



**AN ANALYTICAL STUDY ON SAMSAKARA (PROCESSING) WITH SPECIAL
REFERENCE TO RICE**

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ABSTRACT

Sanskaras are the methods by which food can be processed or changing their consistency and form or transformation of food in different forms to make them good enough for consumption. Rice is a staple food and known as grain of life for more than half of the world's population, and the major single food source of carbohydrate and energy in Asian countries. It is not only food, several medicinal properties and usage of rice preparations by doing different *Samskaras* are mentioned in diseases like fever, diarrhoea, vomiting, haemorrhage, burns. Even today different varieties of processing are used in various states like Karnataka, Madhya Pradesh, Kerala, Uttar Pradesh, Western Ghats, Himachal Pradesh. The sanskaras in the form of washing, roasting, cooking make rice light and the adjuvants like spices ginger, pepper, asafoetida enhance digestion and absorption and seasoning with cumin, asafoetida, ghee alleviate vata. Thus Judicious use of rice along with processing help individuals where rice is Satmya.

KEYWORDS: Spices, roasting, seasoning, traditional foods, diseases.

INTRODUCTION

The word *samskara* (processing) has been used in various aspects with different meanings as per the context. *Samskara* (processing) is included under *paradi gunas*.^[1] *Samskara* (processing) is also enumerated under the *Ashta Aahara vidhi vishesha ayatanas* i.e eight condition mentioned for intake of *Aahara*.^[2] *Samskaras* bring about changes in properties of particular substance, so that it has different effects than its original form.^[3] These are the methods by which food can be processed or changing their consistency and form or transformation of food in different forms to make them good enough for consumption. Rice is a staple food and known as grain of life for more than half of the world's population, and the major single food source of carbohydrate and energy in Asian countries. It is not only food, several medicinal properties and usage of rice preparations by doing different *Samskaras* are mentioned in diseases like fever, diarrhoea, vomiting, haemorrhage, burns. Even today different varieties of processing are used in various states like Karnataka, Madhya Pradesh, Kerala, Uttar Pradesh, Western Ghats, Himachal Pradesh. These foods can be used effectively in variety of ailments like skin diseases, leucorrhoea, blood

pressure, paralysis, fever as well as health tonic and for lactation. Great sage *Parashara* has written *Krishi-Parashara*, which praises the food grain in following way: "Rice is vitality, rice is vigor too, and rice indeed is the means of fulfilment of all ends in life. All, Gods, demons, and human beings subsist on rice"^[4] There are around 40000 varieties of rice and over 1600 varieties are identified. Post-harvest processing includes milling, parboiling and quick cooking & even at consumer level, cooking, storage, reheating alter the qualities of rice. Different varieties and preparation of rice are used in India in different states that have different effects due to the effect of processing and cooking differences. This paper is intended to discuss the alteration in qualities of rice by various *Samskaras*, so that rice can also be a *Pathya* even in conditions where rice is generally avoided among population with rice staple diet.

Various *Ayurvedic* texts have been reviewed in this paper, Around 200 articles were searched in pubmed related to processing of rice, 100 in scholar, 20 in scopus and in various other indexed journals, but traditional processing with special reference to rice is nowhere mentioned.

Various varieties of rice are mentioned in Ayurvedic texts including *Rakta* (red rice) *Mahan* (big size), *Gaura*

(white rice), *Kanchana* (golden coloured rice) etc.

Properties of various rice groups

Type of rice	Rasa	Veerya	Guna	Decreases	Increases
<i>Shali</i>	Sweet	Cold	<i>Laghu</i> (light)	<i>Pitta</i>	<i>Vata, kapha</i> ^[5]
<i>Vrihi</i>	Sweet & astringent	Cold			
<i>Shashtika</i>	Sweet	Cold	<i>Laghu</i> (light)	<i>Vata & pitta</i> ^[6] / <i>Tridoshnashak</i> ^[7]	
<i>Nivara</i>	Sweet & astringent	Cold	<i>Laghu</i>	<i>Kapha</i> ^[8] / <i>kapha & pitta</i> ^[9]	

In general all the rice varieties are *madhura rasa* and *vipaka* (sweet), unctuous, *vrishya* (natural aphrodisiac), *Baddhalpavarchasaha* – causes mild constipation, causes lesser volume of faeces, *Kashaya anurasa* – mild astringent taste, *Pathya* – suitable for daily consumption, *Laghu* – light to digest, *Mutrala* – diuretic, increases urine volume, *Hima* – coolant. Among all red variety is best. It relieves thirst and balances all the three *Doshas*.

Rakta Shali (red rice)- it is best variety of all, eliminates all the three *Doshas*, increases, semen and urine, beneficial for eyes, increases strength and improves complexion, cures fever, thirst^[10]

Shashtika shali – the paddy which matures in 60 days is best among all paddy. It is *Snigdha* – unctuous, oily, *Grahi* – absorbent, useful in mal-absorption syndrome and diarrhoea, *Laghu* (light to digest), *Svadu* – sweet, *Tridoshaghna* – balances all the three Doshas, *Sthira* – brings in stability, *Hima* – coolant. It is of two types, *Gaura* (white) and *Asita-gaura* (blackish white).^[11]

Wild rice: Among wild rice *nivara* was considered the best and was described as being able to generate heat, it is sweet and astringent, subdue *kapha*, and has curative properties, causes solidification of stools. Among *vrihi* group, *Krishna vrihi* is considered best.

Properties of rice varieties are mentioned in BHOJAN KUTUHALAM^[12]

Varieties	Rasa	Increases	Decreases	Specific property	General property
<i>Rajanam</i>	Sweet		Reduces all three doshas	Enhances digestive fire	Increase appetite and strength
<i>Krisna sali</i>	Sweet		Reduces all three doshas	Enhances digestive fire	Increase strength and virility
<i>Red samba</i>	Sweet		<i>Pitta</i>	Purifies blood, reduce fever, improves vision	
<i>Munda sali</i>	Sweet,sour		Reduces all three doshas	Pacifies poison and respiratory disorders	Helps in conditions such as boils and burning sensation
<i>Maha sali</i>	Sweet		<i>Pitta</i>	Enhances digestive fire, reduce fever and intestinal disorders	Reduces burning sensation and thirst
<i>Sugandha sali</i>	Sweet	<i>Vata/kapha</i>	<i>Pitta</i>	Glactogogue	Reduces thirst, tiredness, strengthens the body and developing fetus
<i>Thriya sali</i>	Sweet		<i>Pitta</i>	Reduces fever	Prevent excessive heat
<i>Sashtika</i>	Sweet		<i>Vata</i>	Carminative	Increases vitality and vigour
<i>White samba</i>	Sweet	<i>Vata/kapha</i>	<i>Pitta</i>	Anthelmintic	Decreases tiredness, increases body strength

Table 2: Composition of rice^[13]

Constituent Husked Raw

Constituent	Husked	Raw	MILLED
	HP		
Moisture%	9.7	9.6	9.7
Protein %	7.7	7.3	6.9
Fat	1.8	1.5	.54
Carbohydrate	78.1	80.1	82.06
Crude fibre	1.1	0.7	.2
Mineral	1.6	1.1	.6
Calcium	15.6	13.0	10
Phosphorus	386	182	87
Iron	4.0	2.8	2.2
thiamine	360	210	105
Nicotinic acid	8.5	2.5	1.0

Samskaras of rice varieties with other dietary items in different ailments^[14]

Type of rice	Uses
<i>Shali</i> rice	<i>Rasayana</i> therapy; roots of shali rice after processing used as a component of <i>Brahma rasayana</i> Piles: prepared <i>Shali</i> and <i>shashtik</i> rice along with butter, ghee, goat milk checks bleeding in haemorrhoids Burns: <i>shali</i> rice mixed with ghee is applied Anaemia : <i>Sali</i> and barley are mixed and prepared Fractures: Application of paste of <i>Sali</i> rice with ghee. Meno-metrorrhagia: Powder of red <i>Sali</i> with milk and honey Milk Increase: Powder of <i>Sali</i> with milk Chest Pain: Liquid gruel of Red <i>Sali</i> for pain in chest, pelvis, head
<i>Sashtika Rice</i>	<i>Rasayana</i> Therapy: <i>Sashtika</i> rice when taken with <i>ghee</i> or with milk mixed with <i>ghee</i> , it act as <i>Rasayana</i> . As aphrodisiac: <i>Sashtikadi bhrami gutika</i> contains <i>Sashtika</i> as main component <i>Prameha</i> : <i>Sashtika</i> when consumed with barley <i>Udara</i> : To treat stomach problems, gruel prepared from <i>Sashtika</i> soaked in cow milk
<i>Laja (Puffed Rice)</i>	Fever: Saturated drink of <i>laja</i> (puffed rice) with sugar and honey for burning sensation, vomiting, thirst Diarrhoea: Pieces of koshakar a type of sugarcane, fried in ghee and mixed with sugar and honey to be taken with powdered <i>laja</i> (puffed rice) Vomiting: <i>Laja</i> -puffed rice (powder) with honey and ghee Hemorrhage: Saturated drink of <i>laja</i> powder with ghee and honey
<i>Nivara Rice</i>	Oil: Use in treatment of cervical spondylitis, load backache, paralyses, neuro muscular disorders. Weaning Food: Food for underweight babies Stomach Ulcers: <i>Nivara</i> flour with banana Psoriasis and skin lesions: <i>Nivara</i> paste applied Snakebite: Pain used to reduce pain General health, body weight, and expectant mothers: <i>Nivara</i> gruel with meat Polio: Coconut, gingelly(sesame)oil, and rubbed over the affected organs Hemorrhoids: Raw rice wetted in milk and roasted in cow milk taken for 21 days As aphrodisiac: Rice flakes with <i>Asvagandha</i> (<i>Withania somnifera</i>) and sugar Urinary complaints: Decoction prepared from roots of <i>Nivara</i> given to children

Kritannna varga (Prepared foods)

Manda, *Peyya*, *Vilepi* and *Odana* are preparations of rice or other grains cooked in water along with the adjuvants like spices to give taste and flavour.

***Manda* (Liquid part of Rice gruel):** Rice is cooked well in 14 parts of water, and only liquid portion is used specially in case of *Agnimandya*.

Benefits

- It helps in passage of faeces and flatus, relieves thirst and exhaustion.
- It pacifies residual *Doshas*.
- After *Panchakarma*, *Manda* helps to improve digestion, restore the normalcy of the tissues, improve softness of the channels, perspiration and ignites the digestive activity.

***Peyya* (Thin rice gruel) –** Rice is cooked well in 14 parts of water, both solid and liquid part, which is slightly thicker to *Manda*.

Benefits

- Helps in relieving hunger, diseases of the abdomen.
- Can Be Given In fever, thirst, exhaustion, debility.
- Promote easy elimination of faeces, ignites appetite, good for all and helps digestion.^[15]

***Vilepi* (Thick rice gruel)–** Only 4 part of water is used for cooking of rice. This stage will be more of solid grain and less of fluid.

Benefits

- Ignites appetite, relieves thirst.
- Good for the heart
- ideal for all especially for those suffering from eye diseases, who are weak and who have been given fats for drinking as part of *Snehana* therapy (before *Panchakarma*), ulcers those who have been administered *Panchakarma* purification therapies^[16]

***Odana* (Rice)–** Rice is cooked with 5 parts of water. This is the thickest and only solid portion of rice without liquid.

- When it is prepared with addition of decoction of medicinal substances of hot potency or with fried grains are also easily digestible;
- When prepared with addition of milk etc. are harder to digest.^[17]
- *Shitodana* – cold rice causes weakening of digestive fire, dyspnoea, increased salivation, can be indicated in hemorrhagic disorders, fainting, dizziness, vomiting and intoxication

***Yavagu* –** When one part of rice is cooked in 6 parts of water, *yavagu* is prepared.

Benefits

- It alleviates *vata* and is *grahi* (absorbent).
- It is strengthening and nourishing.

28 *Yavagu* preparations are mentioned which contain different ingredients according to their specific indications.^[18]

Laja (puffed rice)-Husked rice grains that burst open when fried are called *Laja* by wise man.^[19]

Benefits

- It Relieves thirst, vomiting, diarrhoea.
- Best dietary preparation for diabetes and obesity.
- Mitigates *Kapha*, and *Pitta*, increases appetite.
- Easy to digest and cold in potency.^[20]
- According to *Nighantu* the laja of rice nourishes *Dhatu* and alleviate *pitta*.

Prithuka (flaked paddy) *Prithuka* is prepared by boiling paddy for short while wet rice is dry fried little and pounding it with pestle and mortar is hard to digest.^[21]

Benefits

- It is strengthening, increases *kapha*, balances *vata dosha*, nourishing.
- Cardiotonic.
- *Madanvardhana*.
- A PRECAUTION while taking poha: after having taken food, one should never take heavy articles like pastries, *prithuka*, rice, even when hunger, one should take these articles only in proper quantity.^[22] Or else excess intake may lead to indigestion, abdominal distension, headache, worsening of haemorrhoids, burning urination etc. so after intake of beaten rice it is always advisable to take warm water or milk or buttermilk to nullify its effects^[23]

Shali saktu -*Saktu* prepared from rice

- It is Appetizing, light, cold, sweet, constipating, appetizing, wholesome and increase *bala* and *shukra*^[24]

Dhanyamla (kanji)-*Kanji* is prepared by Fermenting Incompletely boiled *Masha Dhanya* and gruel prepared from *Shashtik shali*.

- *Kanji* prepared by *Dhanya* is said to be *Jeevaniye*, *Dahashamak*, alleviates *Vata* and *Kapha*, relieves thirst etc when used internally.^[25]
- *Payasa*-A preparation with milk and rice is *payasa*.^[26]
- It is heavy to digest, strengthening, causes constipation.^[27]
- **Krishra** -Rice is cooked in 6 part of water along with salt, ginger, and asafoetida.
- It increase *sukra*, heavy difficult to digest, causes constipation, aggravates *pitta* and *kapha*^[28]

Indian Traditional Food And Sanskara

From the early weaning of babies till last old age days rice is compatible to everyone. In India rice varieties and various preparations are used in different occasions, in different diseases, various ceremonies, as a nutritious food, as a supplement, as a rejuvenator also. Baby's first rice-eating ceremony called *choroonu* in Kerala, *mukhe bhaat* in Bengal and *bhaatkulai* in the Garhwal hills which is very auspicious and important.^[29] During pregnancy rice water along with little salt or black pepper is given which relieves in indigestions and vomiting. In improving lactation *yedurubelthige* (partially boiled red raw rice) is cooked with pepper tied in cloth. To the cooked rice thick coconut milk, jaggery and salt is added, this again cooked and served with ghee, given after delivery from 3rd day to 15th day two servings a day. fenugreek, cumin or coriander can be added instead of pepper.

The inner portion of bark of *Terminalia arjuna* is taken and dried in shade and pounded to make powder. On any Purnima (full moon) night around 200gm of old red rice is pound and prepared ganjee to which cow milk, jaggery is added and cooked. The rice kheer (sweet semi liquid drink) is placed in copper plate and mixed with churana prepared and exposed to moonlight for min 4 hrs. this is used next day empty stomach. this is effective for asthma or respiratory patients, it should be taken 3-4 times on Purnima night. To overcome headaches red rice ganjee prepared previous night is taken next morning with curds on empty stomach for 3 – 7 days.^[30] In the case of arthritis, there is a method of cooking rice which appears to be very effective in helping musculoskeletal conditions^[31]

List of Rice preparations which are processed in such a way so that they can be eaten in various disorders.

Bisi-bele-bhaath. The traditional preparation of this dish is quite elaborate and involves the use of spicy masala, toor dal (a type of lentil) and vegetables. This rice preparation along with vegetable and spices can reduce the glycaemic load and hence can be indicated in diabetes. Fat and protein reduce glycaemic response by delaying gastric emptying and stimulating insulin secretions^[32]

Boribap -Rice boiled with barley. It help in treating *medoroga* (obesity) and other obesity related metabolic syndrome^[33]

Amla rice: Easily made by using boiled rice, coriander paste, oil, *chana* dal, cumin seeds, *Amla* and salt. *Amla* is antioxidant, antidiabetic, can be used in hyperlipidaemia, anticancer, natural source of antiaging, due to its multiple uses it can be cooked with rice for therapeutic effects.

Idli Steamed rice cakes, made with lentils or other pulses. Idli is generally used in weight losing diet. It is

helpful to reduce the risk of high blood pressure, cardiovascular diseases, and stroke. It is, low-caloric starchy and nutritious foodstuff hence used as a dietary supplement to treat children suffering from protein calorie malnutrition and kwashiorkor. Micronutrients which are present in it like iron, zinc, folate, and calcium prevent anaemia and facilitate the oxygenation of blood and nourishment of muscle and bone. The dietary fibre content promotes healthy digestion and formation of bulky stools.^[34]

Grape leaves stuffed with rice and it is cooked with vegetables. Grape leaves have Anti-inflammatory Properties, Low Glycaemic Load, Used in Chronic Venous Insufficiency. A study was conducted by the Department of Dermatology at the University of Freiburg in 2010, plant extracts from grape vine leaves reduce oedema in patients with chronic venous insufficiency. It is also commonly used in diarrhoea, heavy menstrual bleeding, uterine haemorrhage, canker sores, excess vaginal discharge, sore breasts, rheumatism, headaches and fevers.^[35] Ivy gourd rice (Tendli Bhat) ivy gourd has

proven antidiabetic effect which reduces the glycaemic load of rice and hence useful in diabetes.

Garlic Spinach rice- Garlic its Organosulfur compounds reduce total and LDL cholesterol^[36], spinach is also effective in macular degeneration^[37] *Methi pulao*-Due to antidiabetic effect, used in hypercholesterol and obesity, when fenugreek combined with rice, it will be helpful in improving the health conditions of diseased.

DISCUSSION

Samskara (processing) in *Aahara* kalpana is necessary for bringing about changes in dravyas as and when needed. *Gunas* are the main pillar so an Ayurveda physician needs to increase, decrease or modify *gunas* as and when needed. The *Aahara* which is considered as *mula* for *bala*, *varna* and *prana* needs to be suitable for an individual. Depending on an individual's prakriti, kala, vaya, bala and vyadhi avastha if any; *Aahara* should possess opposite *gunas* of these so as to suit him. *Aahara gunas* need to be altered in accordance of these *gunas*. This can be achieved by virtue of *samskara* (processing).

1. Effect of *Shuchi* (cleansing), *Toya* and *Agni sannikarsh* (processing with water and fire) on rice.

S.No.	<i>Samskara</i>	Effect Nutritive value
1	<i>Toya agni samskara</i>	It helps in removing the impurities of rice and boiling of rice, become Light, easy to digest
		Germinated brown rice which is soaked for 4–20 hours in warm 30–40°C (86–104°F) water, is considered healthier contains bioactive components, such as ferulic acid, γ -oryzanol, raises GABA.
		increase resistant starch by soaking it affects the physical properties, nutritional composition, starch characteristics (pasting properties and crystalline), cooking qualities
		Rice that received post-harvest treatments like parboiling (soaking, steaming and drying) ^[38] and quick-cooking ^[39] generally gave a lower GI compared with white rice not subjected to these post-harvest treatments
		Germintaed rice help in reduction in the risk of some chronic diseases, such as cancer, diabetes, cardiovascular disease, and Alzheimer's disease, antihyperlipidemia, antihypertension.. ^[40]
2	<i>Agni samskara</i>	Heating cause softness of starch
		Process of Gelatinization happens
3	<i>Agni</i> and <i>bharjana samskaras</i>	Puffed rice, light easily to digest, can be given in vomiting, indigestions.

Nutrient loss during washing is almost zero percent in parboiled rice in comparison with raw rice or milled rice, the protein loss is 2-7% in raw rice while 0-1 in milled rice and no loss in parboiled rice, similarly calcium loss is 18-26%, 4-5%, and 0% in raw rice, milled rice and parboiled rice respectively, iron and crude fat are similarly higher lost in raw and milled rice and no loss in parboiled during washing. When cooking done without washing, Thiamine, Riboflavin and Niacin are highly lost in raw rice and almost no loss is shown in milled and parboiled rice. 2. *Manthana* -Churning induce good qualities in food substances. In case of rice the fine powder of rice i.e. rice flour. Rice flour, accordingly, has a higher GI than rice itself^[41] 3. *Desh*-The land or region in which food is grown, cultivated, is stored has

lot of impact in changing the quality of food, different varieties of rice are mentioned *Bhojan ketu halam* on the basis of land mentioned in table 1 has different properties and effect on *doshas*., also rice grown in wild land cure vitiation of kapha and pitta, are astringent, slight bitter and sweet increase vata and digestive power. Those grown in swampy lands are sweet, strengthening, eliminate pitta, heavy, increase *kapha*^[42] 4. *Kala*-Time period also have effect on food. Rice which is guru or heavy in nature become light or *laghu* after one year.5. *Bhavana* -Food grain or dal, vegetables when dipped in water for some time it loses its extra potassium and certain toxins and become safe to consume. Rice when prepared with pulses or vegetables it will become more palatable and resistant starch also increases which

prevent the immediate raise of blood sugar levels. **6.Vasana** – Flavouring of rice with sunthi powder enhances taste along with it improves digestion, rice with dalchini reduces the glycemic load and can be eaten in diabetes occasionally, jeera rice is also digestion enhancer. **7.Bhajana** Earlier used clay pots were ideal for preparing rice it prevent both moisture and nutrition loss and make the dish flavourful^[43] in earthen pot 100% micronutrients retained and absorbed by body, in bronze 97% micronutrients retained, brass 95% micronutrients retained, in aluminium only 7% micronutrients retained in cooked food and absorbed by body.^[44] **Samskara virrudha** (processing incompatibility)- Rice during processing or with some incompatible substances, when prepared and used can cause various disorders and are harmful for health. Some common practices of samskara virrudha preparations are

- Half cooked rice, biryani rice, is mainly difficult to digest, increases *Tridoshas*.
- Rice biryani preparation with curd as in Ayurveda heating curd lead to various diseases.
- Curd rice preparation when milk is also added.
- Milk rice when salt is added.
- Milk or curd rice with radish chutney.
- Pressure cooked rice increases *Kapha*.
- Direct Fire cooked will increases pitta.

There are various processing and cooking methods by which the *gunas* of rice can be altered and they can be useful in number of diseases. **COOKING**-Prolonged cooking or over cooking (from 15 to 20 minutes) will change the properties. immersion cooking, half cooked which hydrate food more in contrast slow cooking or steam cooking hydrate less and provokes less gelatinization. Heat utilised, the amount of water, and the time of cooking, all have a significant effect. Cooking of rice should be done with excess water, so that any excess starch is removed with it. Starch is offered to animals and plants, while the other half is mixed with buttermilk and a pinch of fenugreek seeds - fermented overnight. The following day it is added to the pot in which the day's rice is being cooked.^[45] By this process the most soluble carbohydrates are removed from the rice, so sugar loading is decreased which leads to less impact on blood glucose levels. There is also decrease in the food's *Kapha* content as a result of reduction of easily available carbohydrates decreases tendencies to constipation, and improves elimination. Finally, the food's added microbial content from the lactobacillus and yeast considerably increases its nutritional value. This single procedure therefore has health promoting and preventative value for many conditions. Prevention from obesity, insulin resistance, metabolic syndrome, and type 2 Diabetes can be achieved by decrease in sugar loading. The pacification of *Kapha* and constipation will improve long term colon health, and all conditions involving *ama*, and *amavata*, such as the various forms of arthritis. Improved vitamin content from the lactobacillus and yeast (killed by the cooking) will help all conditions.

Retrogradation Inverses Gelatinization^[46]-Preserving amylase foods for long periods at low temperatures (41°Fahrenheit) stimulates retro-gradation. Loss humidity and drying stimulates starch retro-gradation. Although retro-gradation does not wholly reverse food gelatinization, it does contribute to lowering foodstuffs' Glycaemic Indexes. Amylose content is directly proportional to effectiveness of the retro gradation process. **PROTEIN AND FIBER CONTENT** The fibre and protein contained in starches can also serve to block the amylase action contributing to reducing glucose absorption. **PARTICLE SIZE AFFECTS HYDROLYZATION** -When starchy food are ground, their particles become much finer and, as this makes their hydroxylation easier. When cereals are ground into flour hydroxylation occurs. Rice flour, has a higher GI than rice itself.

CONCLUSION

Rice is a staple food in many parts of India, but is considered as unwholesome in health conditions. Hence, the processing (*Samskaras*), help in modifying the properties and bring about required change. Judicious use of rice along with processing help individuals where rice is Satmya.

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