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Original Research Article

Rice-A Review of Nutritional and Medicinal Aspect Mentioned in Ayurveda

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Abstract: Rice not only an essential food but also a source of protein. Ancient Ayurvedic Acharyas described Raktashali red rice as a nutritive food and medicine. Rice is the second most used cereals in the world next to wheat. Ayurveda have attributed some medicinal properties too in addition to main stay as food. According to Ayurveda rice has the ability to alleviate or subdue Tridoshas (humors) - Vata, Pitta and Kapha -whose imbalance causes various types of diseases within the body. Different groups of rice have different effect on human body as they have different inherent properties. From being used as a diet for sick it has been used as a wholesome and rice is considered as best food in some diseases mentioned in different Ayurveda text.

Keywords: Rice, Sali, Sastika, Charak Samhita, Sushruta Samhita, Astanga Hridaya, Health advantages.

INTRODUCTION

Rice, or Oryza sativa, is an annual grain that is classified in the family-Poaceae. Rice is one of the most commonly consumed grains in the world with wheat remaining in first place. As a food, rice is frequently boiled, but it can also be ground into flour, and it is present in soups, side dishes, and main dishes. Not only is rice a staple food, but it is an active ingredient in medicine and cosmetics.

Ancient Ayurvedic Acharyas delineated Raktashali red rice as an alimentary food and medication. Alternative sorts of rice like Sastika, Sali(rice) and their healthful and nutritionary worth are delineated within the charka Veda (c.700BC) and therefore the Susruta Veda (c.400BC), inside the treatment of various aliments like vomiting, fever, haemorrhage, chest pain, wounds and burns.

In Bhavaprakasha Nighantu rice comes beneath Dhanya Varga. In Dhanvantari Nighantu, it comes in Suvarnaadi Varga. In Kaiyadeva Nighantu, it comes beneath Dhanya Varga. In Raja Nighantu, it comes beneath Shalyadi Varga.

AIM AND OBJECTIVES

- 1. Understanding how rice (Sali, Sastika) can be used as a nutrient-rich diet, as well as for therapeutic purposes.
- 2. To understand the scattered topics of rice in the Charak Samhita (Vedic literature) and the Sushruta Samhita (Vedic literature) and the Astanga Hridaya.
- 3. Exploration of rice and its numerous applications in Ayurvedic texts.

MATERIALS AND METHODS

Through analysis of various classical texts such as the Charak Samhita, Sushruta Samhita, Astanga Hridaya and numerous commentators, followed by critical appraisal.

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C. N.	Deferment	RICE MENTIONED IN CHAR	
Sr. No	Reference	Mention	Indication
1.	C.Su.4/17	Sthnyajanan Mahakashaya	Galactagogues' action
2.	C.Su.4/40	Sramahara Mahakashaya	Sramahara
3.	C.Su.5/12	Nitya Sevaniya Dravya	As a daily routine diet for better health
4.	C.Su.6/13	Hemant Ritu Charya	As Ahara
5.	C.Su.6/28	Greshma Ritu Charya	As Ahara
6.	C.Su.6/38	Varsha Ritu Charya	Protection of Agni(digestion)
7.	C.Su.6/43	Sarad Ritu Charya	
8.	C.Su.7/11	Adharaniya Vega Chikitsa	Retention of semen
9.	C.Su.13/90	Pancaprasrtika Peya	Snehana (Oleation)
10.	C.Su.15/16	Pathya Ahara	Vaman (Vomiting)
11.	C.Su21/31	As Ahara	Krushata Nashak (which remove the over-leanness)
12.	C.Su.21/52	As Ahara	Nidra Karak (which bring shortly the sleep)
13.	C.Su.25/38	Hitatam Ahara Dravya	As a daily routine diet for better health
14.	C.Su.27/8	Sukadhanya	
15.	C.Ni.2/4	As a Nidan	Raktapitta (Bleeding disorder)
16.	C.Ni.4/5	As a Nidan	Kaphaja Prameha (Diabetes)
17.	C.Sha.8/24	Garbha Sthapna Dravya	for stabilising the foetus during pregnancy
18.	C.Sha.8/28	lino Garbha Chikitsa	Treatment of <i>lino Garbha</i>
19.	C.Sha.8/56	As a Pathya Ahara	Pathya in Kshirodosho (For purification of breast milk)
20.	C.Ci.2-2/11	Vrushya Pupalikadi Yog	Vajikarana (Aphrodisiac)
20. 21.	C.Ci.2-2/11 C.Ci.2-2/16	Apatya Kar Swaras	Vajikarana (Aphrodisiac)
21. 22.	C.Ci.2-2/10 C.Ci.2-2/20	Vrishya Kshiram	
		Vrishya Kshiram Vrishyam Ghruta	Vajikarana (Aphrodisiac) Vajikarana (Aphrodisiac)
23.	C.CI.2-2-/23	<u>,</u>	
24.	C.Ci.2-2/25	Vrishya Dadhisara	Vajikarana (Aphrodisiac)
25.	C.Ci.2-2/27	Vrishya Swastika Odono	Vajikarana (Aphrodisiac)
26.	C.Ci.2-2/28	Vrishya Pupalika	Vajikarana (Aphrodisiac)
27.	C.Ci.2-3/8	Apatya Kar Kshira	Vajikarana (Aphrodisiac)
28.	C.Ci.2-3/13	Vrishya Pipalin Yog	Vajikarana (Aphrodisiac)
29.	C.Ci.2-3/14	Vrishya Payasa	Vajikarana (Aphrodisiac)
30.	C.Ci.2-4/23	Vrishya Masadi Pupalikadi Yog	Vajikarana (Aphrodisiac)
31.	C.Ci.3/178	Jwara Nashak Dravya	Jwara (Fever)
32.	C.Ci.3/179-182	Jwara Nasahk Yavagu	Jwara (Fever)
33.	C.Ci.4/36	Rakta Pitta Ahara	Raktapitta (Bleeding disorder)
34.	C.Ci.5/110	Pathya	Gulma (Abdominal lump)
35.	C.Ci.5/133	As Pathya Ahara	Gulma (Abdominal lump)
36.	C.Ci.6/20-21	As Pathya Ahara	Prameha (Diabetes)
37.	C.Ci.7/63	As Ahara	Kushtha (Leprosy)
38.	C.Ci.8/69	As Ahara	Rajyakshma (Tuberculosis)
39.	C.Ci.8/132	As Ahara	Rajyakshma (Tuberculosis)
40.	C.Ci.11/26	Raktasthivana formulation.	Kshytakhino (Emaciation)
41.	C.Ci.11/32	Nyogrodhadi Ghrita	Kshytakhino (Emaciation)
42.	C.Ci.12/63	Ahara	Swayathu (Oedema)
43.	C.Ci.13/67	Vataudaro Chikitsa	Udara Roga (Ascites)
44.	C.Ci.13/97	Ahara	Udara Roga (Ascites)
45.	C.Ci.13/165	Udar Nashak Yavagu	Udara Roga (Ascites)
46.	C.Ci.14/95	As Ahara	Arsha (Piles)
47.	C.Ci.14/191	Kutajadi Rasakriya	Arsha (Piles)
47.	C.Ci.14/191 C.Ci.14/193	As Ahara	Arsha (Piles)
49.	C.Ci.14/205	As Pathya	Arsha (Piles)
<u>49.</u> 50.	C.Ci.14/203	As Fainya Rakta Arsha Nashak Yog	Arsha (Piles)
51.	C.Ci.16/41	Chikitsa Upakrama	Pandu (Anaemia)
52.	C.Ci.17/74	As Ahara during Vaman karma	Hikka and Swasa (Hiccups & asthma)
53.	C.Ci.17/100	Pathya Ahara	Hikka and Swasa (Hiccups & asthma)
54.	C.Ci.18/76	wholesome diet for Vataja Kasa	Kasa (Cough)
55.	C.Ci.18/97	As a diet in the treatment of <i>Pittaja Kasa</i>	Kasa (Cough)
56.	C.Ci.19/35	Varcha Kshya	Atisara (Diarrhoea)
57.	C.Ci.19/56	As Ahara with Pitta Atisara Nashak Yog	Atisara (Diarrhoea)
58.	C.Ci.20/27	Ahara after Samsadhono	Chardi (Vomiting)
59.	C.Ci.20/33	An ingredient of Churna	Chardi (Vomiting)
60.	C.Ci.20/35	Pathya Ahara	Chardi (Vomiting)
61.	C.Ci.21/113	Pathya Ahara	Visarpa

THERAPEUTIC USES OF RICE MENTIONED IN VARIOUS AYURVEDA TEXTS RICE MENTIONED IN CHARAK SAMHITA [1]

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Sr. No	Reference	Mention	Indication
62.	C.Ci.22/28	Реуа	Trishna
63.	C.Ci.22/42	Trishna Shamak Yog	Trishna
64.	C.Ci.23/224	As Pathyanna	Visha (Poisoning)
65.	C.Ci.24/124	As Ahara	Madatya (Alcohol disorder)
66.	C.Ci.24/138	As Ahara	Madatya (Alcohol disorder)
67.	C.Ci.25/112	Payasa used for Tarpanartha	Vrana (Wound)
68.	C.Ci.26/21	Satavaryadi Kwatha	Pittaja Mutrakuchra (Urinary incontinence)
69.	C.Ci.26/142	As Pathya Ahara	Pittaja Pratishya
70.	C.Ci.27/40	Abastika Chikitsa.	Urusthambha
71.	C.Ci.28/114	Utkarikadi Upanaha.	Vatavyadhi (Neurological disorder)
72.	C.Ci.28/185	Pitta Abruta vata chikitsa	Vatavyadhi (Neurological disorder)
73.	C.Ci.29/50	Pathya Ahara	Vatarakta (Osteoarthritis)
74.	C.Ci.30/152	Vasti (enema)	Sukradosha (Azoospermia)
75.	C.Ci.30/257	Doshaghnanna	Purification of breast milk
76.	C.Si.3/27	As Ahara after Vasti	Niruha Vasti Paschat Karma
77.	C.Si.3/51	Chandanadi Niruha Vasti	

Abbreviation: C-Charaka Samhita, Su-Sutra Sthana, Ni-Nidan Sthana, Sha-Shareera Sthana, Ci-Chikitsa Sthana, Si-Sidhi Sthana

RICE MENTIONED IN SUSRUTA SAMHITA [2]

Sr. No	Reference	Mention	Indication
1.	Su.Su.12/25	Atidagdha Chikitsa	As Pralepa in Atidagdha (burn wound)
2.	Su.Su.15/40	As Ahara	Krushata Nashak (which remove the over-leanness)
3.	Su.Su.19/32	Ahara	during recovery from wound
4.	Su.Su.20/4	Hitakari Dravya	As a daily routine diet for better health
5.	Su.Su.20/5	Pathytam Ahara	As wholesome diet for human being
6.	Su.Su.42/18	Madhura Varga Dravya.	Sweet group of drugs
7.	Su.Su.44/31	Vaman& Virechanik Sura	Vaman (Vomiting) & Virechan (purgative)
8.	Su.Su.44/82	Sadya Virechan Yavagu	Virechan (Purgative)
9.	Su.Su.45/7	To examine types of water	Ganga Jal & Samudra Jal (i.e., gangetic and oceanic water)
10.	Su.Su.46/4	Types of Sali rice	Types of rice
11.	Su.Su.46/5	General Qualities of Sali	Properties of rice
12.	Su.Su.46/7	Qualities of Rakta Sali	Specific properties of red rice
13.	Su.Su.46/8	Types of Sastika rice	Types of rice
14.	Su.Su.46/9	General Qualities of Sasthi rice	Properties of rice
15.	Su.Su.46/10-11	Qualities of Sastika rice	Specific properties of rice
16.	Su.Su.46/16-17	Qualities of Sali rice grown in	Properties of rice according to region
		Jangala Desha	
17.	Su. Sha.2/16	As Ahara	Vata Artava Dushta Chikitsa (Menstrual disorder)
18.	Su. Sha.10/4	As Ahara	women in 3 rd , 4 th , 5 th and 6 th month of pregnancy respectively
19.	Su. Sha10/16	As Ahara	Sutika Roga Chikitsa (Post-partum)
20.	Su. Sha.10/30	As Ahara	Sthanya Vardhana (In loss of lactation)
21.	Su.Ci.3/23	As Pralepa	if the junction of nail (with skin) is crushed and is full of vitiated
			blood
22.	Su.Ci.5/8	As Pralepa	to use in the predominance of Pitta&Vata Vatarakta
			(Osteoarthritis)
23.	Su.Ci.5/12	As Ahara	during intake of Pippali-Vardhamanaka
24.	Su.Ci.5/37	As Pathya Ahara	Urusthambha
25.	Su.Ci.6/17	As Ahara	to be taken during Bhallataka Sevana
26.	Su.Ci.9/5	As Pathya Ahara	Kushtha (Leprosy)
27.	Su.Ci.10/14	As Ahara	rice mixed with Ghee should be taken with Amalaka soup in
			Kushtha (Leprosy)
28.	Su.Ci.11/6	As Pathya Ahara	Prameha (Diabetes)
29.	Su.Ci.14/4	As Nitya Ahara	Udara (Ascites)
30.	Su.Ci.26/17	Vajikaran Utkarika	Vajikaran (Aphrodisiac)
31.	Su.Ci.26/22	Vajikar Pupalika	Vajikaran (Aphrodisiac)
32.	Su.Ci.31/40	Sadya Snehana Yavagu	Snehana (Oleation)
33.	Su.Ci.38/15	As Ahara	On the day of Niruha Vasti, there is a great risk of aggravation of
	a		Vayu and so boiled rice is advised
34.	Su.Ka.7/57	As Ahara	if bitten by Unmata
35.	Su.Ut.10/4		
36.	Su.Ut.26/23	As Ahara	Kaphaj Siro Roga (Head disorder)
37.	Su.Ut.39/262	As Ahara	for fever caused by Srama and Kshya (exertion & wasting)
38.	Su.Ut.39/315	As Ahara	residual pitta, after elimination, being localised in skin produces

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Sr. No	Reference	Mention	Indication
			fever, in such cases patient should eat rice
39.	Su.Ut.40/95	Atisarhar Yog	Atisara (Diarrhoea)
40.	Su.Ut.41/33	As Ahara	Samanya Chikitsa of Rajyakshma (Tuberculosis)
41.	Su.Ut.41/106	as a remedy	Pittaja Shula (Pain)
42.	Su.Ut.42/89	Sweda Payasa	Vatika Shula (Pain)
43.	Su.Ut.43/14	As Pathya	Vatika Hrid Roga (heart disease)
44.	Su.Ut.43/20	As Ahara	Krimija Hrid Roga (heart disease)
45.	Su.Ut.44/37	As Ahara	Pandu (Anaemia)
46.	Su.Ut.45/16	As Pathya	Raktapitta (Bleeding disorder)
47.	Su.Ut.46/16	As Pathya	Murcha (Fainting)
48.	Su.Ut.51/49	As Ahara	After Swedana (Sudation therapy)
49.	Su.Ut.53/12	As Ahara with jaggery and ghee	Vataja Swara Bheda
50.	Su.Ut.53/13	Payasa (rice milk) with	Pittaja Swara Bheda
		Yasthimadhu and Ghee	
51.	Su.Ut.64/14	Sarad Ritu Charya	As Ahara
52.	Su.Ut.64/23	Hemant Ritu Charya	As Ahara
53.	Su.Ut.64/34	Vasant Ritu Charya	As Ahara
54.	Su.Ut.64/50	Pravrut Ritu Charya	As Ahara

Abbreviation:S-Sushruta Samhita, Su-Sutra Sthana, Sha-Shareera Sthana, Ci-Chikitsa Sthana, Ka-Kalpa Sthana, Ut-Uttara Tantra

RICE MENTIONED IN ASTANG HRIDAYA [3]

Sr. No	Reference	Mention	Indication
1.	Ah.Su.3/29	Grisma Ritu Charya	As Ahara
2.	Ah.Su.3/50	Sarad Ritu Charya	As Ahara
3.	Ah.Su.4/20	Adharaniya Vega Chikitsa	Retention of semen
4.	Ah.Su.4/28	under regimen	to be adopted after purificatory measures
5.	Ah.Su.6/4	General properties of Sali Dhanya	
6.	Ah.Su.6/5	General properties of Rakta Sali Dhanya	
7.	Ah.Su.6/8-9	General properties of Sastika Dhanya	
8.	Ah.Su.6/25	discrimination of Dhanya	
9.	Ah.Su.7/3	feature of the poisonous boiled rice grain	
10.	Ah.Su.10/33	As an exception	all the substances having <i>Madhura Rasa</i> increases <i>Kapha</i> except old <i>Sali</i> rice
11.	Ah.Su.16/41	Krsara, Pancha prasrta Peya	Snehana (Oleation)
12.	Ah.Su.22/20	Darbhamuladi Mukhalepa	Vasant Ritu Charya
13.	Ah. Sha.2/5	As Ahara	if the pregnant women develop discharge of menstrual blood or pain
14.	Ah. Sha.6/30	as a Subha Shakun (auspicious omen)	
15.	Ah.Ci.1/72	As Pathya Ahara	Jwara (Fever)
16.	Ah.Ci.1/95	As Ahara (Sarpi Sevan Paschat Pathya)	after the medicated ghee is well digested
17.	Ah.Ci.3/19	As Ahara	Kasa (Cough)
18.	Ah.Ci.3/33	as ideal food	In Tanu Kapha (when Kapha is thin)
19.	Ah.Ci.3/73	as an ideal food	Ksatakasa Chikitsa (Cough)
20.	Ah.Ci.4/25	As a Pathya Ahara	Swasa and Hikka (Hiccups & asthma)
21.	Ah.Ci.4/36	As Ahara	Vata and Pitta Anubandha Swasa and Hikka (Hiccups & asthma)
22.	Ah.Ci.5/5	As Ahara	Rajayaksma Chikitsa (Tuberculosis)
23.	Ah.Ci.6/12	Intake of rice along with <i>Mudga</i> and <i>Jangala</i> <i>Mamsa Rasa</i>	Pittaja Chardi (Vomiting)
24.	Ah.Ci.7/21	As Ahara	Pittajamadatya Chikitsa (Alcohol disorder)
25.	Ah.Ci.8/120	as Param Oushadham	Arsha caused by Rakta (Piles)
26.	Ah.Ci.12/11	Pathya Ahara	Prameha (Diabetes)
27.	Ah.Ci.14/59	Ahara	Vataja Gulma (Abdominal lump)
28.	Ah.Ci.14/74	<i>Ahara</i> to be taken along with goat milk or cow milk	Pittaja Gulma (Abdominal lump)
29.	Ah.Ci.14/109	As Pathya Ahara	Gulma Chikitsa (Abdominal lump)
30.	Ah.Ci.17/17	Ahara	Swayathu Chikitsa (Oedema)
31.	Ah.Ci.19/25	Pathya Ahara	Kustha (Leprosy)
32.	Ah.Ci.19/29	rice (Sali) with Potolomuladi Kwath	
33.	Ah.Ci.22/54	As Ahara	Pitta Abruta Vata (Neurological disorder)

Abbreviation: Ah-Ashtanga Hridaya, Su-Sutra Sthana, Sha-Shareera Sthana, Ci-Chikitsa Sthana

DISCUSSION

It is well known that India has a number of rice varieties that offer medicinal properties, as well as fitting the description of a healthy food using both modern and old concepts. Clinical validation of rice in terms of medicinal value is needed for rice to be accepted internationally.

While rice has been described as a traditional medicine in various categories, the data on its functional effects and health benefits has been limited. In this study, we summarize the data about rice's health-promoting and therapeutic properties. Rice has the ability to provide fast and instant energy.

In India, the dietary supply of rice per person per day is 207.9 g, rice provides about 24.1% of the required dietary protein [4]. The fat present in rice is a good source of linoleic acid and other essential fatty acids. The rice does not contain cholesterol [5]. The presence of fibre in the diet increases the bulk of faeces, which has a laxative effect in the gut [6]. rice have high magnesium content, Magnesium is an important mineral that plays a vital role in the regulation of blood pressure and sodium balance in the body [7] rice is rich in fibre and have the ability to keep healthy bowel function and metabolic function. Anthocyanins present in red rice have properties that can help in weight management [7].

CONCLUSION

Rice is an essential food for human being, almost in all parts of India rice have been used in various forms that may be as regular diet or as therapeutic purposes. As a regular diet in south Indian, rice have been used as *Dosai, idli, kichadi* and *idiyappam* whereas for therapeutic uses Rice like *Matali* and *Lal Dhan* are used for curing blood pressure and fever in Himachal Pradesh. Due to the limited availability of data, the beneficial properties of these rice varieties are unknown to most of the population. Therefore, in addition to providing health benefits to most of the population, the above data will assist researchers to conduct research on various therapeutic aspects of rice, so that rice can be consumed as part of a balanced diet or for specific purposes.

REFERENCE

- 1. *Charaka. Charaka Samhita* (Chakrapani Commentary). Jadavaji Trikamji Acharya, editor. 1 st ed. *Sutra Sthana* chapter no-4,5,6,7,13,15,21,25,27. *Nidan Sthana* chapter no-2,4. *Viman Sthana* chapter no-7. *Shareera Sthana* chapter no-8. *Chikitsa Sthana* chapter no-2,3,4,5,6,7,8,11,12,13,14,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30. *Sidhi Sthana* chapter no-3. Varanasi: Chaukhamba Sanskrit Sansthan; 2014.
- Susruta.Susruta Samhita (Dalhana Commentry). Jadavaji Trikamji Acharya, editor. Reprinted ed. Sutra Sthana chapter no-12,15,19,20,42,44,45,46. Shareera Sthana chapter no-2,10. Chikitsa Sthana chapter no-3,5,6,9,10,11,14,26,31,38. Kalpa Stahana chapter no-7. Uttarsthana chapter no-26,39,40,41,42,43,44,45,46,51,53,64. verse no.41. Varanasi: Chaukhamba Sanskrit Sansthan;2014.
- 3. *Astanga.Astanga Hridaya* (Arunadutta Commentry). Pt. Hari Sastri Paradakara Acharya, editor. Repinted ed. *Sutra Sthana* chapter no-3,4,6,7,10,16,22. *Shareera Sthana* chapter no- 2,6. *Chikitsa Sthana* chapter no-1,3,4,5,6,7,8. Varanasi: Chaukhamba Sanskrit Sansthan; 2014.p.49-944
- 4. Kennedy, G., Burlingame, B., Nguyen, V. N. (2019). Nutritional contribution of rice and impact of biotechnology and biodiversity in rice-consuming countries, Food and Agriculture Organization of the United Nations. http://www.fao.org/3/ Y4751E/y4751e05.htm. Accessed 26 June 2019.
- 5. Eggum, B. O. (1979). The nutritional value of rice in comparison with other cereals. In: Proceedings, Workshop on Chemical Aspects of Rice Grain Quality, IRRI. Los Banos, Laguna, The Philippines; p. 91–111.
- 6. Oko, A. O., & Onyekwere, S. C. (2010). Studies on the proximate chemical composition, and mineral element contents of five new lowland rice varieties planed in Ebonyi State. *International Journal of Biotechnology & Biochemistry*, 6(6), 949-956.
- Institute of Medicine (US). (1997). Standing Committee on the Scientific Evaluation of Dietary References Intakes. Dietary reference intakes for calcium, phosphorous, magnesium, vitamin D, and fluoride. Magnesium. Washington, DC: National Academies Press.