Probiotics

A probiotic is a “live microbial food ingredient that, when ingested in sufficient quantities, exerts health benefits on the consumer”. Probiotics exert their benefits through several mechanisms:

- They prevent colonization, cellular adhesion and invasion by pathogenic organisms,
- They have direct antimicrobial activity and they modulate the host immune response.

Randomized double-blind studies have provided evidence of probiotic effectiveness for the treatment and prevention of acute diarrhea and antibiotic-induced diarrhea, as well as for the prevention of cow milk-induced food allergy in infants and young children. Research studies have also provided evidence of effectiveness for the prevention of traveler’s diarrhea, relapsing *Clostridium difficile*-induced colitis, and urinary tract infections.

There are also studies indicating that probiotics may be useful for prevention of respiratory infections in children, dental caries, irritable bowel syndrome, and inflammatory bowel disease. Areas of future interest for the application of probiotics include colon and bladder cancers, diabetes, and rheumatoid arthritis.

**Saccharomyces boulardii**

Although most probiotics are bacteria, one strain of yeast, *S. boulardii*, has been found to be an effective probiotic in double-blind clinical studies. Experimental studies clearly demonstrate that *S. boulardii* has specific probiotic properties, and recent data has opened the door for new therapeutic uses of this yeast as an ‘immunobiotic’. The probiotics with the greatest number of proven benefits include *Saccharomyces boulardii*.

**Saccharomyces boulardii therapeutics in children with acute diarrhoea**

Experts evaluated the effect of *S. boulardii* in children with acute diarrhea. Two hundred children were randomized to receive *S. boulardii* in a granulated form in a daily dose of 250 mg (*S. boulardii* group) or placebo (placebo group) for 5 days.

- The medians of the average stool frequency after the second day of the treatment were significantly lower in the *S. boulardii* group than in the placebo group (*p* = 0.003)
- The duration of diarrhea were significantly reduced in the *S. boulardii* group compared with the placebo group (4.7 vs 5.5 d, *p* = 0.03). The effect of *S. boulardii* on watery diarrhoea became apparent after the second day of the treatment
- The duration of hospital stay was shorter in the *S. boulardii* group than in the placebo group (2.9 vs 3.9 d, *p* < 0.001). Four children from the placebo group versus only one child from the *S. boulardii* group had persisting diarrhea.

To evaluate the efficacy of the probiotic yeast *S. boulardii* as an adjuvant to oral rehydration solution (ORS) in shortening the duration of acute infectious gastroenteritis in children less than 2 years old in ambulatory care, a study was done. Over a period of 1 year, 100 outpatients between 3 and 24 months old presenting with acute mild to moderate diarrhoea of less than 7 days duration, were included in a double-blind, randomized, placebo-controlled trial evaluating the efficacy of *S. boulardii* administered for 6 days.

The mean duration of diarrhea was 6.16 days (range 2-13 days) in the placebo group and 4.70 days (range 2-10 days) in the *S. boulardii* group (*p*<0.05). On the 4th day, the patients in the *S. boulardii* group passed 2.5±1.4 stools/day versus 3.5±1.8 in the
placebo group (p<0.001).

The risk of having diarrhea lasting more than 7 days was lower in the S. boulardii group (3/44 versus 12/44; RR 0.25; 95% CI 0.1-0.8).

In no patient diarrhea persisted longer than 14 days. A statistically significant difference was observed in the number of stools on the 4th and 7th day, favoring the subgroup that received early treatment (within the first 48 h of the onset of diarrhea).

META-ANALYSIS OF PROBIOTICS IN AAD AND CCD
Antibiotic-associated diarrhea (AAD) is a common complication of most antibiotics and Clostridium difficile disease (CDD), which also is incited by antibiotics, is a leading cause of nosocomial outbreaks of diarrhea and colitis. A variety of different types of probiotics show promise as effective therapies for these two diseases.

S. BOULARDII IN RECURRENT CLOSTRIDIUM DIFFICILE-ASSOCIATED DISEASE
Recurrent Clostridium difficile-associated disease (RCDAD) is a difficult treatment problem—once a patient has one recurrence of the disease the likelihood of further recurrences is markedly increased. Repeat antibiotics are usually indicated, either metronidazole or vancomycin. There is also a role for probiotics in the treatment of RCDAD; S. boulardii has been shown to decrease recurrences by about 50%, especially when combined with high-dose vancomycin. Other microbiologic approaches include the restoration of normal colonic flora by fecal enema or by nasogastric tube. In addition, there are numerous new treatment approaches that are under development, including a vaccine, which promise to aid the future treatment of RCDAD as well as prevention of initial CDAD.

S. BOULARDII IN THE PREVENTION OF AAD
A total of 269 children (aged 6 months to 14 years) with otitis media and/or respiratory tract infections were enrolled in a double-blind, randomized placebo-controlled trial in which they received standard antibiotic treatment plus 250 mg of S. boulardii (experimental group, n = 132) or a placebo (control group, n = 137) orally twice daily for the duration of antibiotic treatment. Analyses were based on allocated treatment and included data from 246 children. Patients receiving S. boulardii had a lower prevalence of diarrhea (≥3 loose or watery stools/day for ≥48 h occurring during or up to 2 weeks after the antibiotic therapy) than those receiving placebo [nine of 119 (8%) vs. 29 of 127 (23%), relative risk: 0.3, 95% confidence interval: 0.2-0.7].

S. boulardii also reduced the risk of antibiotic-associated diarrhea (diarrhea caused by Clostridium difficile or otherwise unexplained diarrhoea) compared with placebo [four of 119 (3.4%) vs. 22 of 127 (17.3%), No adverse events were observed. This was the first randomized-controlled trial evidence that S. boulardii effectively reduces the risk of antibiotic-associated diarrhea in children.

PROBIOTICS FOR THE PREVENTION OF TRAVELER’S DIARRHEA
Traveler’s diarrhea (TD) is a common health complaint among travelers. Rates of TD can range from 5% to 50%, depending on the destination. The objective of this study was to compare the efficacy of probiotics for the prevention of TD based on published randomized, controlled clinical trials. S. boulardii had a significant efficacy. No serious adverse reactions were reported in the 12 trials. Probiotics may offer a safe and effective method to prevent TD.

<table>
<thead>
<tr>
<th>Drug</th>
<th>Composition</th>
<th>Packing</th>
<th>Administration</th>
</tr>
</thead>
<tbody>
<tr>
<td>SACBOL</td>
<td>Lyophilized Saccharomyces boulardii 282.5 mg corresponding to Yeast 250 mg</td>
<td>4 Capsules</td>
<td>1 Capsule q6h</td>
</tr>
</tbody>
</table>
The aim of this study was to assess the efficacy of to be beneficial in the maintenance treatment of Crohn’s disease. Probiotics can be useful in the treatment of inflammatory bowel S. boulardii eradication. The secondary aim of this study was to define the efficacy and safety of S. boulardii therapy. One hundred and twenty-four patients with H. pylori infection receiving 14 days of triple therapy (clarithromycin 500 mg b.i.d., amoxicillin 1000 mg b.i.d., and lansoprazole 30 mg b.i.d.) were randomly assigned to S. boulardii or placebo.

H. pylori eradication rate, although higher in the treatment group, was statistically similar in treatment and control groups: 71% (44/62) versus 59.7% (37/62), respectively (p > .05). Nine (14.5%) patients in the treatment group and 19 (30.6%) patients in the placebo group experienced diarrhea. Epigastric discomfort was more frequent in the control group [9 (14.5%) versus 27 (43.5%), respectively (p < .01)]. Diffuse abdominal pain, abdominal gas, taste disturbance, urticaria, nausea symptoms were similar in both groups. GDQ scores after treatment were significantly better for treatment group (mean ± SD, range: 1.38 ± 1.25 (0-5) vs. 2.22 ± 1.44 (0-6), respectively; p < .01).

It was concluded that S. boulardii improved anti-H. pylori antibiotic-therapy-associated diarrhea, epigastric discomfort, and treatment tolerability. In addition, S. boulardii supplement decreased post-treatment dyspepsia symptoms independent of H. pylori status. However, S. boulardii had no significant affect on the rate of H. pylori eradication.49

S. Boulardii in Ulcerative Colitis

Probiotics can be useful in the treatment of inflammatory bowel disease. The non-pathogenic yeast S. boulardii has been found to be beneficial in the maintenance treatment of Crohn’s disease. The aim of this study was to assess the efficacy of S. boulardii in ulcerative colitis patients.

A group of 25 patients with a mild to moderate clinical flare-up of ulcerative colitis received additional treatment with S. boulardii 250 mg three times a day for 4 weeks during maintenance treatment with mesalazine. These patients were unsuitable for steroid therapy. Before and after treatment, Rachmilewitz’s clinical activity index was calculated. The probiotic treatment was considered a therapeutic success only when the final score was lower than 6. Of the 24 patients who completed the study, 17 attained clinical remission; this was confirmed endoscopically. These preliminary results suggest that S. boulardii can be effective in the treatment of ulcerative colitis.11

S. boulardii has a unique action on inflammation by a specific alteration of the migratory behavior of T cells, which accumulate in mesenteric lymph nodes. Therefore, S. boulardii treatment limits the infiltration of T-helper 1 cells in the inflammed colon and the amplification of inflammation induced by proinflammatory cytokines production. These results suggest that S. boulardii administration may have a beneficial effect in the treatment of inflammatory bowel disease.12

HIGHLIGHTS

• S. boulardii as an adjuvant to ORS in ambulatory care in children less than 2 years old with mild or moderate acute diarrhea decreased the duration of diarrhea, accelerated recovery and reduced the risk of prolonged diarrhea. Increased efficacy is seen if S. boulardii is administered within the first 48 h of the onset of diarrhea.

• S. boulardii improves anti-H. pylori antibiotic-therapy-associated diarrhea, epigastric discomfort, and treatment tolerability.

• A meta-analyses concluded that three types of probiotics (S. boulardii, Lactobacillus rhamnosus GG, and probiotic mixtures) significantly reduces the development of antibiotic-associated diarrhea. However, only S. boulardii was effective for clostridium difficile disease.

• S. boulardii has a significant efficacy for the prevention of traveler’s diarrhea based on published randomized, controlled clinical trials.

• S. boulardii administration may have a beneficial effect in the treatment of ulcerative colitis and inflammatory bowel disease.

• S. boulardii has been shown to decrease recurrences of recurrent Clostridium difficile-associated disease by about 50%, especially when combined with high-dose vancomycin.

REFERENCES


Probiotic, Non-Colonizing Yeast Supplement

Saccharomyces boulardii is a live, non-pathogenic yeast recommended as a probiotic and as a biotherapeutic in the treatment of diarrhoea of various etiology.

- Beneficial effects on the gastrointestinal tract
- Favourably alters the composition of the gut flora
- Combination with antibiotics in the treatments of amoebiasis
- Reduces the effects of toxins produced in certain diseases causing microbes like candida
- Increase the amount of immune proteins that flight intestinal invaders
- Inhibits the action of pathogenic microorganisms
- Synthesizes vitamin B1, vitamin B2, vitamin B6, pantothenic acid and nicotinic acid

Indications

- Treatment of diarrhoea - Traveller’s diarrhoea, viral diarrhoea and antibiotic associated diarrhoea, most notably rotavirus-induced diarrhoea in infants and children
- Recurrent clostridium Difficile Associated disease
- Inflammatory bowel diseases, ulcerative colitis, lactose intolerance, sucrase & maltase deficiencies
- Maintenance treatment of chronic disease
- Digestive complications following antibiotic therapy: diarrhoea, colitis, and candidiasis
- Prevention of vaginal yeast infections
- Treatment of food allergies