



Millets: A Review On Its Nutritional Potential And Application

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Abstract

Millets, which are rarely utilized cereals but rank sixth in protein content, are significant producers of phytochemicals, particularly lipophilic compounds, and are cultivated in both Africa and Asia. Several distinct varieties of millets are discussed in this overview, along with its history, consumption, types, and a variety of additional applications. Millet grains come in a broad range of strengths when it comes to their phenolic content and their antioxidant capability. In addition, millet grain phenolics, which are readily accessible, possess biological features that are resistant to a number of pathophysiological diseases. Moreover, they may act as natural antioxidants in food and contribute to the food security of millions of people. Millet grain is not only a rich source of nutrients but also contains a variety of beneficial compounds.

Keywords: Millets, Consumption, phenolics, grain

Introduction

Small, commercially planted grains of many ethnicities and sectors that belong to the Poaceae family are collectively referred to as millet. About 90% of the millet harvested during the world's millet harvest conference goes to impoverished nations. Millets are smaller cereal grains that belong to the family Poaceae family of grasses. Every year, these tiny plants flourish under suboptimal soil conditions and are mostly found in hot, dry areas (Shobana et al., 2013). Gopalan et al. (2009) state that millets are associated with sorghum, foxtail millet, kodo millet, pearl millet, finger millet, proso millet, small millet, barnyard millet, and brown top millet. A relationship has been shown between consuming whole grains and fibre and enhancements in body mass index (BMI), total cholesterol, metabolic syndrome, insulin resistance, type 2 diabetes, mortality from cardiovascular disease, and buttocks length. Cereals are the primary source of sustenance for the vast majority of people on the planet in the world. According to the Bureau of National Food (BNF) (2004), both developed and developing countries depend on grain as a source of energy, protein, and several micronutrients and non-nutrients. Worldwide, cereals and cereal-based foods provide half of the protein and over 56% of the calories that people eat (BNF, 2004). Worldwide, maize, wheat, barley, sorghum, oats, and rye are the most significant crops from an economic standpoint. According to FAOSTAT (2011), the world's millet harvest in 2009 was over 27 million tonnes. Worldwide, 56% of investment has come from African nations, while 41% has come from Asian ones. Although millet only accounts for a small fraction of global grain production—around 1%—its culinary value and impact on the agricultural landscape are substantial (Shahidi & Chandrasekara, 2013). Also, many people consume millet in its whole grain form (FAO STAT, 2011).

Millet is often cultivated throughout the summer months. Worldwide, it serves as a staple meal, as well as a source of animal feed and fodder. About two-thirds of the millet that is grown is used as food, with the remaining portion going into other uses such as planting seeds, animal feed, beer, and chicken seeds. The widespread use of sorghum and millets by economically disadvantaged parts of African and Asian nations has earned them the nicknames "grains of the poor" and "crops of the poor," respectively. In addition, despite the fact that they are grown in agroecological systems, they are not yet completely used for grain production. This is due to the fact that they are not included in commercial food systems and there are no research and development efforts in this particular field (FAO, 1995).

History of Millets

One of the first crops cultivated by humans was millet, and new archaeobotanical research has demonstrated that common millet was a staple crop in northern China as far back as 10,000 years ago (Lu et al., 2009). Proso and foxtail millets were the two varieties of millet used to make noodles four thousand years ago, according to evidence found in northern China (Lu et al., 2005). The ancient Sanskrit literature of India refers to finger millet, one of the first plants in the country, as "nrta-kondaka," which means "Dance Dance" and is also called "rajika" or "markataka" (Acharya, 2009). Around 2300

BC, in the Indian state of Karnataka, the earliest mention of finger bean kernels was made. Many people have different ideas about where finger millet came from; some think it may have sailed all the way from Arabia or South Africa to India, while others think it may have crossed the Indian Ocean on either side (Achaya, 2009). The article by Fuller (2002, 2003) summarises research on the origins of Eleusine from archaeological sites in India and other parts of the world. It emphasises the plant's African roots and shows that various Bantu languages spoken in southern Tanzania, northern Malawi, and portions of India derive "ragi" from the root de'gi finger millet. Fuller, who doubted the various fingerprint findings, believed that Hallur (1000 BC), Malhar (800 BC-1600 BC), and Hulaskhera (700 BC) divided grain in India (Fuller, 2003). Indians have traditionally bred African grains including ragi, jowar, and pearl millet (Achaya, 2009). Finger millet was grown throughout India. Maharashtra called it nachni, meaning dancer. Bihar called it "umi." The dirt was cleaned and the grains gently dried (sometimes after germinating). Pink flour from red finger millet was eaten as a ball or gruel. Sugar and salt were also made from it. Additionally, finger millet was extensively fed to weaning children (Achaya, 2009). In "Kuruntogai," ancient Tamil literature calls red finger millet "Kelvaragu." The Sangam Tamil literature "Purananuru" addresses grain drying, texture, and cooking from 600 BC to 200 AD. According to ancient Indian poets, finger millet was served with a milk-cooked finger and honey or It was utilised then and still in Karnataka (Shobana et al., 2013).

Millet Types

It is a frequent phrase that refers to a few grains of seeds that are included in millet. The two of them do not belong to the same species or to the same genus. According to the statistics on global production, the most abundant variety of grains is pearl millet (*Pennisetum glaucum*), which accounts for around 46% (Marathe, 1994). On the other hand, foxtail, proso, and finger millet are the next most abundant varieties. In addition to kodo, tiny, Japanese barnyard, fonio, and teff millets, there are many additional types of little millets that may be purchased. The common names of millets that are used in many nations, together with their respective tariffs, are listed in Table 1. The vast majority of the time, they are separated like grains due to the fact that they have a very little grain. Because it is feasible for a handful of millets to contain thousands of grains, the name millet originates from the French word mille, which means a thousand grains. According to Gopalan et al. (2009), the nutritional makeup of several varieties of millet is shown below, with all values expressed per 100 grammes of edible part. In the same way as other cereal grains are well-balanced in terms of nutrients, millets are as well (FAO, 1995).

The primary nutrients consist of sixty to seventy percent carbs, seven to eleven percent proteins, one and a half to five percent fat, two to seven percent crude fibre, minerals, and vitamins (Table 2). When compared to other kinds of grains, millets are able to provide the body with a considerable quantity of energy. In compared to other grains, some varieties of millet, including those that are suited for finger-bearing, have a higher percentage of fat, ranging from 3.5% to 5.2% (Shobana et al., 2013). Millets, on the other hand, are rich in a broad range of phytochemical substances and include a significant number of organisms that have the potential to deliver good health effects. These advantages include the prevention of non-communicable diseases (NCDs) and the delay of the start of these illnesses. This is the case for those millet types that are acceptable for finger-bearing. They have a large quantity of both iron and phosphorus in their composition. Furthermore, finger millets contain a high calcium content concentration of 350 mg per 100 g, as stated by the Food and Agriculture Organisation of the United Nations in 1995.

Table 1: Scientific and of major types of millets common names

Sr. No.	Scientific name	Common name
1	<i>Pennisetum glaucum</i>	Pear, bajra, cattail, bul rush, candlestick, sanyo, Munga, Seno
2	<i>Elusine coracana</i>	Finger, ragi, African, rapoko, Hunsu, Wimbi, Koracan
3	<i>Setaria italica</i>	Foxtail, Italian, German, Hungarian Siberian, Kangani
4	<i>Panicum milliaceum</i>	Proso, common, hog, broom, samai, Russian, Panivarigu,
5	<i>Panicum suma trence</i>	Little, blue panic, heenmeneri
6	<i>Paspalum scrobiculatum</i>	Kodo, varagu, bastard, ditch, naraka, water couch
7	<i>Echinochola crusgalli</i>	Barnyard, Japanese, sanwa, sawan, korean, kweichou

Table 2: Nutritional composition of different types of millet

Parameter	Ragi/finger millet	Proso millet	Foxtail millet	Little millet	Kodo millet	Barnyard millet	Pearl millet	Rice (raw milled)	Wheat
Moisture (g)	13.1	11.9	11.2	11.5	12.8	11.9	12.4	13.7	12.8
Protein	7.3	12.5	12.3	7.7	8.3	6.2	11.6	6.8	11.8
Fat (g)	1.3	1.1	4.3	4.7	1.4	2.2	5.0	0.5	1.5
Minerals (g)	2.7	1.9	3.3	1.5	2.6	4.4	2.3	0.6	1.5
Dietary fiber (g)	11.5	-	2.4	2.53	2.47	1.98	11.3	4.1	12.5
Carbohydrates (g)	72.0	70.4	60.9	67	65.9	65.5	67.5	78.2	71.2
Energy (kcal)	328	341	331	341	309	307	361	345	346
Calcium (mg)	344	14	31	17	27	20	42	10	41

Millet consumption in India

While sorghum is eaten in large quantities in the states of Gujarat (together with pearl millet and maize), Maharashtra, and Karnataka, the National Nutrition Monitoring Bureau discovered that it is virtually non-existent in the states of Kerala, West Bengal, Orissa, and Tamil Nadu. Orissa and Tamil Nadu are both located in the state of Kerala. Rice is an excellent basis for a foundation. If we compare the grain consumption in Gujarat and Maharashtra to that of Karnataka (75 g/CU/day), Madhya Pradesh (32 g/CU/day), Andhra Pradesh (16 g/CU/day), and Tamil Nadu, we find that Gujarat and Maharashtra have a higher consumption rate of 132 and 200 g/CU, respectively. In the case of an Indian guy who is engaged in sedentary employment, one CU is equivalent to a daily energy demand of 2400 kinetic calories. Although the majority of Indian dishes continue to consist of whole grains, which constitute 70-80% of the overall energy intake (Gopalan et al., 2009) In the developing countries of Africa and India, pearl millet stover is an essential component of the feed that is used for livestock. According to Basavaraj et al. (2010), pearl millet grains are imported and exported despite the fact that there is a low demand for them and an erratic supply in international markets.

Feed and other purposes

Millet grain is commonly utilised as edible seeds and for avian purposes in the United States and Canada. Many different types of flour, malted flour, and grain sources are used to create millet in the traditional growing regions of Africa, East Asia, and the Indian subcontinent. Cereals made from millets may range from steam goods to boiling and uncooked bread, porridge, steamed rice, alcoholic and non-alcoholic drinks, snacks, and even different areas within the same nation (Murty & Kumar, 1995). Pearl millet is a widely used millet grain that has many other use beyond only feeding animals and humans (Gulia et al., 2007). Doves, turkeys, songbirds, ducks, and pigs are among the many avian species that have benefited from this discovery. The gluten-free nature of pearl millet grain led to its inclusion in health food stores (Gulia et al., 2007). For grill manufacture, pearl millet is just as good as regular soybean meal, and it doesn't even need grinding for up to 10% of the amount (Davis et al., 2003; Hidalgo et al., 2004). In comparison to broilers who were fed corn or a mixture of corn and sorghum, those that were given pearl millet pear had a higher rate of feed conversion and were heavier than those that also consumed maize. (Gulia and others as of 2007), conducted a study that found that a good feeding conversion of laying hens led to a rise in egg size as well as improved feed when pearl millet was supplemented with maize at a weight percentage of sixty percent.

Conclusion

In light of this, it is of the utmost importance to find processing processes that include fingerprint repairs in order to get the most beneficial health effects and to fully appreciate the active components. Millets are a good source of macro- and micronutrients, and they also contain a variety of bioactive phytochemicals, notably phenolic. This is quite similar to the situation with many of the main grains that are consumed across the globe. In addition, since they do not contain gluten, millets are a vital component of the diet for those who suffer from celiac disease. Because it can thrive in a wide range of conditions, millet may be grown during the whole year. It is common known that the country faces a significant social and economic burden as a result of the development of chronic diseases that are impacted by dietary and lifestyle choices. These illnesses include hypertension, heart failure, and type II diabetes, among others. Millet grains are significant owing to the phenolic content and composition of the grains, as well as the current evidence of positive health repercussions. Millet grains are a helpful dietary supplement that may significantly reduce the risk of non-communicable diseases (NCD) and promote overall health.

Millets are essential to the lives of millions of people in some parts of Asia and Africa, and they are also the most widely consumed grain in countries that have developed their industrialization. The presence of substantial quantities of dietary fibre and other nutrients that are kept in all of the recipes from the fingers makes it simpler to manage a diabetic diet that is balanced.

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