in ecosystem. It has been isolated from diverse environmental sources (air, dust, soil and water) and recognized as one of the most ubiquitous organisms on earth. To date, Acanthamoeba has been recovered from all seven continents, including Antarctica, which is due to its adaptability to withstand diverse environmental conditions by switching their phenotype. Due to its widespread distribution, it is reasonable to predict the possibility of amoeba to interact with COVID-19 in the environment during this pandemic. Keeping in mind the free-living nature of the organisms, we come across Acanthamoeba in our daily life through air, soil and water. The author is concerned if COVID-19 is hosted by Acanthamoeba which could turn out to another novel strain in upcoming days. There is a potential danger that Acanthamoeba may be used as a breeding ground for COVID-19. This also further reminds the author about the ruthlessness of dengue, polio and mycobacterium in Third World Countries (TWC) for decades. There is apparent evidence describing the hosting of polio virus and mycobacterium by Acanthamoeba [3, 4]. Literature further confirms TWC environment is contaminated with Acanth-amoeba [5] and the author presumes amoeba may serve as a vector for proliferation and dissemination of underlines pathogenic microbes to the various environments in TWC which need to be further investigated urgently.

Being Parasitologists, we believe if the current pandemic is a natural catastrophe, it will be neutralized by nature itself with time. Furthermore, due to this pandemic mostly general public will get immunized naturally due to their direct exposure to COVID-19 or indirectly through Acanthamoeba (if it carries COVID-19) while some may be infected badly (especially older adults already have other health challenges). It is a well established fact that we are exposed directly (*via* mouth, nose and eyes) to Acanthamoeba everyday through drinking water, air conditioning units, dental and dialysis units, contact lens solutions and eyewash stations and chlorinated swimming pools, *etc*. [5]. Furthermore, recent studies have confirmed the same routes of COVID-19 entry into humans too, suggesting the maximum chances of human interactions with COVID-19 through amoeba as described above. Moreover, the authors believe that we may experience further episodes of pandemic

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in future which may be most probably virus come out after hosted by Acanthamoeba. Overall, author believes COVID-19 (in the current or future modified strains after being hosted by amoeba) will exhibit in our surroundings for a long time which will ultimately help the community during upcoming episodes (if any) due to acquired immunity against it.

Surprisingly, there are few reports of the identification of diverse strains of corona virus from different countries during this pandemic? For instance, few reports demonstrate the strains reported in Europe are different from China (recently spread from Wahan) and established more resemblance with strains in Gulf countries instead. Furthermore, strains reported from Iran are different from China (Wahan), which forced the author to highlight this matter to the scientific community. There could be various explanations for this but the author still believes "Acanthamoeba" could be the missing link too, which needs further investigation urgently to confirm the author's claim. Furthermore, the author also anticipates veterinary scientists to evaluate the potential effect of COVID-19 on animals, if any. Overall, amoebic research is very limited worldwide and virtually none in the TWC. In this context, the author draws attention to the relevant funding agencies, research and education institutions to promote amoebic research worldwide which eventually enhance our knowledge about upcoming various microbial threats.

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