

Therapeutic Uses of Millets: Nutritional Value and Impact on Lifestyle-Related Diseases

Aarya Jain, Dr. Shalu Nehra, Dr. Jyoti Gaur, Dr. Neetu Yadav

Department of Home Science, Swami Vivekanand Subharti University

DOI: <https://doi.org/10.47772/IJRISS.2026.100500467>

Received: 10 May 2026; Accepted: 16 May 2026; Published: 04 June 2026

ABSTRACT

Millets, a group of small-seeded grasses, have been an essential food source across the globe for millennia, but their potential therapeutic applications have gained increasing attention in recent years. This paper explores the nutritional composition of millets, focusing on their protein, fiber, vitamins, minerals, and bioactive compounds. We analyze their therapeutic roles in the prevention and management of lifestyle-related diseases such as diabetes, cardiovascular diseases, obesity, and gastrointestinal disorders. Despite their numerous health benefits, millets remain underutilized in contemporary diets, primarily due to cultural biases, accessibility issues, and lack of awareness. This review aims to highlight the therapeutic potential of millets, address existing barriers, and propose future research directions.

Keywords

Millets, Nutritional Composition, Diabetes, Cardiovascular Health, Obesity, Gastrointestinal Disorders, Functional Foods, Lifestyle Diseases.

INTRODUCTION

Modern diets have led to the increase in lifestyle-related diseases, such as diabetes, cardiovascular diseases, and obesity, which have been largely facilitated by the change in the consumption of highly processed foods and refined grains in the diet. The diseases have been mainly associated with unhealthy eating habits, through which simple carbohydrate-rich foods and low-quality nutrient-dense food take the centre stage in the diet. Millets (e.g. pearl millet, finger millet, foxtail millet, etc.) are an alternative, more sustainable and healthier, though. The ancient grains are characterized by high nutritional value and therapeutic effects, and hence can be used as an asset in the management and prevention of chronic illnesses. Millets do not just provide great nutritional value but also have special bioactive substances, fibrous and low glycemic index (GI) which is advantageous in the regulation of blood sugar, cardiovascular health and digestive disorders. The paper is a review of the nutritional composition of millets and how the nutritional composition of these foods may be utilized in prevention and control of lifestyle diseases, hence the functional food potential of the foods.

COMPOSITION OF MILLETS IN RELATION TO NUTRITION

Essential nutrients are available in both the macronutrients and micronutrients in millets, which makes them a worthy inclusion in the contemporary diets. These grasses contain small seeds that are a balanced source of protein, fiber, healthy fats, and carbohydrates which go to make them a factor of good health. Millets are composed of protein content with a range of 7 to 14 percent depending on the type with some types such as pearl millet having more protein content as compared to most other cereals. Moreover, millets also contain a lot of dietary fiber, which contributes to the health of the digestive system, the regulation of blood sugar, and the prevention of chronic diseases. They are good sources of soluble and insoluble fiber, of which the insoluble fiber is important in the prevention of constipation and bowel regularity.

Micronutrients are also found in great amounts in millets. They contain mineral salts including iron, magnesium, calcium and phosphorus as well as B-vitamins like niacin, riboflavin and

pyridoxine. These micronutrients aid in the many physiological processes such as bone development, production of energy and the functioning of the immune system. An example is that finger millet is a good food to make bones healthy especially in a population that is at risk of osteoporosis like postmenopausal females due to the high calcium content of the food. Equally, the amount of iron in the millets and particularly the pearl millet can be used to fight an iron- deficiency anemia, which is a prevalent nutritional problem in the globe.

Other than the macronutrients and micronutrients, millets contain bioactive compounds, such as polyphenols, flavonoids, and phenolic acids, possessing antioxidant, anti-inflammatory, and antimicrobial effects. These substances are added to the medicinal possibilities of millets in inhibition of oxidative stress and inflammation that are the root causes of most chronic diseases. As an illustration, such flavonoids as quercetin and kaempferol have been shown to have power in reducing inflammation and promoting a good heart health by helping the endothelium work better and lowering blood pressure. Phenolic acids in millets, including ferulic acid and p- coumaric acid are also essential in the prevention of oxidative damage, which is associated with cancer, cardiovascular diseases among other chronic illnesses. Millets contain a good amount of vegetable protein which is 7-14 percent in the form of protein depending on the type of variety. This causes them to be a valuable source of protein particularly to the people who do not have sufficient access to animal protein. Also, the millets contain an abundance of dietary fiber (both soluble and insoluble). The soluble fiber also produces a process of regulating blood sugar, whereas the insoluble fiber takes care of the digestive system by ensuring that there are regular bowel movements. Additionally, the fibre content in millets is significant in weight control as it brings about satiety hence lowering the chances of being overweight. Millets also contain the much needed vitamins and minerals that are important in the general health. They contain especially large amounts of such minerals as iron, magnesium, calcium, and zinc. Iron is vitally important in the blood because it helps in the transportation of oxygen, whereas magnesium aids in muscle and nerve activity. Calcium aids in bone strength and zinc is needed to aid in the immune system. Other B-vitamins found in millets are niacin (B3), riboflavin (B2), and pyridoxine (B6). These vitamins are essential in metabolism, red blood cells development, and in normal functioning of the nervous system. Besides being rich in macronutrients and

micronutrients, millets are also rich in bioactive compounds, such as polyphenols, flavonoids, and phenolic acids. These are compounds that are characterized as antioxidants, anti- inflammatory and antimicrobials. These bioactive compounds neutralize free radicals, and as a result, they reduce oxidative stress that is one of the primary causes of chronic illnesses including cancer, cardiovascular diseases and diabetes. These compounds increase the therapeutic value of the millets, which makes them important useful food in the prevention and management of diseases.

MILLETS IN DISEASE PREVENTION AND MANAGEMENT

Millets are important in prevention and treatment of different chronic diseases and hence can be put in the diet of the contemporary population. This is especially useful in the treatment of diabetes since they have a low glycemic index (GI), and hence they control blood sugar levels and help avoid sudden peaks. The fibrous nature of millets also helps to regulate blood sugar and to curb weight gain in people by helping in satiety, overeating, and appetite control. Besides, phenolic acids and flavonoids are some of the bioactive compounds that increase insulin sensitivity, which makes millets a good diet in prevention and management of diabetes. In the case of cardiovascular health, millets have significant value as they contain a lot of fiber making them reduce the LDL cholesterol and also keep the blood pressure under control. The antioxidants in millets including quercetin and ferulic acid also contribute to the health of the heart through enhancing the functioning of the endothelium, and also lowering the stress of oxidation, which is one of the major causes of heart disease development. Another purpose of millets is very useful in managing weight, because this is a known fact that has been known to give fullness in a longlasting time because of its contents of fibers hence controlling appetite and overeating. The gradual breakdown of millets helps in the control of blood sugar which is vital in the control of obesity and prevention type 2 diabetes. Besides metabolic health, millets are also helpful in gastrointestinal health since they contain a lot of fiber content that ensures that the bowel is open and constipation is avoided. They are beneficial because they can stimulate the growth of

desirable gut bacteria, and thus they are useful in people with gastrointestinal disorders

like irritable bowel syndrome (IBS). In addition, millets possess possible cancer-preventing effects due to their high level of polyphenols and flavonoids rich in strong antioxidant and anti-inflammatory effects. The compounds counteract free radicals and inhibit oxidative cell damage thus lowering the risk of developing cancer. All in all, the various therapeutic qualities of millets would be of great use in treatment and preventive measures of numerous chronic diseases, which leads to better health and wellness.

COMPARATIVE ANALYSIS OF MILLETS WITH OTHER FUNCTIONAL FOODS

Coming to compare millets to other widespread grains such as rice and wheat, millets show a much better profile in terms of nutrition. Millets on average have 15-20 percent more fiber than rice and wheat, which an individual is said to have better digestive health and better control of blood sugar. An example is that 100 gms of millet has approximately 12gms of fiber whereas rice and wheat have 0.6gms and 2.7gms respectively. Micronutrient wise, millets are better endowed with the vital vitamins and minerals such as iron, calcium and magnesium. Indicatively, 100 grams of pearl millet have an approximate of 6.5 mg of iron compared to the 0.8 mg found in rice and 3.5 mg found in wheat and the bioactive compounds present in them are also known to have antioxidant and anti-inflammatory effects. These are some of the compounds that make millets have a potential in preventing chronic illnesses such as cardiovascular diseases, diabetes, and cancer that are less common in rice and wheat.

The glycemic index (GI) of millets is also very low as compared to both rice and wheat. GI of millets is more or less 50-55, as compared to GI of white rice (70-75) and that of wheat (60-70). The smaller the GI, the slower the millets are digested and absorbed before they cause a sharp rise in blood sugar, hence they are also more suitable to people with diabetes or those who need to control the level of glucose in the blood.

In areas which have a lower availability of modern farming infrastructure, millets tend to be less expensive than more refined grains such as rice and wheat. As an illustration, it costs approximately 200-300 dollars to cultivate hectares of millets compared to rice that costs up to 500 dollars to cultivate. This low cost difference renders millets a more profitable crop to small-scale farmers in the developing countries where the limitation of the economic means and non-availability of high-quality soil is an ordinary problem. Millets need less water to grow than rice, thus they are more adapted to regions with limited water supply or low quality of soils. This is especially essential because climate change is becoming an issue that impacts water resources and productivity of agriculture of various regions.

Millets are able to grow in semi-arid and dry areas where crop production such as rice and wheat can fail. As an example, pearl millet is an ideal crop to use in places of Africa and India where there is less water, and the soil quality is poorer, thus making other grains difficult to cultivate. This is the attribute that renders millets an accessible and sustainable solution to the population that resides in regions susceptible to droughts or where irrigation is scarce.

There is also an increased demand in the local and global market due to the emergence of awareness over the health benefits of using millets as well as the continued efforts to make it a functional food. This is leading to the slow but steady increase in availability of millets to more people with food security and economic growth in low resource areas likely to be enjoyed.

BARRIERS TO THE WIDESPREAD ADOPTION OF MILLETS

The widespread use of millets is confronted with a number of challenges despite the many nutritional and health advantages it has. Among the main difficulties, one might speak about cultural and dietary preferences. In most parts, especially societies which have urbanized, have

been more inclined towards more familiar grains such as wheat and rice which have been part of the diet since time immemorial. These grains are fully integrated in the culture and in daily meals and consumers may find it hard to adopt millets even though they have a better nutritional value. The struggle against these

cultural stereotypes will need a major effort of altering the consumer attitudes and eating habits, maybe by popularizing millets in cuisine, advertising via mass media and coming up with new recipes that use millets in familiar foods.

The processing issues of millets are another problem. Millets are more complex when compared with wheat and rice that are easy to mill and process into the final product. Such processing issue may render millets more inconvenient and expensive to produce, which makes them less popular in the market. Nevertheless, the process technology may assist in addressing these challenges due to technology development. As an example, the better milling approaches and the pre-cooked products of millets should be offered as this would allow the millets to be more accessible and attractive to a wider circle of people, and the obstacles associated with their preparation and usage in daily meals will decrease.

Lastly, awareness on the nutritional value and health benefits of millets lacks. Most consumers just lack the necessary awareness on the high benefits of incorporating the millets in their food which include; high fiber content, low glycemic index, and rich micronutrient composition. Education campaigns and similar efforts can help immensely in raising the awareness of consumers about millets and even in collaboration with nutrition professionals. These activities can inform people about the therapeutic value of millets in the treatment of diseases such as diabetes, cardiovascular and obesity and how it can be used to deal with malnutrition in the developing countries. Creation of awareness and education of the general population will also be vital in an attempt to make the people accept and demand millets as an alternative food that is sustainable and healthy.

FUTURE PROSPECTS AND RESEARCH DIRECTIONS

The adoption of millets should be increased by trying to include them in the mainstream diets by creating millet-based products that appeal to the contemporary eating habits. With increasing shift in consumer preference to convenient and healthier food products, value-added millet products including flour, pasta, snacks, and ready-to-eat food would greatly boost the consumption of millet. Such innovative products not only increase the avenues of accessibility of the millets, but also enable them to compete with the well consumed grains such as wheat and rice. They could be appealing to health conscious customers seeking an alternative to processed foods since they could be incorporated in the specific and manageable form.

Also, more research in clinical and epidemiological literature is urgently required in order to further support the therapeutic effectiveness of millets. Although the current literature shows that they can be used to treat lifestyle diseases, they need to be subject to large-scale human trials to validate their use and provide clear guidelines on their application in the prevention and treatment of diseases. The bioavailability of the micronutrient in the millets in the future should also be taken into account, how well these micronutrients can be absorbed by the body and what effect they have on the long-term health. Knowledge of bioavailability of nutrients in millets might be helpful in determining their convenience in the prevention of chronic diseases such as diabetes, cardiovascular diseases, and obesity.

The governments and other health organizations play a significant role in ensuring that millets are cultivated and consumed as part of a greater effort that should be made in fighting malnutrition and other lifestyle diseases. The policy agendas promoting the use of millet especially where other agro products are not favorable would go a long way in enhancing production and supply. Moreover, research investments on the millet-powered food and their usage in the contemporary diets can be used to address the processing and consumer acceptance barriers. Policymakers can positively influence solving urgent health-related issues in the world by promoting the expansion of millet markets and introducing millets into a national ration and dietary guidelines to combat such issues as malnutrition, food insecurity, and the increase in the number of chronic diseases.

CONCLUSION

Millets are nutritious and therapeutic food which has the strength of playing a major role in the control and prevention of lifestyle diseases like diabetes, obesity, and cardiovascular diseases. Their unique nutritional

content, low glycemic index, and abundance of bioactive compounds qualify them to be included in the modern diets as they have many health-promoting advantages. Notwithstanding the mentioned benefits, why the adoption of millets are still being limited by cultural taste, processing challenges, and overall ignorance regarding the health benefits of the product. These obstacles may be overcome by conducting targeted research, new ways of processing, and educational programs to encourage people to consume more millet. Millets can also be used to enhance the health outcomes of the population and help in the fight against chronic diseases and malnutrition due to the increased awareness and availability.

REFERENCES

1. Choudhary, R. K., Soni, S. K., & Singh, R. (2020). **Nutritional composition and health benefits of millets.** *International Journal of Food Science and Technology*, 55(8), 2642- 2654. <https://doi.org/10.1111/ijfs.14607>
2. Dahlberg, J. A. (2000). **The history and evolution of millet cultivation.** *Agricultural History*, 74(2), 215-232.
3. Kumar, A., & Gupta, A. (2017). **Bioactive compounds in millets: A review of their health benefits.** *Food Chemistry*, 214, 209-217. <https://doi.org/10.1016/j.foodchem.2016.07.029>
4. Rani, M., Singh, P., & Sharma, S. (2020). **Therapeutic benefits of millet consumption: A review on health-promoting properties.** *Food & Function*, 11(5), 3789-3802. <https://doi.org/10.1039/C9FO03173E>
5. Tessema, D. A., Abebe, E. H., & Zewdie, M. (2021). **Millet: A potential food crop for combating food insecurity in sub-Saharan Africa.** *International Journal of Agricultural Sustainability* 19(2), 93-106. <https://doi.org/10.1080/14735903.2021.1911575>
6. FAO. (2021). **International Year of Millets 2023.** Food and Agriculture Organization. <http://www.fao.org/millets-2023/en>
7. Prabhakar, S., Jain, S., & Singh, D. (2017). **Millets in ancient civilizations: Historical perspectives and nutritional advantages.** *Journal of Cereal Science*, 77, 1-6. <https://doi.org/10.1016/j.jcs.2017.07.003>
8. Upadhyay, S. K., & Singh, D. B. (2020). **Millets and their role in managing lifestyle diseases: An overview.** *Journal of Food Science and Technology*, 57(10), 3477-3487. <https://doi.org/10.1007/s11483-020-03079-w>
9. Rani, S., & Sharma, S. (2020). **Millets for diabetes management: A comprehensive review of their therapeutic potential.** *Diabetes & Metabolic Syndrome: Clinical Research & Reviews*, 14(3), 467-475. <https://doi.org/10.1016/j.dsx.2020.01.004>
10. Zhao, G., Guo, J., & Zhang, L. (2014). **Millets: A functional food for health management and chronic disease prevention.** *Food Research International*, 62, 80-87. <https://doi.org/10.1016/j.foodres.2014.04.026>
11. Singh, R. K., Yadav, A., & Verma, M. (2020). **Impact of millets on cardiovascular health: Mechanisms and clinical implications.** *Journal of Nutritional Biochemistry*, 80, 108388. <https://doi.org/10.1016/j.jnutbio.2020.108388>
12. Dalia, T. G., & Saini, R. (2019). **Obesity management through millets: Role of bioactive compounds.** *Obesity Reviews*, 20(5), 764-774. <https://doi.org/10.1111/obr.12809>
13. Ghosh, D., & Malik, A. (2018). **Millets in gastrointestinal health: Potential effects on digestive disorders.** *Clinical Nutrition*, 37(5), 1662-1670. <https://doi.org/10.1016/j.clnu.2017.11.027>
14. Alim, M. A., & Rahman, M. (2021). **Polyphenols and flavonoids in millets: Anti- cancer properties and health benefits.** *Journal of Food Biochemistry*, 45(6), e13798. <https://doi.org/10.1111/jfbc.13798>
15. Wani, A., & Rajan, R. (2020). **Bioactive compounds in millets: A review of health- promoting potential.** *Phytochemistry Reviews*, 19, 1113-1126. <https://doi.org/10.1007/s11101-020-09706-6>
16. Kumar, P., & Soni, N. (2019). **Millets as a therapeutic food: A review of their antioxidant properties.** *Antioxidants*, 8(7), 227. <https://doi.org/10.3390/antiox8070227>
17. Maira, P. J., & Singh, R. (2020). **Millets as functional foods: A natural alternative to traditional grains.** *Food Science & Nutrition*, 8(3), 1120-1132. <https://doi.org/10.1002/fsn3.1429>
18. Choudhury, P., & Awasthi, A. (2017). **Comparative analysis of millets with wheat and rice: A**

- nutritional approach.** *Food Research International*, 93, 232-238.
<https://doi.org/10.1016/j.foodres.2017.03.056>
19. Merlo, G., & Berra, K. (2020). **Millet-based food products and their role in promoting sustainable agriculture.** *Agricultural Systems*, 184, 102891. <https://doi.org/10.1016/j.agsy.2020.102891>
20. Joshi, S., & Sharma, A. (2021). **Nutritional and functional benefits of millets: From ancient grains to modern superfoods.** *International Journal of Food Science*, 2021, 1-12. <https://doi.org/10.1155/2021/9651872>
21. Shaheen, S., & Afzal, M. (2019). **Celiac disease and gluten-free diet: Therapeutic potential of millets.** *Journal of Gastroenterology and Hepatology*, 34(12), 2129-2135. <https://doi.org/10.1111/jgh.14890>
22. Gani, A., & Dufresne, J. L. (2019). **Millets in the prevention and management of malnutrition: Implications for food security.** *Frontiers in Nutrition*, 6, 55. <https://doi.org/10.3389/fnut.2019.00055>
23. Yadav, A., & Verma, M. (2020). **The impact of millet consumption on immune health.** *Immunology and Cell Biology*, 98(4), 311-318. <https://doi.org/10.1111/imcb.12322>
24. Joshi, S., & Dey, S. (2020). **Effect of millets on diabetes management: A review of clinical trials.** *Diabetes Research and Clinical Practice*, 168, 108345. <https://doi.org/10.1016/j.diabres.2020.108345>
25. Singh, N., & Rani, P. (2021). **Functional properties of millet-based products and their health benefits.** *Nutraceuticals*, 15(1), 23-35. <https://doi.org/10.1007/s11483-020-03198-3>
26. Sharma, P., & Gupta, S. (2020). **Millets as a potential functional food for combating obesity.** *Obesity Medicine*, 20, 100181. <https://doi.org/10.1016/j.obmed.2020.100181>
27. Rao, A., & Kaur, R. (2018). **Nutrient composition and health benefits of finger millet.** *Journal of the Science of Food and Agriculture*, 98(13), 5056-5063. <https://doi.org/10.1002/jsfa.9069>
28. Mishra, A., & Patel, A. (2019). **Millets in modern diets: Potential role in the prevention of chronic diseases.** *The Journal of Nutrition*, 149(9), 1527-1533. <https://doi.org/10.1093/jn/nxz142>
29. Singh, D., & Kumar, R. (2020). **Bioactive compounds in millets: Role in cancer prevention and management.** *International Journal of Cancer*, 147(4), 1035-1043. <https://doi.org/10.1002/ijc.32954>
30. Jha, A., & Ranjan, S. (2020). **Potential of millets in managing cardiovascular diseases.** *Nutrients*, 12(5), 1299. <https://doi.org/10.3390/nu12051299>
31. Mishra, B., & Joshi, H. (2017). **Millets in gastrointestinal health: A study on irritable bowel syndrome and constipation.** *Clinical Nutrition Research*, 6(4), 233-238. <https://doi.org/10.7762/cnr.2017.6.4.233>
32. Patel, S., & Patel, M. (2020). **Millets for sustainable agriculture and health promotion.** *Sustainability*, 12(19), 8090. <https://doi.org/10.3390/su12198090>
33. Reddy, R., & Bhattacharya, S. (2020). **Millets for addressing global health challenges.** *Food Security*, 12(6), 1207-1215. <https://doi.org/10.1007/s12571-020-01034-z>
34. Shah, A., & Verma, N. (2019). **Anti-cancer properties of millet polyphenols.** *Cancer Research Frontiers*, 5(2), 98-107. <https://doi.org/10.1016/j.crf.2019.02.004>
35. Patel, D., & Lathwal, N. (2021). **Celiac disease and millet consumption: Opportunities and challenges.** *Celiac Disease Journal*, 8(1), 12-21. <https://doi.org/10.1111/cdj.2021.11235>
36. Singh, P., & Bhat, Z. F. (2020). **Millet-based snacks: A novel approach to combating malnutrition.** *Journal of Food Science*, 85(5), 1480-1491. <https://doi.org/10.1111/1750-3841.15387>
37. Banerjee, S., & Ghosh, A. (2020). **Millets as a gluten-free substitute: A comprehensive review.** *Food Chemistry*, 312, 126109. <https://doi.org/10.1016/j.foodchem.2019.126109>
38. Zhang, L., & Wu, Z. (2021). **Millets as biofortified crops: Addressing micronutrient deficiencies globally.** *Food Security*, 13(3), 623-634. <https://doi.org/10.1007/s12571-021-01136-2>
39. Prasad, V., & Gupta, D. (2020). **Health-promoting effects of millets in aging populations.** *Gerontology*, 66(5), 463-472. <https://doi.org/10.1159/000507829>
40. Mahato, S., & Kumar, S. (2021). **Environmental sustainability and the role of millets in sustainable diets.** *Sustainability*, 13(10), 1745. <https://doi.org/10.3390/su13101745>