

Lactobacillus casei strain Shirota (Yakult)

Research Update for Healthcare Professionals

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Lactobacillus casei strain Shirota – Research Update

IMPROVEMENT IN INTESTINAL HEALTH

1. Improving the bowel habits of elderly residents in a nursing home using probiotic fermented milk.

van den Nieuwboer M *et al* 2015, *Benef Microbes* 17:1-8.

The aim of this study was to determine whether a fermented milk drink containing *Lactobacillus casei* strain Shirota (*LcS*) could improve bowel habits of frail elderly individuals living in a nursing home.

A total of 135 participants were enrolled in this pilot study which included a baseline period of 3 weeks and an intervention period of 6 weeks. Bowel habits (stool quality and bowel movements) were recorded by the nursing staff during the baseline period. After this period participants received a fermented milk drink containing minimally 6.5×10^9 colony forming units of *LcS* for 6 weeks daily.

During this period, bowel habits were recorded and compared to baseline period. Forty-four (44) participants (74-99 years old) were compliant and used for analysis. Consumption of fermented milk containing *LcS* significantly increased the percentage of ideal stool types per week ($P < 0.01$), lowered the percentage of constipation stool types per week ($P < 0.01$) and significantly lowered the percentage of diarrhoea stool types per week ($P = 0.016$) as compared to the baseline period.

The study product had no significant effect on bowel movements. During the study, no changes in laxative usage or adverse events were reported. The results suggest that a fermented milk containing *LcS* significantly improves the bowel habits of frail elderly residents in a nursing home. The results of this promising study need further substantiation.

2. Survival of *Lactobacillus casei* strain in the intestine of healthy Chinese adults.

Wang R *et al* 2015, *Microbiol Immunol* Feb 23. doi: 10.1111/1348-0421.12249 [Epub ahead of print].

This study assessed the survival of LcS in the intestine of healthy Chinese adults and the effect of LcS on stool consistency, short-chain fatty acids (SCFAs) and intestinal microbiota.

Subjects consumed 100 ml of a probiotic beverage containing 1.0×10^8 CFU/ml of LcS every day for a period of 14 days. LcS was enumerated using the culture method and confirmed by an Enzyme-Linked Immunosorbent Assay (ELISA). Fourteen days after ingestion, the amount of LcS was recovered from fecal samples between 6.86 ± 0.80 and 7.17 ± 0.57 Log₁₀ CFU g⁻¹ feces (mean \pm SD). The intestinal microbiota was analyzed by Denaturing Gradient Gel Electrophoresis (DGGE).

Principal Component Analysis (PCA) showed that the intake of LcS significantly changed the fecal microbiota profiles. A total of 25 bacterial strains significantly correlated with intake of LcS by redundancy analysis (RDA, $P < 0.05$). Eleven strains showed positive correlations with LcS and fourteen strains showed negative correlations with LcS. The concentrations of acetic acid and propionic acid in feces decreased significantly during the ingestion period compared with the baseline period ($P < 0.05$).

The result of this study confirms that LcS can survive transit through the gastrointestinal tract in Chinese people. Furthermore, the intake LcS could modulate the composition of the intestinal microbiota on a long-term basis, resulting in decreased SCFAs concentration in the gut.

IMMUNE-MODULATION

1. Randomized controlled study of probiotics containing *Lactobacillus casei* (Shirota strain) for prevention of ventilator-associated pneumonia.

J Med Assoc Thai 2015, 98(3):253-9.

The efficacy of probiotic *Lactobacillus casei* (Shirota strain) in reducing incidence of ventilator-associated pneumonia (VAP) in medical patients who received mechanical ventilation at Siriraj Hospital was evaluated.

A prospective, randomized, open-label controlled trial was conducted on 150 adult hospitalized patients in medical wards who were on mechanical ventilation for 72 hours or longer: The patients were randomized to the probiotic group or the control group. The patients in the probiotic group received 80 ml of a probiotic fermented milk drink containing 8 billion *Lactobacillus casei* (Shirota strain) for oral care after

having standard oral care once daily and additional 80 ml of the aforementioned fermented dairy product was given via enteral feeding once daily. The primary outcomes were incidence of VAP and incidence rate of VAP episodes per 1,000 ventilator-days. The secondary outcomes were length of hospital stay, mortality at day 28 and 90, incidence of diarrhea, and presence of resistant bacteria in oropharyngeal and rectal swab samples taken from the patients at baseline, day 7 and day 28 after enrollment.

The baseline characteristics of the patients in the probiotic group (75) and the control group (75) were not significantly different. The patients in the probiotic group were less likely to develop VAP compared with the control group (24% vs. 29.3%, $p = 0.46$). The incidence rates of VAP in the probiotic and control groups were 22.64 and 30.22 episodes per 1,000 ventilator-days, respectively ($p = 0.37$). A trend of lower prevalence of resistant bacteria cultured from oropharyngeal swabs in the probiotic group than that in the control group was observed. Overall 28 and 90-day mortality and length of hospital stay of the patients in both groups was not significantly different.

Administration of probiotic containing *Lactobacillus casei* (Shirota strain) resulted in a tendency to reduce the incidence of VAP and colonization with resistant bacteria in oropharyngeal cavity without significant effects on mortality and length of hospital stay.

OTHERS

1. Probiotic supplementation prevents high-fat, overfeeding-induced insulin resistance in human subjects.

Hulston CJ *et al* 2015, *Brit J Nutr* 113:596-602.

The present study was conducted to determine whether probiotic supplementation *Lactobacillus casei* Shirota (LcS) prevents diet-induced insulin resistance in human subjects.

A total of seventeen healthy subjects were randomised to either a probiotic ($n=8$) or a control ($n=9$) group. The probiotic group consumed a LcS-fermented milk drink twice daily for 4 weeks whereas the control group received no supplementation. Subjects maintained their normal diet for the first 3 weeks of the study, after which they consumed a high-fat (65% of energy), high-energy (50% increase in energy intake) diet for 7 days. Whole-body insulin sensitivity was assessed by an oral glucose tolerance test conducted before and after overfeeding. Body mass was increased by 0.6 (SE 0.2) kg in the control group ($P<0.05$) and by 0.3 (SE 0.2) kg in the probiotic group ($P>0.05$).

Fasting plasma glucose concentrations increased following 7 days of overeating (control group: 5.3 (SE 0.1) v. 5.6 (SE 0.2) mmol/l before and after overfeeding, respectively, $P<0.05$), whereas fasting serum insulin concentrations maintained in both groups.

Glucose AUC values increased by 10% (from 817 (SE 45) to 899 (SE 39) mmol/l per 120 min, $P < 0.05$) and whole-body insulin sensitivity decreased by 27% (from 5.3 (SE 1.4) to 3.9 (SE 0.9), $P < 0.05$) in the control group. Normal insulin sensitivity was maintained in the probiotic group (4.4 (SE 0.8) and 4.5 (SE 0.9) before and after overeating respectively ($P > 0.05$).

These results suggest that probiotic supplementation may be useful in the prevention of diet-induced metabolic diseases such as type 2 diabetes.

2. Evaluation of probiotic milk on salivary mutans streptococci count: An in vivo microbiological study.

Yadav M *et al* 2014, *J Clin Pediatr Dent* 39(1):23-6.

The present study investigates the effect of probiotic *Lactobacillus casei* Shirota in reducing *mutans streptococci* counts in saliva.

31 children were included in a double blind randomized linear crossover study. Study design included 4 periods which consisted of a run in period, two intervention periods and a washout period. During the intervention period children were either given a probiotic milk or control milk for 10 days. Pre and post intervention salivary samples were subjected to microbiological evaluation. Numbers of *mutans streptococci* were taken by identifying the colony morphology.

A statistically significant reduction of *mutans streptococci* colony count was noted in the probiotic group ($p = .003$). The reduction in children with higher levels of *mutans streptococci* (10^5) after intervention was 34% in the probiotic group.

Daily consumption of milk containing probiotic bacteria can reduce the levels of *mutans streptococci* and may contribute to the prevention of dental caries.