ISSN: 2322 - 0902 (P)
ISSN: 2322 - 0910 (O)

International Journal of Ayurveda and Pharma Research

Review Article

EXPLORING AYURVEDIC NUTRITIONAL MEDICINE PERSPECTIVE: THE BENEFITS AND CLINICAL SIGNIFICANCE OF MILLETS

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Article info

Article History:
Received: 19-06-2024
Accepted: 16-07-2024
Published: 10-08-2024

KEYWORDS:
Ayurvedic Nutritional Medicine, *Kshudra Dhanya, Millets, Santapanajanya Vyadhi*.

ABSTRACT

The science of nutrition may be enriched as well as deficiency and over nutritional disorders can be managed in a better way by incorporating Ayurvedic nutritional medicine measures in form of different diets and dietary regulation The millets are referred to in Ayurveda as *Kudhanya, Kshudra Dhanya*, and *Trin Dhanya* under the category *Dhanya Varga* (group of fried grains). **Aim & Objectives:** To explore Ayurvedic nutritional medicine perspective and clinical significance of millets. **Material and Methods:** The research methodology used for the study comprises a review of relevant academic articles and Ayurvedic literature. Using the search engines Google Scholar, Scopus, Web of Science and PubMed (MEDLINE). **Results:** Millets are economical, nutritional and gluten free. Millets are best advised in *Kaphaja Roga* (diseases due to *Kapha*) and other *Santarpanajanya Vyadhi* (diseases brought on by over nutrition of one or more tissues). When it comes to *Vataja Roga* (diseases caused by *Vata*), millets should be avoided as they exacerbate the ailment. **Conclusion:** It has been stated in Ayurveda classics that being thin is preferable to being obese, and the *Laghu* (lightness*), Lekhaniya* (therapeutic scrapping) property of millets, with low glycemic content and the added benefit of long-term satiety, making it an excellent choice as a Ayurvedic nutritional medicine. Additionally, it is *Ruksha* (dry) with *Lekhana* (therapeutic scrapping) and *Kledashoshana* (dries up excess moisture) actions which makes it effective for treating *Santapanajanya Vyadhi* (diseases brought on by over nutrition of one or more tissues), such as *Prameha* (excessive urination), *Sthaulya* (obesity) etc.

INTRODUCTION

The key idea of the science of Ayurveda is *Pathya* (wholesome) *Vyavastha*. To promote *Dhatu samyata* (stability of *Dhatu*) and overall wellness, particular dietary and lifestyle recommendations are constantly recommended alongside medications and treatments. As a result, the Ayurvedic approach as nutritional medicine in form of food and dietetics differs greatly from the conventional western method. With a variety of distinctive concepts and practices, Ayurveda has a reasonably well-developed knowledge basis in dietetics. If integrated with modern nutrition biology, this knowledge base might have a substantial impact on modern food science and nutrition.

Access this article online

Quick Response Code

https://doi.org/10.47070/ijapr.v12i7.3329

History and dietary habits both indicate that millets are the earliest food crop known to man and have been produced for thousands of years. Millets may have been the first cereal known to have been consumed. Paul and the Romans were eating millets as porridge in the middle ages instead of rice. [1]

The common Poaceae family of small-seeded annual grasses and cereals includes millets. It originated in Ethiopia and has since spread to countries in Asia, Australia, China, Africa, and some parts of the United States of America (U.S.A.). Millets can thrive without the use of pesticides since they are disease-resistant.[2] Whole grains are widely consumed around the world, including millet. People are much more aware of healthy living practices today in an effort to combat metabolic disorders and lifestyle diseases. Due to the rise in diabetes and obesity, millets have gained increased attention globally.[3] Since nutrition is essential to society's overall physical well-being, it is the primary nutritional quality and

potential aspect of food grains.[4] Due to their affordability, nutritional value, and gluten-free status, they have grown in relevance in the diet.[3] Millets are cereals that are high in nutrients like vitamin B, calcium, iron, magnesium, potassium, and zinc. These nutrients aid millets in preventing and treating conditions like diabetes, cancer, heart disease, and celiac disease that are brought on by post-translational processes. Millets also help to control problems related to the thyroid, blood sugar, and blood pressure. Millets can also enhance immunity and health, which will aid in the fight against childhood and adolescent malnutrition.[5] Millets, also known as nutrigrains, are highly rich in dietary carbs (60–70%), dietary fibres (10–12%), protein (6–9%), and small amounts of fat (1.5–5%) as well as significant amounts of minerals (2–4%).[6-7] The International Year of Millets (IYM) was submitted by the Indian government to the United Nations and endorsed by 72 nations. On March 5, 2021, the United Nations General Assembly formally proclaimed 2023 the International Year of Millets. The International Year of Millet 2023 will provide an opportunity to increase public awareness of and focus policy attention on the nutritional and health benefits of millet consumption, the suitability of millets for cultivation under challenging and changing climatic conditions, and the advantages of fostering sustainable market opportunities for producers and consumers.[8]

Need of Study: The public domain contains a lot more material about millets under the heading of Ayurvedic nutritional medicine. But something about this information is lacking, unclear, and deceptive. The moment has come to bridge this gap using logical, scientific Ayurvedic *Ahara* concepts.

MATERIAL AND METHODS

The research methodology used for the study comprises a review of relevant academic articles and Ayurvedic literature (*Samhitas*, *Nighantus)*.Using the search engines Google Scholar, Scopus, Web of Science and PubMed (MEDLINE) with keywords like Hindi, Sanskrit and botanical name of different millets like *Ragi, Bajara, Jowar* etc a thorough search was conducted to find the studies relevant to the topic. After a comparison and explanation, a conclusion has been drawn.

Ayurvedic Perspective of Millets

The millets are described in Ayurveda literature under various categories like *Shuka Dhanya*, *Ku Dhanya Varga* (fried grains group), *Shalyadi Varga* (group) and *Suvarnadi Varga* (group) which is described in Table 1. *Rasa-Panchaka* (five attributes of *Dravya* beginning with *Rasa*) and other characteristics of different millets according to *Samhita's* and different lexicons are mentioned in Table 2. Clinical significance of different millets is described in Table 3.

Table 1: Showing description of different Millets according to different *Samhita's* and Lexicons [9-18]

Millets	C.S	S.S	A.S	A.H.	BPN	PN	RN	MN	DN	KN
	Shuka Dhanya Varga Su.27/16-18	*Kudhanya Varga Su.46/21-26*	*Shuka dhanya Varga Su.7/14-22*	*Shuka dhanya Varga Su.6/11-16*	*Dhanya Varga 63-77*	*Dhanya Varga 12-19*	*Shalyadi Varga 126-138*	*Dhanyadi Varga 59-67*	*Suvarnadi Varga 79-84*	*Dhanya Varga 95-108*
Kordusha (Kodo)	+	+	+	+	+	+	+	+	+	+
Shyamaka (Shyama)	+	+	+	+	+	+	+	+	+	+
Hasti Shyama	+	-	+	-	-	-	-	-	-	-
Neevar (Teeni)	+	+	+	+	+	+	+	+	+	+
Toya parni	+	+	+	-	-	-	-	-	-	-
Gavedhuka	+	+	+	-	+	+	-	+	-	+
Prashatika	+	-	+	-	-	-	-	-	-	+
Ambha Shyama	+	-	-	-	-	-	-	-	-	-
Lohitanu	+	-	-	-	-	-	-	-	-	-
Priyangu	+	+	+	+	+	+	+	+	+	+
Mukund	+	+	+	-	-	-	-	-	-	-
Jhinti	+	-	-	-	-	-	-	-	-	-
Garmooti	+	-	-	-	-	-	-	-	-	-
Varuka	+	+	+	-	-	-	-	-	-	-
Varaka	+	+	+	-	-	-	+	-	-	-
Shibira	+	-	-	-	-	-	-	-	-	-
Utkata	+	-	-	-	-	-	-	-	-	-
Jurnaha	+	-	+	-	-	-	-	-	-	-

Shantanu	-	+	-	-	-	-	-	-	-	-
Uddalaka	-	+	-	-	-	-	-	-	-	-
Madhulika	-	+	+	-	-	+	-	-	-	-
Nandi mukhi	-	+	-	-	-	-	-	-	-	-
Kuruvinda	-	+	-	-	-	-	-	-	-	-
Venuyava	-	+	-	-	-	-	-	-	-	-
Gadi	-	-	+	-	-	-	-	-	-	-
Varun padika	-	-	+	-	-	-	-	-	-	-
Toya shyamaka	-	-	+	-	-	-	-	-	-	-
Shilbika	-	-	+	-	-	-	-	-	-	-
Shishiro uddalaka	-	-	+	-	-	-	-	-	-	-
Utkata	-	-	+	-	-	-	-	-	-	-
Anta nirgandi	-	-	+	-	-	-	-	-	-	-
Venu parni	-	-	+	-	-	-	-	-	-	-
Andlohitya	-	-	+	-	-	-	-	-	-	-
Van kodrava (Vankodo)	-	-	-	-	+	-	-	-	-	+
Cheenaka (Cheena)	-	-	-	-	+	+	-	-	-	+
Yaavnala	-	-	-	-	+	+	-	+	-	+
Charuka (Shara Beeja)	-	-	-	-	+	-	-	-	-	+
Kusumbha Beeja	-	-	-	-	+	-	-	-	-	-
Vansha Yava (Baans Ke Beeja)	-	-	-	-	+	-	-	-	-	-
Vajrannna	-	-	-	-	-	+	-	-	-	-
Mahakaya	-	-	-	-	-	+	-	-	-	-
Varta	-	-	-	-	-	+	-	-	-	-
Raagi (Truna Dhanya vishesha)	-	-	-	-	-	-	+	-	-	-
Kuri (Truna Dhanya vishesha)	-	-	-	-	-	-	+	-	-	-
Nartaka	-	-	-	-	-	-	-	-	-	+

Table 2: Showing *Rasa-Panchaka* (Five attributes of *Dravya* beginning with *Rasa*) and other characteristics of different Millets according to *Samhita's* and different lexicons [9-18]

***Rasa-Panchaka* and other Characteristics**		**C.S** Su.27/16-18	**S.S** *Su.46/21-26*	**A.S** Su.7/14-22	**A.H.** Su.6/11-16	**BPN** *63-77*	**PN** 12-19	**RN** *126-138*	**MN** *59-67*	**DN** *79-84*	**KN** *95-108*
***Rasa* (Taste)**	***Madhura***	-	+	+	-	+	-	-	+	-	+
	Kashaya	-	+	+	-	+	-	-		-	+
***Guna* (Attribute)**	***Ruksha***	-	+	+	-	+	-	-	+	-	+
	Laghu	-	-	+	+	+	-	-	+	-	+
***Vipaka* (Biotransformed *Rasa*)**	***Katu***	-	+	-	-	+	-	-	+	-	+
***Virya* (Potency)**	***Ushna***	-	+	-	-	-	-	-	+	-	-
	Sheeta	-	-	+	+	-	-	+	-	-	-
	Anushna	-	-	-	-	+	-	-	-	-	-
	Ishatushna	-	-	-	-	-	-	-	-	-	+
***Doshashamakta* (Pacification of**	***Kaphanashaka***	-	+		-	-	-	-	-	-	-
	Vataprakopaka	-	+	+	+	+	-	+	-	-	+

***Dosha*)**	***Kaphapitta nashaka***	-	-	+	+	-	-	-	-	-	-
	Pitta-Rakta Kapha Nashaka	-	-	-	-	+	-	-	-	-	-
	Vatpittakaraka	-	-	-	-	-	-	-	+	-	-
	Pittanashaka	-	-	-	-	-	-	-	-	-	+
	Kapharakta nashaka	-	-	-	-	-	-	-	-	-	+
***Karma* (Action)**	***Alpamutrakaraka***	-	+	-	-	-	-	-	-	-	-
	Malmutra Baddhakaraka	-	-	+	-	-	-	-	-	-	-
	Lekhana	-	-	+	+	+	-	-	+	-	+
	Kledashoshaka	-	-	-	-	+	-	-		-	+
	Badhha vitakaraka/ Malavrodhaka	-	-	-	-	+	-	-	+	-	+
	Avrushya	-	-	-	-	-	-	-	-	-	+

Table 3: Showing Clinical significance of different Millets [2, 19-37]

Sanskrit Name/ Ayurvedic Name	Common Name	Botanical Name	Benefits
Kangu (Priyangu)	Foxtail millet	*Setaria italica*	Anti-pest, increasing disease resistance, not producing an acid and not becoming sticky, easily absorbed, preventing cardiovascular disease, diabetes, and dyslipidemia, anti microbial, tumor-fighting, and aid in body detox prevents gallstones, breast cancer, and cardiovascular disorders, and restores body cells.
Shyamaka	Barnyard millet	*Echinochloa sp.*	Reducing the blood sugar level, prevents from celiac diseases, strong anti-oxidative activity, anti-cancerous, anti-rheumatic, and anti-diabetic prevents gallstones, breast cancer, and cardiovascular disorders, and restores body cells.
Koradusha (Kodrava/Kodo)	Kodo millet	*Paspalum scrobiculatum*	Beneficial for diabetes individuals and is helpful for the neurological system. Dyslipidemia, hypertension, illnesses of the heart, general ill health, haemorrhages, hepatopathy, and inflammation. Also serves as a diuretic and galactagogues while aiding in the treatment of beriberi.
Cheenaka	Proso millet	Panicum miliaceum	Aids in lowering cholesterol and improving lipid profiles, favourable to bones aid in the fight against breast cancer and cardiovascular disorders, greater anti-proliferative effect.
Gaveduka	Adlay millet	*Coix lacryma jobi* Linn.	Mentioned in diabetes, rheumatism, etc.
Jwar	Great Millet	*Sorghum vulgare*	Reduces esophageal cancer, is anti-carcinogenic, and aids in the fight against pre and post-transition issues like obesity, malnutrition, arthritis, and heart-related cardiovascular disorders.
Ragi	Finger Millet	*Eleusine coracana* Linn.	Controls intestinal cancer, constipation, and excessive blood cholesterol. The best diet for diabetics, which regulates hyperglycemia and blood sugar levels in diabetes and is helpful in the treatment of cardiovascular disease, antimicrobial and anti-tumorigenic against the inhibition of harmful bacteria like Escherichia coli and Bacillus cereus. Use to treat disorders caused by a lack of calcium.
Bajra [5,32,40]	Pearl Millet	*Pennisetum glaucum*	Lowering cholesterol, preserving lipid profile, and strengthening the body. Aids in migraine treatment respiratory issues are lessened, and a hypoglycemic impact is also visible.
Neewar [3,42]	*Bengal wild rice*	*Hygroryza aristata* Retz.	Useful as anti-diarrheal, antimicrobial and anthelmintic drug (crude drug).

Potential role of millets in management of Health as Ayurvedic Nutritional Medicine

The conclusion drawn from all of the tables is that numerous kinds of millets are found in different *Samhitas* and *Nighantu*, and that these millets typically possess the following qualities: *Laghu* (lightness), *Ruksha* (dryness), *Guna* (attribute), *Madhura* (sweet), *Kashaya* (astringent), *Rasa* (taste), *Katu Vipaka* (bio-transformed *Rasa*), and *Ushna* in *Veerya* (hot potency). Millets are recommended for those with *Kaphaja Roga* (*Kapha*-related disorders) and other *Santarpanajanya Vyadhi* (diseases caused by excessive nutrient intake in one or more tissues). Millets should not be used for *Vataja Roga* (diseases caused by *Vata*) as they worsen the condition. Millets have a number of health benefits. They have no gluten and are especially high in phenolic polyphenols. Around the world, millets are used to prepare a wide range of traditional and modern foods and beverages. The use of milling, fermentation, malting, and heat treatments can have a big impact on how nutritious food is, either positively or negatively. Due to the high levels of flavonoid-type phenolics in millets, frequent consumption of millet products may help prevent type 2 diabetes and cardiovascular disease.[38] Additionally, it benefits those who have atherosclerosis and diabetic heart disease. These positive effects on health have been largely attributed to the great variety of phytochemicals, or potentially cancer-preventing substances, such as antioxidants, that are present in foods like millets in large quantities.[39]

DISCUSSION

The millets are known in Ayurveda by the names *Kudhanya, Kshudra Dhanya*, and *Trin Dhanya*.[40-42] These include *Sama (Echinochloa frumentace* Linn.), Ko*do (Paspalum scrobiculatum* Linn.), *Neewar (Hygroryza aristata* Retz.), *Gavedhuk (Coix lacryma jobi* Linn), *Kanguni (Setaria italica* Linn. Beauv.), *Cheena (Panicum miliaecum* Linn.), *Jowar (Sorghum vulgare* Pers.) Millets are the oldest food crop known to mankind and have been farmed for thousands of years, according to both history and dietary patterns.[1] Due to the rise in diabetes and obesity, millets have gained increased attention globally.[3] Millets are cereal grains that are high in nutrients, including vitamins, minerals, vital fatty acids, energy, carbs, dietary fibre, and proteins. These nutrients assist millets fight off diseases that develop after translation, such as diabetes, cancer, cardiovascular disease, and celiac disease.[5] When the general characteristics and effects of millets are examined, it becomes clear that millets are best used to treat diseases caused by *Pitta*, *Kapha*, and *Rakta Dosha* as well as blood vitiation. Millets must always be avoided for treating *Vataja Roga* (*Vata*-related diseases), as they make the condition worse. Based on this understanding the gross indications for use of millets are *Sthoulya* (obesity), *Kushta* (various skin diseases), *Prameha* (excessive urination), *Atisara* (diarrhoea), *Medoroga* (diseases due to *Meda*), *Vrana* (wounds) and other *Santarpanajanya Vyadhi* (diseases due to over nourishment of single or multiple tissues) which are usually lifestyle disorders. *Kudhanya* are having *Kaṣhaya* (astringent taste) and *Madhura rasa* (sweet taste) and having *Laghu* (lightness) and *Ruksa* (dryness) *Guna*, *Ushna virya* (cold potency) and *Kapha nashaka*, *Lekhana* (therapeutic scrapping) and *Medohara* property. Because of these qualities, *Kudhanyas* are very suitable diet for *Santapanajanya Vyadhi* (diseases due to over nourishment of single or multiple tissues) affected persons. Millets are *Durjara* (heavy) for digestion but *Laghu* (lightness) in general qualities means after proper digestion of millets on the body, it imparts lightness. Additionally, it is *Ruksha* (dry) in nature, which leads to its *Lekhana* (therapeutic scrapping) and *Kledashoshana* (dries up excess moisture) actions. This property makes it effective for treating *Santapanajanya Vyadhi* (diseases brought on by over nutrition of one or more tissues).[41] These *Kudhanyas* are having sufficient amount of fibre content, which is more than other *Dhanyas* and also having good amount of protein and comparatively less carbohydrate content. All these factors lead to delay emptying of stomach and improve satiety and less glycemic response.[43] To fully benefit from the health advantages of millets, choose one of the several *Pathya Kalpanas* (wholesome preparations) that are made from millets and that suit both the patient and the disease.[41]

CONCLUSION

Description availed in different *Samhita's* and *Nighantu's* presented in a tabular manner. Availed Information about millets in Ayurvedic texts shows that, in some of *Samhita's* and *Nighantu's* specific description of each and every millet from Ayurvedic perspective is available otherwise general description of Millets is described for e.g. general *Guna* (attribute) *Karma* (action) of whole *Varga* (group) and list of different millets is given. It has been stated in Ayurveda classics that being thin is preferable to being obese, and the *Laghu* (lightness), *Lekhaniya* (therapeutic scrapping) property of millets, with low glycemic content and plus the extra advantage of sustained fullness, which makes it a great option for a high-energy, nutritious meal for a long and healthy life. Due to their high fiber, calcium, and mineral content, millets not only provide a great source of energy and a powerful booster for kids and teens physical and mental development, but they also aid in weight management and meet growing kid's nutritional demands. They can be a healthy alternative to junk food because there is a growing interest in sustainable

and healthful meals in areas where dietary tastes are changing swiftly. Millets should be avoided in *Vataja Roga* (ailments due to *Vata*) since it aggravates the illness. Millets are generally indicated in *Santarpanajanya Vyadhi* (ailments brought on by excess nourishment of one or more tissues) and other *Kaphaja Roga* (diseases due to *Kapha*) diseases. The International Year of Millet 2023 will provide an opportunity to increase public awareness of and focus policy attention on the nutritional and health benefits of millet consumption, the suitability of millets for cultivation under challenging and changing climatic conditions, and the advantages of fostering sustainable market opportunities for producers and consumers.

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Cite this article as:
Manish Pamnani, A. Rama Murthy, Sarvesh Kumar Agarwal. Exploring Ayurvedic Nutritional Medicine Perspective: The Benefits and Clinical Significance of Millets. International Journal of Ayurveda and Pharma Research. 2024;12(7):65-71.
https://doi.org/10.47070/ijapr.v12i7.3329
Source of support: Nil, Conflict of interest: None Declared

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