Journal of Infection and Public Health 12 (2019) 104–105

Contents lists available at ScienceDirect

Journal of Infection and Public Health

journal homepage: http://www.elsevier.com/locate/jiph

Letter to the Editor

Hot springs as sources of infection: An environment overlooked by public health practitioners

Dear Editor,

Infectious diseases are an important public health problem and are currently a topic of special interest for governments when implementing public health policies. To prevent infectious diseases it is important to know both the mechanisms and transmission vehicles involved in the pathogenesis, which include other people, animals, food, air and contaminated waters, in order to intervene in these aspects [1].

In Colombia the quality standards for recreational waters are regulated; however, recently we conducted a study in a recreational thermal pool located one hour from the capital of the country where we collected 11 water samples during a month and a half. These were cultivated for identification of possible pathogens (Fig. 1); 100% of Total Coliform cultures does not satisfy minimum requirements for health according to WHO guidelines [7], as do 100% of *Pseudomonas* cultures, 89% of *E. coli* cultures and 75% of Heterotrophic Bacteria cultures.

As in other studies, we consider that some populations at risk (very young children, elderly, pregnant women and people with impaired immune systems) should avoid natural pools because of the fecal contamination that may be present in the pool [4], more studies are needed to evaluate the impact of such contamination in the general population as well as those with risk factors. Likewise, it is important that regulatory entities in public health have a greater presence in these sites and propose new strategies in order to facilitate the quality control of hot water springs.

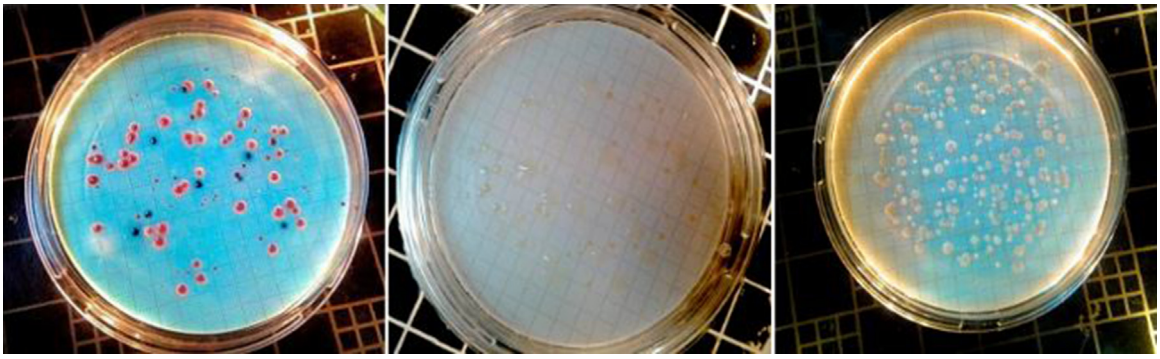

Fig. 1. Pathogen cultures isolated from Colombian hot springs. (A) EMD Millipore m-ColiBlue24™ Broth Culture Media that shows growth of Total Coliforms (red colonies) and *E. coli* (blue colonies). (B) Tryptone Glucose Extract Agar that shows growth of Heterotrophic Bacteria. (C) Millipore Pseudomonas selective broth with Pseudomonas colonies.

Thermal waters and recreational hot springs has been recognized as sources of infection in previous studies. The first primary amebic meningoencephalitis associated with recreational hot springs was identified in a Taiwanese patient in November 2011 who acquired the infection of contaminated waters with *Naegleria* spp. and *Acanthamoeba* spp. [2]. Likewise two articles of microbiological analysis of thermal waters were published in 2013, the first one describes the indentification of *Legionella pneumophila* in three Tunisian hot spring water recreation areas by conventional culture on glycine-vancomycin-polymyxin B-cycloheximide medium and by real-time polymerase chain reaction [3]. The second one was a microbiological analysis in three diverse natural geothermal bathing pools in Iceland, which identified fecal coliforms, *Escherichia coli*, *Pseudomonas* spp., *Enterococcus* spp., *Staphylococcus aureus* and norovirus [4]; both studies emphasize the importance of adopting control measures to prevent the infection associated with these environments in the community. In some countries there are no laws regulating the treatment of thermal pool waters and in those there are, several limitations for the monitoring of minimum quality standards have been identified [5,6].

Funding

The culture media was facilitated by the laboratories of the university *"Escuela Colombiana de Ingeniería Julio Garavito"*.

Competing interests

None declared.

Ethical approval

Not required.

https://doi.org/10.1016/j.jiph.2018.11.006
1876-0341/© 2018 Published by Elsevier Limited on behalf of King Saud Bin Abdulaziz University for Health Sciences. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).

References

[1] Barreto ML. Infectious diseases epidemiology. J Epidemiol Community Health 2006;60:192–5, http://dx.doi.org/10.1136/jech.2003.011593.

[2] Tung MC, Hsu BM, Tao CW, Lin WC, Tsai HF, Ji Der D, et al. Identification and significance of *Naegleria fowleri* isolated from the hot spring which related to the first primary amebic meningoencephalitis (PAM) patient in Taiwan. Int J Parasitol 2013;43:691–6, http://dx.doi.org/10.1016/j.ijpara.2013.01.012.

[3] Ghrairi T, Chaftar N, Jarraud S, Berjeaud JM, Hani K, Frere J. Diversity of legionellae strains from Tunisian hot spring water. Res Microbiol 2013;164:342–50, http://dx.doi.org/10.1016/j.resmic.2013.01.002.

[4] Thorolfsdottir BOT, Marteinsson VT. Microbiological analysis in three diverse natural geothermal bathing pools in Iceland. Int J Environ Res Public Health 2013;10:1085–99, http://dx.doi.org/10.3390/ijerph10031085.

[5] Signorelli C, Pasquarella C, Saccani E, Sansebastiano G. Treatment of thermal pool waters. Ig Sanita Pubbl 2006;62:539–52 https://www.ncbi.nlm.nih.gov/pubmed/17206228.

[6] McClung R, Roth D, Vigar M, Roberts V, Kahler A, Cooley L, et al. Waterborne disease outbreaks associated with environmental and undetermined exposures to water — United States, 2013–2014. MMWR 2017;66:1222–5, http://dx.doi.org/10.15585/mmwr.mm6644a4.

[7] World Health Organization. Guidelines for safe recreational water environments: volume 2. Swimming pools and similar environments. Vol. 2; 2006. Geneva, Switzerland http://www.who.int/water_sanitation_health/bathing/srwe2full.pdf.

David E. Rebellón Sánchez*
Universidad Pedagógica y Tecnológica de Colombia (UPTC), Grupo de Investigación en Epidemiología Clínica de Colombia (GRECO), Grupo de Análisis de Resistencia Bacteriana de Boyacá (GRAB), Colombia

Amalia Avendaño Sánchez
Escuela Colombiana De Ingeniería Julio Garavito, Colombia

Yardany R. Mendez Fandiño
Hospital Regional de Duitama, Duitama, Boyacá, Colombia

* Corresponding author at: Hospital Regional de Duitama, Av. Américas, Carrera 35, Duitama Boyacá, Colombia.
E-mail addresses: david.rebellon@uptc.edu.co (D.E. Rebellón Sánchez), amalia0691@hotmail.com (A. Avendaño Sánchez), yardanymendezf@yahoo.es (Y.R. Mendez Fandiño).

23 February 2018