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Review Article

MILLETS *(KSHUDRA DHANYA)*: NURTURING HEALTH AND PREVENTING LIFESTYLE DISORDERS

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ABSTRACT

Ayurveda is based on the theory of *Trayo-Upsatamba* i.e., which refers to the pillars of Ayurveda: *Ahara* (diet), *Nidra* (sleep) and *Bramhcharya*. The key to adhering the first principal of Ayurveda, *Swasthasya Swasthya Raksham* (to sustain a healthy life), is *Ahara* (nutritious food), or we can say that balanced diet. WHO has declared 2023 "International Year of Millets" with the theme "Harnessing the untapped potential of millets for food security, nutrition, and sustainable agriculture". According to Ayurveda, keeping healthy eating habits can regulate and avoid all ailments. In Ayurveda different *Acharya* have specified various type of *Aahar varga.* Millets are described under *Kudhanya* of Bhavparkash *Dhanyavarga* (category of cereals). *Kshudra dhanya* (millets) is a group of small seeded cereals used by humans by ages. Millets (*Kshudra dhanya*) are drought resistant, serves as a good source of proteins, micronutrient, phytochemicals and gluten free. Due to an imbalance diet of high-calorie, fast foods, there are issues with health that must be resolved on a global scale. The so-called general diseases of present day include obesity, diabetes, cardiac arrest, porous bones and depression etc. This attempt at a review of *Kshudra dhanya* may be helpful to understand their complete health benefits for daily lifestyle disorders and for balancing the disease condition as well.

INTRODUCTION

The Latin word "Milium," which meaning little seed, is where the word "Millet" originates. Compared to major cereals, millets are a family of plants within the Poaceae family that have smaller seeds. Their tiny seeds are nutrient-rich stores. The majority of millet crops are indigenous to India and are referred to as "nutri-cereals" since they contain most of the nutrients needed for regular body function. Mankind has begun to move towards being fit and healthy as recent years have prepared the way for many ailments. Dietary adjustments are one of the several strategies to do this. Millets have been a staple of the Indian diet since very early times[1]. Another name for it is "Poor Man's Food."

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India is the leading producer in the world. Major millet producing states are Rajasthan, Karnataka, Uttar Pradesh, Maharashtra, and Haryana. The most essential element is security, these are affordable, and they grow organically. The rural residents of rural blocks and villages cultivate and utilise millets as a staple feed because they raise domestic animals, which solves a dual purpose of using cereals as grain and animal feed as fodder. Teff and Fonio are two other millets that are grown in the African continent.

The significance of millets stems from the fact that they are a naturally occurring, highly nutritious, self-grown, and pure cereal that fulfils the daily dietary requirements of all people, as attested to by ancient books and the records of our ancestors.

India celebrated 2018 as 'The Year of Millets' and the Food and Agricultural Organization (FAO) has declared 2023 as "International Year of Millets" with theme "Harnessing the untapped potential of millets for food security, nutrition and sustainable agriculture." All these substantiate the importance of

millets. From March 18 to 21, the Institute of Teaching and Research in Ayurveda (ITRA) in Jamnagar hosted a millets expo to raise awareness and encourage millets intake. During the expo, attendees enjoyed more than a hundred various millet-based dishes, including soups, appetisers, millet dahi vada, sorgum pizza, millet nacho, and more.

Common names for *Kshudra dhanya* include *Mota-anaj*, which is typically used in rural areas and is large-sized or a mixture of all millets; *Paramparik dhanya*, which is known for its traditional food; *Kudhanya*, which is a mixture of several millets- these *Dhanya* consume more energy (*Jathragni*) to digest and metabolize, or *Trina dhanya* (*Trinadi varga*- grass derived cereals, which have a short term life span). Six months pass between the summer and the wet season for all *Dhanya* to ripen.

Types of Millets [2]

Millets are classified into three types on the basis of grains size.

Table 1: Classification of millets

Major millets	**Minor millets**	Pseudo **millets**
Finger Millet *(Ragi/Narataki)*	Foxtail Millet (*Kangani)*	Buck wheat *(Kutu)*
Pearl Millet *(Bajra*)	Porso Millet *(Chenna)*	Amaranth (*Chaulai*)
	Kodo Millet (*Kodo)*	
	Barnyard Millet (*Sawa/Shyamak)*	
	Little Millet *(Kutki)*	
	Sorghum *(Jowar)*	

Pseudo millets are of different family grains but are equivalent in nutritional value of millet.

Millets have been grown for centuries for a variety of reasons other than their nutritional values.

- Gluten free[3]- Gluten sensitivity is one of the most prevalent digestive issues that people have these days (Celiac disease). For individuals who are gluten free, millet is a possibility.
- Short Growing season[4] - Majority of millets are produced within 60- 100 days.
- Drought Resistant[5] - Millets are typically planted in water scare area and could even survive during drought because they require a relatively small amount of water compared to other grains for their development.
- Resistant to pests and disease[6]- Millets exhibit strong resilience to disease and pests, which lessens the burden on farmers and improves the public health.
- Nutritive Value[7] - They contain a significant amount of phytochemicals and micronutrients.
- Alkaline forming Grain[8] - Helps to keep body's pH in equilibrium.
- Fulfilling sustainable development goals (SDG).

Table 2: Comparative Chart of nutrition value of Millets vis-a-vis Wheat and Rice

Grains	**Carbohydrates**	**Protein**	**Fat**	**Energy (kcal)**	**Dietary Fiber**	**Ca (mg)**	**P (mg)**	**Mg (mg)**	**Zn (m)**	**(mg)**	**Thiamine (mg)**	**Riboflavin (mg)**	**Niacin (mg)**	**Folic acid**
Sorghum	67.7	09.9	1.73	334	10.2	27.6	274	133	1.9	3.9	0.35		2.1	39.4
Pearl Millet	61.8	10.9	5.43	347	11.5	27.4	289	124	2.7	6.4	0.25	0.20	0.9	36.1
Finger Millet	66.8	07.2	1.92	320	11.2	364.0	210		2.5	4.6	0.37	0.17	1.3	34.7
Kodo Millet	66.2	08.9	2.55	331	06.4	15.3	101	122	1.6	2.3	0.29	0.20	1.5	39.5
Proso Millet*	70.4	12.5	1.1	341		14.0	2.06	153	1.4	0.8	0.41	0.28	4.5	
Foxtail Millet*	60.1	12.3	4.3	331		31.0	188	81	2.4	2.8	0.59	0.11	3.2	15.0
Little	65.5	10.1	3.8 9	346	7.7	16.1	130	91	1.8	1.2	0.26	0.05	1.3	36.2

Millet														
Barnyard Millet*	65.5	06.2	2.2	307		20.0	280	82	3.0	5.0	0.33	0.10	4.2	
Amaranth seed	61	13.3	5.6	356	7.5	162.0	412	270	2.8	8.0	0.04	0.04	0.52	24.7
Wheat	64.7	10.6	1.47	321	11.2	39.4	315	125	2.8	3.9	0.46	0.15	2.7	30.1
Rice	78.2	07.9	0.52	356	02.8	07.5	96	19	1.2	0.6	0.05	0.05	1.7	9.32

Source: Indian Food Composition Tables, NIN- 2017; *Nutritive value of Indian Foods- 2007.

Connection to Soil, Climate, and Environment

Millets are typically planted in tropical regions up to 2,100 metres above sea level. Because they require heat for germination and growth, a temperature range of 26 to 29 degrees is ideal for crop development and good crop output. It is grown in areas with 500–900mm of rainfall annually. In Arunachal Pradesh, finger millets (*Ragi*) are the most widely planted millets. Brown top millet is an annual warm season species that is mostly grown in South East Asia and is specifically grown with rain fed tracts. *Kodo* millets and brown top millets grow well in moderate rainfall of 50–60cm. Most millets are a resilient crop that grows well in arid environments. Particularly the brown-top millets, which mature and may be harvested around 75–80 days earlier than other millets, are drought-tolerant.

According to research, millets can grow in a variety of soil types, from extremely poor to extremely fertile land, and they can even withstand a certain amount of alkalinity. The majority of millets adapt to the soil in which they are born and grow into young, mature plants that produce nutritious seeds; *Kodo* millets do particularly well in stony, gravelly soil found in hilly areas. The first ploughing of the monsoon season is done to cultivate millets.

According to Ayurveda list of Millets includes [9]

- *Kangu (Priyangu*) - Foxtail millet
- *Shayamak* - Barnyard millet
- *Cheenak/Chenna* - Porso millet
- *Ragi (Naratki*) - Finger millet
- *Yavnala (Jowar)* - Sorghum
- *Gaveduka* - Adlay millet

Table 3: Millets in Ayurveda According to Different Texts

Bhavparkash	***Raj nighnatu***	***Charak samhita***	***Sushrut samhita***	***Vagbhat samhita***
Kudhanya/Kshudra dhanya / trindhanya* of *Dhanya varga	***Shalyaadi varga***	***Shookdhanya Varga***	***Kudhanya varga***	***Trindhanya varga***
Kangu	*Ragi*	*Barak*	*Kordushak*	*Chin*
Cheenak	*Kanguni*	*Udaalak*	*Shyamak*	*Kangu*
Kodrav	*Priyangu*	*Kordush*	*Uddalak*	*Kodrav*
Shymak	*Shyamak*	*Shyamak*	*Priyangu*	*Shyamak*
Yavnaal	*Kodrav*	*Gavedhuk*	*Gavedhuk*	*Priyangu*
Gavedhuk	*Yavnaal*	*Kodo*		
Sawa		*Sawavanak*		

Table 4: *Raspanchak* of *Kshudra Dhanya*[10]

Millets	***Rasa***	***Guna***	***Virya***	***Vipaka***
Ragi (Nartaki)	*Madhur, Kashaya*	*Guru*	*Sheet*	-
Shayamak	*Madhur, Kashaya*	*Laghu*	*Sheet*	-
Kanguni (Priyangu)	*Madhur, Kashaya*	*Laghu*	*Sheet*	*Madhur*
Kodo (Kordush)	*Madhur, Kashaya*	*Laghu*	*Sheet*	*Katu*

Cheenak	*Madhur, Kashaya*	*Guru, Ushan*	*Sheet*	*Katu*
Bajra	*Madhur, Kashaya*	*Guru, Ruksha, Ushan*	*Ushan*	*Katu*
Yavnal (Jowar)	*Madhur, Kashay*	*Guru, Ruksha, Ushan*	*Ushan*	*Katu*

DISCUSSION

Millets disease specific use with respect to ancient and modern medicine-

Yavnala/Sorghum

Ancient[11]- *Ruchya, Sheetal, Kshayarasyukth, Avirishya, Ruksh, Laghu, Shleshmraktapittajitt*.

Yavnala preferably being *Pittghana* is used in *Raktapitta, Amlapitta, Twak roga, Trishna* etc. Due to *Tikta-Kshaya Ras* and *Kaphhara* propertied used in *Sthaulya* (obesity), *Prameha* (diabetes mellitus).

Modern- Major portion of sorghum protein is prolamines. Potential source of micronutrient like potassium, phosphorus, calcium, iron, zinc and sodium and phytochemicals[12].

Properties – Anti-obese, anti-diabetics[13].

Ragi/ Finger Millet

Ancient[14]- *Tikta Kshaya Madura* in *Ras, Sheet, Pittaraktanashak, Balya* (promote strength).

Used in *Rakthpitta*, *Amlapitta, Twak vikar* due to *Tiktakshya- Madhura Ras and Sheeta Ghuna*.

Daurbalyata- Balya karma

Sthaulya, Prameha- Tikta Kshsya Ras and *Balya* property

Modern- It is richest source of calcium (300-350mg/100g). Grains have excellent malting properties so used as weaning food.

Used in - Obesity [15], NIDDM[16]

Shyamaka/Barnyard Millet

Ancient[17]- *Madhur, Kshaya, Snigdha, Laghu, Soshaka, Sheetal, Sangrahi, Vatala, Kaphapitta ghana, Vishdoshnuta*.

Used in *Atisara, Grahni* due to *Sanghrahi* properties.

Santarpanjanya vyadhi (Medoroga, Premeha)- Due to *Ruksha, Shoshak* and *Kaphghan* properties.

Modern- Its grain contains additional useful components, like as beta-glucan and GABA.

Used as antioxidant, stabilizes mood, obesity, Diabetes Mellitus

Kangni/Foxtail Millets

Ancient[18]- *Guru, Brihan, Ruksha, Shleshmhara, Ruchya, Bhagnasandhankara, Pittadhahanashak.*

Used in *Atisara, Grahni*- due to *Sanghrahi Guna; Daurbalyta*- due to *Brihan Guna; Santarpanajnya Vyadhi*- due to *Ruksh, Lekhan, Kaphahara* properties.

Modern- Also known as Italian Millet or German Millet.

It contains a lot of carbs, minerals like iron and copper are present in it.

Uses- Used for bone fractures, diabetes, and obesity.

Cheenak (Chena)/Porso Millets

Ancient[19]- *Guru, Brihan, Bhagnasandhankara, Madhura, Ruksha, Kaphahara*

Used in *Santharpanajanya vyadhi* and *Asthibhagna*.

Modern- It has the highest percentage of proteins (12.5%) and vitamin B3 (Niacin). beneficial for strengthening teeth or bones, preventing pellagra, etc.

Uses- strong defence against coronary heart disease risk[20].

Gavedhuk/Adlay Millet

Ancient[21]- *Katu- Madhura rasa, Karshyakara, Kaphahara*, other properties similar to *Shyamak*. Used in *Santharpanjanya vyadhi.*

Modern- Adlay millet is mentioned in diabetes mellitus and rheumatism[22].

Pearl Millet/(Bajra)

No where mentioned in classical texts.

Vital application for every millet

- Finger millet: High in polyphenols and calcium.
- Foxtail Millet- Rich in protein; meal for diabetes patients.
- Proso millet: A thiamine-rich meal that is good for cardiac sufferers.
- The greatest substitute for rice is barnyard millet, which is high in fibre.
- Rich in lecithin, Kodo millet (used for dementia and alzheimer)
- Mini millet: A food to strengthen the immune system.
- Job's Tear: Rich in glutamic acid, high in leucin.
- Brown top Millet: High-fiber food for constipation

One way to understand the properties of millets is that they are rich in fibre, carbohydrates, iron, calcium, and other nutrients. Most millets are commonly called *Laghu*, but in my opinion, millets that are high in iron, protein, and other minerals are *Guru* in nature, which means that it takes a lot of effort and time to reduce the complex nature of these properties to their most basic form (millets).

As we can see, protein is more difficult to digest and absorb than carbohydrates. Digestion of protein takes a long time. Therefore, when millet (a food rich in protein) is prepared and consumed, even

in a balanced way, the millet food draws out the body's fire (requiring more enzymatic action) energy to process for ingestion, digestion, and emulsification; concurrently, these millets draw out water content to emulsify the food to proceed further; for this reason, nutritionists and dietetics prefer to recommend millet for reducing weight or obesity; however, Ayurveda advises using these food types for people with physically demanding jobs, such as farmers, athletes, or people who walk a lot.

However, in order to get the full nutritional content, these should be eaten on weekends or on alternating days. Oftentimes, these high-content foods- like bajra, jowar, jobs tear, and ragi- can induce digestive distress to the body.

CONCLUSION

Metabolic disorders not communicable due to sedentary lifestyle *(Santharpanjnya vikara).* Since millets are used in these *Santhjarpanjanya vikaras*, this becomes evident that they should be used to treat problems related to *Pitta* and *Kapha* when taking into account their general properties and effects. *Vataja Vyadhi*, which are ailments brought on by an excessive build-up of vitiated *Vata* or an excessive flow of movement, millets shouldn't be consumed because they exacerbate the condition, but it is always advised to use millets with ghee preparation and with advised to avoid the exacerbated condition and to subside the *Pitta* condition problem also.

It is crucial to assess a person's *Agni* (digestive ability) and *Prakriti* before suggesting millets (basic constitution). To fully benefit from the health benefits of millets, choose a *Pathya kalpana* (food preparation) that is appropriate for the patient (*Prakriti*) and the ailment (*Rog*). A range of *Pathya Kalpna*, or meal preparations, can be made with millets, thus choosing a cuisine that will benefit *Rogi* and *Roga* is conceivable.

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