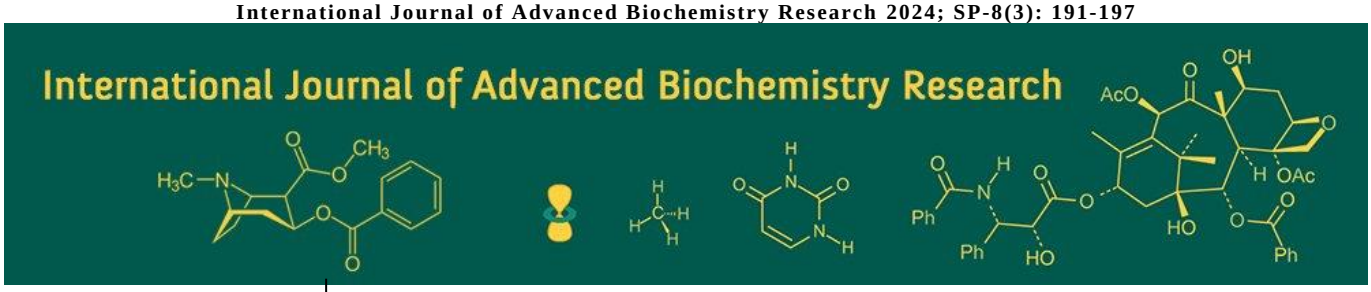

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Joshi MM
Ph.D. Research Scholar, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

Pawar VS
Head, Department of Food Process Technology, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

Lolge RM
Ph.D. Research Scholar, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

Kale Priyanka Ramkrishn
PhD Scholar, College of Food technology, VNMKV, Parbhani, Maharashtra, India

Corresponding Author:
Joshi MM
Ph.D. Research Scholar, College of Food Technology, VNMKV, Parbhani, Maharashtra, India

A review on nutritional importance and health promoting potential of super food millets

Joshi MM, Pawar VS, Lolge RM and Kale Priyanka Ramkrishn

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Abstract
The globe is currently facing challenges related to nutrition and agronomy. In order to significantly boost grain output, we must concentrate on arid regions because agricultural lands with irrigation systems are already fully utilized. The climate change compliant millets crop outperforms other grains like wheat and rice in terms of poor growth conditions and high nutritional content. Agricultural fields equipped with irrigation systems are completely utilized, thus our focus must be on dry regions to increase grain output dramatically. When it comes to poor growth conditions and high nutritional value, millets a crop that conforms with climate change regulations perform better than other grains like wheat and rice. The United Nations General Assembly recently passed a resolution designating 2023 as the International Year of Millets in order to draw attention to the importance of nutrient-rich crops in the face of climate change. A gluten-free grain that produces alkaline in the body is millet. One of the underused varieties of cereal grains is millets. These are still seen as food for the poor despite having significant nutritional and nutraceutical components. With regard to calories, carbohydrates, and protein, millets are no different from other cereals. However, when it comes to fat, calcium, iron, dietary fiber, and Vitamin E (tocopherols and tocotrienols), millets have additional content. Among those found to be prevalent in these are the phytochemicals phytosterols, phenolic acids, flavonoids, catechins, and phytic acid. A number of diseases, such as diabetes, heart disease, and cataractogenesis, have been linked to phenolic compounds and dietary fiber. Antibacterial and antioxidant properties are also claimed for these phytochemicals. Millets include antioxidants that have medical and nutraceutical benefits for preventing human health from declining. These benefits include lowering blood pressure, heart disease risk, obesity, cancer and cardiovascular disease prevention, diabetes, and tumor growth.

Keywords: Millets, antioxidants, diabetes, millets, nutraceuticals, nutrition, polyphenols, phytochemicals

Introduction
The crops resistant to drought are millets, which have a short growing season and can withstand a variety of pests and illnesses (Devi *et al*., 2014) [31]. Tough, rain-fed small-seeded millets thrive in desert environments and develop well in low soil fertility and moisture levels. They make 1% of the world's total cereal production and 3% of the coarse cereals. Africa accounts for 59% of global millet production, with these countries producing 55% of the grain worldwide. Asia is the second-largest millet producer in the world, accounting for 42% of production and 38% of the land area.

According to FAOSTAT, 27.8 million tonnes of millet were produced globally in 2019. India is the world's largest producer, accounting for 41.0% of the market. Millets were exported for $26.97 million USD in 2020-21. From 14.52 million tons in 2015-16 to 17.96 million tonnes in 2020-21, millets were produced. In the same time frame, bajra production rose from 8.07 million to 10.86 million tonnes (APEDA). The majority of underdeveloped countries generally eat millets as food. This meal is incredibly nutrient-dense, high in energy, and in recent years, it has played a major role in processed foods.

The two main major millets are pearl millet and sorghum. Among the millets, minor millet includes foxtail millet (*Setaria italica*), proso millet (*Panicum miliaceum*), barnyard millet (*Echinochloa* spp.), kodo millet (*Paspalum scrobiculatum*), finger millet (*Eleusine coracana*), and little millet (*Panicum sumatrense*) (Himanshu *et al*., 2018) [37]. According to Weber (1998) [69], millet is a type of fodder grass that is tiny and coarse.

It is a member of the poaceae family, of which the majority of genera are members of the subfamily Panicoideae, which is capable of growing under harsh ecological conditions (Seetharam *et al*., 1989) [57].

When produced as a rain-fed crop with average soil fertility and moisture levels, small-seeded millets are drought-tolerant grasses that can withstand arid areas. As a crop of food security, millets are said to be able to withstand poor agroclimatic conditions. These crops provide a great deal of promise for improving food and nutritional security as well as the genetic diversity of the food supply. Millets are primarily consumed as food in most underdeveloped countries. It's a high-energy, extremely nutritious that has become a major ingredient in processed foods in recent years. In addition to being nutritious, millet provides health benefits for a regular diet and aids in the treatment of conditions including diabetes, obesity, hyperlipidemia, cancer, and other conditions. Millets have a special benefit for health since they are a great source of micronutrients, especially minerals, B vitamins, and nutraceuticals.

While Americans and Europeans still do not consume large amounts of millets, they are beginning to realize the benefits of including them into multigrain and gluten-free cereal products. However, for individuals who reside in millet-producing regions, millet serves as their primary source of sustenance in many Asian and African countries. A wide range of traditional foods and beverages, including as chakli, dosa, papad, idli, porridges, breads, baby food, and snack foods are also made using it. Although households prepare a lot of traditional meals, farmers are discouraged from cultivating millet crops because of the lack of widespread industrial use. Many countries have now launched research programs in an effort to enhance nutrition, offer health benefits, and promote their broad usage as food, including China, India, the United States, and others (Sharma *et al*., 2020) [61].

Nutritional profile of millets

Pearl millet has been found to have a notable amount of minerals, antioxidants, soluble and insoluble dietary fibers, and resistance starch. According to Ali *et al*., (2003) [3], it contains 92.5% dry matter, 2.1% ash, 2.8% crude fiber, 7.8% crude fat, 13.6% crude protein, and 63.2% starch. Pearl millet contains a lot of energy (361 Kcal/100g). The three primary types of carbohydrates found in pearl millet grains are soluble sugars, dietary fiber, and starch. Pearl millet starches have a stronger swelling power and solubility than other starches because of their 20-21.5 percent amylose concentration (Lestieme *et al*., 2007) [44].

The soluble sugar concentration varies from 1.2 to 2.6% while the starch level varies from 62.8 to 70.5% in various types of pearl millet. According to Jambunathan and Subramanian (1988) [40] and Gupta and Nagar (2010) [33], there are 1.2 to 2.5% of free sugars, including glucose, fructose, sucrose, and raffinose. Pearl millet grains are devoid of gluten. Protein content in pearl millet typically ranges from 9 to 13%. Higher amounts of lysine, threonine, methionine, and cystine are seen in the essential amino acid profile of pearl millet protein (Adeola *et al*., 2005) [1]. When it comes to total lipid content, pearl millet has the highest range, ranging from 1.5 to 6.8% (Taylor, 2004) [65]. According to Adela *et al*., (2005) [1], the fatty acids found in pearl millet are higher in linolenic, palmitic, and stearic acids than in oleic and linoleic acids. Pearl millet contains a particularly high amount of linoleic acid (46.3%), with almost 75% of the fatty acids being unsaturated. Because pearl millet contains high levels of calcium, phosphorus, magnesium, and iron, it is a rich source of minerals (Burton *et al*., 1972) [10]. Ash content in pearl millet ranged from 1.6 to 3.6% (Serna *et al*., 1994) [59]. Pearl millet grain is a critical source of thiamine, niacin, and riboflavin (Taylor, 2004) [65]. Pearl millet grains contain 2.8 mg of niacin, 0.21 mg of riboflavin, and 0.38 mg of thiamine (Hulse *et al*., 1980) [38].

Finger millet

One of the highest-nutrient grains is finger millet, which also contains a significant amount of naturally occurring calcium, which helps to build stronger bones and reduce the risk of bone fractures. Regular consumption of finger millet whole grains and their products can lower the risk of cardiovascular disease, Type II diabetes, gastrointestinal malignancies, and other health issues (Mckeown *et al*., 2002) [46]. To produce flour, it is ground using testa, which is often high in dietary fiber and micronutrients (Devi *et al*., 2014) [31].

Dietary fiber, vitamins, minerals, phenolics, and other substances contained in the outer layer of the seed coat add to the food's dietary value and health advantages (Antony *et al*., 1998) [7]. Finger millet fights degenerative diseases and malnutrition while improving the level of hemoglobin (Reddy, 2017) [53]. Finger millet fibers provide a feeling of fullness, preventing excess in consumption (ICAR - Indian Institute of Millets Research, 2017 (IIMR).

On the other hand, studies reveal that the overall carbohydrate content of finger millet varies between 72 and 79.5% (Bhatt *et al*., 2003) [9]. Moreover, the overall proportion of carbohydrates was found to be between 59.5 and 61.2% for starch, 6.2-7.2% for pentosans, 1.4-1.8% for cellulose, and 0.04-0.6% for lignin, according to Wankhede *et al* (1879a) [68]. Finger millet includes around 5 and 8% protein, according to Chethan and Malleshi (2007) [24]. The protein content of finger millet was reported to be 6.32% by Anitha *et al*. (2019) [6]. Protein is assumed to be influenced in quality by the essential amino acids. Finger millet has a very balanced composition of essential amino acids since it has larger levels of lysine, threonine, and valine than other millet species. ds that it contains (Ravindran, 1991) [52]. The finger millet contains 5.2% total lipids, of which 2.2% are free lipids, 2.4% are bound lipids, and 0.6% are structural lipids. Conversely, it was found that the primary fatty acids found in finger millet are oleic, palmitic, and linoleic acids (Kunyanga *et al*., 2013) [42]. The entire fatty acid profile of finger millet is composed of 25.6% saturated and 74.4 unsaturated fatty acids. One of the highest nutrient-dense grains is finger millet, and genotypes reveal that its natural calcium content ranges from 162 mg/100g to 487 mg/100g (Sankara Vadivoo *et al*., 1998) [56].

Foxtail Millet

Foxtail millet is an excellent source of beta-carotene, a precursor to vitamin A, according to Murugan & Nirmalakumari (2006) [48]. Foxtail millet has a higher biological value for digestible protein than wheat and rice, and it also contains seven of the eight essential amino acids that humans cannot produce. Compared to finger millet, foxtail millet has a higher percentage of seed protein (14-16%), crude fat (5-8%), and micronutrients (Ravindran, 1991) [52].

It is beneficial to the health of the stomach and intestines since it contains 2.5 times as much edible fiber than rice. The bran contains 9.4% of the crude oil content and is strong in oleic acid (13.9%) and linoleic acid (66.5%). The large amounts of carbohydrates (65.59-74.12 g/100 g), crude protein (11.85-20.58 g/100 g), and amino acids (0.254-4.31 g/100 g) in this millet set it apart from other grains in terms of health benefits. The nutritional value of foxtail mill*et al*so includes 0.26 mg of vitamin B1, 0.78 mg of the antioxidant vitamin E, 0.78 mg of vitamin B2, 0.09 mg of vitamin B6, 0.23 mg of vitamins B6, 2.21 mg of niacin, 37.7 micrograms of folate, vitamin B 364 mg of potassium, 2.39 mg of pantothenic acid, 18.2 mg of calcium, 1.3 mg of sodium, 0.59 mg of copper, and 143 mg of magnesium (Sharma and Niranjan, 2018) [62].

Barnyard millet

A multipurpose crop, barnyard millet is utilized for both food and feed. It is a prestigious resource for highly digested protein and an excellent source of dietary fiber with a considerable proportion of soluble and insoluble components (Hadimani & Malleshi, 1993) [34]. Barnyard millet's low and slowly digesting carbohydrate content makes it a natural gift from nature to today's sedentary human population. Barnyard millet is the most effective strategy to reduce blood glucose and cholesterol levels (Veena *et al*., 2005) [66].

Little millet

Due to its high cholesterol content, little millet is good for growing youngsters and protects the body when consumed. Its complex carbohydrates digest more slowly in diabetics, which is very healthy (Gayatri 2015) [32]. Another benefit is its high fiber content, which makes it perfect for kheer or pongal as a substitute of rice (Reddy, 2017) [53]. It has a high iron content (9.3 mg/100g) and phosphorus content (220 mg/100 g). It is particularly beneficial for those with low body mass. Dosa, idli, pongal, and kichadi are a few dishes that can be made with little millet (Nutritive value of Indian foods NIN 2007) [49].

Proso millet

Proso millet is grown in several nations, including China, Russia, India, Eastern Europe, and North America. Because wheat, maize, and other cereal crops are so widely available in Western nations, proso millet has very little economic significance (Delost-Levis *et al*., 1992) [29]. Thus, the predominant application of proso millet grain there is as bird feed. But because it contains high-quality proteins, it has started to become more well-known in recent years. Because grains include greater vitamins and minerals than regular cereals, they are a superior source of nutrition (Seetharam, 1999) [58]. Proteins get higher in quantity but decrease quality when they are dried. The skin ailment pellagra causes the skin to dry up, become rough, and scaly. Two things that proso millet has are protein and niacin (Vitamin B3). It has been used for a very long time as a healing food, especially during delivery or illness (Kalinova and Moudry 2006).

Kodo millet

Kodo millet, a grain high in nutrients, can be utilized in place of both rice and wheat. Minerals, fiber, and protein concentrations are considerably higher than in popular cereals such as rice. The primary protein source in kodo millet is gluten (Sudharshana *et al*., 1988) [64]. One traditional food that can help you to lose weight is kodo millet. It is easily absorbed and full of antioxidants and phytochemicals that help prevent many diseases related to a lack of physical activity. Kodo millet helps women have more regular menstruation and relieves soreness in the hips and knees (Deshpande *et al*., 2015) [30].

Table 1: Nutrient composition of millets (per 100 g edible portion, Dry weight basis)

Source	Carbohydrates (g)	Crude Protein (g)	Fat (g)	Crude fiber (g)	Ash (g)	Energy (kcal)
Pearl millet	60.0-76.0	12.0 -14.0	4.8 -5.7	2 -2.5	2.0-2.2	363-412
Finger millet	60.0-80.0	7.0-10.0	1.3-1.8	3.6-4.2	2.6-3.0	328-336
Foxtail millet	59.0-70.0	11.2-15.0	4.0-7.0	4.5-7.0	2.0-3.5	330-350
Kodo millet	66.0-72.0	8.0-10.0	1.4-3.6	5.0-9.0	4.0-5.0	309-353
Little millet	60.0-75.0	10.0-15.0	5.0-6.0	4.0-8.0	2.5-5.0	329-341
Barnyard millet	55.0-65.0	6.0-13.0	2.0-4.0	9.5-14.0	4.0-4.5	300-310
Proso millet	55.0-70.0	10.0-13.0	1-3.5	2.0-9.0	2.0-4.0	330-340

Sources: Himanshu *et al*., (2018) [37]

Table 2: Mineral content of millets (mg/100 g)

Minerals	Pearl	Finger	Foxtail	Little	Proso	Kodo
K	440-442	408-570	250-400	129-370	250-320	144-170
Na	10.0-12.0	7.0-11.0	4.6-10	6-8.1	8.2-10	4.6-10
Mg	130-137	110-137	100-130	120-133	117-153	130-166
Ca	10.0-46.0	240-410	10.0-30.0	12.0-30.0	20-23	10.0-31.0
P	350-379	240-320	270-310	251-260	230-281	215-310
Mn	1.15-1.8	5-5.5	2.19-26	1.0-20.0	0.6-1.81	1.10-2.9
Zn	2.95-3.1	2-2.3	2.14-9	3.5-11	1.4-2.4	0.7-1.5
Cu	0.62-1.06	0.4-4	1-3.0	1.0-4.0	0.83-5.8	1.6-5.8
Fe	7.49-8.0	3.9-7.5	3.26-19	13-20	4.0-5.2	0.7-3.6

Sources: Himanshu *et al*., (2018) [37]

Table 3: Mode of Action of Nutrients and Health benefits of Millets

Nutrients	Mode of Action	Health Benefits	Source
High fiber content	Sugars are slowly released	aids in diabetes, intestinal cancer and constipation	Verma and Patel (2012) [67]
Gluten free	Complex Carbohydrate	aids in celiac illness	Dayakar *et al*. (2013) [28]
Phytochemicals	Phenolic acids and flavonoids	whole health care administration	Shahidi and Chandrasekara, (2013) [60]
Nutraceuticals	Antioxidant activity Anti-microbial	Prevent disease risk both probiotic and prebiotic properties antagonistic to diabetes preventive of tumors	Devi *et al.* (2014) [31]

(**Source:** Ambati and Sucharitha 2019) [5]

Bioactive Compounds: When present in food in their isolated form, bioactive compounds are substances that, when taken out of the diet, provide protection against degenerative diseases. It serves as a component of nutraceuticals.

Phenolic Compounds

The term "phenolic compounds" refers to a broad class of substances that are distinguished by the presence of an aromatic ring having several substitutions and one or more hydroxyl groups. Phenolic substances fall into three main categories: lignans, flavonoids, and phenolic acids. Finger millet varieties varied significantly in their amounts of polyphenols; brown varieties had 1.2-2.3% while white varieties had 0.3-0.5% (Chethan and Malleshi's, 2007) [24]. These are well-known antioxidant molecules that serve as essential sources of antioxidants and protect the body from a variety of diseases, including obesity and cancer. Because they lower the chance of developing chronic illnesses, dietary phenolic compounds may enhance health (Chandrasekara and Shahidi 2010) [22].

Phenolic Acids

One benzene ring and a carboxylic acid activity characterize aromatic compounds known as phenolic acids. Pearl millet has two acidic ingredients: fumaric acid (1350 g/g) and ferulic acid (199 g/g). When phenolic acid concentrations were compared to other grains, sorghum (27.3 mg/kg) had the lowest level of phenolic acids compared to pearl millet (64.8 mg/kg). The most common phenolic acids identified in finger millet grains are p-coumaric acid, ferulic acid, caffeic acid, vanillic acid, and syringic acid. One of the most common phenolic acids in finger millet grains is ferulic acid, often referred to as trans-4-hydroxy-3-methoxycinnamic acid. It is abundant in the embryo, pericarp, and aleurone cell walls of many grains, although it is only moderately present in the starchy endosperm (Chethan *et al*., 2008) [25].

Flavonoids

The normal backbone of flavonoids, or secondary plant metabolites, is 15 carbons. One phenyl ring and two heterocyclic rings make up its structure. Below is a list of additional advantageous flavonoids, including tannin, anthocyanin, quercetin, and catechin. Because of their pharmacological action as radical scavengers, they are vital for maintaining human health (Cook and Samman 1996) [26]. Orientin, isoorientin, saponarin, tricin, orientin, and isovitexin are the eight distinct types of flavones found in finger millet leaves (Hilu *et al*., 1978) [36]. The yellow-green pigment that appears on millet flour at basic pH was found to be attributed to the proteins vitexin, glucosylorientin, and glucosylvitexin, which Reichert found in pearl millet in the ratio 29:11:4 (1979, Reichert). Condensed tannins have only been identified in finger millet. In comparison to white finger millets, which have catechin equivalents of 0.04-0.06%, brown finger millets have equivalents ranging from 0.12 to 3.47% (Ramachandra, 1977) [51].

Phytic Acid

Phytate concentrations of common millet cultivars range from 170 to 470 mg/100 g of whole grain; following dehulling, the phytate level drops by 27-53%.

Carotenoids and Tocopherols

Among the different kinds of pigments found in food sources are carotenoids. Studies show that there are over 600 of them out there. It is commonly known that carotenoids function as provitamin A. But one of those important substances called carotenoids works as an antioxidant to shield the body against a number of illnesses. A per the study conducted by Asharani *et al*., (2010) [8] found that for finger, small, foxtail, and proso millets, the average total carotenoids concentration in edible millet flour was 199, 78, 173, and 366 µg/100 g, respectively. Vitamin E is a common fat-soluble element found in nature and is a family of eight different compounds. One hundred grams of finger, foxtail, and small millet varieties provide 3.6-4.0 milligrams of tocopherol. Anti-inflammatory, antioxidant, anti-superoxide, and anti-atherosclerotic, vitamin E has these properties.

Phytosterols

The ring structures of desmethyl sterols, like cholesterol and phytosterols, are comparable. These are essential components of the structure and operation of plant cells. Phytosterol esters can reduce blood serum LDL cholesterol levels by up to 14%, but they have no effect on HDL levels. Your daily risk of heart disease can be reduced by up to 40% with phytosterols, contingent on your age and other factors. However, the presence of sterols reduces the absorption of vitamin E and beta- and alpha-carotene. Emulsification, etherification, and solubilization processes reduce their bioavailability. Based on seed weight, finger millet has a reported sterol concentration of 0.149 percent, which is lower than other millets (Mahadevappa and Raina (1978) [45].

Health benefits

Obesity

In recent years, obesity has become a widespread issue, linked to numerous ailments like diabetes, hypertension, and cardiac issues. Eating a diet rich in fiber can enhance intestinal function, lower the prevalence of obesity, and lower the chance of developing chronic diseases by improving the body's digestion and absorption. Millets help prevent obesity and regulate weight in addition to satisfying hunger. The high fibre content of millets reduces bloating,

cramping, gas, constipation, and stomach disorders. Appropriate digestion and absorption decrease the retention of gastrointestinal disorders such as ulcers and colon cancers (Reddy, 2017) [53].

The largest rising issue in India is obesity, which is linked to a number of chronic conditions include diabetes and cardiovascular disease (CVD). Eating foods high in dietary fiber lowers the prevalence of obesity, per current studies (Alfieri *et al*., 1995) [2]. Eating a diet rich in dietary fiber slows down the digestion and absorption process, improves intestinal function, and lowers the chance of developing chronic diseases (Ali *et al*., 1982) [4].

Diabetes

There is a reduced incidence of diabetes among those who consume millet. Millet phenolics partly inhibit the enzymatic breakdown of complex carbs, reducing postprandial hyperglycemia in a manner similar to alpha glucosidase (Shobana *et al*., 2009) [63]. Aldose reductase inhibitors reduce the frequency of cataract problems associated with diabetes by limiting the accumulation of sorbitol (Chethan *et al*., 2008) [25]. Finger millet feeding lowers blood glucose and improves antioxidant status in diabetic mice (Hegde *et al*., 2005) [35] and accelerates the diabetic rats' recovery (Rajasekaran *et al*., 2004) [50].

Because finger millet has a high amount of fiber, diets exhibited a mild glycemic response. They also aid in the healing of skin wounds. Research clearly supports the finger millets protein's role in avoiding human cataractogenesis. We know that millions of individuals worldwide suffer from the diabetes ailment. Magnesium, which is abundant in millets, helps prevent Type II Diabetes. By generating a large number of the enzymes that break down carbohydrates and regulate insulin activity, magnesium is an essential mineral that helps to improve the efficiency of insulin and glucose receptors (Reddy, 2017) [53].

Celiac Disease

The genetically sensitive illness known as celiac disease is brought on by gluten consumption. Because millets don't contain gluten, they help reduce the amount of people who have celiac disease because they minimize the gastrointestinal pain that common cereal grains with gluten cause (Saleh *et al*., 2013) [55]. By maintaining good care of their digestive tract, one can retain more nutrients and lower their chance of developing more serious gastrointestinal disorders like gastric ulcers or colon cancer. Millets are a high-fiber food that relieves constipation, bloating, cramping, and excessive gas. Celiac disease is an immune-mediated enteropathy that affects sensitive people and is commonly brought on by gluten ingestion. Millets are great for people with celiac disease because they are free of gluten and have a variety of applications in food and drink preparation. Additionally, they can help meet the growing demand for products devoid of gluten.

Cardiovascular disease

A great way to reduce the symptoms and indicators of heart attacks and migraines is by eating millets, which are a great source of magnesium. A range of phytochemicals are present in millets, such as phytic acid, which has been demonstrated to reduce cholesterol (Coulibaly *et al*., 2011) [27]. Finger millet lowers plasma triglycerides in hyperlipidemic rats, probably minimizing cardiovascular disease (Lee *et al*., 2010) [43].

Consuming whole millet grains on a regular basis reduces CVD incidence. Additionally, millets contain plant lignans, a type of prebiotic fiber that bacteria ferment in our digestive tracts and which the microflora in those tracts can transform into animal lignans. It has been demonstrated that these animal lignans are resistant to a wide range of chronic illnesses. Fermentation of them yields enterolactone, a chemical known to protect against heart disease and many types of breast cancer (Reddy, 2017) [53].

Cancer

The "antinutrients" phytate, tannins, and phenolic acids are found in high concentrations in millets. On the other hand, in animals, these antinutrients lower the risk of breast and colon cancer. According to *in vitro* research, the phenolic component of millet may help prevent the onset and spread of cancer (Chandrasekara and Shahidi 2011) [23].

Conclusion

Small-seeded annual grasses referred to as millets are cultivated for their grains, especially on marginal lands in arid regions of temperate, subtropical, and tropical climates. Millets are more nutrient-dense and less expensive than other grains. Rich in protein, fiber, vitamins, minerals, and iron content, among other components, it is abundant. Because there is a shortage of nutrition in poorer countries, malnutrition and other health problems including obesity, diabetes, cardiovascular disease, skin diseases, cancer, celiac disease, etc. are more prevalent. This is primarily due to the general lack of knowledge about the importance of agricultural crops to human health and their nutritional value.

The review's main goals are to raise people's understanding of the importance of food and to promote millets as a nutrient-dense crop that meets dietary demands and aids in the fight against malnutrition and other health problems. There are many health benefits associated with millet foods. These benefits stem from their high nutrient content, which includes fiber, which helps with metabolic disorders like diabetes, obesity, and cardiovascular diseases; high protein; high calcium; high iron; and benefits to those suffering from anemia and celiac disease. Heart-protecting phytosterols and policosanols are found in the waxy layers of millet. This study proved that millets are the richest dietary source for people and have therapeutic qualities.

Future scope

Due to high resistance to pests and diseases, millet is an important agricultural produce in tropical and semiarid regions of the world. Given their abundance in fiber, minerals, vitamins, macro- and micronutrients, and phytochemicals, they provide more significant health benefits. It is an extremely nutrient-dense crop because of its high vitamin and mineral content. It will therefore support the effort to combat food insecurity and malnutrition. One way to fulfill the objective of ending hunger by 2030 is to provide everyone with access to a cheap, healthful diet. Millets have a high nutritional content, which makes it easier to generate a variety of value-added products from them.

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