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## Detection and characterization of Shiga toxin-producing *Escherichia coli* from carps from integrated aquaculture system

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### Abstract

The objective of the study was to screen carps from an integrated fish culture system for Shiga toxin-producing *Escherichia coli* (STEC). The isolates of *E. coli* obtained by selective enrichment and plating were screened for the presence of virulence genes associated with STEC namely *stx1*, *stx2*, *eae*, *ehlyA* and *rfbO157*. A total of 33 fish samples were analyzed, **9 (27%)** of which were positive for *stx* genes by direct PCR on the enrichment broth lysates. **Eight (24%)** of the fish samples yielded isolates harbouring at least one STEC-associated virulence gene. *stx2*, *eae* with *stx* and *eae* not associated with *stx* were detected in **3 (33%)**, **2 (22%)** and **4 (45%)** of the non-O157 *E. coli* isolates, respectively. In case of *Cyprinus carpio*, two samples were found positive for both *stx* and *stx2*. Only one sample of *Puntius javanicus* was found positive for *stx* alone. However, none of the carp samples from the integrated farm harboured *E. coli* isolates positive for *stx1* and/or *ehlyA* genes. Occurrence of *stx2* gene in fish samples from integrated farming system indicated the possibilities of contamination from veterinary and humans which possess more *stx2* associated *E. coli* than *stx1*.

Keywords: Shiga toxin-producing *Escherichia coli*; Shiga toxin associated genes; Non-O157 *E. coli*; Carps; Food-borne outbreaks.

### 1. Introduction

Shiga toxin-producing *Escherichia coli* (STEC) have been recognized as one of the causative agents of serious food-borne outbreaks especially gastrointestinal diseases in humans and are commonly associated with foods of animals origin (Karmali, 1989; Ostroff, et al., 1990; Sanath et al., 2001). Carps are considered as one of the most important cultured species in the commercial aquaculture system of India. In the context of the pathogen's source, India has the largest livestock numbers in the world and also one of the integral components of village level aquaculture system which are solely dependent on the animal dung as manure. Shiga toxin-producing *Escherichia coli* are a serologically diverse group of pathogenic *E. coli* which can produce one or more Shiga toxins, cause diseases in humans and animals (Barman et al., 2008). Stx-producing *E. coli* (STEC) are commonly carried by asymptomatic wild and domesticated ruminants (Cerqueira et al., 1999; Kaddu-Mulindw et al., 2001) and serve as source of contamination of fish (Sanath et al., 2001; Murugadas et al., 2016).

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