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Online Lecture **Series** 2025

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Fundamentals and Recent Research on Fermentable Fibre

Introducing the new Organic Low FODMAP Fiber Pro

Presented by Dr. Kris Kuciel, ND Sponsored by Bioclinic Naturals





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bioclinic naturals

- Exclusive and innovative products for licensed healthcare practitioners
- Canadian company based in Burnaby, BC
- Part of Factors Group of Companies
- We have 1000+ acres of farmland where we grow some of our ingredients
- Commitment to quality from seed to shelf
- Top industry leaders on our medical advisory board such as Dr. Pizzorno, Dr. Gaetano, Dr. Reichert and Dr. Lyon.







bioclinic naturals

- Trusted, efficacious and reliable
- Not only capsules and tablets but multiple other delivery methods
- Vigorous in-house batch testing of our raw materials to ensure quality
- Ensure no variation in active constituents and dosage
- Third party tested through Isura
- Heavy metal and toxin free



Note on our website's reference sections



GI Care Mango - Passion Fruit

120 g Mango - Passion Fruit (SKU: 9631, NPN: 80131494)





Fibre

National Average and Recommendations

- Average Canadian & American get around 14-16g of fibre per day
- Recommended intake:

Female Age	g/day
1-3	19g
4-8	25g
9-18	26g
19-50	25g
51+	21g
Pregnant	28g
Breast Feeding	28g

Male Age	g/day
1-3	19g
4-8	25g
9-13	31g
14-18	38g
19-50	38g
51+	30g

Less than 10% of people get these amounts

National Average and Recommendations

- Dosages can also be done by calorie intake.
 - Roughly 15g per 1000 calories eaten.
- Prevention of colon cancer and coronary heart disease are recommending more. 40-50g a day.
 - Polyp prevention study showed no difference at 35g/day indicating higher dosing may be needed.



Ammonia: barrier function, mucus, mucosal permeability proliferation Branch chain fatty acids: inflammatory Aromatic amino acids: phenolics, indolics, pcresol, *N*-nitrosoamines Hydrogen sulfide: inflammatory, DNA damage, genotoxic

 Cell metabolism: energy supply

 Genetic-Epigenetic regulation: histone

 deacetylase inhibition, miRNA , down-regulation of

 canonical Wnt-signaling

 Anti-proliferative: p53, p21 activation, reduced

 cell cycling, apoptosis

 Immunomodulatory and anti-inflammatory:

 GPR43, GPR109α activation, T_c reg activation of

 Foxp3 and IL-10 expression, NF-κB suppression

 Mucosal health and defence: mucin synthesis,

 tight junctions, trefoil factors, antimicrobial

 peptides, heat shock proteins, transglutamase, β

 glucoronidase acitivty

 Microbiota homeostasis: phenolics, antioxidants



https://pmc.ncbi.nlm.nih.gov/articles/PMC6312100/

CANCER RISK

Fibres

- Insoluble: poorly fermentable fibres that help with weight loss and constipation. These include cellulose, hemicellulose and lignins.
- **Soluble:** fermentable fibres that help with digestion, blood sugar and cholesterol. These include pectins and gums.

Top Dietary Fibre Sources

- Lentils (13.1g in 1 cup) (1.2g soluble)
- Beans (12g in 1 cup) (4.8g soluble)
- Chickpeas (12.5g in 1 cup) (3g soluble)
- Avocado (10g in 1 cup) (3g soluble)
- Raspberries/blackberries (8g in 1 cup) (2.4g soluble)
- Oatmeal (8g in 0.5 cup) (2g soluble)
- Muesli (5g in 0.5 cup) (1g soluble)
- Almonds (8g in 0.5 cup) (0.9g soluble)
- Quinoa (5.2g in 1 cup cooked) (1.7g soluble)
- Sweet potato (3.2g in 1 potato) (0.6g soluble)
- Banana (2.8g in 1 banana) (0.7g soluble)
- Broccoli (2.7g in 1 cup) (1.4g soluble)
- Spinach (2.2g in 100g) (0.7g soluble)
- Whole wheat bread (2g in 1 slice) (0.3 soluble)

Fermentable Fibres

- Inulin (Chicory root)
- Pectins (Fruits and Veggies)
- Beta-glucans (Legumes)
- Gums (Guar and Acacia)
- Oligofructose (FOS, variety)
- Resistant Starches (Variety of foods)



- When feeding bacteria fermentable fibre they produce gases, SCFAs, B-vitmains, hormones, enzymes and other metabolites.
- Fermentable fibres can contain FODMAPS but not all

SCFA (Short Chain Fatty Acids)

- 95% of the SCFAs bacteria produce are:
 - Acetate
 - Propionate
 - Butyrate
- Uses of SCFAs:
 - Energy source for intestinal cells
 - Maintain epithelial barrier
 - Reduce inflammation and immunity
 - Lipid metabolism
 - Reduce cancer risk
 - Insulin sensitivity
 - And more



Acetate

Propionate

Butyrate



Ammonia: barrier function, mucus, mucosal permeability proliferation Branch chain fatty acids: inflammatory Aromatic amino acids: phenolics, indolics, pcresol, *N*-nitrosoamines Hydrogen sulfide: inflammatory, DNA damage, genotoxic

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CANCER RISK



Partially Hydrolyzed Guar Gum Fibre



What is PHGG Fibre?

- The endosperm (split) of the guar seeds are separated. The split has large carbohydrate content.
- It is treated with β-endogalactomannase derived from Aspergillus niger. Reducing the polymer chain length resulting in a more soluble fiber with a lower viscosity.



Uses in Health Industry

- . **Gut health**: improve bowel movements and stool formation and may help with constipation and diarrhea. Bloating and gas.
- . Blood sugar and cholesterol: can reduce blood sugar and cholesterol levels and improve blood lipid profile.
- . Weight management: can increase satiety and delay stomach emptying, which may help with weight management.
- . Immune function: can influence immune function and prevent infections.
- . Intestinal barrier: can contribute to intestinal barrier maintenance.
- . Inflammation: can suppress the influx of inflammatory substances and inhibit systemic chronic inflammation.

- **Constipation/Diarrhea:** help alleviate constipation by increasing stool frequency, improving stool consistency, and reducing straining. It works by enhancing gut motility and improving water retention in the stool, leading to softer, bulkier stools.
 - Impact of partially hydrolyzed guar gum (PHGG) on constipation prevention: A systematic review and meta-analysis (<u>https://doi.org/10.1016/j.jff.2017.03.028</u>)
 - Review of 325 participants showed improvements in constipation with no adverse effects.
 - 5 more studies with elderly and children showed results as effective as laxatives

- **Prebiotic Use:** PHGG is a prebiotic fiber, meaning it serves as food for beneficial gut bacteria, promoting the growth of healthy gut microbiota. This can lead to better digestion, enhanced immune function, and overall gut health.
 - Effect of Repeated Consumption of Partially Hydrolyzed Guar Gum on Fecal Characteristics and Gut Microbiota: A Randomized, Double-Blind, Placebo-Controlled, and Parallel-Group Clinical Trial (https://doi.org/10.3390/nu11092170)
 - Healthy Volunteers (n=44) with no significant bowel issues. Showed increase in Bifidobacterium, Lactobacillus, butyrate production and stool consistency.

- Prebiotic Effects of Partially Hydrolyzed Guar Gum on the Composition and Function of the Human Microbiota-Results from the PAGODA Trial (<u>https://doi.org/10.3390/nu12051257</u>)
- Healthy Volunteers (n=20) with no significant bowel issues also.
- 3 weeks of 5g PHGG Fibre 3 times a day
- Improved bowel movements with no side effects
- Increased SCFAs (butyrate, succinate, acetates)
- Increase in *Ruminococcus, Fusicatenibacter, Faecalibacterium* and *Bacteroides* and a reduction in *Roseburia, Lachnospiracea* and *Blautia*
- Once stopped treatment, SCFAs decreased and bacteria too

- SIBO Use: Clinical trial: the combination of rifaximin with partially hydrolysed guar gum is more effective than rifaximin alone in eradicating small intestinal bacterial overgrowth (https://doi.org/10.1111/j.1365-2036.2010.04436.x)
 - 2010 study done on 77 participants who had SIBO
 - Treatment was 10 days long
 - Rifaximin alone 62.1% eradication rate
 - Rifaximin plus PHGG Fibre (5g) had 87.1% eradication rate

- Effect on Glycemic Control: PHGG has been shown to help regulate blood sugar levels, particularly after meals. It may help slow down the absorption of glucose and improve insulin sensitivity.
 - Really bad studies in this with fermentable fibre specifically.. Mostly rats and small samples
 - Improvement of the metabolic syndrome profile by soluble fibre guar gum in patients with type 2 diabetes: a randomised clinical trial (<u>https://doi.org/10.1017/s0007114513001025</u>)
 - 44 patients, 6 week study
 - Saw slight decrease in waist circumference and decent reduction in HbA1c
 - HbA1c 6.88 to 6.57

- Soluble dietary fibre partially hydrolysed guar gum markedly impacts on postprandial hyperglycaemia, hyperlipidaemia and incretins metabolic hormones over time in healthy and glucose intolerant subjects (<u>https://doi.org/10.1016/j.jff.2016.04.008</u>)
- Small study done in 12 participants
- Followed for 12 months
- Posprandial plasma glucose reduced quite well
- After 3 months 3/6 glucose intolerant individuals regulated and had tolerance

- Effects of soluble fiber supplementation on glycemic control in adults with type 2 diabetes mellitus: A systematic review and meta-analysis of randomized controlled trials (<u>https://doi.org/10.1016/j.clnu.2020.10.032</u>)
- Review of 1517 participants, 29 RCTs
- Dosages of a variety of fibres 7-8g
- Fasting glucose, insulin and HbA1c improvements

- Increased Satiety: It has been shown to increase feelings of fullness (satiety), potentially leading to reduced calorie intake, which may help in managing body weight.
- Fat Metabolism: PHGG has been linked to better fat metabolism and overall lipid profile improvements.
- Impact on Lipid Profile: Some studies have suggested that PHGG can reduce total cholesterol and low-density lipoprotein (LDL) cholesterol levels.

- Effects of guar gum on blood lipid levels: A systematic review and metaanalysis on randomized clinical trials (<u>https://doi.org/10.1016/j.jff.2021.104605</u>)
- 17 studies, sample size around 200 participants
- Showed decrease in Total cholesterol and LDL but not HDL or Triglycerides
- Total Cholesterol -1.38
- LDL-C -1.67

- ITC study on the interaction of some bile salts with tragacanth, Arabic, and guar gums with potential cholesterol-lowering ability (<u>https://doi.org/10.3389/fnut.2023.1258282</u>)
- All studies are done on rats for this
- Showed lowered bile acid uptake in the small intestines allowing for reduction of cholesterol
- Reuptake is increased in the large intestines

Immune Function

- Continuous partially hydrolyzed guar gum intake reduces cold-like symptoms: a randomized, placebo-controlled, double-blinded trial in healthy adults (<u>https://doi.org/10.26355/eurrev_202207_29304</u>)
- 96 participants in Japan
- 5.2g of PHGG Fibre for 12 weeks
- SCFAs (propionic and n-butyric acid) increased quite a bit
- Interferon-gamma levels were low by week 6
- Cold and Flu symptoms lowered statistically significant
- Showing possible importance of SCFAs

Intestinal Barrier Maintenance

- Partially hydrolyzed guar gum increased colonic mucus layer in mice via succinate-mediated MUC2 production (<u>https://doi.org/10.1038/s41538-023-00184-4</u>)
- Intestinal mucus layer increased with PHGG which is important in protecting the intestinal cell barrier
- Oddly it was only seen in those who had increased succinate levels (a SCFA)
- Other studies done on succinate levels and SCFA showed reduced intestinal permeability

Inflammation

- Partially hydrolyzed guar gum attenuates broad-spectrum antibiotic-induced gut microbiota disruption associated with intestinal inflammation and barrier damage in mice (https://doi.org/10.1016/j.fbio.2024.104962)
- Really cool study even if done on mice
- Full recovery after antibiotic induced inflammation and intestinal barrier damage
- Restored flora almost back to normal in two weeks
- Same with mucosal layer and intestinal cell walls

Sleep and Stress

- Partially hydrolyzed guar gum is associated : with improvement in gut health, sleep, and motivation among healthy subjects (<u>https://doi.org/10.3164/jcbn.22-75</u>)
 - Study of 60 participants in Japan.
 - Showed improvements in all participants for all outcomes from baseline (placebo was maltodextrin, T3 group and T5 group)
 - But those taking PHGG Fibre had statistically better outcomes
 - Sleep and Stress was most improved in T5 group

Others

- Partially hydrolyzed guar gum suppresses binge alcohol-induced liver fat accumulation via gut environment modulation in mice (<u>https://doi.org/10.1111/jgh.16737</u>)
- The effects of prebiotic partially hydrolyzed guar gum on skin hydration: A randomized, open-label, parallel, controlled study in healthy humans (<u>https://doi.org/10.1016/j.jff.2023.105494</u>)

Compared to Other Fibres

- Comparative Effect of 22 Dietary Sources of Fiber on Gut Microbiota of Healthy Humans in vitro (https://doi.org/10.3389/fnut.2021.700571)
 - No acacia or guar gum in this study even though done in 2021
 - Across all fibre sources there were not huge differences
 - Psyllium came on top for changes to microbiome and SCFA production



Compared to Other Fibres

- Truth be told: Acacia, Psyllium and Guar Gum don't vary TOO much
 - Psyllium is non fermentable while Acacia and PHGG are
 - Psyllium has both soluble and insoluble fibre (13%)
 - Psyllium has many more studies thus hard to compare
 - PHGG seems to have better outcomes for weight loss than both
 - PHGG doesn't expand or swell stool size while Psyllium does
 - PHGG and Acacia have more gut microbiome studies and effect a more variety of microbes than psyllium
 - PHGG and galactomannan produce the most SCFAs in old study*
 - PHGG ferments much slower than Acacia, having less gas and side effects
 - Overall PHGG may be tolerated better with those who have IBS

Thank you for being here today!

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