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# Traditional and ayurvedic grain-based foods of India

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**ABSTRACT-** *Ayurveda* (the science of life), a branch of *Vedas*, considered as a store of knowledge related to health sciences. In Ayurvedatraditional foodsand their dietary guideline are prescribed. Food is also used for therapeutic purpose as well as inappropriate knowledge about consumption may become the root cause of many diseases. Grains are recommended to be consumed with every meal not only as a main source of energy but also vital source of carbohydrate, protein, iron, calcium, potassium and B vitamins. In *Charaka Samhita*, sixty-eight *aharakalpanas* are described for maintenance of health and for treatment of diseases. Most of these are preparations of *ShookaDhanya* (grains) as the principal food item. This review article puts forward the concept of ayurvedic grain-based healthy foods of India and also details of several grain based ethnic healthy foods across different regions of India.

**Keywords: Ayurveda, grain, Indian, nutrients**

## I. INTRODUCTION:

*Ayurveda*, traditional and one of the oldest practicesof medicine dealing with various and diverse aspects related to health and wellbeing started over three millennia ago. According to Ayurveda, *Ahara* (diet) is one of the three *Upasthambhas* (sub-pillar) of life; the other two being sleep and *Nidra* (sleep) and *Brahmacarya* (abstinence) [1].*Anna/Ahara* (food) is the nourisher of the body elements and responsible for physical, temperamental, and mental states of an individual. According to Acharya Kashyap, *Ahara* is considered as the *Mahabhaishajya* (the great medicine) whereas Acharya Charak has stated that to live healthy, a stable healthy diet routinely maintaining is necessary. In Ayurveda*Ahara* is classified as *Hitahara* (wholesome) and *Ahitahara*(unwholesome) and the terms Pathya and Apathya are used to signify acceptability and adoptability. *Susrutha* described that body, manufacturer overfood is mainly constituted by*panchamahabhutas* and the *Tridoshas(biohumors)explained as Vata, Pitta, Kapha* are the biological derivatives of these *panchamahabhutas*. Acharya Charaka and Vagbhata explained the *Nitya sevaniyaDravyas* which is similar to the balance dietwhich can be defined as "the diet enriched with *Shadarasa* (all six rasa), required *Gunas* (properties), *Virya*(potency)and given to the individual after consideration of *Prakrati*(nature),*Agni* (digestive power), *Kostha*(digestive system) and *Ritu* (season variation)"[2].

Happy life, sustainable happiness and longevity aspects of health and wellbeing have been dealt with their various aspect in Ayurveda[3]. It also asserts that during designing of balanced foods for optimal nutrition,formulating food groups as well as nutrients that have function in harmony, inducing proper digestion and promoting maximum absorption of need to be consider. Food will aggravate the *dosha*when it is alike to one's *dosha.*So, to balance the *dosha*, individual needs to select the proper food group[4-6]. That is why food is essential for our physicalwellbeingas well as for our minds also as it provides nutrition to minds. *Upanishad* describes that food we consume mainly gets divided into three partswhere the gross part is converted into flesh and subtle part that nourishes the mind. Food range in an order way has been described in Ayurveda. Food ranges include the diversity of natural sources, properties varying with seasons and places and particular function both in physiological and pathological states.

Grains are the seeds of plants and are the basis of daily consumed diets for Indian subcontinent people. They are belonging to the botanical groups of cereals, pseudocereals, and legumes. Grains are the sources of all nutrients such as macronutrients like carbohydrates, proteins and lipids as well as micronutrients like vitamins and minerals to the human diet. Wholegrains,vital source of dietary fibre and bioactive compounds are now interest for the production of high value grain-based products due to its enhanced health benefits.Grains cannot be consumed in its raw state. After several processing steps like decortication, dehulling and dehusking, milling, cooking, dough making, extrusion, bread making, pasta making, noodle making etc., it can be consumed[7, 8].To improve nutritional value,different types of grains can be mixed in the same product as it may be cereals and cereals or cereals and pulses [9].

From different literature, it can be seen that our ancestors from different civilizations of India consumed different types of grains. From the *Rigveda* of about 1500 BC, we came to know that barley was the main grain eaten by Aryans. In the *Yajurveda*, it is mentioned that urad (*Vigna mungo*), mung (*Vigna radiata*),

andmasoor (*Lens culinaris*) these three grain legumes were most commonly used. Wheat is also first mentioned in *Yajurveda* [10]. Though different grains are used through millennia, so here the purpose of this paper is to review the name and use of traditional and ayurvedic grain-based foods of Indian origin.

## II. PROSPECTS OF GRAIN-BASED FOODS IN INDIA:

Traditional foods of India generally recognized as functional foods due to presence of functional constituents such as antioxidants, body-healing components, probiotics and dietary fibres which are helpful in controlling blood sugar, managing weight and in supporting immunity of human body. Processing of food results the changes in quality and characteristics of the *dravya.*Processing techniques such as germination, malting and fermentation may enhance these functional properties [11].During fermentation of cereals, new bioactive metabolites can be produced from the starter components of raw materials[12]. During cereal fermentation formation of several volatile compounds contributes a complex blend of flavors to that food products. Here is the list of compounds which form during fermentation of cereals[13].

- **Alcohols**: Ethanol, Amyl and Isoamyl alcohol, Isobutanol, *n*-Propanol
- **Aldehydes and Ketones**:Acetone, Butanone, Acetaldehyde, Acetoin, Diacetyl, Formaldehyde, *n*-Hexaldehyde, Methyl ethyl ketone
- **Organic Acids**: Palmitic, Acetic, Benzoic, Butyric, Caproic, Caprylic, Formic, Isobutyric, Lactic, Lauric, Myristic, Palmitic, Propionic, Succinic, Valeric,Pelargonic,
- **Carbonyl Compounds**: Furfural, Glycoxal, Methional, Hydroxymethyl-furfural, 3-Methyl butanol

Rice and Pulses are the main grain foods consumed in Asia and India. Grains are the main staple food of India. Grains are nutritionally rich products and it fulfill recommended dietary nutrients to the body. Rice is rich in lysine and its proteins are hypoallergenic. It provides most energy in our diet. Pulses also provide energy, dietary fiber, vitamins and minerals. Some of the grains exhibit antinutritional properties like trypsin inhibitor.

In CharakasamhitaunderSukadhanyavarga cereals like rice, wheat and barley were described and under Samidhanyavarga pulses like green gram and black gram were described. In Susruta cereals and pulses classified under Sali, Kudhanya and Mudgavargas [14]. Mainly three types of rice were mentioned which are*Sali, Sashtika* and *Vrihi.* Botanically they belong from same family and species but according to Ayurveda they are nutritionally different. Charaka says that wheat/*Godhuma* is unctuous stabilizing and heavy and barley/*Yava*isused as unwholesome but it cannot be recommended for prolonged use for its light and astringent quality[15].In context of Ayurveda barley is used for several diseases like *Prameha* (diabetes), *Sthoulya* (obesity) and *Vrana* (injuries). Its fibre helps in reduce cholesterol and blood pressure as well as blood sugar and insulin levels[16].

Pulses (*Shimbidhanya or Shamidhanya*) are *Kashaya* (Astringent), *Madhura* (sweet) in taste, cold in *Virya* (potency) and *Katu*(pungent) in *Vipaka*. They are recommended as the main source of protein and alleviate *Pitta* and *Kapha*. They also generatevayu, arrest the flow of urine and helpful in evacuation of stool. From the *Yajurveda* onwards the three pulses *masha* (urad), *mudga*(mung) and *masura*(masoor) are the most commonly used grain legumes and *masha*occurs even in *Rigveda*[17].

*Mudga*(Mung)/Greengram is the best among all pulses (*Shimbidhanya )* in the form of soup and rich in iron and potassium ((3.9 mg and1150 mg per100 gm) [18].*Masha* (Urad)/Blackgram is most wholesome among all *Shamidhanya*. It is also rich in vitamins and minerals particularly potassium. *Masha* (Black gram) is also said *Snigdha* (unctuous), *Balya*(increases strength), *Malakara* (increases bulk of faeces),increases *Kapha*and *Pitta*, *Sara* (laxative), *Guru* (not easily digestible), *Ushna* (hot in potency), *Vatahara* (mitigate Vata), *Madhura* (sweet in taste), and *ShukraVriddhikara* (aphrodisiac properties) [19].*Masura*(Masoor)/Lentil is considered as highly nutritious pulse next to green gram or mung bean. But insome parts in India, lentils is not included in their food, probably due to the red color resembling flesh[20].

*Kulatha* (Horsegram) has been used as food item for the for millennia. During the Sutra period (c. 1500–800 BC), the soup extract from *kulattha*, called *yusa*, was consumed commonly. These soups are known as rasams of today [21]. This pulse is astringent and pungent in taste. *Adhaki*(Toordal) contains folic acid, an important vitamin for all women especially pregnant women and it also alleviates the vitiated *kapha* and *pitta* but aggravates *vata*.

In Ayurveda consumption of pulses is associated with prevention of different diseases. *Mudga*(Mung)/Greengram consumption helps to reduce risk of coronary heart disease and cardiovascular disease and *Masura*(Masoor)/Lentil is claimed to be act as a blood purifier.*Masha* (Black gram) is helpful in reducing blood pressure or hypertension and also helps in balance sodium potassium

level due to its high content of potassium.*Kulatha* (Horsegram) has anthelmintic properties which is useful in treating amoebic diarrhoea, bowel haemorrhage and colic pains[22].
Under grain *Tila* (sesame seeds) has been also used in food which is sweet, bitter, astringent, hot in potency and produces *Pitta*. It has cholesterol lowering effect in humans, and prevents high blood pressure. It has also beneficial effect on skin,teeth and liver[23].Charakaclassifiedfood in 12 groups whereas Susrata included 21 groups. Different types of *Sukadhanya* (Corns with bristles) *Samidhanya* (pulses) are included among that12 groups classified by *Charaka*. (Table 1)

**Table 1: Nutritional and ayurvedic value of traditional grain food items**

| **Food items-**<br>**Sanskrit Name (Common Name)** | **Nutritional and Ayurvedic value** |
|---|---|
| *Sali, Shashtika (*Varieties of Rices *)* | Alleviates the vitiated biohumors, maintains the body |
| *Godhuma (*Wheat*)* | Restorative, invigorating, nourishing aphrodisiac |
| *Yava*(Barley) | Useful in diabetes and obesity |
| *Mudga(*Green Gram*)* | Alleviates vitiated kapha, pitta (bio humors). easy to digest, good for eyes (drishtiprasadana). |
| *Masura (*Lentil) | act as a blood purifier |
| *Masha (*Black Gram*)* | Increases bulk of faeces, laxative, aphrodisiac |
| *Kulatha (*Horsegram*)* | Anthelmintic, useful in urinary calculi |
| *Tila (*Sesame Seeds*)* | Beneficial to the skin, hair and teeth, improves the intellect and digestion |

## III. TRADITIONAL GRAIN-BASED HEALTH FOODS:

Examples of some of the traditional grain-based health foods (Table 2) with their nutritional and functional health benefits have been discussed below.
***Idli.*** *Idli* is a fermented product mainly found in the south India region. It is mainly prepared from the rice and black gram batter by steam cooking [24]. During batter preparation,black gram and rice are used in the ratio of 1:2 and sour buttermilk is used as a source of microorganisms for fermentation. The fermented batter is placed in special *idli*pans and steamed for to prepare steamed *idli*. Nutritional content of *idli* is 3.4% protein, 20.3% carbohydrate and 70% moisture[25].*Idli*is used as breakfast foods and is suggested for all age groups in all season. Fermentation process increases its digestibility, nutritional and protein efficiency value.*Kadubu*(plate idli) which is also another type of *idli*prepared by steaming *idli* batter in a plate.
***Dosa.*** *Dosa* is another fermented product like *idli* with origins in southern India. Blackgram and rice are also used here as primary ingredients but instead of being steamed, the fermented batter is fried with a little oil on a flat plate. To improve nutritional value finger millet and horse gram can be used as primary ingredients and lengthen of fermentation time increases protein content of batter[26]. Across India,regionally there are different names of *dosa*. In the state of Odisha, the dish is called *chakuli* resembles *dosa* in which parboiled rice and black gram is used as primary ingredients for batter. *Susupedosa* which is also another type of *dosa*, is prepared from the boiled red raw rice with aniseed, palm jaggery, and salt[27, 28]. Like *idli, dosa* is used as breakfast foods and is suggested for all age groups in all season.
***Enduri and MunhaPithas.****Enduri* and *MunhaPithas* are cereal and pulse based fermented foods eaten primarily in festive season in Odisha state. Parboiled rice and black gram are mainly used as primary ingredients here. It is prepared by steaming of the fermented batter in a turmeric leaf and folding the leaf through the midvein.*MunhaPitha*is also prepared from parboiled rice and black gram mixed in a 3:1 ratio.In this sugar/jaggery, coconut, raisins and cashew nuts may be added. Black gram proteins are deficient in methionine and cysteine amino acid but fermentation enhances the nutritional quality of the blend of black gram and rice[29].
***Dhokla.*** *Dhokla* is fermented indigenous breakfast food originating in Gujrat state. It is prepared from the fermented Bengal gram and rice or rice and chickpea flour. The method of preparation is same as *idli*, but it is steamed in covered state[29].For making *dhokla* yeast is used for the culture because it makes food spongy by increasing the batter volume.*Dhokla* is rich in folic acid and also in antioxidants as it is a fermented food. Its antioxidant property helps to reduce oxidative stress in human body[30].
***Siddhu.*** *Siddhu* is cereal and pulse based fermented food occasionally eaten in Himachal Pradesh. Fermented wheat dough mixed with a paste of opium seeds, walnut, and/or blackgram and prepare by steaming[31].

***Selroti.*** *Selroti* is a fermented rice-based food consumed in Sikkim and Darjeeling. A local variety of rice or rice flour is soaked overnight in cold water and then pounded into small powder. Then the rice is mixed with wheat flour, sugar, butter, and condiments such as cloves, cardamom, coconut, nutmeg, cinnamon and milk. The batter is fermented, molded into a ring and then fried. The nutritive value of *Sertoli* is equal as *idli*[32].

**Table 2: Examples of some of the traditional grain-based health foods**

| Food name | Place of origin | Main Ingredients |
|---|---|---|
| *Idli* | Southern India | Rice and Blackgram |
| *Dosa* | Southern India | Rice and Blackgram |
| *Enduri and MunhaPithas* | Odisha | Parboiled rice and Blackgram |
| *Chakuli* | Odisha | Parboiled rice and Blackgram |
| *Dhokla* | Gujrat | Bengal gram and rice or rice and chickpea flour |
| Siddhu | Himachal Pradesh | Wheat and Pulses |
| Selroti | Sikkim and Darjeeling | Rice or Rice flour |

## IV. CONCLUSION:

A diverse array of foods are prepared using wide variety of locally grown grains in different regions of India. Acharya Charaka and Acharya Susrata described different grains in *Charakasamhita* and still grains are important for preparation of food in both conventional food and normal diet and added an advantage in physiological functions and in providing nutrition to the body. A scientifically documentation is needed to identify benefits of ayurvedic and traditional health foods made by grains so that a database can be created and used for benefits of future era.

**Conflicts of interest**

All contributing authors declare no conflicts of interest.

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