KaLOHAS®

Bioactive Greenkale

An easy natural solution for diabetes and obesity

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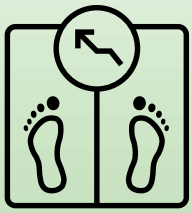
Diabetes and obesity in modern life



Diabetes is a chronic metabolic disease that occurs when there are prolonged high levels of blood glucose (hyperglycemia) due to the body cannot produce any or enough of the essential hormone insulin, or use insulin effectively[1].

There are two main types of diabetes, type 1 diabetes and type 2 diabetes (T2D), and the latter is the most common type that accounts for around 90% of all diabetes cases worldwide[1]. It can lead to cardiovascular diseases (CVD), nerve damage (neuropathy), kidney damage (nephropathy) and eye disease (leading to retinopathy, visual loss and even blindness)[1].

Although the exact causes of T2D are still not fully understood, the links with overweight (BMI $\geq$ 25) and obesity (BMI $\geq$ 30) are firmly established – overweight/obesity is believed to be one of the strongest risk factors of T2D, which account for 80% of T2D cases[1]. In addition to T2D, increased BMI is also a major risk factor for cardiovascular diseases, musculoskeletal disorders, and cancers[2].

Globally, the prevalence of T2D and obesity is tripled in the past decades and rising across all regions. This rise is driven by population aging, rising level of physical inactivity and inappropriate diet[2,3]. Worldwide, there are more than 650 million adults are obese[2], and about 9.3% adults - 463 million people have diabetes[1]. It is estimated that the number of diabetic people will reach 578 million by 2030, and 700 million by 2045[1]. Therefore, solutions for obesity and diabetes are and will continually be a huge global market.

Global food market of obesity and diabetes

The increasing incidence and rising awareness of obesity and T2D is shifting consumer's focus on healthy eating and generating a high demand for low-calorie healthy diets, which in turn, is expected to boost the demand for diabetic food and functional foods.

The global diabetic food market was estimated to be valued more than US$ 10.5 billion in terms of revenue in 2019. It is predicted to grow at a compound annual growth rate (CAGR) of 5.8% during the 2020 to 2027, and is projected to surpass US$ 16.5 billion by the end of 2027[4].

The global functional foods market is expected to grow from US$161.99 billion in 2020 to US$171.25 billion in 2021 at a CAGR of 5.7%, and it is expected to reach $228.79 billion in 2025 at a CAGR of 8%[5].

The markets may even be larger due to rising medical care costs, consumer’s consciousness of life quality, and their needs for precautionary measures. In addition, key players in the markets are increasingly focusing on new product developments and company expansion in order to meet the rising demand from the consumers, which will in turn provide opportunities to expand their foothold in the market of diabetic foods and functional foods.

An easy natural solution for diabetes and obesity

Although right now there is no cure, obesity and T2D are largely preventable and can be effectively managed.

Self-management of exercise and diet is a promising, safe, and cost-effective way of preventing obesity and T2D, which can reduce the risks up to 58%[6], and provide long-term benefits like improved life quality, better cardio-metabolic control, etc.[7].

However, people often fail to maintain adequate exercise in the long-term due to inconvenience, lack of motivation, time, and local facilities, etc.[6,8].

On the other hand, high vegetable consumption, especially an increased intake of dark-green leafy vegetables, e.g. kale, has shown to be protective against the development of obesity and T2D[9-11]. Unfortunately, unwillingness and difficulties in changing will-established dietary habits often result in reduced intake of vegetables. Many people feel the recommended vegetable-rich diet has no flexibility, and it is far from real daily life[12].

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KaLOHAS+® is an easy natural dietary solution for the prevention and management of obesity and T2D. It is a functional food ingredient made from green leafy vegetable – kale, and can be easily integrated into daily diets without changing consumers' dietary habits, offering consumers an option of gaining health benefits through ordinary foods. In addition, it reduces the weight of the vegetable by 10 times through freeze-drying, so that consumers can easily reach the recommended daily vegetable intake by just taking a small amount of KaLOHAS+®.

For manufactures, by formulating KaLOHAS+® into different food matrices, a variety of kale based daily food products with desired anti-obesity and anti-diabetic effects can be easily developed without affecting the palatability and convenience. Moreover, formulating KaLOHAS+® into different food categories will enrich product diversity and expand consumers' free choices, thereby ensure high acceptance and willingness of consumption.

What is KaLOHAS+®?

KaLOHAS+® is a functional food ingredient made from green the leafy vegetable – kale (Brassica oleracea var. acephala). It is a low-calorie food ingredient with almost no fats but extremely high content of fiber – almost 50%.

KaLOHAS+® is also rich in vitamin C, vitamin A (β-carotene), K, and calcium, potassium, as well as significant amounts of other vitamins and minerals that are necessary for the body. Especially, calcium from kale is highly bioavailable (easy to be absorbed)[13,14], therefore KaLOHAS+® can be a good calcium source.

Moreover, kale contains at least 43 high levels of health-promoting phytochemicals (chemicals from plant) – 14 glucosinolates, 20 anthocyanins, 3 phenylpropanoids, and 6 carotenoids[14,15], which are also well kept in KaLOHAS+®. These phytochemicals are linked to many powerful health benefits like antioxidant activity, anti-carcinogenic activity, and protection of cardiovascular and gastrointestinal tract etc.[14].

In particular, kale has the highest antioxidant activity among Brassica oleracea family and other 38 commonly consumed vegetables[16,17]. Additionally, kale can increase HDL (the 'good' cholesterol) by 27% and reduce LDL (the 'bad cholesterol') levels by 10%[18], possibly through the oxidation of HDL and LDL[19]. These above-mentioned biological activities are also very important for the prevention and management of obesity and T2D.

The potential effects of kale on obesity and T2D has not been studied or recognized until recently, and there is no kale-based functional food products so far. In this sense, KaLOHAS+® is a brand-new functional food ingredient for the prevention and management of obesity and T2D.

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Preliminary research reveals potential benefits of KaLOHAS+® for diabetes and obesity

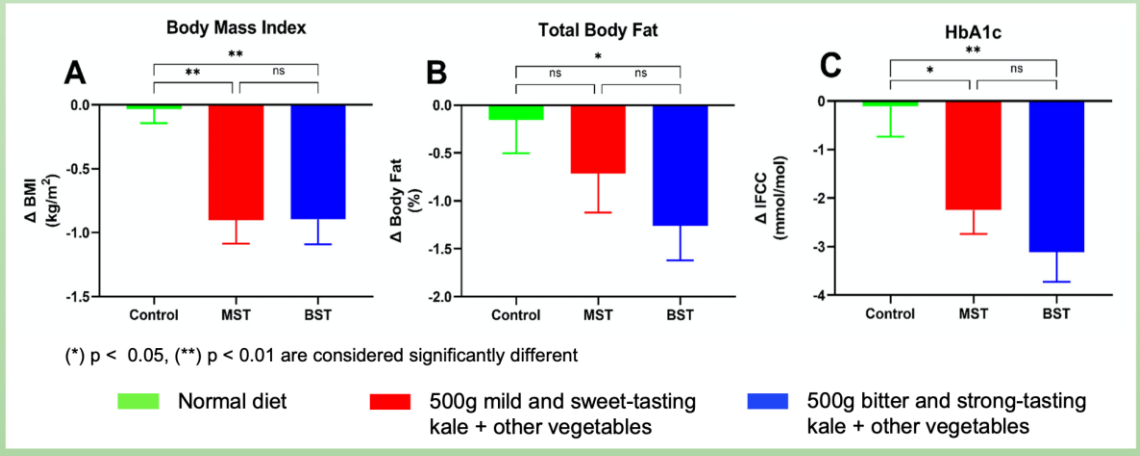
The type of vegetables has great importance when it comes to dietary management of obesity and T2D.

Intake of green leafy vegetables, rather than total intake of vegetables, is particularly effective at preventing the development of T2D[20,21]. An increase of 1.15 servings a day of green leafy vegetables can reduce the risk of T2D by 14%[20].

The effects of the green leafy vegetable – kale on obesity and T2D has also been showed in a 12-week randomized, controlled, parallel intervention study conducted on 92 T2D patients[11].

The study shows that a high intake of Brassica (kale, white cabbage, pointed cabbage) and root vegetables (carrot, celeriac, Beetroot), significantly reduced the participants' BMI, total body fat mass, and long-term blood glucose levels (HbA1c) compared to control (figure 1).

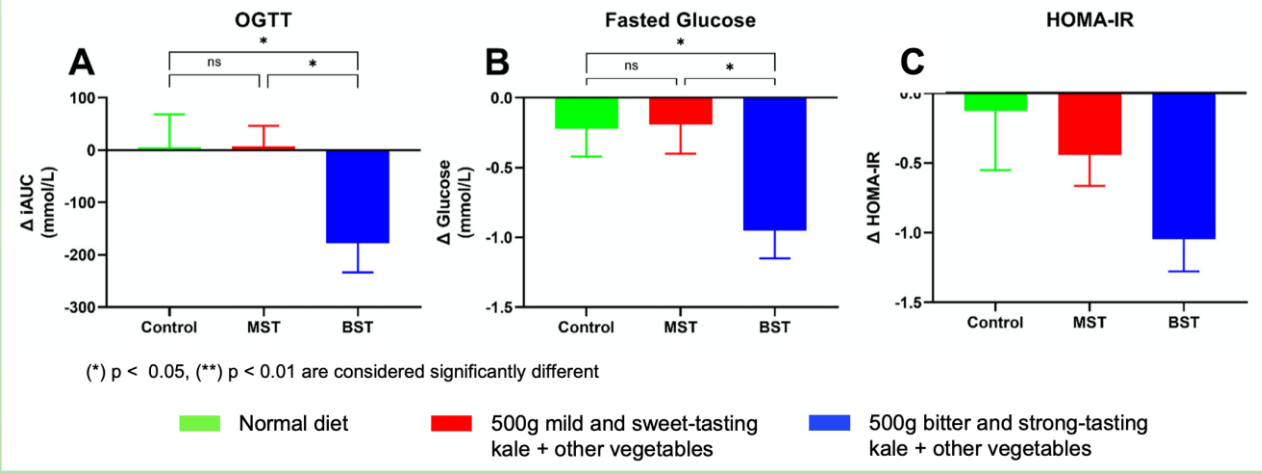
Figure 1. Bitter and strong tasting kale and other vegetables reduce BMI, total body fat, and long-term blood glucose



Insulin is an essential hormone that helps glucose from the blood enter various cells to be stored or used for energy, thus maintaining a normal blood glucose level. In T2D, cells in the body cannot respond fully to insulin, which is called 'insulin resistance'. This will result in ineffectiveness of insulin and inadequate insulin production over time, finally leading to the loss of blood glucose control[1].

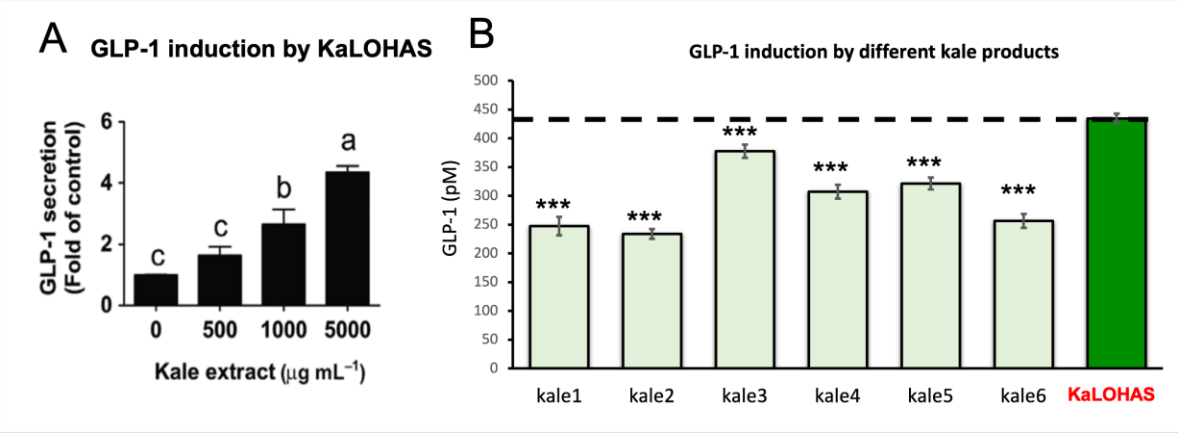
The study also shows that bitter-tasting varieties of the vegetables (BST) had the greatest impact on reducing glucose level (measured as OGTT, fasted glucose) and insulin resistance (measured as HOMA-IR) (Figure 2). This are probably due to higher phytochemical content of the bitter tasting vegetable, which also gives the bitter and strong-tasting[11].

Figure 2. Bitter and strong tasting kale and other vegetables reduce blood glucose and insulin resistance



Kale is rich in phytochemicals that are beneficial for diabetic and obese people. KaLOHAS+® that made from kale was found to induce the secretion of a satiety hormone GLP-1 up to 4.4-fold (figure 3A)[22]. And among several major international brands of kale powders, KaLOHAS+® shows much better effect on GLP-1 stimulation than other products (figure 3B).

Figure 3. KaLOHAS induce GLP-1 secretion *in vitro*



GLP-1 is a gut hormone released in response to foods. It can improve glycemic control by stimulating insulin secretion and increasing insulin sensitivity[23]. It also enhances satiety and delay gastric emptying, that will decrease food intake and lead to subsequent weight loss[24], and therefore improves glycemic control in T2D individuals[23,24]. Adequate doses of GLP-1 can restore the insulin response to normal in T2D patients[25], thus it is considered as a potential therapeutic agent for obesity and T2D, and synthetic GLP-1 agonists are already in use in obesity and T2D therapy[24].

KaLOHAS+® as a functional food ingredient that shows promising effects on GLP-1 secretion, enlightens a new opportunity to naturally reduce the risks of obesity and T2D and improve their management via daily diet.

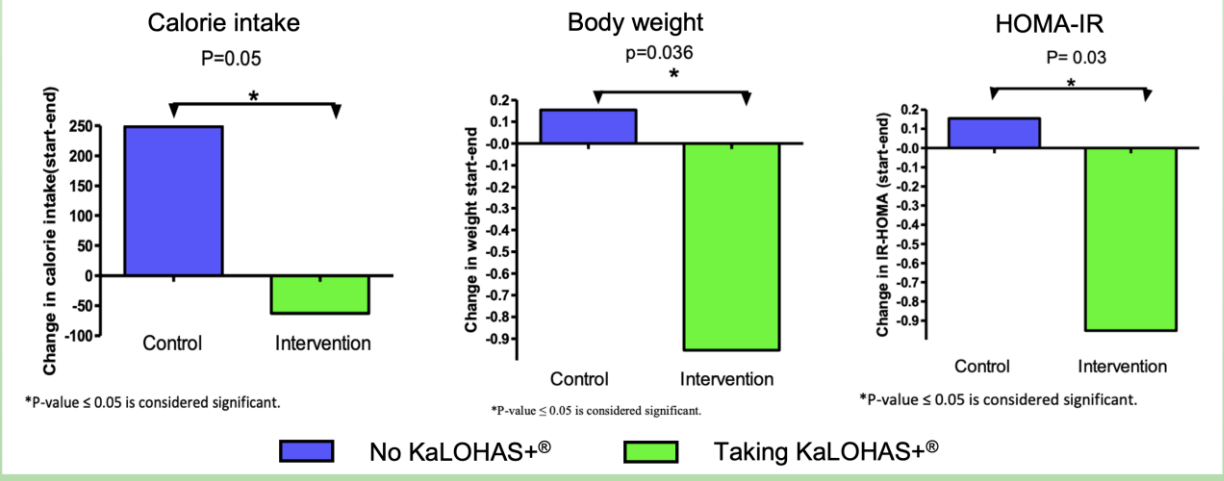
Clinical study shows benefits of KaLOHAS+® for diabetes and obesity

The effects of KaLOHAS+® on diabetes were shown in a recent 12-week randomized double blinded clinical intervention study performed on 43 T2D patients.

The patients were randomly assigned to the intervention group or control group. The intervention group were provided with bars incorporating with KaLOHAS+®, and were asked to take 3-4 bars daily, which equals a daily intake of KaLOHAS+® at 26-35 g. The control group were provided placebo bars that has similar outlook, nutritional composition, and energy.

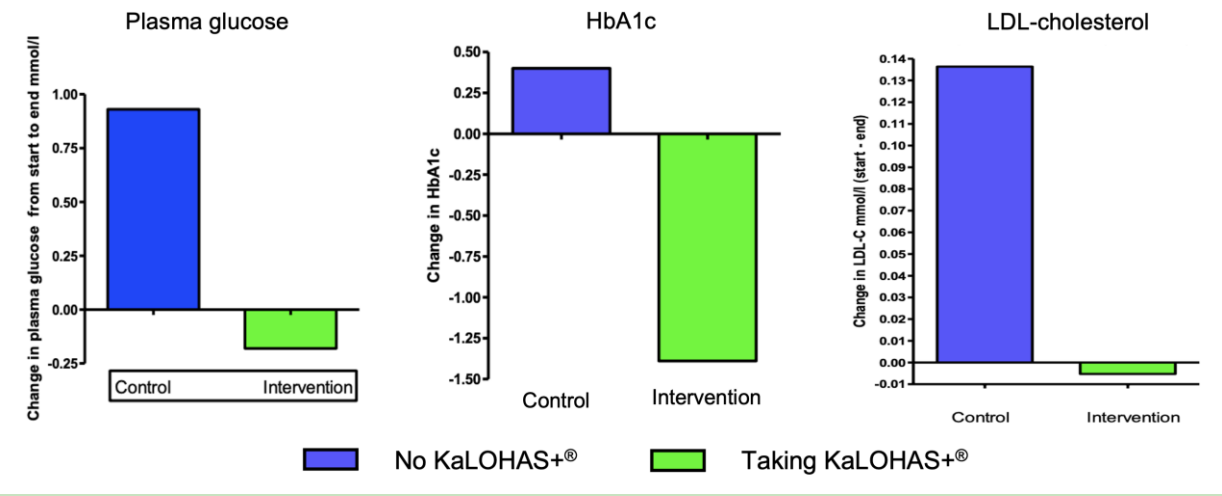
After 12-weeks intervention, the intervention group who take KaLOHAS+® bar has significantly reduced calorie intake, greater body weight loss, and greater reduction in insulin resistance (measured as HOMA-IR) as shown in figure 4.

Figure 4. Bar made of KaLOHAS+® reduce calorie intake, body weight and insulin resistance



In addition, there was a clear tendency that the intake of KaLOHAS+® bar decreased blood glucose level (measured by plasma glucose, and long-term glucose level – HbA1c), and reduced the 'bad cholesterol' – LDL cholesterol levels after 12 weeks (figure 5).

Figure 5. Tendency of reduced blood glucose and LDL in KaLOHAS +® bar group



Why choose KaLOHAS+®?

KaLOHAS+® is a 100% organic food ingredient that provides health benefits through a completely natural way. It shows a significant effect on body weight loss and a clear tendency on blood glucose and cholesterol reduction at a daily dose of 26-35 g in the form of bars. The convenience of KaLOHAS+® makes it can be easily formulated into any food matrix, thus bringing the opportunity to make diverse kale-based functional foods for the prevention and management of obesity and T2D.

For individuals, KaLOHAS+® can become a quick and easy part of everyday lives. It provides the possibility of improving health by daily diet without affecting palatability, convenience or changing established dietary habits.

KaLOHAS+® is a non-GMO, EU certified organic product. The kale used for KaLOHAS+® was planted and selected in North Europe and manufactured under strict safety and quality control. By special freeze-drying technique, the nutrition and phytochemicals (the components that have health benefits) are preserved in KaLOHAS+® to the maximum extent.

In Conclusion

Green Gourmet is an innovative small company that, with awe, works and believes in the need to continue the ancestral proud traditions of using original, plant-based, functional raw materials in the treatment of today's natural lifestyle diseases. Our goal is to help people achieve good health in an easy and natural way.

KaLOHAS+® is optimal for people who want to live a healthy life but also want to save time when making a ready-to-eat, healthy meal. Taking KaLOHAS+® every day can help with the prevention and management of obesity and T2D.

KaLOHAS+® is also ideal for manufacturers who want to develop new functional food products for daily health care purposes. It can be easily formulated into any food matrices to make diverse kale-based functional foods without affecting palatability, convenience.

- KaLOHAS+® – let's solve health problems by an easy and natural way

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