Scientific Innovation Magazine
ISSN : 2584-1157

SUPER FOOD AS CURRENT DAY NEEDS: NUTRI-CEREALS

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Abstract

Millets in present day called as Nutri-cereals have potential to combat the agrarian and nutritional challenges faced by the world. Millets are drought resistant, insect and pest resistant and the most demanding property possessed by millets, they require minimal amount of water to grow with maximum yield. Millets are rich source of macronutrients, micronutrients and phytochemicals and the amount varies with different species of millets. Phytochemical presence in millets have advantageous impact in lowering non-communicable diseases such as diabetes, hypertension, obesity, atherosclerosis. The core aim of present review is carried out to provide insight about the nutritional status of different types of millets and their impact on human health.

Introduction

One of the most significant cereal grains is millets. Millets are cereals from the Poaceae grass family and are considered one of the oldest cultivated crops. It is the sixth-largest cultivated cereal crop in the world according to agricultural production. Jowar (sorghum), Sama (little millet), Ragi (finger millet), Korra (foxtail millet), and Variga are millet varieties (Proso millet). Ragi has the least amount of fat, while Bajra and Sama are both heavy in fat content. In rural places, some of the millets such as sorghum, finger millet etc are consumed as food and the remaining is used as feed. Millets are having amazing values in their nutrition content. Millets play a significant role in traditional diets in many regions. In many states of India they are using different varieties of millets respectively. All the millets are three to five times higher in their nutrition content when compared to nutritional content of widely used rice and wheat. Wheat and rice provide with security of food while millets give many securities like food, health, nutrition, livelihood, animal feed etc, making millets as yield of agricultural security. Millets are having

nutritional and also health benefits and they also help in managing health problems like diabetes mellitus, hyperlipidemia, etc. In India, Karnataka is the leading producer of millets.

Millets/ Nutri-cereals

Millets are nutritionally superior to rice and wheat as they contain a high amount of proteins, dietary fibers, iron, zinc, calcium, phosphorus, potassium, vitamin B, and essential amino acids. Millets offer abundant micronutrients like vitamins, beta-carotene etc which are being consumed like pharmaceutical pills in present day. In this present day, all the millets are extraordinarily superior and are therefore, the solution for the malnutrition and obesity that affects a vast majority of the Indian population. Millets have 65% carbohydrates, 9% proteins, 3% fat, and 2-7% crude fibre and vitamins and minerals. They are a good source of vitamin B, magnesium, antioxidants, manganese, phosphorus and also iron. Millets are good source of essential amino acids except for lysine and threonine but are relatively high in sulphur containing amino acids methionine and cysteine. Millets are good source essential fatty acids like linoleic, oleic and palmitic and other fatty acids i.e. arachidic acid, behenic acid, erucic acid are found in trace amounts. Millet oil could be a good source of linoleic acid and tocopherols. Millet is an alkaline forming grain that is gluten-free. Vitamin B such as Niacin, folacin, riboflavin, and thiamine and phosphorus are present in millets that play a key role in energy synthesis in the body.

Millets are advised for the health of newborns, nursing mothers, the elderly, and those who are recovering from illness. The grains are regarded as "gluten-free" because they slowly release sugar into the bloodstream. Millets are favoured as dietary foods for patients with diabetes and cardiovascular disorders because of their high fibre and protein content. Additionally, they contain phenolic acids and flavonoids that are good for your health and help lower blood sugar levels and fight free-radical-mediated oxidative stress.

But the presence of antinutrients like phytates, polyphenols, and tannins reduce the mineral bioavailability by chelating multivalent cations like Fe^{2+}, Zn^{2+}, Ca^{2+}, Mg^{2+}, and K^{+}. In addition, high amounts of protease and amylase inhibitors affect the digestibility of millet grains. Processing techniques applied in nutri-cereals to make it acceptable at wider range such as

fermentation, germination and malting reduces anti-nutritional content and bioavailability of minerals, vitamins and proteins increases

Types of millets

1. Finger millet

One of the most nutrient-dense grains, finger millet is a wonderful source of natural calcium that strengthens bones and lowers the incidence of bone fractures. It has good amount of naturally occurring iron, which helps with anaemia. Rice or wheat can be substituted with finger millet, which is regarded as a healthy, nutritious food. It is regarded as a nutrient storehouse since it is high in minerals, vitamins, proteins, and amino acids. It is a good laxative and helps to avoid constipation because of its high fibre content. Finger millet contains suffice amount of calcium, so it is beneficial for young children, the elderly, and pregnant women. It helps nursing women produce enough breast milk, which makes it very beneficial for them as well.

2. Sorghum

Sorghum is ancient cereal grain and is staple crop in India as well as Africa. It is considered to be gluten free and hence used in the diet of patients suffering from celiac disease and gluten sensitivity. Molecular analysis of sorghum demonstrated that it is gluten free and has several health promoting benefits. Gluten, is a protein which is present commonly in grains like wheat, barley and rye that gives them the chewy, springy quality when baked into breads or pastas. Sorghum used as Wheat replacement for Breads, Pastas, etc.

It has also been demonstrated that jowar, or sorghum, aids in weight loss. Jowar has a higher calcium content than other key cereals like wheat and rice. Iron, protein, and fibre are also in plentiful amount. Researchers have discovered that a normal sorghum wax is high in policosanols, which lower cholesterol levels. It is also highly favoured by folks who cannot accept items made from wheat because it is gluten-free.

3. Pearl millet

Magnesium, which is present in pearl millet, aids in easing asthmatic patients respiratory issues

and lessens the effects of migraines. The fibre in pearl millet contributes to a decrease in the occurrence of gall stones. Gall stones are caused by an overabundance of bile in the body, which is reduced by the insoluble fibre found in pearl millet.

4. Kodo millet

Kodo millet is a traditional food that aids in weight loss and has a taste that is similar to rice. It is quickly absorbed and rich in phytochemicals and antioxidants, which aid in preventing many ailments linked to a sedentary lifestyle. Kodo millet also eases hip and knee discomfort and helps women's periods become more regular.

5. Proso millet

Proso millet is beneficial in preventing Pellagra condition, which is caused due to the niacin Vitamin B3. Niacin is highly concentrated in proso millet. Pellagra is a skin condition that results in dry, scaly, and rough skin. Proso millet consists of good amount protein and niacin (Vitamin B3). It is traditionally used as a restorative dish, particularly after childbirth or illness.

6. Foxtail millet

Foxtail millet helps in steady release of glucose without affecting the metabolism of the body. Due to its high magnesium content, foxtail millet is renowned as a heart-healthy food in diet and helps to lower the prevalence of diabetes in society.

7. Little millet

Little millet is highly nutritious and is often referred to as sama. It has good source of B complex vitamin, minerals like calcium, iron, zinc, potassium among others. It also provides essential fats to the body, the kind that helps in weight loss. Its high fiber content is yet another positive making it an ideal part of pongal or even kheer instead of rice.

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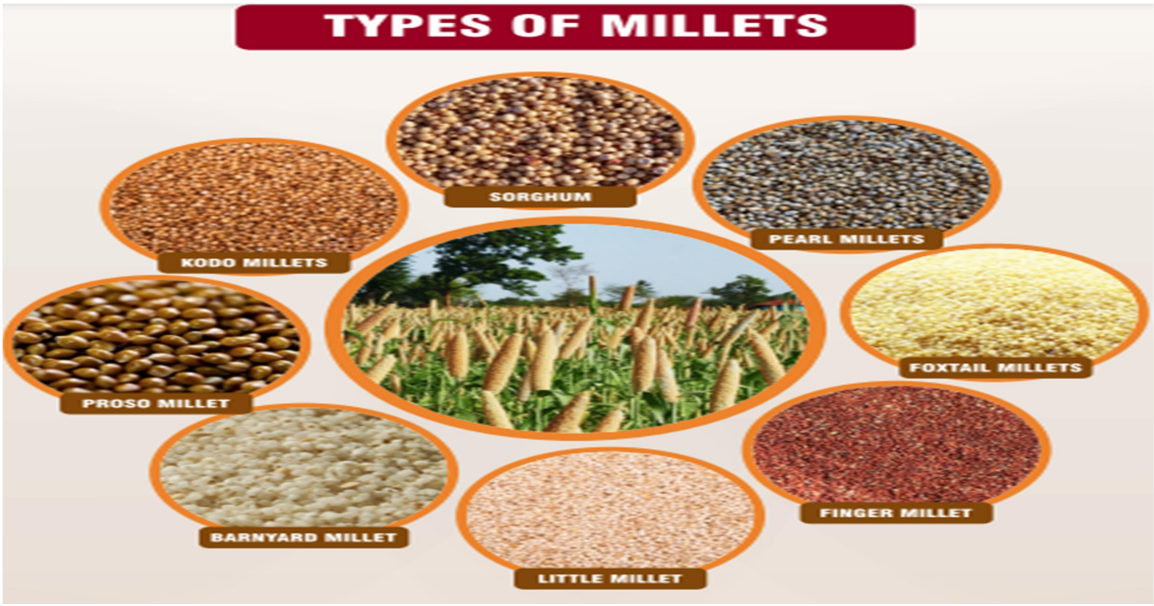

Source- Agriculture Vikaspedia

Nutri-Cereals and Diseases

Nutri-Cereals and Obesity

Obesity is the biggest emerging problem in India and it is associated with several chronic diseases including diabetes and CVD. Recent studies show that intake of high dietary fibre decreases the incidence of obesity. Foods rich in dietary fibre improves the bowel function and slows the process of digestion and absorption, thereby reducing the risk of chronic diseases. The dietary fibre content present in millets is 22% which is comparatively higher than other cereals like wheat having 12.6%, rice having 4.6%, maize having 13.4%. Researchers reported that, there is 15.7% insoluble dietary fiber, 1.4% soluble dietary fiber, in finger millet grain. has reported that finger millet is having 22.0% total dietary fiber, 19.7% insoluble dietary fiber and 2.5% soluble dietary fiber.

With high fibre content, millets help to reduce problems like constipation, flatulence, bloating and stomach cramping. With good digestion and absorption, the retention of gastro-intestinal illnesses like ulcers and colon cancers.

Nutri-Cereals and Cardiovascular diseases

Consuming proso millet protein concentrate has an impact on plasma lipid levels, and clearly showed that the plasma high-density lipoprotein cholesterol and adiponectin levels are elevated. Additionally, millets are an excellent source of magnesium, which is proven to lower the risk of heart attacks. By lowering plasma triglycerides, millets, which are known to be high in phytochemicals and contain phytic acid, can lower cholesterol and prevent cardiovascular disease. According to studies, regularly consuming whole millet grains lowers the incidence of CVD.

One of the greatest grains to include in diet which safeguards the heart. Magnesium is abundant in millet, which is an important mineral for reducing blood pressure and the risk of heart attacks of strokes, particularly in the case of atherosclerosis.

Nutri-Cereals and Diabetes

Millets showed the results by reducing the α-glucosidase and pancreatic amylase thereby reducing the postprandial hyperglycemia by reducing the enzymatic hydrolysis of complex carbohydrates. The enzymes like aldose reductase which helps in prevention of accumulation of sorbitol and reduces the risk of diabetes induced cataract diseases. Hence consuming millets helps controlling the blood glucose level and also helps in dermal wound healing process with the help of antioxidants.

National Institute of Nutrition (ICMR) in 2010 assessed Glycemic Index (GI) of sorghum based foods in collaboration with the Indian Institute of Millets Research, Hyderabad under National Agricultural Innovation Project (NAIP). The results showed that sorghum based foods are having low GI and reduces the postprandial blood glucose level. Finger millet diets showed low glycemic response due to high fiber content. They also help in dermal wound healing process. Studies have strong evidence for finer millets protein in inhibiting the cataractogenesis in humans.

Millets help in prevention of Type II Diabetes due to their significant levels of magnesium. Magnesium is an important mineral which helps in increasing the efficiency of Insulin and glucose receptors by producing many carbohydrate digesting enzymes, which manages insulin

action.

Nutri-Cereals and Cancer

Nutri-Cereals showed results that they are rich phenolic acids, phytates and tannins which are the antinutrients which help in reducing the risk for colon and breast cancer. It is showed that phenolics in millets are effective in preventing the cancer initiation and progression in vitro. Millet have linoleic acid which contain anti-tumor activity.

Anti-carcinogenic properties of sorghum have been well documented. The polyphenols and tannins present in sorghum have anti-mutagenic and anti-carcinogenic properties and can act against human melanoma cells, as well as positive melanogenic activity. China and in different parts of the world showed that Incidence of oesophageal cancer was low with sorghum consumption. In each country, the authors studied 21 communities over a period of 6 years and found consumption of sorghum showed lower mortality from oesophageal cancer than wheat and corn.

Many of the antioxidants found in millets, in addition to their beneficial impact on neutralizing free radicals, which can cause cancer, they can also clean up other toxins from your body, such as those in your kidney and liver. Quercetin, curcumin, ellagic acid, and various other beneficial catechins can help to rid your system of any foreign agents and toxins by promoting proper excretion and neutralizing enzymatic activity in those organs.

SUMMARY AND CONCLUSION

Nutri-Cereals can easily thrive in extreme conditions like drought, and some wild varieties can even prevail in flooded areas and swampy grounds. These have low glycaemic index, abode gluten-free protein and are rich in minerals (calcium, iron, copper, magnesium, etc.), B-vitamins and antioxidants. The presence of abundant amount of phytochemicals in Nutri-Cereals make them more valueable to be used in diet of person suffering from Non-Communicable Diseases. Nutri-Cereals are not only comparable to major cereals with respect to their nutritional features but are very good sources of carbohydrates, micronutrients and phytochemicals with nutraceutical properties. The millets contain 7-12% protein, 2-5% fat, 65-75% carbohydrates and

15-20% dietary fibre. These extraordinary traits make them nutritious and climate change compliant crops. These can not only serve as an income crop for farmers but also improve the health of the community as a whole. Existing limitations, i.e., the presence of anti-nutritional factors and low sensory acceptability of millet-based products, can be overcome by the scientific interventions. The anti-nutritional factors can be inactivated by processing methods like cooking, roasting, germination and fermentation. The sensory acceptability of millet-based products can be enhanced by mixing millet flours with other flours of high acceptability and preparing composite foods. The use of millets in commercial/packaged food will encourage farmers to grow millets and will open new opportunities and revitalize the farmers. The inclusion of millet-based foods in international, national and state-level feeding programs will help to overcome the existing nutrient deficiencies of protein, calcium and iron in developing countries.

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