Immune Response to Shiga Toxin Producing Escherichia Coli: Detection of Antibodies against Outer Membrane Proteins in Healthy Population around Dhaka City, Bangladesh

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Abstract

Escherichia coli O157:H7, a serotype of Shiga toxin producing E. coli (STEC), are responsible for numerous food and waterborne outbreaks, mostly in industrialized countries. Despite the presence of this organism in the environment and food materials, however, no outbreak has been reported in Bangladesh in recent years. In this study, we investigated the STEC associated immune response in healthy humans residing around Dhaka city. A total of 549 sera samples were randomly collected from healthy (without any reported infectious disease) humans visiting clinics and diagnostic centers located inside (urban) and outside (sub-urban) of Dhaka city. Sera from one confirmed STEC infected case and five neonatal sera, were used as positive and negative controls, respectively. Outer membrane proteins (OMP) were extracted from an stx_2 positive E. coli O157:H7 previously isolated from local bovine feces. ELISA tests were carried out with the extracted OMP against the healthy human sera followed by SDS-PAGE and Western blot analysis. All healthy human sera including the positive control, showed significantly higher IgG antibody responses (Mean OD 1.1) against the OMP, when compared with that of the negative control cases (Mean OD 0.24) in the ELISA tests. SDS-PAGE and Western blot analysis done with 80 healthy human and positive control sera, could detect several antigenic bands ranging from 38 to 84 kDa of the OMP. However, the neonatal negative control sera showed no such bands on the nitrocellulose membrane. All these results suggest that healthy human sera collected from both urban and sub-urban areas around Dhaka city contain IgG antibodies against OMP of E. coli O157:H7. These results also indicate that immunogenicity against the OMP of the STEC in the healthy population may protect them against any possible outbreak despite the prevalence of these bacteria in the environment.

Keywords: Escherichia coli O157:H7, Outer membrane proteins, ELISA, SDS-PAGE, Western blot