

Exploration of unexplored microbial contaminations in Potable waters: Rapid detection and prevention

Pavan Kumar Pindi*

Fellow, TAS

Professor, Department of Microbiology, Palamuru University, Mahabubnagar, Telangana State,
India-509 001, pavankumarpindi@gmail.com, +91-98493-27029

ABSTRACT

Globally 160 million children suffer from stunting and chronic malnutrition linked to water. Lack of access to safe water by school-going children is likely to contract various emerging diseases like typhoid, cholera, diarrhea, etc. Henceforth, there is an utmost need for the exploitation of uncultivable pathogens and rapid detection. Furthermore, fetal exposure to emerging microbial and chemical contaminations increases the risk of child's brain damage, lower IQ and immunity, learning disabilities or developmental problems. All the primary government schools of 64 mandals in Mahabubnagar district in Telangana state were surveyed for water quality and hygiene. The main sources of supply of water to these schools being Ramanpadu and Koilsagar reservoirs were studied further. Evaluation of coliforms and non-coliforms contamination of these two reservoirs both by cultivable and uncultivable methods was done which included standardization of DNA isolation protocols for DGGE and generation of clone/metagenomic libraries. Ramanpadu yielded more genera of bacterial pathogens than Koilsagar in both cases DGGE (37 species belonging to 5 coliform and 3 non-coliform genera EMBL-RP; LT592288- LT59327) and clone libraries (53 species belonging to 5 coliform genera and 7 non coliform genera NCBI-RP; KR612007-KR612048) which further proved for the necessity of water treatment. In cultivable assessment, 23 species belonging to 5 non-coliform and 3 coliform genera (NCBI; GU566304-GU566358) were reported. It was found that the most predominant coliform pathogens belonged to genus *Enterobacter* followed by *Citrobacter* and the predominant non-coliforms belonged to the genus *Salmonella* in both the reservoirs. It was found that more than 70% of the schools were found to be not meeting the standards of the WHO. These contaminations showed adverse effects on the school children exposing them to various health problems ultimately leading to drop outs. The contaminations in these reservoirs persisted even after many treatments, insisting on more innovative treatment techniques. In this study, the treatment at large-scale-level was done by a technique, rotating biological contactor (RBC) which proved efficient, removed BOD and chemical contaminants along with the microorganisms onto the biofilms with low power consumption and high water flow system. A novel house-hold treatment was developed by using *Mentha arvensis* (Mint) and *Pimpinella thirupathensis* (Adavi kothimera) leaves' extracts showed adverse effects on the growth of coliform pathogens and minimized chemical contaminants, proving this a simple, swift and cost-effective method for water treatment at house-hold-level. Further, molecular markers were developed for the rapid detection of coliforms in potable water within 3-4 hr before supplying to the house-holds.

In spite of the shooting measures taken, water quality is always a pertinent issues prevailing in the drinking water space. This may be attributed not only to the severe water contamination, threat and depletion of water reservoirs,

but also lack of awareness among people. Treating water with simple edible leaves like mint leaves and adivi kothimeera leaves, and existing technologies can be adopted to save millions of lives.