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Journal of Pharmaceutical Toxicology

# Biological activity and apoptotic signaling pathway of C11-functionalized cephalostatin 1 analogues

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**Statement of the Problem:** The issue of anitimicrobial resistance is a global threat to human, animal and environmental health. Pre, pro and synbiotics are emerging as an important alternative of antibiotics. Synbiotics are more efficient because of the combined effect of prebiotics and probiotics. The objective of this study was to evaluate the antimicrobial potentiality of D-tagatose and Lactobacilli as a synbiotic.

**Methodology & Theoretical Orientation:** Batch culture fermentation was carried out with four Lactobacillus spp. (L. rhamnosus GG, L. casei, L. acidophilus and L. fermentum) and two pathogenic bacteria (E. coli and S. typhimurium) in presence of D-tagatose, Fructooligosaccharides and D-glucose as carbon sources. Based on D-tagatose utilization ability, two lactobacilli (L. rhamnosus GG and L. casei) were used in liquid co-culture assay to investigate the anti-microbial efficacy against selected pathogens. The agar diffusion bioassay was used to screen the anti-microbial activity of the cell free culture supernatant (CFCS) of the Lactobacillus spp. in grown presence of D-tagatose. Findings: Our results showed that all the selected Lactobacillii spp. were able to utilize D-tagatose, but the tested pathogens were failed to utilize it as carbon source. The highest growth was demonstrated by L. rhamnosus GG and L. casei after 24h. In co-culture assay, the presence of D-tagatose with selected lactobacilli was shown to inhibit both the pathogens (E. coli and S. typhimurium) completely (Fig.1 and Fig. 2). The anti-microbial activity by the CFCS was attributed by lowering of pH due to the production of lactic acid and short chain fatty acids.

**Conclusion & Significance:** D-tagatose in combination with L. rhamnosus GG or L. casei can be used to develop a potential synbiotic supplement. The antimicrobial efficacy of the symbiotic preparation could be used in replacing the antimicrobial therapy in prevention or treatment of bacterial infections.

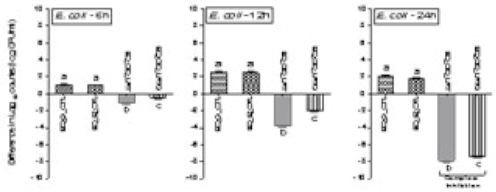

Figure 1: log differences in CFU counts (Mean ± SEM) of E. coli at different time intervals (6, 12 and 24 h) against the initial microbial populations (~107 cells/ml). LR: Lactobacillus rhamnosus GG (NCDC 347); EC: Escherichia coli (ATCC 10536); CTL: Control Mono-culture; CC: Co-culture; G: D-glucose; T: D-tagatose; B: basal medium without carbon

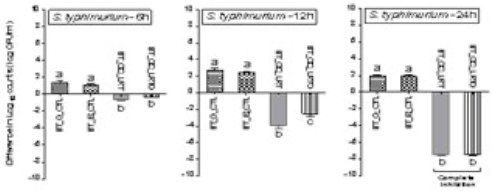

Figure 2: log differences in CFU counts (Mean ± SEM) of S. typhimurium at different time intervals (6, 12 and 24 h) against the initial microbial populations (~107 cells/ml). LR: Lactobacillus rhamnosus GG (NCDC 347); ST: Salmonella typhimurium (ATCC 14028); CTL: Control Mono-culture; CC: Co-culture; G: D-glucose; T: D-tagatose; B: basal medium without carbon

**Biography**

Sohini Roy is currently pursuing her Doctoral studies at ICAR-NIANP, Bangalore, India. She has completed her masters in Biotechnology. Her area of research interest is related to nutraceuticals and its effect on gut health. Her research work is focused to establish an effective and acceptable enzymatic process of D-tagatose production keeping in view the expected demands of D-tagatose in near future and to evaluate its prebiotic and anti-diabetic properties through in- vitro and in-vivo experimental models. She has experience in research and teaching. Her interest lies in conducting a long-term scientific research in the field of nutraceuticals and their role in modulating the gut microbial composition impacting the health and well-being of both animal and human.

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**Citation:** Sohini Roy, *Antimicrobial potentiality of D-tagatose and Lactobacillus spp. synbiotic preparation*, Natural Products 2020, International Conference on Natural Products and Traditional Medicine, Amsterdam, The Netherlands, Webinar, 13th July, 2020, pp: 19.