Immunomodulatory Effects of *Lactobacillus spp* and Leaf Extract of *Moringa oleifera* Lam on Wister Albino Rats Challenged with *Eshericha coli*

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Identification and understanding of the immune response mechanisms that contribute to the control of pathogen induced diarrheal disease remains an important priority, as diarrhoea kills about 1.7 million children annually. Pathogenic *E. coli* represents a leading cause of diarrhoea and several antibiotics resistant strains have evolved, hence the need for alternative management strategies. In this study, the immunomodulatory role of *Lactobacillus spp.* and *Moringa oleifera* during diarrheal disease was investigated in albino wistar rats. Diarrhoea was induced in the rats using pathogenic *E. coli* and the animals were monitored for seven days post infection (dpi). *Lactobacillus spp.* (~10^{12} CFU/ml) and 250mg/kg, 500mg/kg and 1000mg/kg of *Moringa oleifera* extract were administered either as single or combination therapies. The treatments were given either as prophylaxis or after challenging the animals with ~10^{11} CFU pathogenic *E. coli*. The production of anti-inflammatory cytokines IL-10, IL-4, and IL-11 and mucosal antibody IgA were estimated by Enzyme linked immunosorbent assay (ELISA). We observed that the rats that received *Lactobacillus spp.* for 7 days prior to the *E. coli* challenge and those that received the treatment for the entire duration of the experiment did not develop diarrhoea. The severity of diarrhoea in rats that received single *Lactobacillus spp.* 48 hours before E. coli infection and combination therapy of *Lactobacillus spp.* and *M. oleifera* (500mg/kg) for 5 days after *E. coli* infection was reduced compared to the other infected groups. In these 2 groups with reduced diarrhoea, diarrhoea also resolved 3 dpi compared to 5 dpi in other groups. There was also a significant difference ($p \leq 0.05$) in the concentration of anti-inflammatory cytokines IL-4 and IL- 10 in these 2 groups. The rats that received 1000mg/kg *M. oleifera* showed very severe diarrhoea symptoms and the diarrhoea persisted throughout the duration of the experiment. These results suggest that *M. oleifera* is not beneficial to the management of pathogen induced diarrhoea and indicate that routine use of probiotics is beneficial and may serve as prophylaxis against pathogen induced diarrhoea.