

ABSTRACT

Ecology of *Escherichia coli* associated with water and sediments in a freshwater stream in Trinidad

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A study was conducted to investigate the natural occurrence of high levels of *E. coli* in water and sediments from the upper Tacarigua River, Trinidad, West Indies. Water and samples from undisturbed sediment were collected from six sites along the river during the wet and dry seasons of 2007. The levels of *E. coli* were determined, as well as physico-chemical parameters measured for all sample sites. Randomly selected isolates from both water and sediments were then subjected to rep-PCR DNA fingerprinting to determine relationships among isolates, source, sites and season. The ability of isolates to survive in river sediments and form biofilms under *in vitro* conditions were also determined.

The results showed that 72% of all water samples had *E. coli* levels that exceeded international standards for recreational waters. *E. coli* levels were consistently higher by several folds in sediments than water at all sites. The lower, more impacted sites also had significantly higher *E. coli* levels than the upper, less impacted sites.

There were stronger relationships between bacterial levels and nutrients in sediments as compared to water. The rep-PCR analysis of 140 isolates showed occurrence of common strains in sediments and water, whereas the population genetic analysis showed higher similarity levels between water and sediment isolates, especially in the higher un-impacted sites, during the dry as compared to the rainy season. The *in vitro* experiment showed survival of *E. coli* isolates in sediments for up to 11 weeks, which is the longest reported time for survival of this organism in a closed system. The isolates also showed varying abilities in forming biofilms in different media. The results of the study provide strong evidence that the sediment is an important source of *E. coli* in water in the upper Tacarigua River.

Keywords: *Escherichia coli*, biofilm, Tacarigua River, physico-chemical