

Epidemiological and molecular study of pathogenicity characters of enterobacteriaceae isolated from humans and foods

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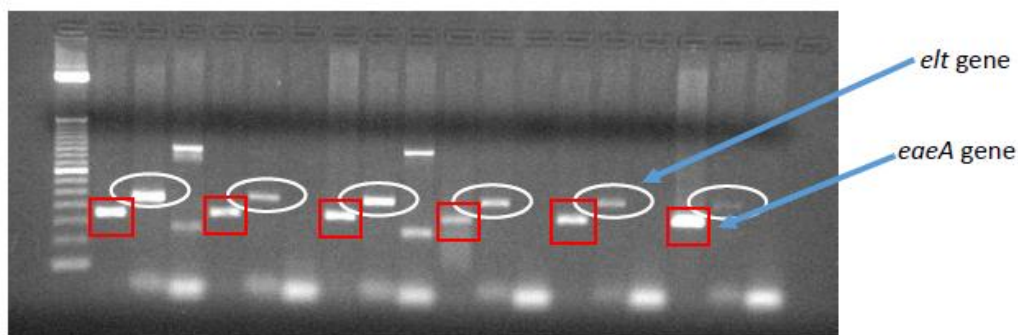
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ABSTRACT

The human gastrointestinal tract represents one of the most densely populated microbial ecosystems detected to date. Although this microbial group has been recognized to have a crucial impact on human health, its precise composition in the first period of life is still subject to intense investigation.

The aim of the present case-control study was to describe the etiologic agents of diarrhea in infants, with special attention on diarrheagenic *E.coli* (DEC), the role of coinfections with other pathogens and the possible correlation between the presence of intestinal pathogens and risk factors such as age, feeding, nationality, sex and birth; other components of the infant gut microbiota (such as Lattobacilli, Bifidobacteria, Bacteroides) were investigated to better understand how individual differences can promote the multiplication of pathogens and how diarrhea influences gut health. Moreover another objective was to evaluate the possibility that early-life administration of probiotics (*Lactobacillus reuteri* DSM 17938) can modulate microbial composition in the gastrointestinal tract of infants, improving beneficial flora and reducing potential pathogens, and which modifications occurring in intestinal microbiota after antibiotic therapy. From March 2014 to July 2016 a total of 350 stool samples, from children aged between 0-6 months, were collected and examined, differently, for enteric pathogens (particularly DEC), Total aerobic counts, Total anaerobic gram-negative counts, Total anaerobic gram-positive counts, Enterobacteriaceae, Enterococci, Lactobacilli, Bifidobacteria. Viruses were the most frequently isolated agents in the diarrheal group, particularly Rotavirus (41.8%). Two categories of DEC were observed, precisely atypical enteropathogenic *E. coli* (a-EPEC 10% in case and 6.6% in control) and enterotoxigenic *E. coli* (ETEC 3.3% in case and 0.8% in control). About the effects of early-life administration of *Lactobacillus reuteri* DSM 17938 the two groups showed differences in gut microbial strains composition and richness. Infant treated with probiotics Lactobacilli count was significantly higher ($p < 0.05$). After 6 days of antibiotic treatment Lattobacilli e Bifidobatteri were no longer detected in the control group (without probiotics). The present research suggested that DEC may be an important and unrecognized cause of diarrhea in hospitalized infancy. The finding of diverse DEC types stressed the need for enhanced surveillance of gastroenteritis agents in infants with more active characterization of the *E. coli* isolated strains, since they are not routinely detected in clinical practice. Moreover the study showed that fecal microbiota composition was significantly modified by antibiotic treatment and probiotic administration during or after antibiotic therapy can speed up the re-establishment of normal count of lactobacilli; early treatment with *L. reuteri* DSM 17938 in infancy can influence gut microbiota composition, improving gut health by reducing pathogen colonization. Further studies are needed to better understand how individual differences could act in the interaction between gut health and microbiota.



Representative gel showing multiplex PCR amplification of DNA extracted from *E. coli* strains