

Gluko SAP

Science-based formulation for healthy glucose levels

Diabetes is one of the most widespread metabolic and lifestyle disorders affecting millions all over the world. The hallmarks of diabetes are hyperglycemia and impaired insulin sensitivity, which create various chronic complications in the body over time. Several factors contribute to development of type 2 diabetes mellitus, such as sedentary lifestyle, food, age and stress. Management of type 2 diabetes mellitus involves carbohydrate control via a balanced diet, exercise and weight loss. Anti-diabetic drugs have proven to be effective in management of diabetes, however the side effects of these drugs can cause their own complications. Several herbs have been used in traditional medicine, which have with recent research proven to be efficacious in the management of diabetes symptoms, by themselves and in the form of adjuvant treatment to drug therapy.

Gluko SAP is a synergistic formulation of key evidence-based botanicals and minerals that can help promote the management of diabetes by regulation of serum glucose levels and improvement of insulin sensitivity. **Gluko SAP** can help manage weight loss and support healthy body mass index. **Gluko SAP** can help promote healthy carbohydrate and lipid metabolism.

ACTIVE INGREDIENTS

Each vegetable capsule contains:

<i>Gymnema sylvestre</i> leaf extract, 25% gymnemic acid	250 mg
Fenugreek (<i>Trigonella foenum-graecum</i>) seed extract, 50% saponins	100 mg
Bitter melon (<i>Momordica charantia</i>) fruit extract, 5% charantin	100 mg
Vanadium oxysulfate	0.9 mg
Chromium (from chromium picolinate)	0.25 mg
Cassia cinnamon (<i>Cinnamomum aromaticum</i>) bark extract, 10% polyphenols	275 mg
Vitamin B ₁₂ (Methylcobalamin)	0.5 mg
R- α -Lipoic acid	50 mg

Other ingredients: Vegetable magnesium stearate, microcrystalline cellulose, silicon dioxide, vegetable carbohydrate gum, and purified water.

Contains no: Gluten, soy, wheat, eggs, dairy, yeast, citrus, preservatives, artificial colours and flavours or starch.

This product is non-GMO.

Gluko SAP contains 60 capsules per bottle.

DIRECTIONS FOR USE

Adults: Take one capsule twice daily with food or as directed by your health care practitioner.

INDICATIONS

Gluko SAP:

- Supports healthy glucose metabolism.
- Helps reduce elevated blood lipid levels.
- Can help manage weight loss and improve body mass index.

CAUTIONS AND WARNINGS

Consult a health care practitioner if symptoms persist or worsen. Consult a healthcare practitioner prior to use if you have a kidney disorder and/or diabetes.

Contraindications: Do not use if you are pregnant or breastfeeding. For adult subpopulation only.

Known adverse reactions: Discontinue use and consult healthcare practitioner if you experience sweating, paleness, chills, headache, dizziness, and/or confusion.

Do not use if seal is broken. Keep out of reach of children.

PURITY, CLEANLINESS, AND STABILITY

All ingredients listed for each **Gluko SAP** lot number have been tested by an ISO 17025 accredited third-party laboratory for identity, potency, and purity.



Scientific Advisory Panel (SAP):
adding nutraceutical research
to achieve optimum health



351, Rue Joseph-Carrier, Vaudreuil-Dorion, Quebec, J7V 5V5
T 1 866 510 3123 • F 1 866 510 3130 • nfh.ca

Diabetes mellitus is a complex lifestyle disorder affecting millions of people around the world. It has been hypothesized that the number of people suffering from this condition will rise to 552 million by the year 2030, 90% of which would be type 2 diabetes mellitus (T2DM) patients. [16] This chronic metabolic disorder is primarily characterized by hyperglycemia, and can result in long lasting damage and impaired function of vital organs. [2] There are several pharmacological approaches that have been employed in the treatment of T2DM, however these drugs come with their own set of detrimental effects. [17]

Traditional medicine has several herbs and natural approaches to support the management of T2DM, and recent human clinical trials have produced new evidence to support the therapeutic potential and efficacy of these nutraceutical ingredients.

NUTRACEUTICALS IN THE MANAGEMENT OF GLUCOSE AND LIPID METABOLISM

Gymnema sylvestre leaf extract

Extracts of *Gymnema sylvestre* (GS) have been used in the management of blood pressure, body weight and glucose levels in traditional medicine. Recent research has brought to light the antidiabetic potential of this extract. In a small cohort of type 2 diabetes mellitus (T2DM) patients, administration of GS extract in dose of 1g/day for 60 days reduced circulating insulin and C-peptide, with reduced fasting and post prandial glucose levels. The same study demonstrated the in vitro stimulatory effects of GS on isolated human islets of Langerhans insulin secretion from β -cells. [1] Supplementation of 500mg per day of GS for 3 months in 58 T2DM patients showed reduced fatigue, polyphagia, blood glucose, and glycated hemoglobin with favorably altered blood lipid profiles. [2] In addition to its insulin modulating effect, GS has been found to reduce very low density lipoprotein (VLDL) levels and decrease body weight and body mass index (BMI) when 600mg per day was administered for 12 weeks to 24 patients suffering from metabolic syndrome. [3]

Fenugreek seed extract (*Trigonella foenum-graecum*)

Fenugreek is another commonly herb the extract of which has been used in herbal medicine for the treatment of various metabolic conditions. Administration of 1176mg per day of fenugreek seed extract (FSE) for 6 weeks in 39 overweight subjects decreased dietary fat consumption and decreased insulin/glucose ratio. [4] A double blind placebo controlled study observed improved glycemic control and reduced insulin resistance in 25 T2DM patients after administration of 1g/day of FSE for 2 months, accompanied with reduced serum triglycerides and increased high density cholesterol (HDL) serum levels. [5] The insulin modulating effects of fenugreek have further been explored in recent studies. Administration of 1000mg of fenugreek in 13 volunteers for 2 weeks showed improved insulin sensitivity and glucose tolerance, with reduced melanin concentrating hormone, which is hypothesized to be one of the mediating factors of insulin sensitivity regulation. [6]

Bitter melon fruit extract (*Momordica charantia*)

Momordica charantia (MC), commonly known as bitter melon fruit, has been used for its biological properties in traditional medicine systems, and is cultivated widely in Asia, Amazon, the Caribbean and east Africa. It has been tested for use with modern medicine as well, where a 400mg per day dose given to non-insulin dependent diabetes mellitus patients in conjunction with half doses of oral hypoglycaemic drugs for 7 days caused hypoglycemia greater than the treatment by drugs alone. [7] These benefits have been proven useful against T2DM as well. A randomized double blind placebo controlled trial with 24 patients given 2000mg/day MC for 3 months showed reduced HbA1C, glucose AUC, weight, BMI, fat percentage and waist circumference, with an improvement in insulin secretion and sensitivity. [8] These results have been further confirmed in prediabetics as well, where supplementation of 2.5g of MC powder for 8 weeks to 52 individuals lowered elevated plasma fasting glucose. [9] Aside from its potent anti-diabetic properties, recent evidence is also supporting potential future use of MC as an antioxidant, anti-inflammatory agent, which could help manage chronic conditions such as osteoarthritis. [10, 11]

Vanadium

Vanadium has been a compound of interest for its potential health benefits in treatment of various chronic disorders such as atherosclerosis, diabetes and cancer. Animal and in vitro studies point to potential efficacy of vanadium in the management of type 1 and type 2 diabetes. Animal studies support the administration of polyoxovanadates for the improvement of serum glucose tolerance. [12] In a cohort of 16 T2DM patients, administration over 6 weeks of 150mg/day improved glucose metabolism in 3 of 5 patients, and administration of 300mg/day showed improved glucose metabolism in 4 of 8 patients. Vanadyl supplementation modified proteins in skeletal muscle involved in early insulin signaling, such as acting on insulin receptor, activation of PI 3-kinase and tyrosine phosphorylation. [13]

Chromium

Chromium is an important mineral for carbohydrate and lipid metabolism. Several

studies have been conducted looking at chromium and its effects on management of T2DM. Systematic meta-analysis of 28 studies revealed chromium to be useful in reducing fasting glucose levels, triglycerides and increase levels of HDL. [14] This meta analysis has been further backed by a similar systematic meta analysis looking at 22 studies with monosupplementation of chromium, which showed improved glycemic and lipid profile. [15]

Cassia cinnamon (*Cinnamomum aromaticum*) bark extract

Cinnamon has been widely used for its medicinal properties in traditional medicine. Its therapeutic efficacy against T2DM is well established. A recent meta-analysis looking at human studies conducted between 2013 and 2018 revealed 1-6g cinnamon supplementation reduced fasting blood glucose, HbA1c levels. The studies also indicated that cinnamon may have potential to reduce fat mass and increase serum antioxidant levels, however further studies may be able to validate these claims. [16]

Vitamin B12 (Methylcobalamin)

Vitamin B12 is an essential vitamin with several physiological benefits. A recent meta-analysis of 31 studies indicates that administration of metformin, a commonly used antidiabetic drug, may increase vitamin B12 deficiency risk, and showed a potential dose dependent correlation between metformin doses and levels of serum vitamin B12. [17] Specifically in T2DM patients, lower serum B12 levels have been found in patients suffering from diabetic neuropathy. [18]

R-alpha-lipoic acid

Neuropathic pain is one of the complications of diabetes that is difficult to treat. Alpha-lipoic acid (ALA), which is a powerful antioxidant, may have certain anti-obesity properties and may help with diabetic neuropathic pain. A systematic meta analysis conducted in 2010 of 5 randomized clinical trials and one meta analysis found that an intravenous 600mg/day dose of ALA may lead to a significant reduction in neuropathic pain. [19] A more recent systematic review looking at 10 randomised controlled trials found that supplementation with ALA may support weight loss and help with weight management, which would ultimately contribute to T2DM management. [20]

SYNERGISM FOR OPTIMAL EFFICACY

Research evidence suggests that supplementing a combination of key ingredients such as *gymnema sylvestre*, fenugreek seed extract, bitter melon fruit extract, vanadium, chromium, cinnamon, vitamin B12, R-alpha-lipoic acid can support in management of type 2 diabetes mellitus symptoms. [21]

REFERENCES

- Al-Romayyan A., et. al. A novel *Gymnema sylvestre* extract stimulates insulin secretion from human islets in vivo and in vitro. *Phytother Res.* 2010, 24(9):1370-6.
- Kumar S.N., et. al. An open label study on the supplementation of *Gymnema sylvestre* in type 2 diabetics. *J Diet Suppl.* 2010, 7(3):273-82.
- Zuniga L.V., et. al. Effect of *Gymnema sylvestre* administration on metabolic syndrome, insulin sensitivity, and insulin secretion. *J Med Food.* 2017, 20(8):750-754.
- Chevassus H., et. al. A fenugreek seed extract selectively reduces spontaneous fat intake in overweight subjects. *Eur J Clin Pharmacol.* 2010, 66(5):449-55.
- Gupta A., et. al. Effect of *Trigonella foenum-graecum* (fenugreek) seeds on glycaemic control and insulin resistance in type 2 diabetes mellitus: a double blind placebo controlled study. *J Assoc Physicians India.* 2001, 49:1057-61.
- Kiss R., et. al. Insulin-sensitizer effects of fenugreek seeds in parallel with changes in plasma MCH levels in healthy volunteers. *Int J Mol Sci.* 2018, 19(3):E771.
- Tongia A., et. al. Phytochemical determination and extraction of *Momordica charantia* fruit and its hypoglycemic potentiation of oral hypoglycaemic drugs in diabetes mellitus (NIDDM). *Indian J Physiol Pharmacol.* 2004, 48(2):241-4.
- Cortez-Navarrete M., et. al. *Momordica charantia* administration improves insulin secretion in type 2 diabetes mellitus. *J Med Food.* 2018, 21(7):672-677.
- Krawinkel M.B., et. al. Bitter melon reduces elevated fasting plasma glucose levels in an intervention study among prediabetics in Tanzania. *J Ethnopharmacol.* 2018, 216:1-7.
- Dandawate P.R., et. al. Bitter melon: a panacea for inflammation and cancer. *Chin J Nat Med.* 2016, 14(2):81-100.
- Soo May L., et. al. The effects of *Momordica charantia* (bitter melon) supplementation in patients with primary knee osteoarthritis: a single-blinded, randomized controlled trial. *Complement Ther Clin Pract.* 2018, 32:181-186.
- Trevino S., et. al. Vanadium in biological action: chemical, pharmacological aspects, and metabolic implications in diabetes mellitus. *Biol Trace Elem Res.* 2019, 188(1):68-98.
- Goldfine A.B., et. al. Metabolic effects of vanadyl sulfate in humans with non-insulin-dependent diabetes mellitus: in vivo and in vitro studies. *Metabolism.* 2000, 49(3):400-10.
- Huang H., et. al. Chromium supplementation for adjuvant treatment of type 2 diabetes mellitus: results from a pooled analysis. *Mol Nutr Food Res.* 2018, 62(1).
- Suksomboon N., et. al. Systematic review and meta-analysis of the efficacy and safety of chromium supplementation in diabetes. *J Clin Pharm Ther.* 2014, 39(3):292-306.
- Santos H.O., et. al. To what extent does cinnamon administration improve the glycemic and lipid profiles? *Clin Nutr ESPEN.* 2018, 27:1-9.
- Yang W., et. al. Associations between metformin use and vitamin B12 levels, anemia, and neuropathy in patients with diabetes: a meta analysis. *J Diabetes.* 2019, doi: 10.1111/1753-0407.12900.
- Wang D., et. al. Serum folate, vitamin B12 levels and diabetic neuropathy in type 2 diabetes: a meta analysis. *Mol Cell Endocrinol.* 2017, 443:72-79.
- Mijnhout G.S., et. al. Alpha lipoic acid: a new treatment for neuropathic pain in patients with diabetes? *Neth J Med.* 2010, 68(4):158-62.
- Kucukoguncu S., et. al. Alpha-lipoic acid (ALA) as a supplementation for weight loss: results from a meta-analysis of randomized controlled trials. *Obes Rev.* 2017, 18(5):594-601.
- Liu Y., et. al. Correction: a dietary supplementation containing cinnamon, chromium, and carnitine decreases fasting plasma glucose and increases lean mass in overweight or obese pre-diabetic subjects: a randomized, placebo-controlled trial. *PLoS One.* 2015, 10(12):e0145315.