

# SYNERGISTIC EFFECTS OF PREBIOTICS ON PROBIOTICS

By

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## ABSTRACT

**Aim:** This study was aimed to evaluate the effects of prebiotics viz fructo-oligosaccharide, inulin and maltodextrin on the growth of probiotic yeast *Saccharomyces boulardii* and three probiotic lactobacilli *Lactobacillus casei*, *Lactobacillus rhamnosus* and *Lactobacillus plantarum*. Based on the in vitro results, the synbiotic effect of *S.boulardii* and inulin was evaluated on mouse gut microbiota by analyzing stool samples. Interaction between *S.boulardii* and common gut bacteria was studied in vitro in presence of different prebiotics. Effect of *S.boulardii* was checked on liver polyamines and damaged liver in mouse model. Effects of the abovesaid prebiotics was checked on the growth of lactobacilli in presence of antibiotics.

**Results:** *S.boulardii* was found to grow better in presence of inulin in vitro. Administration of inulin and *S.boulardii* together altered the number and nature of microorganisms in the stool sample of mice. *In vitro* association studies revealed that *S.boulardii* grown in inulin could interact and form large aggregates with *E.coli* and *E.faecalis*. Aggregation is dependent on time and did not form in presence of other prebiotics or other bacteria like *S.aureus* or lactobacilli. The association is a property of the live *S.boulardii* as heat treatment and translation inhibitor; cycloheximide completely abolished the aggregate formation.

The prebiotics increased the growth of the lactobacilli though the sensitivities of the lactobacilli to antibiotics was found to vary with the prebiotic. Maltodextrin was found to change the viability of *L.casei* and made it sensitive towards azithromycin while had very little effect on other two lactobacilli. *L.casei* cells became shorter and lost their viability. *L.plantarum* became sensitive towards ampicillin and ciprofloxacin in the presence of maltodextrin and inulin respectively compared to dextrose as revealed by MTT assay and fluorescence microscopy whereas sensitivity of *L.rhamnosus* remains the same.

Oral administration of *S.boulardii* was found to have hepatoprotective role against CCl<sub>4</sub>. All the markers of hepatotoxicity were found to decrease in the serum of mice treated with *S.boulardii* prior to CCl<sub>4</sub> administration. The concentrations of polyamines, known as hepatoprotectives, were found at increased level in mice liver treated with *S.boulardii*.

**Conclusion:** Aggregate formation between *S.boulardii* and *E.coli/E.faecalis* in presence of inulin and their subsequent removal might be the reason for change in composition of microbes in stool samples of mice. As the sensitivity of lactobacilli towards antibiotics changes in presence of prebiotics, proper choice of both for better synbiotic effect is very important for any treatment.