

## Black Rice: A miracle Cereal for Public Health

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**ARTICLE ID: 60**

### Abstract

From ancient times, Rice is consumed in various parts of the country and is a staple food. Generally, different types of rice, such as white, purple, red, brown, and black rice, are named following the physical appearance of the rice bran. Black rice (*Zizania aquatica*) is a rice variety formed by the mutation of *Kala4* gene. The major cultivating areas of this black rice includes Southeast Asian countries like China, Thailand and India. 62% of total production only comes from China in the world. Sri Lanka, India, Indonesia and Philippines are also the producers. The major contribution for this black rice production goes to states like Manipur, Mizoram, Meghalaya, Assam and some parts of Odisha. The presence of anthocyanin accounts for the black colour of rice. It is present in the outer layers (bran) of the rice kernel. Black rice is enriched with other rich nutrients like tocopherols (vitamin E), iron and antioxidants which accounts for high levels of protein, fiber, vitamins (Vitamin B1, Vitamin B2, folic acid) and minerals (iron, zinc, calcium, phosphorous and selenium) compared to that of white rice. Because of the presence of these nutrients, it accounts for various health benefits like antioxidant activity, anti-inflammatory properties, lipid oxidation, anti-diabetic, anti-ageing and anti-cancer effects are due to the presence of good amount of essential amino acids like lysine and tryptophan in black rice. This paper highlights the importance of black rice in health perspective.

**Keywords:** Black rice, Vitamins, Food processing, Anthocyanin; Amino acids.

### Introduction

Consumption of rice is very high in India. Because it is consumed by large section of society, rice is a staple crop of India. The scientific name of black rice is (*Zizania aqatica*). The rice is named differently in different communities for e.g. in Odisha it is known as Kalabati). In south India it is found Keelapoongudi village in karaikudi district of Tamil Nadu and it is called as 'kavuni rice'. In manipur it is known as Chak-hao Ambi (Chak-hao means 'delicious' and ambi means 'black) and thus refers to delicious black rice. The outer pericarp layer of rice

grain has anthocyanin pigment which is responsible for its characteristic color. Nowadays, black rice has gained its popularity from health perspective and is consumed worldwide as functional food because of the rich amount of nutrients present in it. The other names of black rice are purple rice, forbidden rice, heaven rice, imperial rice, king's rice and prized rice.

### **Nutrient profile of Black Rice**

On comparison with the regular white rice, Black rice is loaded with higher number of proteins, vitamins, and minerals.

- The protein content per 100gms is 9.1gms while white rice has 6.3 grams of protein per 100 grams.
- The black rice has lower glycaemic index which makes it very good option for diabetic patients
- It contains the initial 18 amino acids like lysine, tryptophan, Iron, Zinc, Copper, carotene, good amount of Vitamin E.
- Its arsenic content is greater than white rice.
- It also improves the production of adiponectin in body.
- Decrease levels of the hormone leptin, which is responsible for appetite-regulating.
- Black rice is comparatively high in several antioxidants.
- In addition to anthocyanin, black rice contains several types of flavonoids and carotenoids and over 23 plant compounds with beneficial antioxidant properties. Although being the least popular than other rice varieties, it has the highest overall antioxidant properties, capacity, and activity.



### **Health Benefits of Black Rice**

1. Antioxidants help our body fight against free radical damage, and are very important for maintaining optimum health and well – being. Free radicals attack healthy cells of the body because of which they tend to lose their structure and function. The antioxidants block these free radicals before they attack. There are various studies which show that low antioxidant intake or low blood levels of antioxidants are major underlying reasons for increased health risk. Black rice bran has more anthocyanin antioxidants than blueberries. However, black rice bran has more health benefits. It contains more fibre and vitamin E (another essential antioxidant) and less sugar than blueberries. Antioxidants are able to neutralize free radicals, and can help to prevent oxidative damage. Studies show that antioxidant supplementation can exert a preventive effect against the development of serious conditions like cancer, and may improve overall health.
2. Infections on a regular basis are considered a key contributor to a number of diseases and illnesses prevalent in society today. Some of them include arthritis and other joint issues, asthma, Alzheimer’s disease, heart disease, and even cancer. Black rice bran is known to reduce the inflammation at a cellular level. This results in a reduction in improving cell health, and acting as a therapeutic agent for the treatment of inflammatory disease and illness. [1] Black rice contains anti-inflammation properties that decrease reactive oxygen species in the body. Black rice also increases anti-inflammatory mediators such as superoxide dismutase, leading to better prevention against allergies, joint pains, atherosclerosis, and other symptoms related to aging. It has been validated that black rice also help prevent certain types of cancers because of the presence of these anti-inflammation properties.[2]
3. Other researchers found that a diet that has black rice bran in it is very helpful to suppress inflammatory skin conditions like dermatitis.
4. Black rice is extremely rich in fibre content. As we are aware diet rich in fibre content is very helpful to promote gut health. Fibre also aids with digestive processes. Along with that as fibre is digested slowly (and subsequently stays in our stomach longer), it can reduce feeling of hunger, and results reduction in daily energy intake. This reduction in energy intake leads to weight loss. Black rice contains twice the amount of

fibre content of brown rice. Fibre also helps to flush out waste from the colon by binding with the various toxic compounds found in the human digestive tract. [3]

5. Black rice has also been demonstrated to reduce plaque build-up within arteries. Because of the development of plaque in the arteries it narrows the walls of the arteries making the blood flow rate to slow down. The walls of the arteries also thicken down. This negatively affects the function of those arteries, while also placing an increased demand on the heart, causing a significant rise in blood pressure. This is considered a key risk factor to both heart attacks and strokes. By reducing plaque build-up in the arteries, black rice can directly reduce the likelihood of developing cardiovascular and heart disease, while also improving heart health and function.
6. Cancer is characterized by the proliferation of abnormal cells that fail to respond correctly to normal regulatory mechanisms. Antioxidants stop the formation of free radicals, which in turn, protects the body from the onset and development of cancer. Furthermore, black rice consumption has demonstrated in lowering tumour metastasis (referring to the spread of cancer around the body). The antioxidant anthocyanins in black rice helps to protect from cell damage in the body that can cause cancer. In fact, extracts from black rice have been shown to have an anti-cancer effect and prevent the growth and spread of tumours. [4]
7. Black rice has antioxidant property. This can also help to detoxify liver and improve liver function. Black rice increased fatty acid metabolism and helped to reduce the risk of elevated blood sugar levels and high cholesterol. There was also a lower risk of developing liver disease.
8. The antioxidant effect of anthocyanins is also linked with improving brain function. This means that black rice can help to improve memory impairment and prevent or reduce the risk of diseases like Alzheimer's disease, dementia, and depression. Clinical studies also showed that anthocyanins helped to improve learning capacity and reduce symptoms of depression. By adding black rice in the diet, help to boost memory and prevent premature cognitive aging. [5]

### Summary and Conclusion

Black rice is an excellent alternative over other forms of rice. The review mainly highlights the importance of black rice for maintain the health. Black rice is enriched with

various nutrients which play a significant role in improving the health and also to prevent the onset of various life-threatening diseases. In today's world due to the availability of various sources, the trend of consuming fast food is increasing at an alarming rate. As the rate increases, it also brings along with it the various forms of diseases which can be very serious if proper precautions are not taken timely. Black rice, due to its nutrient density, high fibre content, and rich antioxidant content is a very good option. Currently, black rice is regarded as a nutraceutical and functional food because beyond supply of nutrients it involves in the prevention and control of diseases. Several researches suggested that black rice may have the capacity to reduce the likelihood of developing a number of diseases and illnesses, suggesting that black rice consumption may promote heart and liver health, weight loss, control on blood glucose level and lipid profile, prevention and control of inflammation and cancer.

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