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AN REVIEW ON MILLETS WITH NUTRITIONAL VALUE & SIGNIFICANCE WITH SOME HEALTH BENEFITS OF FINGER MILLET

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ABSTRACT

In 21st century, climatic changes, water scarcity, increasing world population, rising food prices and other socioeconomic impacts are expected to generate a great threat to agriculture and poorest people who live in arid and subarid region. As we know, cereal grains is an important source that plays significant role in human diet. In which, millets are widely grown in the tropics of Africa and Asia and contains major source of carbohydrate and proteins, fatty acid, minerals, vitamins, dietary fibres and polyphenols. Typically millets protein contain higher amount of essential amino acids for e.g. sulphur containing amino acids (methionine and cysteine). Millet is an alkaline forming food. Alkaline based diet is useful to gain optimal health. Another health benefits of millets are to increase gastric emptying time. Millet grounded foods are considered as implicit prebiotic and probiotics with prospective health benefits. Millet based foods are considered with prospective health benefits. Including these grains in the diet may improve health and decrease the risk of diseases.

There are various types of millets such as Sorghum millets, Proso millet, Pearl millet, Foxtail millet, Finger millet, Browntop millet, Barnyard millet, Little millet, Buckwheat millet, Amarnath millet, Kodo millet. Cutlet millet is also known as Ragi in India. The present review article elucidate the information of millets with a major focus on Finger millet by highlighting there Nutritional value and significance with some of their health benefits.

INTRODUCTION

Millets are one of the cereals asides the major wheat, rice and sludge. Millions of people are consuming and cultivating millets in large scale. They are grown mostly in marginal areas under agricultural condition. Interest in the development of policy statement about drought grains is increasing in several developing countries such as India, China and some other countries of Africa because of water scarcity and increasing population. Millets is one of the important drought-resistant crops and sixth cereal crop according to world agriculture production. Also some millets are resistant to pests and disease, short growing season, and productivity under drought conditions compared to major cereals.[1]

The major reasons of decrease in consumption is the lack of awareness of nutritional merits, inconveniences in food preparations, lack of processing technologies, and also the government policy of disincentives towards millets and favouring of force of fine cereals subsidized prices. It's important to explore ways for creating mindfulness on nutritive graces of millets. Now-a-days people are very conscious about their healthy being and overcome metabolic disorders and other diseases. Millets are small seeded with various varieties such as Pearl millet (Pennisetum glaucum), Finger millet (Eleusine coracana), Kodo millet (Paspalum setaceum), Proso millet (Penicum miliceum), Foxtail millet (Setaria italic), Little millet (Panicum sematrense) and Barnyard millet (Echinochloa utilis), Sorghum millet (Sorghum bicolor). [1]

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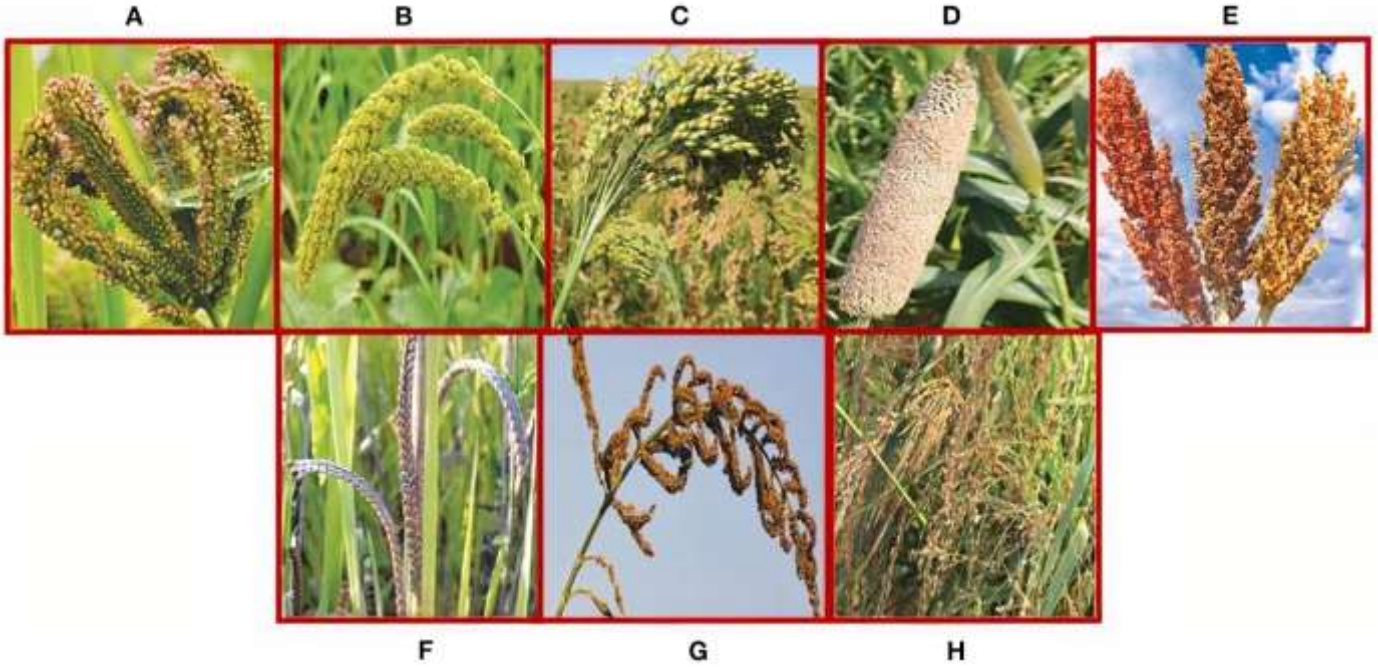


Fig.1: Various varieties of Millet Grains.

The top producer of millet grains is India with an annual production of 3,34,500 tons. In addition to there nutritive value, there are several potential health benefits such as preventing cancer and cardiovascular disease, reducing tumor incidence, cholesterol and rate of fat absorption, lowering blood pressure, delaying gastric emptying time, risk of heart disease and supplying gastrointestinal bulk have been reported for millets.[3]

Millets grains posses proteins ranging from 7-12%, fat varying from 2-5%, carbohydrates in the range of 65-75% and dietary fibres from 15-20%.

Variety	Carbohydrate (g)	Protein (g)	Fat (g)	Ash (g)	Fiber (g)	Ca (mg)	Fe (mg)	Zn (mg)	Thiamin (mg)	Riboflavin (mg)	Niacin (mg)	Energy (kcal)
Sorghum	71	10.4	3.1	1.8	2.0	25	5.4	3.1	0.38	0.15	4.3	329
Finger millet	59–75	6.9–10.9	1.5	2.6	15.2	350	3.9	3.13	0.42	0.19	1.1	336
Kodo millet	72–76	6.2–13.1	3.2–4.9	3.3	5.2	35	1.7	1.9–2.4	0.15	0.09	2.0	353
Foxtail millet	55–69	11.2	4.0	3.3	9.4	31	2.8	2.92	0.59	0.11	3.2	351
Fonio millet	68–75	8.4	3.3	3.4	18.2	20	2.1	1.5	0.17	0.22	1.15	379
Little millet	76	15	4.5	5.4	2.5	17	9.3	5.25	0.30	0.09	3.2	329
Barnyard millet	74	11.0	5.2	4.5	13.6	22	18.6	3	0.33	0.10	4.2	300
Pearl millet	67–72	11.8	5.1	2.2	13.8	42	11.0	3.29	0.38	0.21	2.8	363
Proso millet	64–76	12.6	2.9–11.6	2.7	13.1	15	2.2	2.36	0.41	0.28	4.54	316

Table no.1: Proximate nutrient composition and nutritive value of various millets (g/100g db and mg/100 g db).[4]

Finger Millet

Finger Millet, corcana.L is also known as Ragi and Mandua(India); Kaddo(Nepali);Eleusine, Cultivee, Coracan, Koracan(France); Fingerhirse,(Germany); Kambale, Lupoko, Mawele, Amale, Bule(Zambia), Finger millet, African millet, koracan(England); Wimbi(Kenya); Bulo(Uganda); Dagussa, Tokuso, Barankiya(Ethopia); Poho, Rapoko, Zviyo, Njera, Mazhocole(Zimbabwe).[4]

Finger millet is extensively cultivated in various regions of India and in entire world, India is the major producer of Finger millet which contributes nearly 60% of the production. One of the most important feature of finger millet is its ability to adjust itself in different agro-climatic conditions.[4]

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Nutritional value of Finger Millet:
Finger millet grain has a carbohydrate content of 81%, crude fibre 4.5%, mineral 2.5% and proteins 10% which is comparable with other cereals like rice, maize, millets and wheat. Other than above contents or nutrients finger millets consists various essential amino acids that have a significant impact on how well proteins function. The necessary proportion of amino acids in the finger millet is about 44.5%. With regard to the ratio of essential to non-essential amino acids, as we know ragi has a well balanced amino acids profile.[6]

The various essential amino acids are Arginine, Lysine, Methionine, Lecithin and many others amino acids. Comparison of amino acid except Lysine ranks higher. In usual grains Tryptophan amino acids is frequently absent but it is found in finger millet. The ratio of Valine, Threonine and Lysine in finger millet is balanced compared to other millets. Besides the function essential amino acids are given below:-

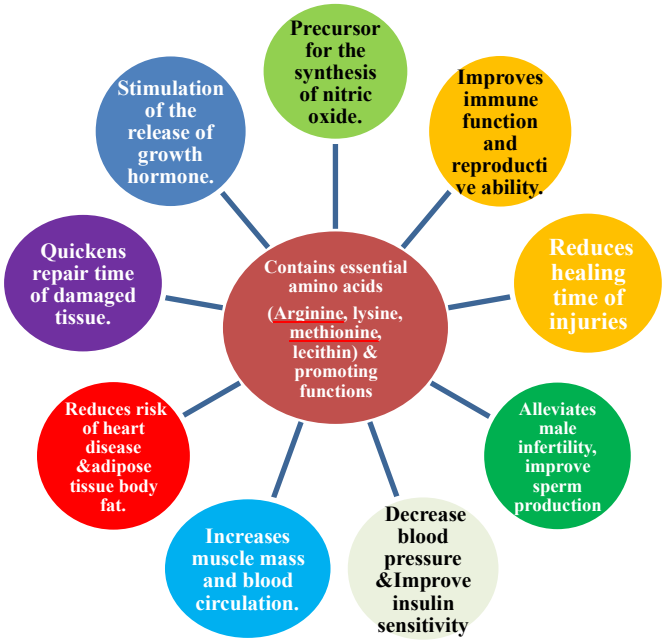


Fig.2: Essential Amino Acids Presents in Finger Millet Contains and its functions[6]

Nutritional significance of Finger Millets
The main constituent of the millet are seed coat, embryo and endosperm. Among several varieties of finger millet such as yellow, white, brown, re, violet and tan colour only the red coloured are cultivated extensively throughout world. The presence of five layered seed fleece in cutlet millet makes it unique compared to other millets similar as foxtail millet, plum millet, Kodo millet and Proso millet. This could be one of the reason for higher dietary fibre in finger millet.[7]

The nutraceuticals importance of finger millet lies in its high content of calcium (0.38%), protein (6-13%), dietary fibre (18%), carbohydrate (65-75%), minerals (2.5-3.5%), phytates (0.48%), tannins (0.61%), phenolic compounds (0.3-3%) and trypsin inhibitory factor and id recognised for its health beneficial effects, such as Anti-Diabetic, Antitumerogenic, Anti-Diarrheal, Antiulcer, Anti-Inflammatory, Atherosclerogenic effects, Antioxidants and Antimicrobial properties.[7]

Before it was believed that polyphenols, phytates, tannins and dietary fibres contents of Cutlet millet act as Anti-nutrients because of their essence chelating and enzyme inhibition conditioning but now it has been verified that these ingredients can contribute to antioxidant exertion, which is an important factor in defying aging and metabolic conditions. Moreover, finger millets is also useful in managing various physiological disorders such as Diabetes mellitus, Hypertension, Vascular fragility, Prevention of oxidation of Low Density Lipoprotein(LDL), Hypercholesterolemia and also improves Gastrointestinal health.[3]

Finger millet is milled with seed coat which is in dietary fibre and micronutrients to prepare flour and the whole meal is utilized in the preparation of traditional foods, such as roti(unleavened breads), ambali(thin porridge) and mudde(dumplings). On diurnal consumption of whole grain of cutlet millet and its products can covers against the threat of cardiovascular conditions, type-II

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diabetes and gastrointestinal cancers. The dietry fibres, phenolics, minerals and vitamins concentrated in the outer layer of the seed coat form the part of food and other there nutritional and health benefits.[4]

Health Benefits of Finger Millets

Several in-vitro and in-vivo studies (animals) have been conducted to explore the health benefits of finger millets.[12]

Several studies are available on the anti-oxidant properties and anti-microbial properties of finger millet. Production of statins (antihypocholestrolemic metabolites) from finger millets was attempted by Venkateswaran and Vijayalakshmhi (2010). α -glucosidase inhibitors play a vital role in the clinical management of postprandial hyperglycemia and established the α -glucosidase and pancreatic α -amylase inhibitory properties of finger millet phenolic extract, whereas it indicates that finger millet phenolics are inhibitors of aldose reductase and snake venom phosphor lipases (PLA_2). Protein glycation is one of the complications of diabetes and protein glycation inhibitors are helpful in management of this complication. Methanolic extracts of finger millets were found to exhibit protein glycation inhibitory properties.[12]

A. Anti-Diabetic

Consuming meals high in fibre and complex carbohydrate help prevent subsequent blood glucose spikes, which is essential for managing diabetes and lowers chronic vascular issues. Finger millets carbohydrates were absorbed and processed very slowly. The advantages of cereal grains were recognized to lowers the incidence of diabetes mellitus and gastrointestinal tract diseases.[11]

B. Anti-Oxidant

Antioxidant substances are becoming more and more common as lipd stabilizer and inhibitors of extreme oxidation. The seed coat of millet contain polyphenols and its constituents, flavonoids and tannins which have multiple uses. They can act as chelators of essence, these both of singlet oxygen and reductants. In edible flours derived from tiny millets, endogenous oxidants are present.[11]

C. Anti-Microbial

According to the phenolics mainly the tannins in the finger millet may provide resistance to fungus infection. Because of high polyphenol content of the seed coat, acidic methanol extracts of the seed coat show greater antifungal and antibacterial properties than whole wheat extract. A structural obstacle towards fungal infection is created by phenolic compounds, particularly tannins in the grains outer layer.[12]

Some of the Health Related Functional Attributes of Finger Millets

I. Antioxidant Property

Advanced antioxidant capacity of cutlet millet is attributed to the high total phenolic content as well as flavonoids similar as catechin, gallocatechin, epicatechin, procyanidin dimmer, posotion of enzymatic and non-enzymatic antioxidants.[13]

II. Anti-Microbial Activity

Polyphenols extract from finger millet seed coat and whole flour active Bacillus cereus, Aspergillus niger and fermented finger millet extract suppress growth of Salmonella sp ., Escherichia coli.[13]

III. Anti-Ulcerative Property

Finger millet incorporated diet prevents mucosal ulceration.[13]

IV. Antiprotein (Albumin) Glycation Property

Finger millet seed coat polyphenols are effective inhibitor of fructose induced albumin glycation.[13]

V. Aldose reductase (AR) Enzyme Inhibitory Property

Finger millet inhibits AR activity which results in the prevention of AR induced cataractogenesis.[13]

VI. Blood Glucose Lowering Effect, Nephroprotective Properties, Cholesterol Lowering

Finger millet incorporated diets reduce serum cholesterol and phenolics from finger millet seed coat matter inhibit the intestinal α -glucosidase and pancreatic amylase thus helps in controlling postprandial hyperglycemia.[14]

VII. Inhibition of Phospholipases (PL)

Galic acid, Quercitin and crude polyphenols extract from finger millet act as potent inhibitor of PLA_2 from snake venom, it indicates the potential application of finger millet in treating inflammatory disorders.[14]

VIII. Natural Probiotic Treatment for Diarrhea

Finger millet drink fermented by lactic acid bacteria used as a therapeutic agent against diarrhea.[14]

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IX. Wound Healing Property

In diabetic patients, wound healing is impaired and studies have shown that finger millet extracts results in ameliorating this impairement by improving the Nerve Growth Factor (NGF) production and improved antioxidant status.[14]

X. Improvement on Hemoglobin Status in children

Excellent factory source of natural iron germinated cutlet millet grounded food showed a general enhancement on hemoglobin status.[14]

REFERENCE

1. *V. Dhanushkodi a*, A. Thanga Hemavathy a, S. Shenbagavalli b, S. Sangeetha c, R. Anitha d and T. UmaMaheshwari, A Review on Nutritional Properties and Health Benefits of Finger Millet. International Journal of Plant & Soil Science. 2023:35: 753-761.*
2. *Pragya Singh* and Rita Singh Raghuvanshi , A Review on Finger millet for food and nutritional security. African Journal of Food Science 2012: 6(4): 77-84.*
3. *Anil Kumar1*†, Madhu Rani2†, Shalini Mani3*, Pallavi Shah2, Dev Bukhsh Singh4, Himabindu Kudapa5 and Rajeev K. Varshney5,6. Nutritional significance and Antioxidants mediated Antiaging Effects of Finger Millets:Molecular insights and Prospects.2021: 10,3389*
4. *Issoufou Amadou1*, Mahamadou E. Gounga2 and Guo-Wei Le.A Review on Millets: Nutritional composition, some health benefits and processing. 2013. 25 (7): 501-508.*
5. *AhmedS.M.Saleh,QingZhang,JingChen,andQunShen. A review on MilletGrains: Nutritional Quality,Processing,and Potential Health Benefits. 2013:12:281-295.*
6. *Pranita Patil, Sury Pratap Singh, Pankti Patel.A review on Functional properties and health benefits of finger millet. 2023; 12(3): 196-202.*
7. *Kumar A, Metwal M, Kaur S, Gupta AK, Puranik SS, Singh M, et al. Nutraceutical value of finger millet [Eleusine coracana (L.) Gaertn.], and their improvement using omics approaches. Front Plant Sci. 2016;7:1-14.*
8. *Gupta R. Ragi, a boon to nutritional security. Newsletter. NESA; 2014.*
9. *Dubey A. Verma AKMillets: good neutraceutical source. Agropedia. 2009;1 2.*
10. *Jagati P, Mahapatra I, Dash D. Finger millet (Ragi) as an essential dietary supplement with key health benefits: A review. Int J Home Sci. 2021;7(2): 94-100.*
11. *Singh P, Raghuvanshi RS. Finger millet for food and nutritional security. Afr J Food Sci. 2012;6(4):77-84.*
12. *Agte V, Joshi SR (1997). Effect of traditional food processing on phytate degradation in wheat and millets. J. Agric. Food. Chem., 45 (5): 1659-1661.*
13. *Antony U, Chandra TS (1998). Antinutrient reduction and enhancement in protein, starch and mineral availability in fermented flour of finger millet (Eleusine coracana). J. Agric. Food Chem., 46 (7): 2578-2582.*
14. *References Abd El-Salam, M. H., A. R. Hippen, M. M. Salem, F. M. Assem and M. El-Aassar. 2012. Survival of probiotic Lactobacillus casei and Enterococcus fecium in Domiati cheese of high conjugated linoleic acid content. Emir. J. Food Agric. 24 (2):98–104.*
15. *Gopalan C, Rama Sastri, BV, & Balasubramanian, SC Nutritive value of Indian foods. 1971.*