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Identification of *E. coli* O157 Strain, *Salmonella* sp., and *Shigella* sp. in Negombo Lagoon, Sri Lanka

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Abstract

Negombo Lagoon is one of Sri Lanka's largest, shallow, basin-like estuaries running parallel to the western coast. Lagoon is fed by many channels which carries effluent water with massive loads of micro-organisms. *E. coli* O157 is a particular serotype of *Escherichia coli*, which is capable of producing intimin and shiga toxins that causing severe human diseases including Hemolytic Uremic Syndrome. *Salmonella* sp. and *Shigella* sp. are the causative agents for Salmonellosis and Shigellosis. Plenty of tourism and fishing activities in lagoon resulting a severe risk of entering pathogenic *E.coli* O157 strains, *Salmonella* sp. and *Shigella* sp. into the human gastrointestinal tract and cause severe diseases. Thus, this study aims to identify the presence of *E. coli* O157 strain, *Salmonella* sp. and *Shigella* sp. in the Negombo lagoon to ensure safe water quality. In this study, water samples were taken from ten selected locations from Negombo lagoon and the screening of *E.coli* O157 was done through optimized PCR protocols using virulent genes *eae*, *stx1* and *stx2*. The *eae* gene responsible for the enterohemorrhagic activity while the *stx* genes responsible for produce shiga toxins; that can damage to cells, particularly in the lining of the intestines. Thus, *eae* and *stx* genes are the most important and widely used genes in detection of *E. coli* O157 strain. The presence of *Salmonella* sp. and *Shigella* sp. was observed through microbiological tests using Peptone Broth and Xylose Lysine Deoxycholate agar and further differentiated through biochemical tests; Lysine Decarboxylase Test, Urease Test and Kligler Iron Agar Test. The results of PCR analysis of isolated *E. coli* from the lagoon confirmed that near the Negombo fish market showed positive results for the *eae* gene while areas near the inlet of the Hamilton canal and the middle of the lagoon showed positive results for the *stx2* gene, confirming the presence of the *E. coli* O157 strain. The *stx1* gene wasn't detected in lagoon waters. The *Salmonella* sp. was detected in all sampled locations, and *Shigella* sp. was detected in 8 out of 10 locations. The existence of these pathogenic strains poses a potential risk to human health and these results confirm regular monitoring and legislation for wastewater discharge into lagoon is vital to maintain safe microbiological and water quality in Negombo Lagoon, Sri Lanka.

Keywords: Negombo lagoon, *E. coli* O157, *Salmonella* sp., *Shigella* sp., Water quality