



## The Nutritional Benefits of Millets for Children

*Dr. Sachin Gwalani<sup>1</sup>, Dr. Deepthi P.<sup>2</sup>, Dr. Shubhangi Jadhav<sup>3</sup>*

<sup>1</sup>Asso. Professor, Dept of Kaumarbhritya, SMBT Ayurved College and Hospital, Nashik.

<sup>2</sup>Asst. Professor, Dept of Kaumarbhritya, SMBT Ayurved College and Hospital, Nashik.

<sup>3</sup>Asst. Professor, Dept of Kaumarbhritya, SMBT Ayurved College and Hospital, Nashik.

DOI: <https://doi.org/10.55248/gengpi.5.0624.1432>

### ABSTRACT:

This paper aims to explore the nutritional benefits of millets for children. Millets are a group of small-seeded grains that have gained popularity due to their nutritional value and health benefits. This paper will discuss the various types of millets, their nutritional composition, and the potential health benefits they offer to children. Additionally, the paper will review the importance of including millets in children's diets and provide recommendations for incorporating millets into their meals.

**Keywords:** Millets, Children, Nutrition

### Introduction

The United Nations General Assembly at its 75th session in March 2021 declared 2023 the **International Year of Millets**.<sup>1</sup> Millets are a group of small-seeded grains that have been cultivated for thousands of years and are considered a staple food in many parts of the world. Millets encompass a diverse group of cereals including pearl, proso, foxtail, barnyard, little, kodo, browntop, finger and Guinea millets, as well as fonio, sorghum (or great millet) and teff. They are an important source of nourishment for millions of people in sub-Saharan Africa and Asia. They are deeply rooted in Indigenous Peoples' culture and traditions and help guarantee food security in areas where they are culturally relevant.<sup>2</sup>

Millets have indeed been a significant part of Indian cuisine for centuries, with traditional dishes incorporating a variety of millet grains such as amaranth, barley, brown rice, millet, and sorghum<sup>3</sup>. These ancient grains have been cultivated and consumed in India for thousands of years, serving as a staple food source that provided essential nutrients and sustained communities. Millets were domesticated and cultivated as early as 10,000 years ago, highlighting their long-standing presence in Indian agriculture and cuisine<sup>4</sup>. In ancient times, agriculture in regions like the Deccan Plateau focused on small millets, beans, and occasionally wheat and barley, showcasing the importance of millets in early Indian agricultural practices<sup>5</sup>. Millets were not only valued for their nutritional content but also for their adaptability to diverse growing conditions, making them a resilient crop in Indian agriculture<sup>6</sup>. The rich diversity of traditional Indian cuisines includes whole grains, millets, wild gathered vegetables, and various spices, highlighting the integral role of millets in Indian culinary heritage<sup>7</sup>. Prior to the 1950s, millets like sorghum were commonly used in Indian cooking, reflecting the historical significance of these grains in traditional Indian diets<sup>3</sup>.

However, the shift towards modernization and the adoption of other cereals like rice and wheat has led to a decline in the consumption of small millets in the traditional Indian diet<sup>8</sup>.

The nutritional value of millets has been recognized throughout history, with millets being described as high-energy foods that offer a rich source of essential nutrients. Millets are known for their high fibre content, which is beneficial for digestive health and helps regulate blood sugar levels, making them a valuable addition to the diet, especially for children. Additionally, millets are rich in minerals such as iron, calcium, magnesium, phosphorus, and potassium, all of which are essential for children's growth and development<sup>4</sup>.

Introducing millets to GenZ children can be an exciting adventure filled with health benefits. Hence the review of health advantages of millets was done specially in children considering their possible contribution to their overall well-being, support in growth, development, and various aspects of health in children.

### Nutritional Benefits of Millets:

First and foremost, millets are packed with essential nutrients vital for children's overall health. Millets are often referred to as nutri-cereals due to their exceptional nutritional profile. Their nutritional composition varies among different varieties of millets and accounts for 60 to 70% carbohydrates, 6 to 9% Proteins, 10 to 12% fibres, 1 to 5% fats, and about 2 to 4% minerals. They are rich in carbohydrates, providing a sustained release of energy, which

is crucial for active children. Additionally, millets are gluten-free, making them a suitable option for children with gluten sensitivities or celiac disease. Millets are abundant in protein. The protein composition of millets consist mainly of albumin, prolamin, and globulin, making them an excellent plant-based source of this essential macronutrient. Protein is essential for children's growth, muscle development, and immune function.<sup>9</sup> Millets have gained recognition for their remarkable fibre content, which plays a significant role in their numerous health benefits, especially in enhancing digestive health and aiding weight management. Dietary fibre is an essential component of a healthy diet, known for its ability to regulate bowel movements, promote satiety, and support overall gut health. The exact fibre content in millets can vary slightly depending on the specific type of millet. However, across various varieties such as foxtail millet, pearl millet, and finger millet, as well as sorghum, millets generally offer substantial amounts of dietary fiber.<sup>10</sup> A diet high in fibre can help prevent constipation, a common issue among children, and promote a healthy weight by keeping them feeling fuller for longer periods.

Along with high nutritional value, the nutraceutical composition of millets has the potential to provide several additional health benefits.

Millets have been recognized for their role in providing phytoconstituents, vitamins, minerals, and fibrous materials essential for normal growth and overall nutritional well-being<sup>11</sup>. Among the different types of millets, finger millet stands out for its higher levels of calcium and magnesium compared to other millets, making it a particularly valuable source of these macro-minerals<sup>12</sup>. Finger millet varieties have been found to be particularly rich in dietary fibres, resistant starch, and essential minerals like potassium, calcium, phosphorus, and iron, further solidifying their nutritional value<sup>13</sup>. The mineral content in millets is notably higher compared to staple cereals like wheat and rice, with values ranging from 1.7 to 4.3 g/100 g, showcasing their superior nutritional composition<sup>14</sup>. In terms of both macro- and micro-nutrients, millets excel as they offer a superior mineral profile and essential amino acid composition compared to major cereals like wheat and rice<sup>15</sup>.

Due to the high mineral content, significant benefits can be provided for children through millets, particularly iron and calcium. Iron is essential for the formation of haemoglobin, the protein in red blood cells that carries oxygen throughout the body. Children, especially infants and adolescents, have increased iron requirements due to rapid growth and development<sup>16</sup>. Including iron-rich foods like millets in their diet can help prevent iron deficiency anaemia and support optimal cognitive function and physical growth. Similarly, calcium is crucial for building strong bones and teeth in children, and millets provide a good source of this essential mineral to support bone health and growth<sup>16</sup>.

Millets are rich in magnesium, a mineral that plays a vital role in hundreds of biochemical reactions in the body, including energy production, muscle function, and nerve transmission. Magnesium is particularly important for children's growth and development, as it supports bone mineralization, protein synthesis, and overall cellular health<sup>16</sup>. By including magnesium-rich foods like millets in their diet, children can ensure they are meeting their daily requirements for this essential mineral, promoting overall health and well-being.

Phosphorus is another essential mineral found in millets that is crucial for children's health. Phosphorus plays a key role in bone formation, energy metabolism, and acid-base balance in the body. Children require an adequate intake of phosphorus to support proper growth, development, and overall cellular function<sup>16</sup>. By including phosphorus-rich foods like millets in their diet, children can ensure they are meeting their nutritional needs for this essential mineral, promoting healthy bone development and overall well-being.

Potassium is yet another important mineral found in millets that is essential for children's health. Potassium plays a critical role in maintaining fluid balance, muscle function, and nerve transmission in the body. Children require an adequate intake of potassium to support proper growth, development, and overall cardiovascular health<sup>16</sup>. By including potassium-rich foods like millets in their diet, children can ensure they are meeting their daily requirements for this essential mineral, promoting healthy blood pressure levels and overall well-being.

Furthermore, millets are a good source of B vitamins, including niacin, thiamine, and riboflavin, which play essential roles in energy metabolism, cognitive function, and overall growth and development in children. B vitamins are water-soluble vitamins that are not stored in the body, so it is important for children to consume an adequate amount of these vitamins daily to support their overall health and well-being.<sup>16</sup> By including millets in their diet, children can benefit from the B vitamins present in these grains, supporting optimal energy levels, brain function, and overall growth and development.

Each type of millet has its own unique nutritional profile, but they are generally high in fibre, protein, and essential nutrients.

Table 1: Nutrient Content of different Millets<sup>17</sup>

Crop / Nutrient	Protein(g)	Fibre(g)	Minerals (mg)	Iron(mg)	Calcium (mg)
Pearl millet	10.6	1.3	2.3	16.9	38
Finger millet	7.3	3.6	27	3.9	344

Foxtail millet	12.3	8	3.3	2.8	31
Proso millet	12.5	2.2	1.9	8	14
Kodo millet	8.3	9	2.6	0.5	27
Little millet	7.7	7.6	1.5	9.3	17
Barnyard millet	11.2	10.1	4.4	15.2	11
Rice	6.8	0.2	0.6	0.7	10
Wheat	11.8	1.2	1.5	5.3	41

Introducing millets into children's diets can also contribute to diversifying their food choices and promoting a healthy relationship with food. Encouraging children to explore different grains and foods from various cultures fosters an appreciation for diverse cuisines and promotes open-mindedness towards trying new foods. To support these claims, numerous scientific studies have highlighted the health benefits of millets in children's diets<sup>18</sup>. For instance, one study found that incorporating millets into the diet of school children led to improvements in their nutritional status, including increased iron and protein intake.<sup>19</sup>

### **Incorporating Millets into Children's Diets:**

In addition to their nutritional benefits, millets are also a versatile and easy-to-cook grain that can be incorporated into a variety of dishes that children enjoy. From porridges and cereals to bread, muffins, and even desserts, millets can be used in numerous recipes to boost the nutritional value of meals for children. Their mild, nutty flavour makes them a palatable option for even picky eaters, and their small size and soft texture make them easy for children to chew and digest. By introducing millets into children's diets from an early age, parents can help establish healthy eating habits and ensure their children are receiving a wide range of essential nutrients for optimal growth and development.<sup>20</sup>

### **Conclusion:**

In conclusion, millets are a nutritious and versatile food that offers numerous health benefits for children. Including millets in their diets can help ensure they receive essential nutrients for growth and development. Parents and caregivers are encouraged to explore different ways of incorporating millets into children's meals to promote their overall health and well-being. Further research is warranted to explore the long-term effects of millet consumption on children's health and to promote their consumption as a part of a balanced diet.

### **References:**

1. Food and Agriculture Organization of the United Nations (FAO); International Year of Millets (IYM 2023); Accessed on 10th April 2024 URL:<https://www.fao.org/millets-2023/en>
2. Food and Agriculture Organization of the United Nations (FAO); International Year of Millets (IYM 2023); Accessed on 10th April 2024 URL:<https://www.fao.org/newsroom/detail/international-year-of-millets-unleashing-the-potential-of-millets-for-the-well-being-of-people-and-the-environment/en>
3. Dixit, A., Azar, K., Gardner, C., & Palaniappan, L. (2011). Incorporation of whole, ancient grains into a modern asian indian diet to reduce the burden of chronic disease. *Nutrition Reviews*, 69(8), 479-488. <https://doi.org/10.1111/j.1753-4887.2011.00411.x>
4. Reddy, R. and Patel, D. (2023). A study on consumers' awareness and preference towards millets and its products in vizianagaram district, andhra pradesh, india. *Asian Journal of Agricultural Extension Economics & Sociology*, 41(6), 9-16. <https://doi.org/10.9734/ajaees/2023/v41i61915>
5. Peters, J., Lebrasseur, O., Irving-Pease, E., Paxinos, P., Best, J., Smallman, R., ... & Larson, G. (2022). The biocultural origins and dispersal of domestic chickens. *Proceedings of the National Academy of Sciences*, 119(24). <https://doi.org/10.1073/pnas.2121978119>

6. Sharma, D., Tiwari, A., Sood, S., Jamra, G., Singh, N., Meher, P., ... & Kumar, A. (2018). Genome wide association mapping of agromorphological traits among a diverse collection of finger millet (*eleusine coracana* L.) genotypes using snp markers. *Plos One*, 13(8), e0199444. <https://doi.org/10.1371/journal.pone.0199444>
7. Esakkimuthu, S., Darvin, S., Mutheeswaran, S., Paulraj, M., Pandikumar, P., Ignacimuthu, S., ... & Al-Dhabi, N. (2018). A study on food-medicine continuum among the non-institutionally trained siddha practitioners of tiruvallur district, tamil nadu, india. *Journal of Ethnobiology and Ethnomedicine*, 14(1). <https://doi.org/10.1186/s13002-018-0240-9>
8. Adekunle, A., Lyew, D., Orsat, V., & Raghavan, V. (2018). Helping agribusinesses—small millets value chain—to grow in india. *Agriculture*, 8(3), 44. <https://doi.org/10.3390/agriculture8030044>
9. Awasthi, Jayanti, Mishra, Ayush, Rathore, Soumya, Verma, Shalja, Pandey, Kumar Anand, A Review of the Nutraceutical Composition of Millets and their Health Benefits, *Current Functional Foods*, volume 2, issue , pages 1-13, year 2024, issn 2666-8629/2666-8637. doi 10.2174/0126668629298743240320035203,
10. Hadimani, N.A., & Malleshi, N.G. (1993). Studies on Milling, Physico-chemical Properties, Nutrient Composition and Dietary Fibre Content of Millets.
11. Mishra, A., Pattnaik, B., Dutta, T., & Baitharu, I. (2022). Nutritional values and potential health benefits of millets- a review. *Journal of Nutrients*, 8(1), 9-26. <https://doi.org/10.18488/87.v8i1.3176>
12. Hassan, Z., Sebola, N., & Mabelebele, M. (2020). Evaluating the physical and chemical contents of millets obtained from south africa and zimbabwe. *Cyta - Journal of Food*, 18(1), 662-669. <https://doi.org/10.1080/19476337.2020.1818831>
13. Jayawardana, S., Samarasekera, J., Hettiarachchi, C., Gooneratne, J., Mazumdar, S., & Banerjee, R. (2019). Dietary fibers, starch fractions and nutritional composition of finger millet varieties cultivated in sri lanka. *Journal of Food Composition and Analysis*, 82, 103249. <https://doi.org/10.1016/j.jfca.2019.103249>
14. Kumar, A., Tomer, V., Kaur, A., Kumar, V., & Gupta, K. (2018). Millets: a solution to agrarian and nutritional challenges. *Agriculture & Food Security*, 7(1). <https://doi.org/10.1186/s40066-018-0183-3>
15. Sharma, R., Sharma, S., Dar, B., & Singh, B. (2021). Millets as potential nutri-cereals: a review of nutrient composition, phytochemical profile and techno-functionality. *International Journal of Food Science & Technology*, 56(8), 3703-3718. <https://doi.org/10.1111/ijfs.15044>
16. Paul VK., Piyush Gupta, (2013): *Ghai Essential Pediatrics*. 9th ed. New Delhi: CBS Publishers and distributors; 2019:109-122
17. Millet Book, Millet Network of India - Deccan Development Society - FIAN, India. Downloaded on 12th April 2024 URL: <https://krishi.maharashtra.gov.in/Site/Upload/GR/millets-Book.pdf>
18. Anitha S, Givens DI, Subramaniam K, Upadhyay S, Kane-Potaka J, Vogtschmidt YD, Botha R, Tsusaka TW, Nedumaran S, Rajkumar H, et al. Can Feeding a Millet-Based Diet Improve the Growth of Children?—A Systematic Review and Meta-Analysis. *Nutrients*. 2022; 14(1):225. <https://doi.org/10.3390/nu14010225>
19. Lakshmi Devi N, Shobha S, Alavi S, Kalpana K, Soumya M. Utilization of extrusion technology for the development of millet based complementary foods. *J Food Sci Technol*. 2014 Oct;51(10):2845-50. doi: 10.1007/s13197-012-0789-6. Epub 2012 Aug 16. PMID: 25328236; PMCID: PMC4190232.
20. Dayakar Rao B, Vishala AD, Arlene Christina GD, Tonapi VA, 2016 Millet Recipes, A Healthy Choice, ICAR- Indian Institute of Millets Research, Rajendranagar, Hyderabad, pp 138