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Nutritional & Health Benefits Of Millets

Pratiksha A. Dhokane¹, Ram S. Gawande², Gaurav S. Tangade³, Pranali S. Sakhalkar⁴, Kamlesh A. Kadam⁵,
Dr.H.H.Gangurde⁶

^{1,2,3,4}, Student at Shri sant gajanan maharaj college of pharmacy, Buldana

⁴, Assistant professor at Shri sant gajanan maharaj college of pharmacy, Buldana

⁵, Principal at shri sant gajanan maharaj college of pharmacy, Buldana

Abstract:

Millets are a major food source in arid and semiarid parts of the world. Millet are drought tolerant crops. Extensively grown in Asia and semi-arid tropic of Africa. They provide protein, fatty acid, minerals, vitamin, dietary fibre and polyphenol. Typical millets protein contain high quantity of essential amino acid especially, the sulphur contain amino acid(methionine and cysteine.) the millets are the source of antioxidant which are potential prebiotic and can enhance the viability or functionality of probiotic with significant health benefits. Millet protein have a balance amount of essential amino acid, sulphur. Which are enriched with several positive health attributing phytochemicals, including lignans, phytosterol, polyphenol, phytoestrogen and phytocyanans. Millets are supportive prevention of various lifestyle illness such as cardiovascular disease, cancer, low and high blood pressure, diabetes. Because of their significant involvement in nutritional security and possible increasing health effect, it is now addressing in important area of research for food scientist. Millet is an alkaline forming grain that is gluten free. Other health benefits are increasing the timespan of gastric emptying, provide roughage to gastrointestinal. Millet diet is often recommended to optimal growth of health. Millets as a nutritious food, fulfillment of the nutritional need of global population and combat malnutrition.

Keyword:

Milletes, Food Source, Distribution, Diabetes, Nutritious Food, Malnutrition, Grain

Introduction:

Milletes are one of the cereals asides the major wheat, rice & maize. Milletes, are major food sources for millions of people, especially those who live in hot , dry area of the world. There grown mostly in marginal area under agriculture conditions in which major cereals fails to give substantial yeilds . millets are classified with Sorghum, Maize, Coix . Milletes are important foods in many under developed countries because of there ability to grow under adverse wheather conditions like limited rainfall. In contrast, millet is the major source of energy and protein or millions of people in Africa. It has been reported that milletes has many nutritious and medicinal function. It is drought registant crop and can be store for long time without insect damage. Hence, it can be important during Famine. Discrepancies exist concerning classification of family millet due to given reference from book family of millets is Gramineae, another classifying it in the family Poaceae. There are many variety of millets. The four major type are pearl millet (*Pennisetum glaucum*), Foxtail millet (*Setaria italica*) , Proso millet or white millet (*Panicum miliaceum*) , Finger millet (*Eleusine Coracana*).

The minor millets include: Barnyard millet (*Echinochloa* spp.), kodo millet(*Paspalum scrobiculatum*), Little millet (*Panicum sumantrense*), Guinea millet (*Branchiaria deflexa* = *Urochloa deflexa*), browntop millet (*Urochloa ramosa* = *brachiaria ramosa*= *Panicum ramosum*), Teff (*Eragrostis tef*) and fonio (*Digitaria exilis*) are also often called millets, as rarely are sorghum (*sorghum* spp.).

Nutritional composition of millet grains

Millets are unique among the cereals because of their richness in calcium, dietary fibre, polyphenols and protein. Millet generally contain significant amounts of essential amino acids particularly the sulphur containing amino acid (methionine and cysteine). They are also higher in fat content than maize, rice, and sorghum. In general, cereals proteins including millets are limited in lysine and tryptophan content and vary with cultivar. However, most cereals contain the essential amino acids as well as vitamin and minerals.

Different climatic conditions are required for different types of millets. A warm, temperature climate is essential for the sprouting and germination of the millet seeds to keep the soil temperature cozy since they susceptible to damage by cold weather and frosts. The sustainable temperature for millet growth is 20-30 degrees Celcius. Most millets are short growing season and can be grown well in areas where other crops fail to grow. For example, sorghum can be cultivated even in drought conditions, unlike any other plant because of its excellent water holding capacity due to the presence of waxy coatings on its stems and leaves. Most millets can do with little moisture since they have efficient water utilization abilities. In India about 8 types of millet are cultivated under rain-fed conditions which required little or no irrigation, as they do not require high amounts of moisture – for example, Jowar is a rain fed crop(30-100cm, annually) grown in the area which barely need irrigation. Usually minor millets require below 35cm of rainfall, while a few other major millets require at least 40cm of rainfall for a good harvest.

Distribution of Millets in India

India is the top most procedures of millets followed by Nigeria for the year 2000 and 2009. In india, eight millets species (Sorghum, Pearl millet, Finger millet, foxtail millet, Kodo millet, Proso millet, Barnyard millet and Little millet) are commonly cultivated under rain fed conditions. Further, in each of the millet growing areas at least 4 to 5 species are cultivated either as primary or allied crop in combination with the pulses, oilseeds, species and condiments. For instance, while pearl millet and sorghum are primary crop and allied

crops respectively in the desert regions of Rajasthan, in the eastern parts of Rajasthan and Gujarat it is the opposite. Similarly, sorghum is sown as major crop in the Telangana, Andhra Pradesh, Maharashtra and parts of Central India, while it is considered as fodder crop in some of the Southern regions.

Similarly, finger millet is a minor crop in Telangana but a major crop in Gujarat and Tamil Nadu. Therefore, the growing environment and the quantity of rainfall in the area have a major influence on the spatial distribution of millets, whether they are grown as allied crops or as the main crop where annual rainfall is less than 400mm, pearl millet competes with sorghum, which is the dominant crop in those areas. Furthermore, the majority of the southern and central states of India are home to small millets like finger millets, foxtail millet, barnyard millet, little millet, and proso millet. This is especially true in areas where the yearly rainfall is less than 350mm, possibly the only place where other cereal crops can survive such moisture stress.

Nonetheless, the cultivation of the wide range of millet species and varieties is becoming less common in recent times, despite their rich inter- and intra- species diversity and greater climatic adaptability. The region where millet is grown is gradually getting smaller due to a lack of institutional support for millet crops as opposed to the institutional promotion of wheat and rice. However, a number of communities in the dry/rainfed areas still include a variety of millets in their traditional cropping patterns because they have long recognized the nutritional value of millets and consider millet to be a necessary component of the millet diet.

Nutritional profile of millets

The nutritional content of food is an important factor in the maintenance of a human body's metabolism and wellness. The nutritional content is critical for developing and maximizing the human genetic potential. Millets nutrition is comparable to major staple cereals (rice, wheat, and maize), since they are an abundant source of carbohydrates, protein, dietary fiber, micronutrients, vitamins and phytochemicals. Millets provide energy ranging from 320-370 kcal per 100g of consumption. Millets have a larger proportion of non-starchy polysaccharides and dietary fiber compared to staple cereals and comprise 65-75% carbohydrates. High-dietary-fiber millets have several health advantages, including bettering blood lipid profiles, blood glucose clearance, and gastrointestinal health. Low glycemic index and low-gluten millets are beneficial for both diabetes and celiac disease. Phytochemicals that are good for your health, like phytosterols, polyphenols, phytocyanins, lignins, and phyto-oestrogens are also abundant in millets. By acting as antioxidants, immunological modulators, and detoxifying agents, these phytochemicals help prevent degenerative diseases, associated with aging, including cancer, type 2 diabetes, and cardiovascular diseases. Millets contain approximately fifty distinct phenolic groups and their derivatives, including flavones, flavanols, flavononols, and ferulic acid, which have strong antioxidant properties, according to a study. Proso and finger millet contain large amounts of phenolic components, which are crucial antioxidants in millets. Pearl millet contains large amounts of phenolic components in its free form. According to a different study, proso millet contains a variety of phytochemicals, including p-coumaric acid, ferulic acid, caffeic acid, syringic acid, and chlorogenic acid. Additionally, it has been reported that the bound fraction contains nearly 65% of the phenolics. These phytochemicals and significant antioxidants suggest that millets may be beneficial to human health.

Therapeutic advantage of millets

The most prevalent metabolic disease that affects people and causes health issues is diabetes mellitus. Dietary complications are caused by poor dietary habits, stress, and changes in lifestyle. Because of their high content of complex carbohydrates, low fat content, high fiber content, millets are a good addition to a diabetic diet. Therefore, millets have a hypoglycemic and hypocholesteremic effect on people. millets have the potential to reduce the amount of undigested food components that ferment in the gut and bind with toxins, which are then expelled from the colon along with stools reduces the prevalence of intestinal problems, constipation, and colon cancer as a result. It is reported that cardiovascular diseases, duodenal ulcers and hyperglycemia occur rarely in regular millet eaters.

Types of millets:-

1. Finger millet (*Eleusine coracana*)

The generic name Eleusine derives from the Greek cereal goddess, "Eleusine" while the common name finger millet suggests "finger-like" panicle branching. Finger millet is widely referred to as "nutritious millet" since grains are nutritionally better than many cereals, that provide people with equal quantities of proteins, minerals, calcium, and vitamins. The finger millet belongs to the poaceae family and was domesticated in east Africa (possibly Ethiopia) about 5000 years ago and introduced to India 3000 years ago. *Eleusine coracana* subsp. *africana* is the nearest wild relative to finger millet which was originated in Africa. Scientific research has focussed the crop on its extraordinary ability to grow under high temperatures, low humidity, and weak soils.

Medicinal Uses :-

The product derived from finger millet are useful for the growth of bone mass in growing children, as well as for the prevention of osteoporosis and other bone disorders in adults and aging populations. The seed is astringent and used to treat fever, biliousness, and hepatitis.

2. Barnyard millet

Barnyard millet (*Echinochloa frumentaceae*) is an ancient millet crop grown in warmer and temperate parts of the world, growing since 5000 B.C. in India and then 3000 B.C. in China. *Echinochloa* species have very few cultivable forms and are consequently cultivated by marginal farmers as minor millet. *Echinochloa frumentaceae* (Roxb.) Link; syn. *E. colona* var. *frumentacea* (allohexaploid, $2n=6x=54$), commonly known as Indian barnyard millet, originated from wild *E. colona* (L.) (jungle rice), and shown an evolutionary parallel in India and Africa. *E. frumentacea* has four races that are widely cultivated in Central Africa, India, Malawi, Nepal, and Tanzania namely *stolonifera*, *intermedia*, *robusta*, and *laxa*.

Medicinal uses:-

Barnyard millet sprouted seed is astringent, acidic, emollient, and stomachic. It is used for the treatment of abdominal dyspepsia, impaired digestion, and nutritional stagnation. White seeds are refrigerant and are used in cholera and fever care. Green seeds are diuretic and make virility stronger.

3. Proso millet (*Panicum iliaceum*)

Archeological researcher suggest that proso millet domestication took place at the beginning of the Holocene when global temperature were warmer and new plants and habitats became introduced to hunter-gatherers. The wild ancestor of proso millet has yet to be identified though weedy types of millet are found throughout Eurasia, which may have a wild offspring. The

allotetraploid form of proso millet, with or similar to *Panicum capillare*, and *Panicum repens* as ancestors, is revealed by chromosomal in situ hybridization with genomic DNA and phylogenetic evidence. Evidence suggests important changes in the cultivation of proso millet on the Tibetan plateau before it was abandoned in eastern Tibet. Proso millet was later mostly substituted for wheat and barley on the Tibetan plateau.

Medicinal uses:-

The intake of proso millet and other millets is associated with a decreased risk of type 2 diabetes mellitus because whole grains are a rich source of magnesium. Since the incidence of migraine headaches and heart attacks can also be decreased by magnesium, people with atherosclerosis and heart disease benefits from it.

4. Foxtail millet (*Setaria italica*)

One of the oldest cultivated millet crops is foxtail millet (*Setaria italica*), which needs warm weather and limited water for rapid ripening during the hot and dry months of the year. In global millet production, it comes second after pearl millet. *Setaria italica* (L.) was the Roman “panicum,” and *Setaria italim* (L.) is currently cultivated worldwide. The cultivated form of *Setaria italica* is its wild ancestor *S. viridis*. The most primitive archeological remnants of foxtail millet have discovered in the ruins of Cishan and peiligang in northern China’s Yellow River Valley, almost 7400 and 7935 years ago, respectively. Its domestication may have taken place anywhere in the area that stretches from Europe to Japan.

Medicinal uses:- Foxtail millet is also a good source of crude fiber, assists in the digestive process, and help to stimulate bowel movement, laxative effect that supports a balanced digestive system, like most millets. Foxtail millet also shows many health benefits such as cancer prevention, hypoglycemic effects, and hypolipidemic effects.

5. Little millet (*Paspalum sumatrense*)

Paspalum sumatrense, a small millet, is native to India so it is also called as Indian millet. The name of the species is based on a collected specimen from Sumatra. It is grown mainly in India, China, eastern Asia, and Malaysia. Little millet is suited to both the tropical and temperate climates. Currently, the crop is almost limited to some hilly areas in India. It is an important cash crop and cultivated by Indian tribals.

Medical uses:- Little millet is used for patients with diabetic and cardiovascular disorders to control or reduced the blood glucose response. Little millet is also a good source of nutraceuticals such as phenolics, butyric gamma-amino acid (GABA), lignans, starch resistant, sterols, and phytates. In millet-based foods, the additive and synergistic effects of these bioactive nutraceuticals can give many health benefits.

Future strategies:- A nutraceutical market that is predicted to grow several times over the next several years is the result of a number of factors, including the growing demand for nutrient-dense food, the efficacy and efficiency of the consumed product, and the increased awareness of the consumer and healthcare industries. Because of this, the Food and Drug Administration has also released laws supporting this emerging sector and fostering academic study. Thus, identifying health-promoting variables that raise the levels of essential nutrients in staple crops should be a top priority in order to significantly impact global human nutrition. The development of “smart” biofortified crops will result from the targeting of genes and proteins that are crucial for proper nutrition using newly developed biotechnology tools and techniques. Reduced protein-energy malnutrition is just one of the many problems that products from these value-

added crops can help with. Studies can assess how these goods affect the body's defense, absorption, homeostasis, and nervous system regulation. They can also explore hypoallergenic diets and cutting-edge methods for developing nutraceuticals. According to preliminary studies, finger millet has a bright future in the nutraceutical sector and offers a theoretical basis for its application as a financially feasible nutrient store for the depreciation of chronic diseases. However, little research has been done on the characteristics of millets and their potential for agriculture and nutrition uninvestigated.

Conclusion:- In order to bring traditional healthcare to market and satisfy customers' needs for "self-care," minor millet should be set up as a nutraceutical, surpassing the typing wait, commitment, and cost inputs. Starting at the most basic village level, we need to take steps to promote millet consumption and farming on a small scale. Increased consumption of these grains will lead to fewer health issues, which will save money on medical expenses and free up more cash for other needs purposes. It abundant nutritional value is also widely utilized, which is important for supplying development nation with food security, increased agricultural output, economic development, and self-reliance. The nutraceutical qualities of minor millet are becoming more widely recognized, will be a staple on everyone's daily dirt. The government of India is launching the intensive millet promotion initiative(INSIMP) to promote nutritional protection, while in the developed world, those ancient grains are starting to show up on the shelves of specialty stores. Our current farming system needs to be more resilient and diversified in order to meet the nation's food and nutrition needs while guaranteeing the sustainable use of natural resources. Over the past ten years, the Gol and state governments have taken a number of proactive measures to support mission-based millets farming and increase public awareness of increased millet consumption, especially among the urban Indians. Therefore, millets are receiving more attention and significance.

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