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Probiotic *E. coli* Nissle1917 as a potential therapeutic candidate for treatment against Enterohemorrhgic *E. coli* infections

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Enterohaemorrhagic *E. coli* (EHEC) is important foodborne pathogen responsible for diarrhea, hemorrhagic colitis and hemolytic uremic syndrome (HUS) in humans. To date, there is no consensus regarding the use of antibiotics for the treatment of EHEC mediated illnesses, alternatives like probiotics are of increasing interest. In this study, we analysed the effect of probiotic *E. coli* strain Nissle1917 (EcN) on growth viability, Shiga toxin release and adhesion of EHEC serotypes O26:H11, O103:H2, O111:NM, O145:NM and O104:H4.

EHEC were co-cultured with probiotic EcN or its microcin negative mutant in LB broth. Reduction in growth viability of EHEC was measured by plate count and qRealTime-PCR. Quantitative Shiga toxin-ELISA determined the difference in Shiga toxin release between co-culture broths and control. The cytotoxicity effect of Shiga toxin was evaluated using Vero cell line. In addition, *in vitro* probiotic effects of EcN on adhesion of EHEC were evaluated on human colonic epithelial cells (Caco-2) using conventional and immunofluorescence adhesion assays. In all experiments, *E. coli* MG1655 served as control.

Probiotic EcN caused considerable decrease in growth viability (39~82 %) of EHEC strains as determined by plate count and qRT-PCR. The amount of Shiga toxin decreased (20~90 %) depending upon serotype of EHEC strain with significant reduction ($p<0.01$) in O26:H11 (82%), O103:H2 (90%) and O104:H4 (84%). This inhibition was not due to microcin produced by EcN. Vero cytotoxicity showed that EHEC co-cultured with EcN was atleast three timeless cytotoxic (CD50 titer) ($p<0.05$). Adhesion assay data displayed significant reduction ($p<0.01$) (39~92%) of EHEC to Caco-2 cells when preincubated with EcN.

These findings show that probiotic EcN displays strong inhibitory effects on growth, Shiga toxin release and adhesion of major EHEC serotypes. Thus, EcN is a putative therapeutic candidate during EHEC-mediated diseases.

Biography

Mashkoor Mohsin Gilani did his PhD in Biotechnology in 2010 from Quaid-i-Azam University, Pakistan. He had been working at Austrian National Reference Lab. on Enterohaemorrhagic E. coli (EHEC) Innsbruck Medical University, Austria. In 2010, he was awarded with one of the prestigious postdoctoral fellowship from Alexander von Humboldt, Foundation, Germany. Currently he is doing his Postdoctoral research at Freie University Berlin, Germany. His project investigates effect of probiotic E. coli 1917 strain on adhesions, Shiga toxin production, virulence genes and growth viability of major EHEC strains. Dr. Gilani has published over 13 research articles in reputed International and National journals and attended 3 International conferences in the field of Microbiology..

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