

## Abstract

Thermal/cool spring tubs have become a popular means of recreation. Indeed, it has been reported that many people in Taiwan have purchased spring tubs since 1990. Human contact with aquatic environments can clearly introduce pathogenic and nonpathogenic microorganisms, including bacterial, viral, and protozoan parasites. The concentration and persistence of these organisms in spring tubs are subject to a number of complex factors. Numerous reports of illnesses related to spring tub use suggest the necessity for continued vigilance over maintenance practices. Contamination of thermal/cool spring tub water during high pathogen loading events (e.g., excessive bather loading, or an accidental fecal release) can temporarily compromise the ability of the system to remove pathogenic organisms. Contact with this contaminated water can result in skin, ear, or eye infections and, if the water is ingested, can lead to gastrointestinal illness. Therefore, it is important to realize the water quality and management of Taiwan spring tubs.

In this study, we have surveyed the thermal/cool spring tubs around Taiwan. A total of ninety-six spring water samples were taken from six prescreened locations. The evaluated items include the surrounding factors near around the tubs, physical water quality parameters, microorganism indicators and the pathogenic microorganism- *Entamoeba histolytica*. The detecting methods for microbiological parameters are according to the standard method published by Environmental Analysis Laboratory of Taiwan EPA. The detection methods of *Entamoeba histolytica* are ELISA and PCR, which were revised from journal papers. *Entamoeba histolytica* were absent in all eighteen tested samples, however, all the microorganism parameters were detected in the highly percentage. Spring tubs may contain a wide range of microorganisms. Although the individuals using the spring water introduce most of these organisms, some may also be introduced from the source water or from contamination by surrounding environmental sources. Most parasite microorganisms are from the excretion of users. Illnesses associated with spring usage include those caused by bacterial, viral, and protozoan organisms, such as *Entamoeba histolytica*, *Pseudomonas aeruginosa*, *Legionella*, *Yersinia*, *Giardia*, *Cryptosporidium*, adenoviruses and hepatitis A virus. Elevated temperatures, filtration, and disinfectants are used to control microorganisms in spring tubs. In Taiwan, the spring water quality is generally maintained by continuous outflow. Disinfectants are probably the single most important factor in controlling contact with pathogenic

microorganisms. However, low percentage of the spring tubes proprietor used disinfectants in Taiwan. Microorganisms may be added to the spring tubes indirectly, as a result of the shedding of organisms from the skin surfaces of bathers, or directly, from accidental fecal releases. Proper maintenance of spring tubs is essential in the control of microbial disease. In recognition of potential illnesses associated with the use of spring tubs, to develop guidelines then minimize the risk is needed. Although most illnesses are generally self-limiting for immunocompetent individuals, the government has responsibility to indicated people that how much risk of developing severe or life-threatening disease.

**Keywords : Thermal spring ; Entamba ; Indicator microorganism**