

Spirulina and Chlorella



1:1 Organic Spirulina and Chlorella

Benefits:

- High in protein, iron, vitamins, and chlorophyll
- Antioxidant with distinguished usage for cardiovascular health
- May help with appetite control
- Source of prebiotic
- Promote optimal immune function
- 100% vegan
- Non-GMO

Spirulina and chlorella are forms of microalgae. Both have impressive nutrient profiles, lack toxicity, and are excellent vegan sources of protein (55–70% protein content).

Spirulina (*Spirulina platensis*) was declared as the “best food for the future” by the World Health Organization.^[1] Spirulina contains a few clinically active components. The main ingredient is 1% phycocyanobilin (or phycocyanin), which gives it its blue-green color. This compound can inhibit the enzyme complex called nicotinamide adenine dinucleotide phosphate (NADPH) oxidase, exerting antioxidative and anti-inflammatory effects, and protecting vascular cells from the excessive production of reactive oxygen species.^[2] Inhibition of NADPH oxidase has been shown to mediate the lipotoxicity of pancreatic *beta* cells (that secrete insulin) and may explain spirulina's benefit in type 2 diabetes.^[3] Spirulina is also a good source of *beta*-carotene.

Oral supplementation of spirulina in human studies has been shown to relieve symptoms of allergic rhinitis^{[4][5]} and strengthen the innate immune system.^[6] Spirulina is widely known for its ability to chelate and detoxify accumulated toxins in the body. One human study showed spirulina decreased toxic load of arsenic in those chronically exposed to it.^[7] Spirulina has hypoglycemic effects,^{[8][9]} may lower blood pressure,^{[10][11]} aids weight loss in the overweight,^{[12][13][14]} and may reduce lipid levels in populations at risk of heart disease.^{[9][15]} More recent studies have shown that spirulina may modulate the composition of gut microbiota which may explain its mechanism and ability to improve overall health status, by increasing or promoting growth of certain strains of *Lactobacillus* and *Bifidobacterium*.^[16]

Chlorella (*Chlorella pyrenoidosa* and *Chlorella vulgaris*) is a deep-green freshwater algae that contains 12 naturally occurring vitamins including *beta*-carotene, B₁, B₂, B₃, B₁₂, and biotin. Due to chlorella having a hard cell wall, broken-cell chlorella in supplement form is more digestible. Dried, it contains approximately 45% protein, 20% fat, 20% carbohydrate, 5% fibre, and 10% minerals and vitamins. It contains 1% chlorophyll.

Most recent clinical research on chlorella have revealed its potential in depression.^[17] This could possibly be explained by the neuroprotective components contained in chlorella (linoleic acid and vitamin B₁₂/methylcobalamin), which have been reported to improve depressive symptoms. It has been used safely in pregnancy and has potential to help detoxification of dioxins^[18] and improve iron status in pregnancy.^[19] Like spirulina, chlorella also has a minor stimulatory effect on immunity^{[18][20]} and may lower blood pressure.^{[21][22]} It has been shown to significantly reduce liver enzymes as well as triglycerides, uric acid, HbA_{1c}, and HOMA-IR index levels in those with nonalcoholic fatty liver disease (NAFLD).^{[23][24]}

Antiobesity Mechanism of Microalgae: Although several mechanisms have been proposed to explain the antiobesity and insulin-signaling effects of microalgae, further studies are needed in order to gain more insight. For instance, in several studies, increased expression of genes related to thermogenesis has been found, suggesting the activation of this process, but additional studies are needed to confirm that in fact thermogenesis—and consequently energy expenditure—are increased.^{[25][26]}

Organic Source of Algae Are Important: A study on contamination of natural supplements found contamination (toxins, heavy metals) of marine-sourced supplements like chlorella.^[27] Vitazan Professional performs third-party testing on all raw materials and only sources organic spirulina and chlorella.



Table 1. Clinical Studies of Spirulina

Indication	Design	Outcomes	Notes
Allergic Rhinitis	Double-blind, placebo-controlled study evaluating the effectiveness and tolerability of spirulina (2 g/d × 6 months) on 129 adult patients with allergic rhinitis.	Spirulina consumption significantly improved the subjective symptoms and physical findings compared with placebo ($p < 0.001$) including nasal discharge, sneezing, nasal congestion, and itching. On a rating scale of 1–10 with how satisfied participants were with the treatment, spirulina rated on average 7.21 ± 1.01 (how satisfied) and 7.44 ± 0.89 (how effective), while placebo rated 3.40 ± 1.71 and 3.54 ± 1.37 , respectively.	[4]
	Randomized, double-blind, crossover study versus placebo evaluated the impact of spirulina (1–2 g/d) over 12 weeks on patients with allergic rhinitis. Outcome was measured by the production of cytokines (IL-4, IFN- γ , and IL-2) which are critical in regulating IgE-mediated allergy.	Immune cells isolated from the persons ingesting 2 g spirulina daily had suppressed secretion of the proinflammatory cytokine IL-4 by 32% in response to an antigen (T_H2 response).	[5]
Immune System	Longitudinal study on 12 healthy adults studied the effect of 50 ml hot-water extract of <i>Spirulina platensis</i> extract × 8 weeks on activation of the innate immune system.	Natural killer-cell cytotoxic activity enhanced in > 50% of subjects.	[6]
Heavy Metal Poisoning	Placebo-controlled, double-blind study of 41 patients with chronic arsenic poisoning were treated with either spirulina (250 mg) plus zinc (2 mg) twice daily or placebo × 16 weeks. The effectiveness of treatment was evaluated by comparing changes in skin manifestations, as well as the arsenic content in urine and hair between the groups.	Increase in urinary excretion of arsenic were seen after 2 weeks, and a 47% drop in amount of arsenic in hair in the spirulina group. There were also significant differences in the clinical appearance of skin.	[7]
Diabetes Type 2	In a small randomized controlled trial, 25 elderly adults with type 2 diabetes were given 2 g/d of spirulina × 2 months.	Spirulina significantly reduced fasting blood glucose (-19 mg/dL or -12%), 2-hour postprandial glucose (-16 mg/dL or -6%), and HbA_{1c} (-1.0% ; from 9% down to 8%) compared to baseline, whereas these glycemic parameters remained unchanged in the control group. No statistical analysis was performed between groups.	[8]
	A meta-analysis of eight studies involving adults with type 2 diabetes ($n = 3$), HIV ($n = 2$), hypertension ($n = 1$), and obesity alone ($n = 2$); used 1–19 g/d (median: 2 g) and lasted 2–24 weeks (median: 12 weeks).	Spirulina supplementation lowered fasting blood glucose by an average of 5 mg/dL.	[9]
Hypertension	Clinical study of 36 adults who took 4.5 g of spirulina orally × 6 weeks. Blood pressure was measured before starting the study as a control, and then weekly after study onset.	Blood pressure decreased significantly ($p < .001$) at the end of the spirulina treatment, and a significant decrease on systolic blood pressure was observed after the fourth week of treatment ($p < .01$). Decrease in blood pressure, such that the percentage of subjects fulfilling the criteria for hypertension decreased from 45% to 14% when compared to baseline.	[10]
	Randomized controlled trial of 40 hypertensive patients received 2 g spirulina orally or placebo for 3 months.	Reduction in systolic blood pressure by 7 mmHg and diastolic blood pressure by 6 mmHg when compared with placebo.	[11]
Weight Loss in Obesity	Randomized, double-blind, crossover controlled clinical trial of 52 sedentary young men with BMI > 25 kg/m ² evaluated the effects of <i>Spirulina maxima</i> (SM) 4.5 g/d for 6 weeks, with or without performing a physical exercise program (PEP) on blood lipids and BMI. Participants were assigned to four intervention groups: 1) SM with PEP; 2) placebo with PEP; 3) SM without PEP; 4) placebo without PEP (control). Plasma lipids were measured pre- and postintervention.	Pre/post comparisons showed significant reductions in all plasma lipids in the SM-with-PEP group, particularly in those with dyslipidemia ($p \leq 0.043$). Comparing the final v. the initial values, BMI, total cholesterol, triglycerides, and low-density lipoprotein cholesterol were decreased. High-density lipoprotein cholesterol increased in all treatment groups compared to control. Changes were observed mostly in SM with PEP interventions, particularly in dyslipidemic subjects ($p < 0.05$). SM supplementation enhances the hypolipidemic effect of a systematic PEP in men with excess body weight and dyslipidemia.	[12]
	Meta-analysis: Data obtained from 5 studies with 278 subjects (145 case / 133 control) were analyzed.	Spirulina supplementation significantly reduces body weight, especially in obese individuals.	[13]
	Randomized controlled trial of 64 healthy obese adult individuals received 1 g of spirulina or placebo for 12 weeks.	Weight and BMI were significantly reduced in the treated v. untreated group ($p < 0.05$). The additional weight loss was about 2 lb. The treated group also had a significant decrease in appetite ($p = 0.008$) which could, in itself, account for the weight loss. It is unclear whether there is something specific in spirulina that decreases appetite or whether it is because of an overall increase in dietary protein.	[14]

Hyperlipidemia	A meta-analysis of 12 studies with 807 participants. Studies lasted on average of 12 weeks and administered on average 2 g/d of spirulina, and involved high-risk populations (e.g. type 2 diabetes, hypertension, and heart-disease patients).	Spirulina supplementation significantly affected LDL-C (-33 mg/dL), triglycerides (-39 mg/dL), vLDL-C (-8 mg/dL), and HDL-C (+6 mg/dL) compared to placebo (7 studies) or no intervention (5 studies).	[9]
	An earlier meta-analysis of 7 RCT studies with 522 participants.	Spirulina supplementation significantly affected LDL-C (-41 mg/dL, $p < 0.001$), triglycerides (-44 mg/dL, $p < 0.001$), and HDL-C (+6 mg/dL, $p = 0.001$) compared to control.	[15]

Table 2. Clinical Studies of Chlorella

Indication	Design	Outcomes	Notes
Depression	Randomized controlled trial evaluated the effectiveness of 1.8 g chlorella extract tablets daily as adjunct to antidepressant medications in 125 patients with major depressive disorder (MDD) × 6 weeks.	Changes in the frequency of depressive symptoms were assessed using the Hospital Anxiety and Depression Scale (HADS) and Beck Depression Inventory II (BDI-II) scale. Significant improvements in depression and anxiety in patients who consumed chlorella. All improvements were subjective (insufficient power to detect a difference).	[17]
Pregnancy: Toxin Removal	Clinical study of 35 pregnant women who took <i>Chlorella pyrenoidosa</i> oral tablets for 6 months. Levels of dioxins and IgA were measured in breast milk.	Chlorella significantly reduced transfer of dioxins to children through breast milk ($p = 0.003$). IgA was higher in breast milk of the chlorella group ($p = 0.03$).	[18]
Pregnancy: Iron Deficiency	A controlled, unblinded trial of 70 pregnant women were supplemented with 6 g of <i>Chlorella pyrenoidosa</i> daily during week 12–18 gestation until delivery.	Chlorella was associated with significantly higher hemoglobin (+5.6%), hematocrit (+6.3%), and red blood cell count (+4.7%) compared to control (unblinded). The number of women remaining above a 11 g/dL threshold for hemoglobin concentration was significantly enhanced with chlorella, and no influence on blood pressure was noted.	[19]
Immunity	In a randomized, double-blinded, placebo-controlled trial, 5 g of chlorella tablets was given to 51 healthy participants × 8 weeks.	Serum concentrations of interferon- γ ($p < 0.05$) and interleukin-1 β ($p < 0.001$) were significantly increased, and that of interleukin-12 ($p < 0.1$) tended to increase in the chlorella group. Chlorella tablets increased natural killer cell activity, IL-1 β , and T $_h$ 1 response in people who ingested the tablets for 8 weeks.	[20]
Hypertension	A meta-analysis of 19 randomized control trials with 797 subjects.	Chlorella significantly decreased systolic (-4.51 mmHg, $p < 0.001$) and diastolic blood pressure (-1.64 mmHg, $p = 0.049$). At doses higher than 4 g/d for at least 8 weeks, chlorella supplementation also significantly reduced TC and LDL-C levels.	[21]
	A placebo-controlled, double-blind study performed on 80 individuals with hypertension (systolic 130–159 mmHg), using a supplement GABA-rich chlorella (10 g delivering 20 mg GABA) or placebo twice daily × 12 weeks.	Chlorella was associated with lower systolic and diastolic blood pressure from week 4 onward, with more potency in persons with higher blood pressure at baseline ($p < 0.01$).	[22]
Nonalcoholic Fatty Liver Disease	Open-label, randomized, controlled trial in 76 patients with NAFLD assigned to 2 groups: 1) 1.2 g chlorella + 750 mg metformin + 200 mg vitamin E daily × 3 months or 2) 1250 mg metformin + 200 mg vitamin E daily × 3 months.	Intervention with chlorella combined with metformin decreased serum levels transaminases (ALT, AST), uric acid, HbA $_{1c}$, as well as triglycerides and improves insulin sensitivity, compared to baseline. This study is limited by lack of between group analysis.	[23]
	Randomized controlled trial of 70 NAFLD patients took 4 × 300 mg of chlorella tablets × 8 weeks.	Mean reduction in weight was higher in the chlorella group ($p < 0.001$). Blood glucose levels, TNF- α , and hsCRP also decreased.	[24]

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Each vegetable capsule contains:

Organic spirulina (*Spirulina platensis*) 237.5 mg
 Organic broken-cell chlorella (*Chlorella pyrenoidosa*) 237.5 mg

Also contains: Non-GMO vegetable capsule composed of vegetable carbohydrate gum and purified water.

Directions of use: Adults: Take 4 capsules three times daily with food or as directed by your health-care practitioner. If you are taking other medications, take this product a few hours before or after them.

#1664 · 60 capsules · 475 mg · NPN 80073353 · V0453-R3