Bio.Me™ Prebio PHGG

Low FODMAP, water soluble fibre to support microbial diversity

Nutritional Information	Per Dose
Active	5g
Sunfiber® R-O (Organic Partially Hydrolysed Guar Gum)	5g

GMO-free | Gluten-free | Lactose-free | Halal | Kosher | Heat-stable | Suitable for vegans

Directions:
Mix 5g daily into at least 200ml of water or other beverage of choice. Stir and take on an empty stomach.

Partially hydrolysed guar gum (PHGG) is a vegetable based, water-soluble dietary fibre derived from the seeds of *Cyamopsis tetragonolobus* - the guar plant.

The polysaccharide component in PHGG consists of mainly galactomannan (galactose and mannose in recurring units), which are put together by glycosidic linkages that are fermented by the microbiota in the large intestine. This creates selective feeding of the gut microbiota, which gives PHGG its prebiotic effect. PHGG is classed as a large molecular weight dietary fibre which gives it the ability to be fermented in the large bowel. PHGG is often fermented by bacteria that make short chain fatty acids (SCFA), which in themselves have a beneficial effect on the host epithelium and wider system.

The powder dissolves in water, is tasteless and has been shown to be well tolerated in individuals with bowel symptoms.

Clinically, the main uses for PHGG are:

- As a bulking agent and prebiotic to help balancing faecal movements – both for constipation and diarrhoea type presentations
- To help selectively feed the microbiome – increasing *Bifidobacterium* and other SCFA producing bacteria
- As a dietary fibre to increase satiety

IBS and impacts on the microbiome

PHGG has been shown to be helpful in cases of Irritable Bowel Syndrome (IBS).

In a trial of healthy volunteers who had a tendency to IBS-D (diarrhoea), PHGG was found to improve the consistency of the stool and had an impact on the microbiota profile by increasing the abundance of *Bifidobacterium, Ruminococcus*, and *Megasphaera*, while it reduced *Bacteroides* spp.[1] Some in-vitro research has shown that *Bifidobacterium* does not ferment PHGG directly, suggesting that stimulation of *Bifidobacterium* by PHGG would be due to cross-feeding by other bacteria [1].

In an 18-week-long study (2 weeks of run-in, 12 weeks of treatment and 4 weeks of follow-up) with 108 subjects, IBS patients were blindly randomized to receive 6 grams of PHGG or placebo. A 12-week administration of PHGG led to a significant improvement of bloating score in the PHGG group, versus placebo, as well as in bloating plus gasses score. The effect lasted for at least 4 weeks after the last PHGG administration. There were no significant side effects associated with PHGG ingestion[2].

In a paediatric clinical trial of children between 8-16 years old who had symptoms of IBS or chronic abdominal pain, 5 grams of PHGG was given daily. The treatment group had significant changes to their IBS symptoms (bloating, discomfort, stool consistency) with no side effects[3].

In a small sample of humans, bacterial analysis of faecal samples before and after 2 weeks of supplementation of 6 grams per day of PHGG were taken. Copies of the butyryl-CoA CoA-transferase gene, *Bifidobacterium*, *Clostridium coccoides*, *Roseburia, Eubacterium rectale*, *Eubacterium hallii*, and butyrate-producing bacterium were significantly increased by the intake of PHGG. PHGG may benefit health by stimulating *Bifidobacterium* and butyrate-producing bacteria in the large intestine[4].

Constipation

In a large meta-analysis of PHGG use with constipation, the overall finding revealed that a daily dosage of 5–7 grams of PHGG is sufficient to ameliorate the symptoms among the healthy participants with constipation. Five studies evaluated elderly and children. These results suggest that PHGG consumption led to a favourable impact on constipation prevention to a similar magnitude achieved with laxatives[5].

In a murine model of constipation, PHGG was shown to resolve constipation and inhibited the growth of D*esulfovibrio* spp[6].

Autism and constipation

A small study was conducted on the impact of PHGG added to diets of Japanese children with autism spectrum disorders, presenting with constipation symptoms. All children, between 4-7 years old, where given 6 grams of PHGG daily. Bowel frequency improved from 2 times a week to 4 times a week, and irritability scores dropped. PHGG supplementation significantly decreased IL-1b and tended to decrease IL-6 and TNF-a. The relative abundance of genera *Blautia* and *Acidaminococcus* increased significantly and that of genera *Streptococcus*, *Odoribacter* and *Eubacterium* decreased significantly[7].

SIBO

In a human randomised trial, patients with confirmed small intestinal bacterial overgrowth (SIBO) were randomized to receive the antibiotic rifaximin 1,200 miligrams per day, or rifaximin 1200 miligrams per day plus 5 grams of PHGG per day for 10 days. The eradication rate of SIBO was 62.1% in the rifaximin, and 87.1% and 85.0% in the rifaximin-plus-PHGG group. Clinical improvement was observed in 86.9% and 91.1% of eradicated cases in rifaximin and rifaximin-plus-PHGG groups respectively.[8]

In a small clinical study, 40 patients with IBS who were known methane-producers were given PHGG. The patients that consumed PHGG had a reduction of methane gas on breath test and a reduction of symptoms. PHGG seemed to be effective at reducing methane excretion and symptoms in IBS subjects who are methane producers[9].

Other studies

In a murine model of colitis, PHGG administration resulted in colonic damage being significantly ameliorated. Levels of SCFA (acetate, propionate and butyrate) were also increased in the faecal samples at the end of treatment[10]. In another murine model, it was shown that the mucosal lining healed quicker after bowel resection than placebo when fed with PHGG[11].

As in most fibres, PHGG has been shown to reduce cholesterol and fat absorption from the GIT[12].

Fibres also make an important adjuvant in creating satiety in patients trying to lose weight. PHGG has been shown to increase satiety at a dosage starting at 2 grams, but up to doses of 6 grams. It has also been seen in combination with protein (2.6 grams guar fibre + 8 grams protein/serving) to have acute satiety effects in healthy subjects[13].

In another human study, the conversion of primary bile acids into secondary bile acids in serum decreased significantly in the PHGG group after 12 weeks of taking 6 grams per day[1].

Dosage

In most clinical studies 5-6 grams a day of PHGG have been used, even in children. It can be taken with or without food at any time of the day.

Summary table

Author (year)	Age range (mean) yrs	n	Trial Design	Daily Dose	Trial Duration	Definition of IBS	IBS Sub-type	Results
Giaccari (2001)	14–71 (43.1)	134	OL	5g	24 wks	Rome II	All	Improvements in evacuation frequency – at baseline median 5.62 movements per week (range 2–35/week); at week 24, median 7.17 (range 5–9) Decreases in frequency of flatulence, abdominal distension and cramping progressively through the trial
Parisi (2002)	not given (40.3)	188	OL	5g	12 wks	Rome I	All	65% of subjects in the PHGG group had an absence of abdominal pain at week 12 versus 42% in the wheat bran group (P=0.001) 65% of subjects in the PHGG group had normalisation of bowel habit at week 12 versus 48% in the wheat bran group (P=0.001) Overall IBS symptoms were significantly improved at wk 4 (P<0.001) and wk 8 (P=0.017), but not at wk 12 compared to wheat bran group
Parisi (2005)	not given (43.8)	86	OL	5g or 10g	12 wks	Rome II	All	Both doses appeared equally effective – only difference was a single outcome at a single time point (SF-36 Vitality subscale at week 12) which was significantly better in the high dose group At both 1 and 3 months, compared to baseline, there were significant (all P<0.05) improvements in: total GSRS scores and each of the 3 subscales (Dyspepsia, Digestion, and Intestinal); all subscales of the SF-36 QOL instrument; both Anxiety and Depression scores on the HADS instrument At 3 months after treatment ceased, improvements vs baseline values remained significant on most outcome measures; however, not as good as at 3 months on total GSRS scores
Paul (2011)	1–18	46	OL	U	6–8 wks	U	All	Alternating constipation and diarrhoea at baseline – 82% of subjects improved Diarrhoea at baseline – 58% improved Abdominal pain at baseline – 68% of subjects improved
Comito (2011)	8–16	60	R, PC	5g	4 wks	Rome III	All	Median Birmingham IBS score 0±1 in PHGG group versus 4±1 in placebo group (P=0.007)

Author (year)	Age range (mean) yrs	n	Trial Design	Daily Dose	Trial Duration	Definition of IBS	IBS Sub-type	Results
Furnari (2012)	not given (53.0)	40	OL	5g	16 wks	Rome III	All	At 1 month: Overall IBS symptoms improved in 65% of subjects (P<0.001) Methane production decreased in 45% of subjects At 4 months: Overall IBS symptoms improved in 80% of subjects (P<0.001) Methane production decreased in 60% of subjects
Romano (2013)	not given (12.7)	60	R, DB, PC	5g	4 wks	Rome III	C-IBS and D-IBS	Birmingham Score (summary of IBS-related symptoms) – 43% of subjects IBS symptoms improved on the Birmingham Scale whilst taking PHGG vs 5% on placebo (P=0.025) Bristol Stool Score – 40% had an improvement in stool form vs 13.3 in placebo (P=0.025); both IBS subgroups improved Wong-Baker Score (Abdominal pain intensity) – improved in the PHGG group vs baseline and placebo, but not significantly so
Russo (2015)	19–62 years (37 median)	68	OL	5g	4 wks	Rome III	C-IBS	Compared to baseline: Abdominal bloating scores ↓ by 33.9% (P<0.05); Number of evacuations/day ↑ by 34.2% (P<0.05); Number of perceived incomplete evacuations ↓ by 56.8% (P<0.05); Days on laxatives/enemas ↓ by 72.8 (P<0.05); Colonic transit time ↓ from 46.2 hours to 39.1 hours (P<0.05); Bristol scale improved significantly from a mean of 1.97 to 2.8 (P<0.05)

References

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