WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 13, Issue 13, 704-711. Research Article ISSN 2277–7105

ROLE OF FOXTAIL MILLETS (*KANGARI*) IN HYPERTENSIVE DISORDER

Dr. Ashwini Sharadrao Kawale[1]* and Dr. Vinod Choudhary[2]

[1]PG Scholar of Rachana Sharir, Shri Ayurved College, Nagpur.

[2]Prof and HOD of Rachana Sharir, Shri Ayurved College, Nagpur.

Article Received on
15 May 2024,

Revised on 05 June 2024,
Accepted on 25 June 2024

DOI: 10.20959/wjpr202413-32842

***Corresponding Author**
Dr. Ashwini Sharadrao Kawale
PG Scholar of Rachana Sharir, Shri Ayurved College, Nagpur.

ABSTRACT

Objective: High blood pressure has now become a major public health problem worldwide. Hypertension is a primary risk factor for cardiovascular disease, including stroke, heart attack, heart failure, and aneurysm. Main aim for undertaking this study is to control life style disorder mainly hypertension by dietary changes and these are recommended first line treatment for mildly hypertensive subject. **Materials & Method:** Material related to hypertension, millets and other relevant topics have been collected. Reffer to the various websites and selective journals to collect information regarding current researches on the relevant topic. The protein of foxtail millet after extruding or fermenting and the raw foxtail millet was extracted and hydrolyzed by digestive protease to generate angiotensin converting enzyme (ACE) inhibitory peptides. Foxtail millet protein hydrolysates and thus lower BP. **Results:** Daily consumption of foxtail millet reduces BP, body mass index, body fat percentage, and fat mass in untreated mildly hypertensive subjects, but without affecting their dietary habits. **Conclusion:** This study will impact on patient that just by adding dietary changes into diet can heal a disease. And will lead to a healthy life.

KEYWORDS: Millets, Hypertension, Cardiovascular disease, Stroke, Heart attack, Heart failure, and Aneurysm, Foxtail millet (*Kangari*).

INTRODUCTION

Hypertension is a major cause of disease worldwide.[1] Hypertension or high blood pressure is a leading risk factor for many cardiovascular diseases. As the blood pressure remains high, the vascular tone increases, and vasoconstriction dysfunction occurs, leading to the need for

revascularization.[2,3] Hypertension is usually managed with drugs belonging to a class called as "ACE inhibitors", they work by relaxing the blood vessels which helps in reducing the blood pressure. ACE-inhibitor molecules are also found in food sources like foxtail millet.[4] Foxtail millets, magical millets or miracle grains are natively known as Kangni, Kang and *kakum.* Finger millet (Eleusine coracana) is a nutritious crop because of its high calcium and polyphenol contents.[5]

Qualities of Foxtail millets as per *ayurveda-Guru* (heavy for digestion), *Sangrahi* (absorbs excessive fluids and helps for normal formation of faeces and enhances digestion), *Brumhana* (nourishes the body tissues), *Shoshana* (dries up excessive moisture), *Bhagnasandhanakrit* (fracture healing), *Durjara* (difficult for digestion) and *Vrishya.*[6,7]

Potential uses of foxtail millets

- Foxtail millets are rich source of iron, which is required for the formation of haemoglobin, thus an increased iron intake may help manage iron-deficiency anaemia.
- The presence of insoluble fibres in foxtail millets reduces the risk of gallstones by reducing the production of bile acids (end products of cholesterol metabolism) and decreasing bile cholesterol levels.[8]
- The fibre content in millets aid bowel movements and may provide relief from constipation.[9]

ACE-inhibitor molecules are also found in food sources like foxtail millet. the consumption of foxtail millet can have a positive impact on blood pressure. However, we need more studies to support these claims.[9] The protein of foxtail millet after extruding or fermenting and the raw foxtail millet was extracted and hydrolyzed by digestive protease to generate angiotensin converting enzyme (ACE) inhibitory peptides. Foxtail millet protein hydrolysates and thus lower BP.As a diet, *Syamaka* and *Kangu* are recommended in *Rakta pitta* (Bleeding disorder) *uchharaktadab*.[10]

REFERENCE IN AYURVEDIC TEXT

According to Ayurveda, Foxtail millet increases vata dosha but balances doshas related to pitta, kapha and blood tissues.[11]

कैयदेवनिघण्टु - धान्यवर्ग

क्षुद्रधान्यं कुधान्यं च तृणधान्यमिति स्मृतम् ।

क्षुद्रधान्यमनुष्णं स्यात्कषायं लघु लेखनम् ।

मधुर कटुकं पाके रुक्ष च क्लेदशोषकम् ।

वातकृद् बद्धविट्कं च पित्तरक्तकफापहम् ॥६३॥

भावप्रकाश –

धान्यवर्ग स्त्रियां कङ्गुप्रियंगू दवे कृष्णा रक्ता सिता तथा ।

पीता चतुर्विधा कङ्गुस्तामा पीता वरा स्मृता ॥६४॥

कङ्गुस्तु भग्नसन्धानवातकृद् बृंहणी गुरुः ।

रूक्षा श्लेष्महराऽतीव वाजिनां गुणकृद् भृशम् ॥६५॥

भावप्रकाश - धान्यवर्ग

कङ्गुणी कङ्गुनी प्रोक्ता चीनकः पीततण्डुलः ।वातलः सुकुमारश्च स च नानाविधाभिधः ॥१३२॥

प्रियङ्गुर्मधुरो रुच्यः कषायः स्वादुशीतलः । वातकृत्पित्तदाहघ्नो रुक्षो भग्नास्थिबन्धकृत् ॥१३३॥

राजनिघण्टु –

शाल्यादिवर्ग प्रियङ्गुः कङ्गुकश्चैव चीनकः पीततण्डुलः ।

अस्थिसम्बन्धनश्चैव कडगनी षट च कथ्यते ॥८३॥

धन्वन्तरिनिघण्टु - सुवर्णादिवर्ग

श्यामाकः श्यामकः श्यामस्त्रिबीजः स्यादविप्रियः ।

सुकुमारी राजधान्यं तृणबीजोत्तमश्च सः ॥१२६॥

श्यामाको मधुरः स्निग्धः कषायो लघुशीतलः ।

वातकृत्कफपित्तघ्नः सङ्याही विषदोषनुत् ॥१२७॥

Charak mentions Kudhanya means the alternate or staple food to be consumed in winter season to keep the body warm. i. Kodo(kordub) having rasas are kashaya and madhur; are

laghuguna and instigates/vitiates vata dosha- pacify kapha and pitta dosha; virya is sheet; grahi and dhatu shoshak;, we have a feeling of satisfaction and fullness. [Charak sutra sathanpage no. 528, 27/ 14]

Sushruta writes millets as Kudhanya- kodo, shayamak, nivar, shantnu, varak, udalak, priyangu, madhulika, nandimukhi, kuruvund, gvedhuk, varuk, todparni, mukundak, venuyav- all kudhanya are ushana, kashaya, madhur, ruksa,katu in vipak, kapha-nashak, mutra- alpata, vata- pitta prakopak. i. Kodo, nivar,shayamak, and shantanu are kashaya, madhur, and shit guna, pitta shamak.

Ashtangharidya has given the references of millets in chapter of annaswaroop-vijyaniya; millets are named as trindhanya or kudhanya or kshudradhanya, for example kangu(kaguni), kodav, having properties are sheetal, laghu, vat-karak, lekhan, kapha-pita nashak. These millets are cooked very easily and earlier than other cereals. it is one component of mixed grain (mandva and kodo) which helps for to complete nutrition and giving strength for preparing mixed grain roti.

Bhavprakash Nighantu mentions common properties of kshudradhanya-kinchitushan (keep warmth but in low ratio), madhur and kashaya rasa (sweet and astringent in taste), laghu (cooked easily, keeps body in lighter side), lekhan (to remove excess fat/ adipose tissue), vipakkatu (absorbed in circulation as a pungent taste product), ruksha (if we eat- it results dryness in the body), adarta ko sukhana (it pulls out water via hotastringent properties of millets), raktavikar and kaphavikarnashak (purifies blood and reduces fat).

MATERIALS AND METHOD

Material related to hypertension, millets and other relevant topics have been collected. Reffer to the various *samhitas, Ashtanghrudayam, Kaiyadevnighantu, Bhavprakash, Rajnighantu, Dhanvantari Nighantu,* websites and selective journals to collect information regarding current researches on the relevant topic. Modern literature and modern research article, textbook, magzines, journal, research paper, data available on the internet, online database, PubMed, and Google scholar were searched. All literature was reviewed and comiled.

PRIYANGU- FOXTAIL MILLET [SETARIA ITALICA] Kangu

Botanical Name - Setaria italica

Family - Gramineae

Vernacular Names

Sanskrit Name - Kangu

English Name - Foxtail millet

Hindi Name - Kanguni, Kagani, Tanguni

Marathi Name - Kang, rala.

Qualities of Kangu

Taste - sweet, astringent

Ruksha - dry in nature

Guru - heavy to digest

Ruchya - improves taste Virya (potency) – cold.

Varieties of Kangu

1. Black (krishna) variety
2. Red (laal) variety
3. White (sitha) variety
4. Yellow (pitha) variety

Yellow variety is considered to be the best.

Classical categorization

Bhavaprakasha Nighantu - Dhanya varga

Raja Nighantu - Shalyadi varga

Dhanvantari Nighantu - Suvarnadi varga

Kaiyadeva Nighantu - Dhanya varga

Shodala Nighantu - Trinadhanya varga.[6]

RESULTS

Daily consumption of foxtail millet reduces BP, body mass index, body fat percentage, and fat mass untreated mildly hypertensive subjects, but without affecting their dietary habits. Making changes to what you eat can help control high blood pressure. There is increasing evidence that macronutrients are effective in reducing blood pressure; the largest quantity of evidence for the effect of any of the three macronutrients influence on blood pressure exists for protein. Conversely low levels of potassium have been linked to poor adaptation of the kidney and dysregulated sodium retention and the development of hypertension. Diastolic hypertension is common in individuals with components of the metabolic syndrome such as

diabetes and hyperlipidemia, and diastolic blood pressure is the best predictor for future risk of CVD.[24,25]

CONCLUSION

Modern sophisticated sedentary lifestyle is giving rise to epidemic of Non-communicable diseases and Millets are best to be used in these Santarpanajanya Vikara (Diseases due to over nourishment) and Kapha-Pitta Doshaja Vikara (Diseases due to Kapha and Pitta). Millets can be used as a preventive diet in healthy and therapeutic diet in diseased. But they should be avoided or cautiously used in Vataja Vyadhi (Diseases due to vitiated Vata). Assessing Agni (Digestive capacity) of an individual before advising Millets is very much necessary. There are a lot of Patya Kalpanas (Food preparations) that can be prepared out of Millets so, preparation that suits both Rogi (Patient) and Roga (Disease) can be chosen to avail complete health benefits out of Millets.

REFERENCES

1. GBD. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks for 195 countries and territories, 1990–2017: A systematic analysis for the global burden of disease study, 2017. Lancet, 2018; 392: 1923–1994.
2. Liang, Y.; Gao, H.; Wang, J.; Wang, Q.; Zhao, S.; Zhang, J.; Qiu, J. Alleviative effect of grape seed proanthocyanidin extract on small artery vascular remodeling in spontaneous hypertensive rats via inhibition of collagen hyperplasia. Mol. Med. Rep., 2017; 15: 2643–2652. [CrossRef] [PubMed]
3. Vriz, O.; Magne, J.; Jarosh, J.; Bossone, E.; Aboyans, V.; Palatini, P. Local carotid arterial stiffness is an independent determinant of left ventricular remodeling in never-treated hypertensive patients. Blood Press, 2019; 28: 23–33. [CrossRef]
4. Chen, Jing et al. “Effect of foxtail millet protein hydrolysates on lowering blood pressure in spontaneously hypertensive rats.” European journal of nutrition, 2017; 56(6): 2129-2138. doi:10.1007/s00394-016-1252-7. Available at: https://pubmed.ncbi.nlm.nih.gov/27344669/
5. Devi, P.B.; Vijayabharathi, R.; Sathyabama, S.; Malleshi, N.G.; Priyadarisini, V.B. Health benefits of finger millet (Eleusine coracana L.) polyphenols and dietary fiber: A review. J. Food Sci. Technol., 2014; 51: 1021–1040. [CrossRef]

https://www.easyayurveda.com/2017/03/14/priyangu-callicarpa-macrophylla/#sanskrit_synonyms

6. Bhavamishra. Dhanya varga. In: Srikantha Murthy,K.R (ed.) Bhavaprakasha. Varanasi: Chowkhamba Krishna Das Academy, 2011; 374-377.
7. Acharya kaiyadeva. Dhanya varga. In: Prof priya vrat sharma, Dr guru prasada sharma (eds.) Kaiyadeva Nighantu (Pathyaapthya vibhodika). Varanasi: Choukambha Orientalia, 2009; 318-321. File:///D:/downloads/1405-Article%20Text-2806-1-10-20210915%20(1).pdf
8. Anitha, Seetha et al. "Can Feeding a Millet-Based Diet Improve the Growth of Children?-A Systematic Review and Meta-Analysis." Nutrients, 2022; 14(1): 225. 5 Jan. doi:10.3390/nu14010225. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8747143/
9. Vaṅgasena. Vaṅgasena Saṃhitā, Or, Cikitsāsāra Saṅgraha of Vaṅgasena: Nidānādhikāra to Ślīpadarogādhikāra. Virago Press, 2004; 253.
10. Shastry, S. *Millets for weight loss: Types of millets and their health benefits, Possible,* 2022. Available at: https://possible.in/millet-weight-loss-recipes-health-benefits-side-effects.html (Accessed: December 10, 2022).
11. https://www.netmeds.com/health-library/post/foxtail-millet-nutrition-health-benefits-ayurvedic-uses-and-recipes.
12. Chen, Jing et al. "Effect of foxtail millet protein hydrolysates on lowering blood pressure in spontaneously hypertensive rats." European journal of nutrition, 2017; 56(6): 2129-2138. doi:10.1007/s00394-016-1252-7. Available at: https://pubmed.ncbi.nlm.nih.gov/27344669/
13. Yadav T, editor Charak Samhita of Agnivesh, Sutra sthana. Ch11,3rd editions, Varansai: Chaukhamba Subharati Prakashana, 2008; 67.
14. Yadav T, editor, Charak Samhita of Agnivesh, sutra sthana, ch. 27,.3edition, Varansai: Chaukhamla Surabharati Prakashana, 2008; 526.
15. Vd. Yadav ji Trikamaji Aacharya, Susruta Samhita with commentary of Dalhan editions, Sutrasthana, chapter 45, Chaukhamaba Subharati Prakashan, Varanasi, reprint, 2010.
16. Dr Brahmanand Tripathi, Ashtarg Haridaya Nirmala Hindi commentary, sutra sthara, chapter 6, Chaukhamba Sanskrit Sanshtan, Varanassi, reprint, 2009.
17. Prof.K.C.Chunekar, Bhavprakasa Nighantu, Dhanyavarga,Varanasi: Chaukhamba Bharati Academy.reprint, 2022; 643.
18. [https://en.wikipedia.org/wiki/Proso_millet]

19. [https://www.boldsky.com/health/nutrition/health-benefits-of-samak-rice-barnyard-millet]
20. [https://apeda.gov.in/milletportal/Barnyard_millet.htm]
21. https://healthyday.net/kodo-millet-varagu-health-benefits-and-nutrition-facts/
22. https://www.caloriecounter.com.au/food/calories-in-jobs-tears-seed-whole/
23. https://pharmeasy.in/blog/12-nutritional-benefits-of-bajra-pearl-millets/
24. Tverdal A. Systolic diastolic blood pressures as predictors of coronary heart disease in middle aged Norwegian men. *Br Med J*., 1987; 294: 671–3. 10.1136/bmj.294.6573.671 [PMC free article] [PubMed] [CrossRef] [Google Scholar]
25. Franklin SS. The importance of diastolic blood pressure in predicting cardiovascular risk. *J Am Soc Hypertens.*, 2007; 1: 82–93. 10.1016/j.jash.2006.11.004 [PubMed] [CrossRef] [Google Scholar]