

# Mechanism of action and validity of probiotics for treatment of IBS

Review. Manuel Torres Arauz,  
Biomedical Sciences Degree 2013-2014, Autonomous University of Barcelona.

## Introduction

- Irritable bowel syndrome (IBS) is a common chronic gastrointestinal tract disorder.
- IBS is characterized by abdominal pain or discomfort, diarrhea, constipation, bloating, and distension in absence of identifiable biochemical or structural abnormalities.
- IBS has a prevalence of 12-20% of the adult population worldwide and more common in women. (1)
- Pathophysiology may be multifactorial, which is attributed to alterations in: gastrointestinal motility, visceral hypersensitivity, intestinal microbiota, gut epithelium and immune function, dysfunction of brain-gut axis or certain psychosocial factors.
- Recent research have revealed a potential role for the microbiota and the host immune response in IBS.
- Probiotics are live microorganisms that have the capacity to prevent or treat specific pathological conditions when administered in adequate amounts.
- Probiotics has been investigated as a promising treatment for IBS, and have demonstrated beneficial effects in some patients. (2)

## Materials and Methods

- Scientific literature search on PubMed database:** Reviews and recent papers about probiotics and IBS (search terms : "IBS", "treatment", "IBS + Probiotics"). This info was selected according to their relevance and date.

## Probiotics

- For being effective probiotics need five conditions:
  - (1) It must not be toxic or pathogenic
  - (2) It must have a proven beneficial effect
  - (3) It must contain a sufficiently large number of viable microorganisms,
  - (4) It must be capable of surviving in the intestine, maintaining itself and having intraluminal metabolic activity
  - (5) It must remain viable during storage and use. (3)
- Most commonly used probiotics come from genera *Bifidobacterium* and *Lactobacillus*, but other species are in trial.
- Probiotics can be used alone, or in combination of different microorganism.
- There are many clinical trials investigating the therapeutic benefit of probiotics in IBS patients, but they are heterogenic in terms of doses and species. (Table 1)

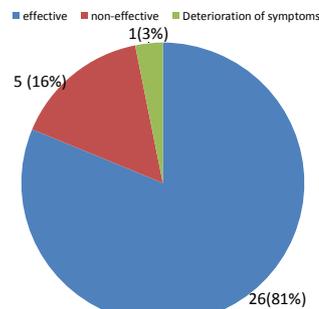
Organism	n	Outcome
<b>Studies in adult patients</b>		
<i>S. faecium</i>	54	↓ Global score
<i>Lactobacillus acidophilus</i>	18	↓ Global score
<i>Lactobacillus plantarum</i> 299V	60	↓ Flatulence
<i>L. plantarum</i> 299V	20	↓ Pain, 'all IBS symptoms'
<i>L. plantarum</i> 299V	12	Negative
<i>L. plantarum</i> MF1298	16	Deterioration of symptoms
<i>L. ramosus</i> GG	25	Negative
<i>L. reuteri</i> ATCC 55730	54	Negative
<i>L. californicus</i> UCC4331	75	Negative
<i>Bifidobacterium infantis</i> 35624	75	↓ Pain and composite score
<i>B. infantis</i> 35624	362	↓ Pain and composite score
<i>Bifidobacterium lactis</i> DN-173-010	274	↓ Digestive discomfort
<i>B. lactis</i> DN-173-010	34	↓ Maximum distension & pain
<i>Bifidobacterium bifidum</i> MIMB675	122	↓ Global score
<i>Bacillus coagulans</i> GB-30, 6086	52	↓ Bowel movements
<i>Escherichia coli</i> Nissle 1917	120	↑ Treatment satisfaction
VSL#3® (x8)*	25	↓ Bloating
VSL#3® (x8)*	48	↓ Flatulence
Mediac DS® (x2)*	40	↓ Pain
Mixture (x4)*	103	↓ Global score
Mixture (x4)*	86	↓ Global score
Mixture (x4)*	52	↓ Global score
Mixture (x4)*	106	Negative
Mixture (x2)*	40	↓ Pain
ProSymbioFor® (x2)*	297	↓ Global score
Culture® (x3)*	74	Negative
Culture® (x3)*	52	Negative
Mixture (x4)*	70	↓ Pain
<b>Studies in paediatric patients</b>		
<i>L. ramosus</i> GG	50	↓ Abdominal distension
<i>L. ramosus</i> GG	104	↓ Pain
<i>L. ramosus</i> GG	141	↓ Pain
VSL#3® (x8)*	59	↓ Global score

Table 1: Placebo controlled clinical trials of single or mixed probiotic preparations in IBS. Modified of A.Magnus et al.

## Results

### Results Of Trials

- Most clinical trials have been effective in treating the symptoms, as show the Table 1 and Figure 2. (4)
- Some clinical trials did not show significant effect. (Table 2)
- Only one clinical trial did show deterioration of the symptoms.
- Current data indicate that mixture of probiotics is more effective than singles one.
- Although, some strains have shown benefits for IBS when used alone (Table 2)



More effective	Non-effective
<i>L. plantarum</i> 299V	<i>L. ramosus</i> GG
<i>L. GG</i>	<i>L. reuteri</i> ATCC 55730
<i>B. infantis</i> 35624	<i>B. animalis</i> DN 173010

Table 2: More effective, and non-effective probiotics used alone.

- Most clinical trials have showed efficacy in the treatment of IBS, but most of them are been more effective on single symptoms than on the entire IBS. Only some probiotics have showed efficacy improving the global symptoms of IBS. It is showed in Figure 2.
- Also, as IBS is a complex and multifactorial disease, finding a treatment for all the symptoms, and types of IBS, will be difficult.

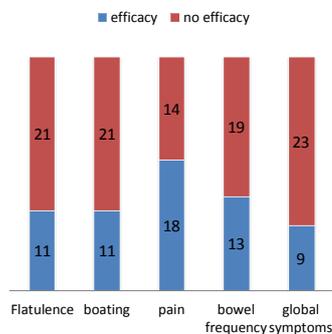
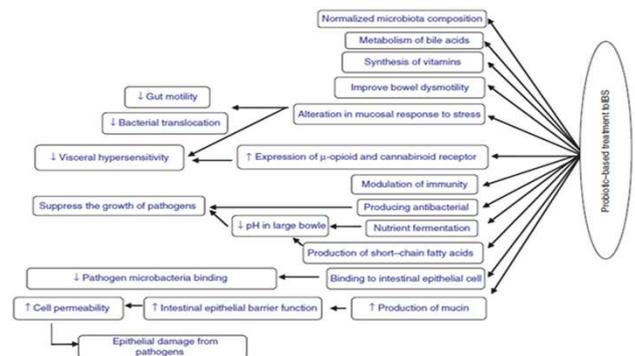


Figure 2: summary of probiotics have demonstrated efficacy improving the symptoms of IBS.

### Mechanism action of probiotics

- It is well known that probiotics strains have numerous positive effects in the gastrointestinal tract.
- Mechanisms of action of probiotics in the treatment of IBS are not fully known, but actually there are a lot of evidences and research about it. Figure 3 is a summary of all these mechanisms which participate in the improvement of patients with IBS.
- It is increasingly evident importance between the composition of the microbiota of the host, the immune system, the gut-brain axis and the interaction between them.



## Conclusions

- Systematic reviews and meta-analyses have showed reasonable evidences that probiotics have a beneficial effect improving the symptoms of IBS. But it needs investigation about best strains, doses, time of treatment, use of mixtures or single probiotics and classification criteria for patients.
- The pathophysiology of IBS need more investigation. Understanding better the mechanisms of this disease also will do easier to find personalized treatments. For that reason, also it will be important to study the microbiota profile in patients.
- In the short term, the most important thing is to harmonize clinical trials to obtain more powerful results. And with them to identify probiotics that are the best candidates for treatment.

## References

- Only relevant references are cited below. A detailed references list is available upon request for the committee:

1) Hosseini A. Probiotics use to treat irritable bowel syndrome. Expert Opin Biol Ther. 2012 12:1323-34.  
 2) Quigley EM. Probiotics in the management of functional bowel disorders: promise fulfilled?. Gastroenterol Clin North Am. 2012 41:805-19.  
 3) Simrén M. Intestinal microbiota in functional bowel disorders: a Rome foundation report. Rome foundation committee. Gut. 2013 62:159-76.  
 4) Dai C. Probiotics and irritable bowel Syndrome. World J Gastroenterol. 2013, 19:5973-80.