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P0748 In vitro activity of a multistrain probiotic formulation against carbapenem-resistant Klebsiella pneumoniae, Acinetobacter baumannii and Pseudomonas aeruginosa

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Background

Intestinal colonization with carbapenem-resistant (CR) microorganisms in hospitalized patients is considered as a consequence of antimicrobials-induced gut dysbiosis. Given the effect of probiotics in modulating gut microbiota, the aim of the study was to investigate whether a high concentration multistrain probiotic formulation containing *Lactobacillus plantarum* DSM24730, *Streptococcus thermophilus* DSM24731, *Bifidobacterium breve* DSM24732, *L. paracasei* DSM24733, *L. delbrueckii subsp. bulgaricus* DSM24734, *L. acidophilus* DSM 24735, *B. longum* DSM24736, *B. infantis* DSM24737 (Vivomixx in EU, Visbiome in USA) possessed *in-vitro* activity against clinical strains of CR *K. pneumoniae* (CR-Kp), CR-*Acinetobacter baumannii* (CR-Ab) and CR-*Pseudomonas aeruginosa* (CR-Pa).

Materials/methods

Probiotic formulation was dissolved in 10 ml of saline solution and 400 µl of the solution were added to MRS Broth and incubated for 48h in anaerobic conditions. To confirm the growth of Lactobacilli, *Streptococcus thermophilus* and Bifidobacteria, we plated the broth on MRS agar and incubated for 48h. A final CR-Kp, CR-Ab and CR-Pa inoculum of $5x10^5$ CFU/mL was added to tubes containing two-fold serial dilutions of probiotic solution and incubated at 37°C for 24h. Minimal inhibitory dilution (MID) and minimal bactericidal dilution (MBD) were defined as the lowest dilution that completely inhibited visible growth and ≥99.9% (≥3-log10 CFU/ml) reduction of the initial bacterial count after 24h of incubation, respectively.

Results

The MID/MBDs were 1:16/1:8 for CR-Kp, with absence of growth up to 1:8 and a reduction of 2.8 log10 CFU/mL at 1:16 whereas absence of bacterial growth was observed up to 1:16 for CR-Ab and CR-Pa.

Based on these encouraging findings, we evaluated whether the surnatant of probiotic formulation maintained the anti-bacterial properties. Similarly to the previous experiment, we confirmed an absence of CR-Kp, CR-Ab and CR-Pa growth at 1:8, 1:16 and 1:16 dilutions, respectively.

Conclusions

There is a growing interest in probiotics use for prevention or treatment of intestinal infections. Although still preliminary, our experiments demonstrated an additional mechanism which could justify the administration of probiotic formulations to prevent infections by CR microorganisms often present in the gut of hospitalized patients as a consequence of gut dysbiosis. Studies on the management of CR gut colonization through probiotics use should be encouraged.