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The Importance of Seeds in Diabetes



It is widely recognized that an essential component in the prevention and management of T2DM is maintaining a healthy body weight. Reducing fat mass is crucial to mitigating the pro-inflammatory state associated with obesity, which contributes to greater glucose intolerance. This objective is achieved by creating a **caloric deficit**.

To illustrate simply, despite the hundreds of processes that determine our energy balance (1), it ultimately boils down to the simple equation:

Calories consumed - Calories expended = **Energy balance**

Maintaining a neutral energy balance means body weight will remain constant. A negative balance—consuming fewer calories than expended—results in weight loss due to the caloric deficit. Conversely, a positive balance leads to fat accumulation due to a caloric surplus.



Diet plays a pivotal role in our health. However, regardless of the type of diet chosen or the specific foods consumed, the key to fat loss lies in consuming fewer calories than are expended through physical activity and exercise.

A frequently misunderstood concept is that a caloric deficit does not necessarily mean »

Amidst the ongoing battle against the dual global epidemics of obesity and T2DM, we often overlook the significance of the smallest elements. In this article, you will discover the hidden potential of seeds as part of managing and preventing T2DM, as well as their role in improving body composition in obesity.

» eating less. In fact, it is possible to consume a larger volume of foods with lower caloric density. For example, a sandwich might be perceived as a light dinner but can contribute a significant amount of calories. In contrast, a large plate of mixed salad—containing ingredients like lettuce, carrot, tomato, boiled egg, fresh cheese, and lentils—can offer a greater food volume, higher-quality nutrients, and greater satiety with fewer calories.

At the intersection of the quality and quantity of our diet, seeds emerge as an element of great importance, and their daily inclusion in our meals is highly recommended.

Types of seeds



• Sesame

Sesame seeds are oilseeds, as 50% of their weight is fat, which is highly stable vs oxidative degradation and nutritionally superior. They also contain around 20% protein and various micronutrients. These seeds can be golden or black. After cleaning through sieving, washing, and drying, they are typically toasted at 120–150°C for about five minutes. Toasting enhances their rich characteristic flavor. During processing, sesame seeds are sometimes mechanically hulled. Hulled seeds are said to be easier to digest but lose some beneficial nutrients like calcium in the process (2).

Sesame seeds are used in many ways worldwide, commonly as toppings for baked goods like bread, cakes, and crackers. Sesame paste (tahini), made by grinding the seeds, is widely used as a condiment. Sesame oil is also common.

Nutritionally, sesame is characterized by its high fat content, mainly oleic (**omega-9**) and linoleic (**omega-3**) acids, which to-

gether represent about 80% of its fat content². Additionally, it contains about 20% protein, particularly rich in leucine, arginine, and methionine². The rest consists largely of dietary fiber. Sesame also contains significant amounts of B vitamins, some antioxidant vitamin E, and high concentrations of calcium and iron². Several studies have shown that sesame consumption can reduce fasting blood glucose(3).

Regular consumption is therefore recommended in easily accessible ways. For example, sesame can be used as a salad topping or as a condiment combining ground sesame seeds and sesame oil, which pairs well with various vegetables. This preparation offers a delicious flavor, good digestibility, and high nutritional value.



• Chia

Chia seeds are small, white or black seeds derived from a mint family plant native to Central America. They are widely consumed either hydrated as a pudding or as a topping added to salads, vegetable creams, or other cooked dishes. Chia is also incorporated into yogurts or used in bread and other baked goods.

Chia seeds are primarily composed of plant-based proteins (20%) and fats (30%), alongside a high content of dietary fiber (more than 80% of carbohydrate content) (4). They are rich in antioxidants such as polyphenols, vitamin E, and omega-3 fatty acids, particularly alpha-linolenic acid (4). The synergy of chia's nutrients has been linked to reducing circulating cholesterol, lowering blood pressure, reducing atheromatous plaque, and preventing oxidative damage, all of which contribute to a reduced cardiovascular risk (4). Additionally, chia components have demonstrated a capacity to reduce the incidence of T2DM by improving beta-cell performance and lowering »

- » glucose levels (4). Specifically, studies have shown that adding chia to the diet of healthy individuals decreases postprandial blood glucose levels by delaying the absorption of carbohydrates from the accompanying meal and increasing satiety due to its high viscosity (5).



● *Flaxseed*

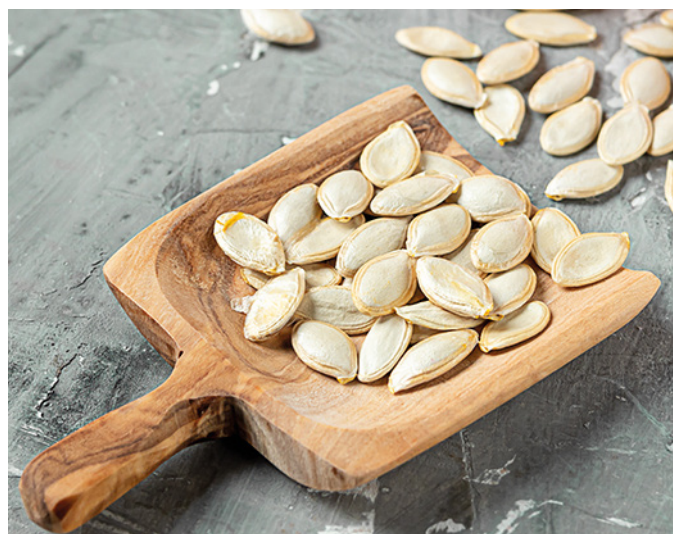
Flaxseed can be consumed whole or ground and in oil form. The seeds are rich in dietary fiber (40%) and high-quality protein (20%), as well as polyphenols and other micronutrients. They also contain a significant amount of fats (40%). Flaxseed oil, while devoid of other nutrients, contains more than 50% omega-3 fatty acids, specifically α -linolenic acid, making it the richest plant-based source of this compound, as well as 19% oleic acid (6).

Consumption of flaxseed has been shown to improve lipid profiles by reducing total cholesterol, LDL cholesterol, and triglycerides while increasing HDL cholesterol in healthy individuals with excess body weight and patients with dyslipidemia. This can be crucial for preventing many diseases, particularly cardiovascular diseases.

Furthermore, flaxseed consumption has been observed to modulate carbohydrate metabolism by reducing fasting glucose levels and HOMA-IR, thereby helping to prevent type 2 diabetes or insulin resistance (5, 6).

● *Pumpkin Seeds*

Pumpkin seeds are rich in protein (30%), fat (40%), and dietary fiber, which represents 25% of their carbohydrate content. They are one of the best natural sources of magnesium, an important mineral for maintaining blood pressure control. Pumpkin seeds are also a good source of other minerals, unsaturated fats, and fiber (7).



They can be purchased roasted or raw in supermarkets, but they can also be easily prepared at home by roasting the seeds from a pumpkin on a baking sheet in the top rack of an oven at 350°F for 15–20 minutes.

Their high magnesium content makes them especially beneficial for T2DM since magnesium intake is inversely associated with fasting insulin levels and insulin resistance(8).



● *Sunflower Seeds*

Two main types of sunflowers are cultivated. Sunflowers with solid black shells produce oil-rich seeds, while those with striped black-and-white shells are consumed directly. Sunflower seeds are generally high in fat (50%), protein (20%), and dietary fiber (50% of total carbohydrates). Sunflower seeds are one of the best sources of vitamin E. Studies have linked higher dietary intake of vitamin E with lower rates of heart disease. They »

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» are also rich in minerals like copper, manganese, and selenium. Beyond their micronutrient content, sunflower seeds contain other bioactive compounds that contribute to better glycemic control following consumption(9).

• Hemp Seeds

Hemp is a versatile, sustainable, and low-impact crop that produces seeds, flour, and oil with significant nutritional and

functional properties, along with bioactive compounds of pharmacological interest¹⁰. Hemp seeds are rich in fat (50%), protein (30%), and dietary fiber (50% of total carbohydrates). Hemp seed proteins contain all essential amino acids required by humans, with glutamic acid and arginine being the most abundant¹⁰. The fats in hemp seeds are characterized by a high content of unsaturated fatty acids, about 90% of total fats, of which 70%–80% are polyunsaturated fatty acids, with the rest primarily being oleic acid (omega-9), which is also highly beneficial.

Hemp seeds are particularly valuable in plant-based diets, as they provide nutrients that might otherwise be deficient or limited.

In conclusion, seeds, with their nutritional density and ability to enrich the diet effortlessly, are invaluable allies in the fight against obesity and T2DM. They advocate for better health by promoting habits that include seeds and other low-calorie yet nutrient-dense foods as part of an active lifestyle.

By adopting dietary habits that include seeds and other foods with low caloric density but high nutritional density, combined with an active lifestyle, we can create an environment conducive to metabolic health and weight control. Thus, seeds become an essential component of a comprehensive strategy for managing and preventing T2DM and obesity, allowing us to enjoy a fuller and healthier life. **D**

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