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## The health benefits of millets: A nutritional powerhouse

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### Abstract

Millets are considered an important source of nutrients because of their anti-aging, anti-carcinogenic, antibacterial, and antioxidant properties, in addition to containing some essential vitamins. Certain demographics are starting to favour these functional foods more and more minerals (Fe, Cu, Mg, Ca, Zn), thiamine, riboflavin, and beta-carotene (found in yellow pearl millets). Millets have been found to be helpful for a number of medical diseases, such as celiac disease, cardiovascular disease (CVD), diabetes mellitus, gastrointestinal tract issues, and malnutrition. Millets continue to be the staple diet of millions of underprivileged people in Asia and Africa. Although it isn't currently included in North American and European food baskets as one of the staple grains globally, millet highlights its worth as a component of gluten-free and multigrain grain products. The importance of millet and its part in managing illness have been thoroughly covered in this review.

**Keywords:** Millets, functional food, disease, health benefits

### Introduction

MILLETS are an extensive group of finely grained annual grasses that are widely cultivated in arid and semi-arid regions of the world. Since 8000 BC, millets have been among the most widely consumed grains in a number of Asian and African regions. However, since the green revolution, wheat, rice, and maize have dominated agriculture, while millets have been neglected. Across the world, millets are emerging as a major crop for fodder. Furthermore, millets perform better than the majority of other cereals in terms of agronomic advantages including drought tolerance, shorter growing seasons, and the ability to thrive in marginal locations with few inputs. The two primary applications for millet grain and straw, respectively, are as animal feed and human food. Additionally, millet grains resist pests and diseases. Nowadays, millet is thought of as. Millets are now called "smart foods" and "nutri-cereals" since they sustainably supply food, health, and feed. When our country embraced the green revolution to establish sustainable food production in order to combat hunger, we were able to attain food security. Due to a lack of essential nutrients like proteins and essential micronutrients like vitamins and minerals in daily diet, the population's "hidden hunger" or nutrient insufficiency continued. Those who rely on a staple diet based on grains are particularly vulnerable to nutritional insecurity because cereals are often believed to be poor in micronutrients. Millets offer a range of ingested micronutrients that are nutritionally varied. Carbohydrates add to the millet grains' well-balanced nutritional value.

The nutrients that make up millet grains are distributed as follows: 60-70% carbs, 7-12% proteins, 1.5-5.5% fats, and 6-11.5% dietary fibre. Millets are safe for those with celiac disease and free of gluten. Among grains, proso millet provides the most protein (~15%), and barnyard millet is a great source of fibre. Additionally, millet grains are a rich source of B-complex vitamins and minerals. While millet is sometimes considered a monoculture, its various varieties each have unique nutrient profiles, and when combined they provide a multitude of micronutrients and other vital nutritional elements that help ensure the population's nutritional security.

### Health benefits of millets

India was the world's leading producer of millet. India cultivates eight major types of millets as important or secondary crops multiple states.

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While pearl millet is generally grown in Rajasthan and Gujarat, sorghum is primarily grown in Maharashtra, Telangana, Central India, and Andhra Pradesh. Finger millet is a major crop in Gujarat and Tamil Nadu.

### **Sorghum (Jowar)**

There are many different ways to eat sorghum grain. Sorghum-based beverages are popular throughout Africa. In India, sorghum is usually consumed with cooked rice and roti/chapati. Sorghum-based composite flour can be used to make bread and other delicacies. Known for its slow rate of starch digestion, sorghum is a crop that is widely grown in India. Good source of fibre and B vitamins, including thiamine, folic acid, and riboflavin. The grains have adequate levels of iron and zinc in addition to being well-concentrated in calcium, phosphorus, and potassium. Eating sorghum can help prevent chronic lifestyle problems, which is only one of the many health benefits. Due to its high resistant starch content, sorghum helps lower obesity and its associated consequences while also promoting intestinal health. The high resistant starch content of sorghum not only prevents obesity and its associated consequences, but also supports intestinal health. Phytochemicals found in sorghum have been shown to provide possible health benefits, including as preventing diabetes-related problems, enhancing cardiovascular health, and maybe lowering the risk of some cancers.

### **Pearl millet (Bajra)**

Pearl millet is consumed as cooked grains after the seed coat is peeled off, or as unleavened bread made with flour. In many parts of the world, weaning recipes are made using it in addition to beans. In Africa, fermented or unfermented pearl millet porridges are popular, but in India, it is primarily consumed as bajra roti. Pearl millet is high in energy due to its high fat content. Compared to other millets, it has a comparatively high level of the amino acid lysine, making it a rich source of protein. They are an excellent source of vitamins and minerals as well. Pearl millet has relatively high iron content when compared to other cereals and millets. Moreover, it enabled the growth of the iron-rich pearl millet Dhanshakti (iron > 70 ppm). People with diabetes could benefit from eating pearl millet because it has slowly released sugars. Because of their high iron and zinc content, pearl millet grains are suitable for the diets of anaemic patients as well as those of pregnant and lactating mothers. The phytonutrients included in pearl millet are known to have anti-inflammatory and anti-cancer effects, which lower the risk of cardiovascular diseases.

### **Finger millet (Ragi/Mandua)**

Particularly in India, weaning meals like finger millet are essential. It is also consumed as cereal, ragi rotis, and dosa. Its composite flour is often used for bread-making. Finger millet is said to have large amounts of methionine and amino acids. It is also high in minerals, such as calcium, iron, and magnesium, and highly beneficial to expectant and nursing moms. It has a lot of dietary fibre as well. As a matter of fact, finger millet has the highest calcium content of any cereal grain (350 mg/100 g). Eating finger millet helps build stronger bones in growing youngsters and the elderly due to its high calcium content. Moreover, it lessens the risk of fractures, especially those brought on by osteoporosis.

### **Foxtail millet (Kakum/Kangani)**

The thin layer of husk that encases the foxtail millet grains

needs to be removed before consumption. Cooked roti, rice, and porridge are made from millet derived from foxtails. You can make breads, cakes, puddings, and noodles with its composite flour. Foxtail millet contains more protein than rice does. It also has high mineral matter content. It is incredibly helpful at preventing type II diabetes and heart-related problems because of its high fibre content and low glycaemic index. Foxtail millet has a number of health advantages since it includes phytochemicals that scavenge free radicals.

### **Little millet (Kutki)**

Little millet is primarily consumed in cooked rice and other fermented meals like idly and dosa. These days, multigrain flours are used to make bread and other baked goods like cakes and biscuits. Little millet is a good source of protein, fat, and fibre. Little millet is also high in iron, magnesium, and zinc. It's common knowledge that little millet lowers blood sugar and cholesterol. Consequently, frequent consumption benefits in the treatment of diabetes and cardiovascular disease. Furthermore, the stool bulking effect of the grain aids in constipation relief.

### **Proso millet (Chena/Bari)**

Dehulled proso millet grain is commonly consumed cooked as rice in India, while in other parts of the country, it is ground, used to make roti, and consumed. Proso millet is well-known for having a maximum protein level of 12.5%. Proso millet protein is said to be high in leucine, isoleucine, and sulfur-containing amino acids like cysteine and methionine. Its grains are rich in B-vitamins, including niacin and folic acid. It's also an excellent source of minerals like manganese, iron, and potassium. Like other millets, proso millet has a high content of dietary fibre and polyphenols. Consuming proso millet has been linked to several health benefits, including increased levels of HDL cholesterol-metabolizing enzymes and protection against liver damage. Eating proso millet has been linked to several health benefits, including reduced type 2 diabetes and obesity, increased HDL levels, liver protection, and lowered cholesterol. Moreover, eating proso millet has been shown to support neurological health because it has a high lecithin content.

### **Kodo millet (Kodon)**

Kodo millet is usually eaten like rice due to its ease of digestion. It is also used to create idly, soup, roti, and dosa. Kodo millet has a high content of total dietary fibre and B vitamins, including folate, niacin, pantothenic acid, and biotin. Due to its high folate content (39.5 mg/100 g), kodo millet is beneficial for those who suffer from anaemia. Furthermore, nutrients including magnesium, iron, calcium, potassium, and zinc are abundant in kodo millet. It is taken as a supplement to assist the neurological system because of its high lecithin. Kodo millet's phenolic phytochemicals have antioxidant properties that have positive impacts for human health, such as a decreased risk of cardiovascular disease and hypertension. The health benefits of phenolic phytochemicals found in kodo millet include a lower risk of cardiovascular disease due to their antioxidant properties.

### **Barnyard millet (Sanwa)**

The Poaceae family includes the small-seeded grain known as barnyard millet, or "sanwa" in India. In science, it is known as *Echinochloa frumentacea*. This ancient grain, called millet, is mostly grown throughout Asia, particularly in China, Japan, and India. Barnyard millet is a nutrient-dense substitute for

other often consumed cereals because of its high fibre, iron, and protein content. Because of its low glycemic index, it's a great option for people with diabetes and those trying to control their blood sugar levels. Because it is inherently gluten-free, anyone with celiac disease or gluten intolerance can use it. Because of its high fibre content, it aids in weight management by inducing satiety. In addition, fibre promotes regular digestion and keeps constipation at bay. Cardiovascular health is supported by the presence of antioxidants and vital minerals like potassium and magnesium. Because of its high calcium and phosphorus content, it helps to keep bones strong.

#### **Browntop millet (Andu korralu)**

They are Rich in protein, fibre, minerals and vitamins. Reported to be useful in thyroid, arthritis, obesity and high Blood pressure.

#### **Buckwheat (kuttu)**

People with celiac disease and gluten sensitivity should be able to comfortably consume it because it is naturally gluten-free. It's high in protein and fibre. There are numerous trace minerals in it. Including manganese, copper, magnesium, and is a good source of vitamins B.

#### **Conclusion**

Millets are abundant in minerals including calcium, magnesium, and phosphorus and have been linked to a host of health advantages, including regulating blood sugar, blood pressure, and cholesterol levels. Because of its high fibre content and high lecithin content, which is excellent for strengthening the neurological system, it is easy to digest. Since millets don't contain gluten, they're a great option for anyone with celiac disease or following a gluten-free diet. Eating millets on a regular basis can promote health. Nutrient deficits can be eliminated with the successful method of producing functional food by supplementing or fortifying millet. Given that India leads the world in millet production, developing functional foods should receive top priority. India leads the world in millet production, hence developing functional foods through supplementation or fortification should receive top priority.

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