



Integrating Tradition and Science: A Systematic Review of Millets' Nutritional and Therapeutic Properties

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ABSTRACT :

Millets have garnered considerable attention across various fields due to their unique properties and applications. The nutritious value of all millets is three to five times higher than that of widely consumed cereals like rice and wheat. This review article provides a comprehensive analysis of the current state of knowledge regarding millets, including their composition, production methods, and applications. The review synthesizes data from recent studies and technological advancements, highlighting innovations in millet for Health Benefits human. Millets are mentioned in the form of Trinadhanya and Kshudradhanya in Ayurvedic Samhitas. The article also discusses the environmental and economic implications of millet usage, addressing sustainability concerns and potential for cost reduction. Conclusion- The greatest applications for millets are Santarpanajanya Vikara (diseases brought on by excessive nutrient intake) and Kapha-Pitta Doshaja Vikara (diseases brought on by Kapha and Pitta).

Keywords:- Millets, Trinadhanya and Kshudrad, Santarpanajanya Vikara, Nutritional and Therapeutic Properties

Introduction:-

Millets are one of the most important cereal grains. More than 1/3 of global population consumes millets. It ranks as the 6th cereal crop in terms of global agricultural output. It's been cultivated over the past 50 years, and both humans and animals eat it. It is also known as "poor man's food." The English word "millet" originates from the Latin word "Milium," which meaning little seed. Millets are a particular group of plants of the Poaceae family¹. The nutritious value of all millets is three to five times higher than that of widely consumed cereals like rice and wheat. Compared to wheat and rice, millets have a higher fibre level and a lower mineral content. All other millets have at least twice as much calcium as rice, and finger millet has thirty times more calcium than rice.² Beta carotene, vitamins, and other minerals are abundant in millets. The linoleic, oleic, and palmitic acids, as well as monogalactosyl, diacylglycerols, digalactosyl diacylglycerols, phosphatidylethanolamine, and other important fatty acids, are all plentiful in millets. For the body to produce cellular energy, millets must have phosphorus and vitamin B molecules including niacin, folacin, riboflavin, and thiamine.³ Millets have beneficial physiological and nutritional effects, and they help treat illnesses like diabetes mellitus, hyperlipidemia, and others.⁴

Under the *Dhanya Varga* (category of grains) heading, Ayurveda has provided detailed explanations of various millets, emphasising the significance of food for both healthy and diseased individuals.⁵

Millets are mentioned in the form of *Trinadhanya* and *Kshudradhanya* in Ayurvedic *Samhitas*. Millets like *Shyamak* and *Koradusha* are included in *Dhanyavarga* of the *Charak Samhita*. They boost *Vata*, harmonise *Pitta*, *Kapha*, *Ruksha*, and *Grahi*, are easy to digest, and raise *Vata*.⁶ In *Bhavprakash Nighantu* millets are also mentioned in *Dhanyavarga* like *Kshudradhanya* (*Kanguni*, *Cheenak*, *Shyamak*) *Kodo*, *Gavedhuka*, *Yavanala*. *Bhavprakash* maintains that *Kshudradhanya* is *Ushna*, has *Kashaya* and *Madhura Ras*, *Laghu*, *Lekhan*, *Vipaka* is *Katu*, *Ruksha*, *Vatakaraka*, and *Grahi*, as well as a decrease in *Pitta* and *Kapha*.⁷

Table No.1: Types of millets ^{8,17}

Millets	English name	Ayurvedic name	Hindi name	Botanical name
Major	Finger millet	<i>Nartaki</i>	Ragi	<i>Eleusine coracana</i> Linn.
	Pearl millet	-	Bajra	<i>Pennisetum typhoides</i>
	Sorghum	<i>Yavanaala</i>	Jowar	<i>Sorghum vulgare</i> pers.
Minor	Foxtail millet	<i>Priyangu (Kangu)</i>	Kanguni	<i>Setaria italica</i> Linn. Beauv
	Proso millet/	<i>Cheenaka</i>	Cheena	<i>Panicum miliaceum</i> Linn.

	Common Millet	(<i>Varaka</i>)		
	Little millet/ Barnyard millet	<i>Shyamaka</i>	Sama,Savan,kumku	Echinochlo frumentace Linn.
	Kodo millet	<i>Koradusha</i> (Kodrava)	Kodo	Paspalum scrobiculatum
	Adlay millet	<i>Gaveduka</i>	Gurlu,samkru	Coix lacryma jobi Linn.

Major Millets-

- (1) Pearl Millet - The type of millet that is widely utilised is pearl millet (Bajra). For countless years, bajra has been a main ingredient in Indian cuisine, either in the form of khichdi or in the making of rotis. Rajasthan is India's top grower of this nutrient-rich crop. Magnesium, which is found in pearl millet, helps asthmatics breathe easier and decreases the symptoms of migraines. Gallstone incidence is reduced in part due to the fibre in pearl millets.^{9,10}
- (2) Finger Millet- The nutrients in the superfood finger millet (Ragi) enhance digestion, slow down the ageing process, and reduce the risk of heart disease. Natural calcium found in finger millet helps to build bones and reduces the risk of bone fractures. Iron that occurs naturally in it also aids in the treatment of anaemia. Finger millet is advantageous for small children, the elderly, and expectant mothers since it is high in calcium. It aids nursing women in producing enough milk for their newborns.^{10,11}

Minor Millets-

- (1) Foxtail Millet - Foxtail millet Commonly known as *Kangu*. Because it resembles a tapering cluster of flowers, its name is a reference to this. Foxtail millet helps with the continual release of glucose without changing the body's metabolic process. Foxtail millet is well known as a heart-healthy diet and aids in reducing the prevalence of diabetes in society due to its high magnesium content.^{10,11}
- (2) Proso Millet - It is commonly known as *Cheanak*. Pellagra is brought on by a lack of Niacin, a kind of vitamin B3 that proso millet is effective at correcting. Traditionally, it has been served as a healing meal, especially following delivery or illness.^{10,12}
- (3) Little Millet - Little millet often referred to as *Sama, Shavan, or Kutki*. Minerals including zinc, iron, potassium, and calcium are added to the little millet, also known as sama, shavan, or kutki. This grain has a lot of vitamin B3, which reduces cholesterol, encourages a rapid metabolism, repairs tissue, and provides energy. Additionally, it contains a lot of fibre and provides the body with the essential lipids for weight reduction.^{10,11}
- (4) Kodo Millet - Also known as *Kodrava* or *Koradusha*. A traditional meal that promotes weight reduction and has a flavour akin to rice is kodo millet. It is easily absorbed and rich in antioxidants and phytochemicals, which help prevent many ailments linked to a sedentary lifestyle. Kodo millet also helps women's periods become more regular and eases hip and knee discomfort.^{10,13}
- (5) Barnyard Millet - Known as *Shyamaka*, A little white seed known as barnyard millet is said to be more nutrient-dense than any other cereal grain. Because it is high in fibre, carbs, and protein, it is used to help people lose weight. Moreover, it is a great source of calcium and phosphorus, both of which are necessary for the development of bones.¹⁰

Millets in Ayurveda

Millets have been given many synonyms like, *Kudhanya* (Inferior among cereals)¹⁴, *Kshudra Dhanya* (small sized cereals)¹⁵, and *Trina Dhanya* (grass derived cereals) in Ayurveda in detail under *Dhanya Varga*.¹⁶

Table No.2: The general Guna and Karma (qualities and effects) of millets are,^{18,19}

<i>Rasa</i>	<i>Kashaya-Madhura</i>
<i>Vikapa</i>	<i>Katu</i>
<i>Veerya</i>	<i>Sheeta</i>
<i>Guna</i>	<i>Laghu, Ruksha</i>
<i>Karma</i>	<i>Lekhana, Vrishya, Kledashoshana, Baddhamalakara</i>
Effect on Tridosha & Dhatu	<i>Kapha-Pittahara, Vatala, Rakta Shaamaka</i>

Table No.3: Ayurvedic Properties of millets²⁰

Millet	Botanical Name	Synonyms	Guna
<i>Sama</i>	Echinochlo frumentace Linn.	<i>Shayamak, Shyam, Tribeej, Rajdhanya, Trinbeej, Uttam</i>	<i>Sheet</i> (Cold), <i>Snigdha</i> (Oily) <i>Laghu</i> (Light)
<i>Kodo Millet</i>	Paspalum scrobiculatum	<i>Kodrav, Kordush, Kudyal, Uddalak</i>	<i>Guru</i> (Heavy), <i>Ruksha</i> (Unctuous)
<i>Gavedhuk</i>	Coix lacryma jobi Linn.	<i>Vaijyanti,</i>	<i>Ruksha</i> (Unctuous)
<i>Kanguni</i>	Setaria italica Linn. Beauv	<i>Kanguni, Pitatandula, Vatal, Sukumar, Priyangyu</i>	<i>Guru</i> (Heavy) <i>Ruksha</i> (Unctuous)
<i>Cheena</i>	Panicum miliaceum Linn.	<i>Varak, Sthulkangu, Sthul priyangyu, Kangubhed, Marha</i>	<i>Ruksha</i> (Unctuous)
<i>Jwar/ Yavanala</i>	Sorghum vulgare pers.	<i>Jurnahwa, Yavnal, Raktika Krostupuccha,</i>	<i>Guru</i> (Heavy), <i>Sheet</i> (Cold)
<i>Ragi/ Nartiki</i>	Eleusine coracana Linn.	<i>Madhuli, Ragika, Nartak, Madua</i>	<i>Laghu</i> (Light), <i>Sheet</i> (Cold)

Bajra	Pennisetum typhoides	<i>Bajranna, Sajak, Nalika, Neelkaran</i>	<i>Ruksh</i> (Unctuous), <i>Ushna</i> (Hot)
Neewar	Hygroryza aristata Nees.	<i>Tini, Aranyadhanya, Munidhanya, Trinodbhav, Munidhanya, Trinodbhav</i>	<i>Laghu</i> (Light) <i>Snigdha</i> (Oily), <i>Sheet</i> (Cold)

Table No.4: Therapeutic indication of millets in Ayurveda ²⁰

Millet	Therapeutic uses
Sama (Barnyard Millet)	<i>Shoulya</i> (Obesity), <i>Raktapitta</i> (Bleeding disorders), <i>Pittaj kasa</i> (Cough), <i>Urustambha</i> (Stiffness of thighs), <i>Stanyadosa</i> (Disease related to Breastmilk), <i>Jalodara</i> (Ascites)
Kodo Millet	Obesity, <i>Raktapitta</i> , <i>Pittaj kasa</i> , <i>Visha</i> (Poison), <i>Urustambha</i>
Gavedhuk	Obesity, <i>Kapaj Chardi</i> (Vomiting)
Kanguni (foxtail Millet)	<i>Kustha</i> (Skin disease) <i>Vatakarak</i> , <i>Pitta-dahanashak</i> (Destroyer of burning sensation), <i>Bhagna- asthi Sandhan</i> (Treat to Fracture)
Cheena (Common Millet)	<i>Brihana</i> (Nourishing)
Jwar	<i>Brihana</i> , <i>Malrodhak</i> (Anti-Diarrhoea), <i>Ruchikarak</i> (Appetizer), <i>Viryavardhak</i> (Semen booster)
Ragi (Finger Millet)	<i>Brihana</i> <i>Triptikarak</i> (Satiety), <i>Balakarak</i> (Promotes strength), <i>Raktapitta Shamak</i> (Bleeding disorders demulcent)
Bajra	<i>Balya</i> , <i>Agnideepak</i> (Increasing appetite), <i>Strikamodpadaka</i> (Aphrodisiac)
Neewar	<i>Raktapitta</i> , <i>Vatarakta</i> (Gout), <i>Pathya</i> (Dietary), <i>Kaphkarak</i> , <i>Malamutra rodhak</i> (stool and urine blocker)

Table No.5: Nutrient value of millets & Indian Foods ²¹

S.No.	Millets	Protein (gm)	Fiber (gm)	Minerals (gm)	Iron (gm)	Calcium (gm)
1.	Sorghum	11	6.7	2.7	3.4	13
2.	Finger millet	7.3	3.6	2.7	3.9	344
3.	Foxtail millet	12.3	8	3.3	2.8	31
4.	Kodo millet	8.3	9	2.6	0.5	27
5.	Little millet	7.7	7.6	1.5	9.3	17
6.	Pearl millet	10.6	1.3	2.3	16.9	38
7.	Proso millet	12.5	2.2	1.9	0.8	14
8.	Barnyard millet	11.2	10.1	4.4	15.2	11

Source:- ICAR - Indian Institute of Millets Research, 2017

Table No.6 :Therapeutic Properties and use of Millets ^{22,23}

Millets	Therapeutic Properties and use
Priyangu (<i>Kangu</i>)	<ul style="list-style-type: none"> <i>Guru</i> (heavy for digestion), <i>Sangrahi</i> (absorbs excess fluids and aids in the natural development of feces and increases digestion), <i>Brumhana</i> (nourishes bodily tissues), <i>Shoshana</i> (dries up extra moisture), <i>Bhagnasandhanakrit</i> (heals fractures) <i>Durjara</i> (difficult for digestion) <i>Vrishya</i> (aphrodisiac) <i>Kangu</i> also decreases labor pain and used in <i>Amvata</i>. A substitute for rice.
<i>Cheenaka/ Cheena</i>	<ul style="list-style-type: none"> <i>Guru</i> (heavy for digestion), <i>Durjara</i> (difficult for digestion), <i>Brumhana</i> (nourishes the body tissues) <i>Bhagnasandhanakara</i> (promotes fracture healing)
<i>Shyamaka/Sawa</i>	<ul style="list-style-type: none"> <i>Sangrahi</i> (absorbs excessive fluids and helps for normal formation of feces) <i>Dhatu Shoshak</i> (dries the body tissues) <i>Shyamak Panchang</i> is used in <i>Pittaj Vikara</i> and <i>Vibandha</i> (constipation)
<i>Koradusha (Kodrava)</i>	<ul style="list-style-type: none"> <i>Guru</i> (heavy for digestion) <i>Param Graahi</i> (absorbs excessive fluids and helps for normal formation of feces) <i>Vishahara</i> (anti-poisonous) <i>Avrishya</i> (anaphrodisiac) <i>Pathya</i> in <i>Vrana</i> (good food in wounds and ulcers) As a substitute for rice to diabetic patients
<i>Gavedhuka</i>	<ul style="list-style-type: none"> <i>Karshyakaari</i> (emaciating) <i>Kapha Hara</i> (decreases <i>Kapha Dosha</i>). <i>Gavedhuka</i> also has properties like <i>Mutral</i> (diuretic) and is hence used in

	<p><i>Mutra Krich.</i></p> <ul style="list-style-type: none"> • The roots of this plant are used in <i>Pidita Artava</i> (dysmenorrhea). • Chapati made from this grain helps in weight loss.
Yavanala	<ul style="list-style-type: none"> • <i>Ruchya</i>(enhances taste perception), • <i>Trishnaghna</i> (decreases excessive thirst) • <i>Kledaghna</i> (decreases excessive moisture content). • <i>Mutrajanan</i> (urogenesis) • <i>Slightly Vrishya</i> (aphrodisiac)
Ragi/ Nartiki	<ul style="list-style-type: none"> • <i>Sheeta</i>(cold in potency), • <i>Snigdha, Balya</i> (promotes strength), • <i>Vrishya</i> (aphrodisiac).
Neewar	<ul style="list-style-type: none"> • The roots and seeds are sweet, acrid, cooling, diuretic, constipating and tonic. • It is useful in diarrhoea, ear diseases, burning sensation, excessive thirst, fatigue and general weakness.

Health Benefits of Millets :

Millets may have health benefits. According to epidemiological studies, eating millets lowers the risk of heart disease, protects against diabetes, improves the digestive system, lowers the risk of cancer, detoxifies the body, boosts immunity and respiratory health, gives you more energy, strengthens your muscles and nervous system, and protects against a number of degenerative diseases like metabolic syndrome and Parkinson's disease. (Manach *et al.*, 2005; Scalbe Neewar *et al.*, 2005; Chandrasekara and Shahidi, 2012.

1. **Diabetes**²⁴ Various research findings indicated those who ate millet as part of their diet had lower blood sugar levels. Whole grain-based diets typically lower triglycerides, blood pressure, and LDL cholesterol while elevating HDL cholesterol (Anderson, 2003). Sorghum's high dietary fibre content and low glycemic index may aid in the prevention and management of T2D. The presence of fibre, magnesium, vitamin E, phenolic compounds, and tannins in diet lowers the chance of developing diabetes as they delay the abrupt rise in blood sugar and insulin levels (Montonen *et al.*, 2003).

National Institute of Nutrition (ICMR) in 2010 assessed Glycemic Index (GI) of sorghum based foods in collaboration with the Indian Institute of Millets Research, Hyderabad under National Agricultural Innovation Project (NAIP). The results revealed that sorghum based foods have low GI and reduces the postprandial blood glucose level, glycosilated hemoglobin.

Table No.6: Health Benefits of Millets in Diabetes

Author/ Researcher	Tested In	Outcome
(Kumari and Sumathi, 2002)	Non-insulin dependent diabetes mellitus (NIDDM) subjects.	Due to the high fibre content and alpha amylase inhibitory capabilities of finger millet, which are known to limit starch digestion and absorption, diets based on this grain have demonstrated reduced glycemic responses.
Vahini and Bhaskarachary, 2013).	Human subjects	The chapatti made with white Jowar flour had a lower glycemic index. These modifications in glycemic index brought on by processing and heating have a significant impact on the diets used for diabetic dietary control.
Rajasekaran et al.	Diabetic rats	Finger millet has shown significant results in dermal wound healing process also showed that it improves antioxidant status and controlled blood sugar levels.
Ugare <i>et al.</i> , 2011).	Human subjects	Barnyard millet has been reported to be beneficial for type 2 diabetics especially the dehulled varieties, as the glycemic index for dehulled millet (50.0) and heat treated was 41.7.
Brennan <i>et al.</i> , 2012	Invitro study	The rapidly digestible carbohydrate and slowly digestible carbohydrates were reduced significantly in the invitro studies performed in the extruded products made from amaranth, buckwheat and millet combination food products
(Shobana <i>et al.</i> , 2009).	Invitro study	The strong inhibition on α -glucosidase and pancreatic amylase were found by few other phenolic compounds from the millet seed coat.
Sireesha <i>et al.</i> , 2011).	STZ diabetic rats	The aqueous extracts of foxtail millets have excellent anti-hyperglycemic activity.
Park <i>et al.</i> , 2008	Obese type 2 diabetic mice	Proso millet had shown to improve the glycemic responses and insulin in genetically obese type 2 diabetic mice under high fat feeding conditions.
Heon Park et.al	Mice	The hypoglycemic effect of SE (sorghum extract) may be related with the regulation of PPAR- γ -mediated (peroxisome proliferator-activated receptor gamma) metabolism in this mouse model.

2. Cancer²⁵: Millets are rich in antinutrients such phytates, tannins, and phenolic acids that reduce the risk of cancer. Millets contain linolic acid, which aids in cancer prevention. Sorgham possesses anticancer and antimutagenic properties as a result of the tannins and polyphenols that are present in it. Sorghum and millet's fibre content and phenolic content have been linked to a decreased risk of esophageal cancer than people who consume wheat or maize (Van Rensburg, 1981).

Table No.7: Health Benefits of Millets in Cancer

Author/ Researcher	Tested In	Outcome
(Gomez-Cordovez et al., 2001).	In Vitro study	The polyphenols and tannins present in sorghum can act against human melanoma cells, as well as positive melanogenic activity.
Grimmer et al., 1992)	In Vitro study	The polyphenols and tannins present in sorghum have anti-mutagenic and anti-carcinogenic properties.
Bowei Zhang et.al.	in Mice	Millet treatment inhibited the phosphorylation of STAT3 and the related signaling proteins involved in cell proliferation, survival and angiogenesis
Shuhua Shan	In Vitro study	the millet bran-derived peroxidase has a therapeutic potential in the management of colon cancer.
Nidhi Singh et.al.	In Vitro study	polyphenols of millets could be used as a natural source of antimicrobials and antioxidants, especially for minimizing the risk of diseases arising from oxidative deterioration and also cytotoxic effects.

3.Cardiovascular Diseases

Millets are abundant in phytochemicals and Magnesium that decrease cholesterol and assist to avoid heart disease.²⁶Also, the potassium present in millets helps in keeping blood pressure low by acting as a vasodilator and help to reduce cardiovascular risk. The high fiber present in millets plays a major role in cholesterol lowering eliminating LDL from the system and increasing the effects of HDL.The lignin and phytonutrients in Pearl millet act as strong antioxidants thus preventing heart related diseases.

Table No.8: Health Benefits of Millets in Cardiovascular Diseases

Author/ Researcher	Tested In	Outcome
Kumari and Thayumanavan, 1997	Rats	The rats fed with diet of treated starch from barnyard millet had shown to lower blood glucose, serum cholesterol and triglycerides compared with rice and other minor millets
Lee et al., 2010).	In hyperlipidemic rats	The finger millets and proso millets have also shown to lower significantly the concentrations of serum triglycerides than white rice and sorghum fed rats and prevent cardiovascular disease by reducing plasma triglycerides.
Carr et al., 2005	In hamsters	GSL diet lowers non-HDL cholesterol and Liver cholesterol ester concentration was also significantly reduced in hamsters fed with GSL (grain sorghum lipid extract).
Heidemann et al. (2008	Prospective study in Women	The regular consumption of balanced diet which includes whole grains, vegetable, fruit, fish and poultry diet reduce the risk of CVD and total mortality.
(Jensen et al., 2004	Prospective study in men	The found intake of whole grains 40g/ per day reduces the risk of CHD by 20%.

4. Gastrointestinal Disorders - Celiac disease

Millets' fibre content aids in the cure of conditions including constipation, excessive gas, bloating, and cramps. Celiac disease is an immune-mediated enteropathic condition that, in susceptible people, is typically brought on by consuming gluten. (Catassi and Fasano, 2008). People following a gluten-free diet may benefit from substituting cereals manufactured from grains other than wheat, barley and rye, such as rice, corn, sorghum, millet, amaranth, buck wheat, quinoa and wild rice. (Thompson, 2009). Sorghum can be a healthy diet for those who are ailing from celiac disease as it is gluten free. (Carolina et al., 2007).

5. Detoxification (Anti-oxidant Properties) and Oxidative Stress

Many of the anti-oxidants in millet have a positive effect on scavenging the cancer-causing free radicals and eliminating other toxins from the body, including those present in the kidney and liver. By encouraging appropriate excretion and reducing enzymatic activity in those organs, quercetin, curcumin, ellagic acid, and a number of other advantageous catechins can aid in the removal of any unwanted substances and poisons from the body. The pathophysiology of many illnesses, including Alzheimer's disease, myocardial infarction, atherosclerosis, Parkinson's disease, and auto-immune disorders, is connected to oxidative stress and is caused by free radicals. Antioxidants are crucial in stopping the oxidation process, which minimises cellular damage. Sorghum may be able to protect against reactive oxidative species by acting as an antioxidant.

Table No.9: Health Benefits of Millets in Detoxification

Author/ Researcher	Tested In	Outcome
Chandrasekara and Shahidi, 2010	In vitro study	The antioxidant, metal chelating and reducing powers are shown by the soluble and insoluble bound phenolic extracts of several varieties of millet (kodo, finger, foxtail, proso, pearl and little millets)
Choi et al., 2007)	In vitro study	A positive and significant correlation ($R^2 = 0.9973$, $P < 0.01$) between polyphenolic content and radical cation scavenging activity was observed.
Hegde and Chandra, 2005	In alloxan-induced rats	Kodo millet, finger millet, little millet, foxtail millet, barnyard millet, and sorghum bicolor grown in India and their white varieties were screened for free radical quenching of 1,1, diphenyl-2-picrylhydrazyl (DPPH) by electron spin resonance.
Dykes and Rooney, 2006	In vitro study	finger millet extracts were found to have a potent radical-scavenging activity that is higher than those of wheat, rice, and other species of millet.
potency (Mohamed <i>et al.</i> , 2012).	In vitro study	The defatted foxtail millet protein hydrolysates exhibited antioxidant potency

Thus, millets may serve as a natural source of antioxidants in food applications and as a nutraceuticals and functional food ingredient in health promotion and disease risk reduction.

6. Obesity

Evidence from experiments suggests that eating a high-fiber diet lowers the prevalence of obesity (Alfieri *et al.*, 1995; Burkitt and Trowel, 1975). Sorghum is rich in dietary fibre and has unique chemical and physical characteristics (bulk to the diet, viscosity, water holding and absorption capacity) which determine the subsequent physiological behaviour. It aids to the hunger satisfaction, increases satiety and thereby reducing the risk of development of obesity.

7. Anti-allergic: -

The grain itself has a very minimal likelihood of producing allergy responses and is very digestible. Due to its hypoallergenic qualities, it can be safely consumed by newborns, breastfeeding mothers, the elderly, and those who are convalescing.

8. Bone health:-

The Calcium, which helps to build bones, is abundant in ragi. Consuming ragi supports bone health in adults as well as bone growth in developing youngsters. Ragi may lower fracture risk and protect against illnesses like osteoporosis.

9. Anxiety and Insomnia:-

Consuming ragi aids in natural bodily relaxation. It helps with anxiety, sadness, and insomnia (nights without sleep). Ragi can help with migraines as well.²⁷

Discussion:-

1. **Pearl millet (Bajra)** – By virtue of these properties *Katu* and *Tikta Rasa* and *Teekshna Guna* the pearl millet (*Bajra*) use in the management of *Krumi* (Worm infestation), *Shula* (GI ulcers), *Jvara* (Fever) disease. The pearl millet have properties of *Katu, Tikta Rasa* so use in management of *Raktapitta* (Bleeding disorders), *Raktadosha* (haematological disturbances) *Kandu* (Pruritis), *Trushna* (Dyspepsia) disease. In pearl millet *Katu, Tikta Rasa Ruksha Laghu Guna* Properties use in treatment of *Vrana* (Wounds and ulcers). The *Ashmari* (Calculi) treat by pearl millet due to its *Katu, Tikta Rasa, Teekshna Guna, Katu Vipak* Properties.

2. **Sorghum (Jowar)**-The Sorghum (*Jowar*) have *Pittaghna, Rakta Shamaka* Properties so beneficial in the management of *Raktapitta* (Bleeding disorders), *Amlapitta* (Gastric disturbances), *Twak Roga* (Skin diseases). the condition of *Trishna* (Thirst), *Sthoulya* (Obesity) treated by *Sorghum (Jowar)* due to presence of *tikta* and *kashaya rasa*. *Prameha* (Diabetes mellitus) also manage by *Sorghum (Jowar)* due to *Kaphahara* property. As sorghum (*jowar*) is gluten free so use in management of celiac disease.

3. **Finger millet (Ragi)**- The finger millet have *Madhura Rasa, Sheeta, Snigdha Gunayukta* properties. The mode of action *sheeta* (cold in potency) is anabolic in action so its use in management of *Raktapitta* (Bleeding disorders), *Amlapitta* (Gastric disturbances), *Twak Roga* (Skin diseases).

4. **Little millet (Sama)** – The little millet (*sama*) have *sangrahi* property. the mode of action of *sangrahi* property is absorbs excessive fluids and helps for normal formation of faeces and enhances digestion so millet (*Sama*) use in management of *atisara* (Diarrhea). The *badda vitkara* property of little millet (*sama*) use in *grahani* (Irritable bowel syndrome) management due to mode of action of *badda vitkara* is compactness of faeces. The mode of action of *shoshana* property is dries up excessive moisture so *sama* use in treat the *sthoulya* (Obesity). The *sama* use in *medoroga* (Diseases due to excessive lipids) due to *ruksha* property. the mode of action of *ruksha* property is reduces unctuousness. Sama have *Badda Mutrakara* property the mode of action of this property is promotes normal formation of urine so *sama* use for *Prameha* (Diabetes mellitus). *Twak Vikara* (Skin diseases), *Amavata* (Rheumatoid arthritis) treated by *sama* due to *lekhaniya* (Scraping) property.

5. **Foxtail millet (Kangu or Priyangu)** –Due to *sangrahi* property the *priyangu* use for *atisara* (Diarrhea). The mode of action of *brumhana* (Nourishing) and *Shoshana* (Dries up excessing moisture) properties is it can be used for *dhatu shoshana* (Reduction of body tissues) of over nourished *Dhatu*s like *Meda* (Adipose tissue) and *Mamsa* (Muscle tissue) meanwhile it can also provide nourishment by supplying micro-nutrients so *priyangu* use in

management of *Sthoulya* (Obesity) and *Prameha* (Diabetes mellitus). *Priyangu* also have *Bhagnasandhanakrit* property the mode of action this property is as it's guru so use in *asthi bhagna* management.

6. Proso millet (*Cheenak*) – Guru (Heavy), *Ruksha* (Reduces unctuousness), *Kaphahara* (Pacifies *kapha*) properties present in *Cheenak* so proso millet indicated in *Sthoulya* (Obesity), *Prameha* (Diabetes mellitus), *Medoroga* (Diseases due to excessive lipids). The ability of proso millet in increasing the HDL levels thus may have strong protective effects against the risk of coronary heart disease development. Proso millet have properties of pro-apoptotic, anti-adipocytic activities toward adipocytes so useful in obesity.

7. Kodo millet (*Kordusha*)- The mode of action of *param grahi* and *badda vitkara* is absorbs excessive fluids and helps for normal formation of faeces and enhances digestion and compactness of faeces so *kordusha* use in management of *Grahani* (Irritable bowel syndrome). Due to *kleda shoshana* propertie of *kordusha* use in treat *vrana* (Wound and ulcers). the mode of action of *kleda shoshana* is dries up excessive moisture. *Kordusha* also have property of *Ruksha* and mode of action of it reduces unctuousness so use in *Santarpana Janya Vyadhi* like *Sthoulya* (Obesity) *Prameha* (Diabetes Mellitus). Due to properties of , *Lekhana* and *Vatarakra Kordusha* use in treat the) *Medoroga* (Diseases due to excessive lipids). the mode of action of *Lekhana* and *Vatarakra* is scraping and increases *Vata*.

Conclusions-

The purpose of this study to promote millets as a nutrient-dense food and increase public knowledge of the importance of food. Due to their high nutritional content, they also include fibre, which aids in the treatment of metabolic illnesses such as diabetes, obesity, and cardiovascular diseases. Their high calcium level, which helps bone formation in both children and elderly individuals, and their high protein content, which promotes kid growth and development All millet foods offer substantial health benefits, including their high iron content, which promotes the treatment of anaemia, and their lack of gluten, which assists the treatment of celiac disease. They are abundant in micronutrients including calcium, phosphorus, and iron. Millets' dietary fibre makes the body bulkier and helps it absorb water. It assists in bodily cleaning and minimises the risk of intestinal illness. Millets minimise the incidence of colon cancer, lower blood pressure, function as an anti-acidic, and prevent type-2 diabetes. Jowar, Bajra, Ragi/Mandua, Kanngani/kakun, Cheena, Kodo, Sawa, Kutki, Kuttu, and Chaulai are among the millets. Due to the presence of polyphenols, phytosterols, anthocyanins, and tannins, among other compounds, millets have therapeutic qualities. Millets prevents metabolic diseases like diabetes and obesity. Millets is helpful for digestive problems and nourishes body.

The greatest applications for millets are Santarpanajanya Vikara (diseases brought on by excessive nutrient intake) and Kapha-Pitta Doshaja Vikara (diseases brought on by Kapha and Pitta). However, in Vataja Vyadhi (diseases brought on by vitiated Vata), they should be avoided or utilised with caution. There are several Patya Kalpanas (Food preparations) that can be made from millets, therefore it is possible to select a preparation that is suitable for both the patient and the disease (Roga) in order to reap the full health advantages of millets.

REFERENCES-

1. Robert F. The words of Medicine. Charles C Thomas Publisher Ltd., Springfield, USA. 2000; 121.
2. Amir Gull., Romee Jan., Gulzar Ahmad Nayik, Kamlesh Prasad and Pradyuman Kumar, Significance of Finger Millet in Nutrition, Health, and Value-added Products: A Review: Journal of Food Processing & Technology 2014: Vol.3. No .3, 1601-1608.
3. Sarita, Ekta Singh. The potential of Millets: Nutrients Composition and Health Benefits. Journal of Scientific and Innovative Research, 2016 5(2): 46-50.
4. Veena B. Nutritional, functional and utilization studies on barnyard millet. M. Science Thesis, University of Agricultural Sciences, Dharwad (Karnataka), India. 2003.
5. Acharya kaiyadeva. Dhanya varga. In: Prof priya vrat sharma, Dr guru prasada sharma (eds.) Kaiyadeva Nighantu (Pathyaapthya vibhodika). Varanasi: Choukambha Orientalia; 1979. p. 301.
6. Acharya charaka. Sutrasthana, Annapanavidhi Adhyaya. In: Vaidya Jadavaji Trikamji Acharya (ed.) Charaka Samhitha. Delhi: Chaukhamba Prakashan; 2011. p. 154.
7. Bhavamishra. Dhanyavarga. Dr K.C. Chuneekar (cm.) Dr G.S Pandey (ed.) Bhavaprakasha Nighantu Varanasi: Chowkhamba Bharti Academy; 2002. p. 656-661.
8. Bora P, Ragaee S, Marcone M. Characterisation of several types of millets as functional food ingredients. International journal of food sciences and nutrition. 2019 Aug 18;70(6):714-24.
9. Shweta Malik, Pearl Millet-Nutritional Value and Medicinal Uses (Food & Nutrition) Dept. of Home Science, B.P. S Women's University Khanpur Kalan (Hry) www.ijariie.com, 2015 Vol-1 Issue-3.
10. ICAR - Indian Institute of Millets Research, 2017 (IIMR).
11. O.S.K. Reddy, Smart Millet, and Human Health, Green Universe Environmental Services Society. 2017.
12. Jana Kalinova, nutritionally important components of Proso millets (*panicum miliaceum* L.) food 1(1), 91-100 global science books.
13. Deshpande, S. S., Mohapatra, D., Tripathi. M. K., and Sadvatha R. H. Kodo millet-Nutritional Value and Utilization in Indian Foods, ICAR-Central Institute of Agricultural Engineering, Nabibagh, Journal of Grain Processing and Storage 2015. Vol 2.
14. Acharya charaka. Sutrasthana, Annapanavidhi Adhyaya. In: Vaidya Jadavaji Trikamji Acharya (ed.) Charaka Samhitha. Delhi: Chaukhamba Prakashan; 2011. p. 154.
15. Bhavamishra. Dhanya varga. In: Srikantha Murthy, K.R (ed.) Bhavaprakasha. Varanasi: Chowkhamba Krishna Das Academy; 2011. p. 374.
16. Acharya kaiyadeva. Dhanya varga. In: Prof priya vrat sharma, Dr guru prasada sharma (eds.) Kaiyadeva Nighantu (Pathyaapthya vibhodika). Varanasi: Choukambha Orientalia; 2009. p. 301.

17. Acharya charaka. Sutrasthana, Annapanavidhi Adhyaya. In: Vaidya Jadavaji Trikamji Acharya (ed.) Charaka Samhitha. Delhi: Chaukhamba Prakashan; 2011. p. 154-155.
18. Bhavamishra. Dhanya varga. In: Srikantha Murthy,K.R (ed.) Bhavaprakasha. Varanasi: Chowkhamba Krishna Das Academy; 2011. p. 374.
19. Acharya kaiyadeva. Dhanya varga. In: Prof priya vrat sharma, Dr guru prasada sharma (eds.) Kaiyadeva Nighantu (Pathyaapthya vibhodika). Varanasi: Choukambha Orientalia; 2009. p. 318.
20. Chuneke KC. Bhava Prakash Nignantu of Bhav Mishra. Hindi Commentary Chaukhambha Bharti Academy, Varanasi, Uttar Pradesh, India. 2013.
21. ICAR - Indian Institute of Millets Research, 2017.
22. Pooja Hassan G, Unnikrishnan PM, Sankanagoud Patil; An eyeshot on *KshudraDhanyain* Ayurveda, Journal of Ayurveda and Integrated Medical sciences, July-Aug 2021,Vol.6,Issue 4.
23. Bhavamishra. Dhanyavarga. Dr K.C. Chunekar (cm.) Dr G.S Pandey (ed.) Bhavaprakasha Nighantu Varanasi: Chowkhamba Bharti Academy; 2002. p. 656-661.
24. American Diabetes Association. Diagnosis and classification of diabetes mellitus. Diabet Care. 2005; 28: 37-42.
25. Chandrasekara A, Shahidi F. Bioaccessibility and antioxidant potential of millet grain phenolics as affected by simulated in vitro digestion and microbial fermentation. J Funct Foods. 2012; 4: 226-237.
26. Veena B. Nutritional, functional and utilization studies on barnyard millet. M. Science Thesis, University of Agricultural Sciences, Dharwad (Karnataka), India. 2003
27. Dayakar Rao B., Bhaskarachary K., Arlene Christina G.D., Sudha Devi G., Vilas, A. Tonapi, 2017, Nutritional and Health benefits of Millets. ICAR_Indian Institute of Millets Research (IIMR) Rajendranagar, Hyderabad, PP 112