



INFLUENCE OF RICE VARIETIES IN DIABETICS AMONG INDIAN POPULATION - A REVIEW

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ABSTRACT

The incidence and burden of diabetes is alarming all over the world. In recent days diabetes is creating untoward happenings in India, in spite of Indian culture and tradition. Several recipes and food habits are under practice in Indian continent, especially in south India. Westernisation has influenced not only the diet, but also the life style of Indian population. According to ancient Indian manuscripts “food is medicine and medicine is food”, which implies that, proper dietary habits supports for healthy living. Among the variety of cereals, rice is the staple food of India, which has close relation with increasing glycemic index in diabetics. The purpose of writing this review article is to know and study about the importance and influence of various types of rice used in south India. The incidence of NIDDM (non-insulin dependent Diabetes mellitus) among Indian population is nowadays steadily in the increasing trend. The excessive intake of carbohydrates paves the way for large glycemic response and increase the risk of NIDDM, whereas dietary fibre is suspected to reduce the incidences.

KEYWORDS: Rice, Diabetes, Glycemic index, NIDDM.

INTRODUCTION

Rice has fed people over a longer period of time than any other crop and its history dates as far back as 2500 BC. Moreover, India is one of the world's largest producers of white rice and brown rice accounting to 20% of world rice production.^[1] Rice is India's pre-eminent crop and it's the staple food of people dwelling in eastern and southern parts of India. In India, rice and wheat compromise 70% of agricultural production. South Indian population has an urge towards carbo-holic diets, which may enrich the calorific value, but increases the risk of NIDDM.

The Glycemic index of rice depends on the degree of processing, cooking time and amylose content. In large scale human observational studies, among various populations, diets with a high Glycemic load were associated with increased risk of developing Type 2 diabetes and other non-communicable diseases.^[2] Researchers found that glycemic index of rice ranges from 48 to 92, with an average of 64 depending upon the rice variety.

Varieties of Rice and its benefits

Varieties of rice used in India, vary according to climate and terrestrial conditions. Depending on the variety of

rice, the benefits are also varied. Some of the commonly used rice and their benefits are stated below.

1. Brown Rice

Brown rice is unpolished and whole grain rice with bran and germ. Brown rice is a rich source of Mg, P, Mn, Se, Thiamine, Niacin, Vitamin B6 and high fibre content. Several vitamins and dietary minerals are lost due to the removal of husk germ part and subsequent polishing methods.

Most Important Health benefits of brown rice

- a. Lowers the risk of diabetes.
- b. Lowers cholesterol level.
- c. Offers many cardio vascular benefits.
- d. Promotes bone health.

2. Ponni Rice

Ponni rice ranks high on the glycemic index, which means it can cause a sudden increase in blood sugar levels. 1cup of ponni rice contains 267 calories. Whereas unpolished ponni rice has got immense health benefits, such as high fibre content and low fat concentration.^[3]

3. Rose Mutta Rice

Rosemutta rice is the most used rice variety in Kerala, thus also known as Kerala mutta rice, palakkadanmatta rice, Kerala red rice. As mentioned in the ancient Tamil literature Thirukkural, mutta rice was the royal food consumed during the Chera-Chola period.

The uniqueness of this rice with bold grains and red pericarp ensures high content of nutrients. Further parboiling of the rice withholds Mg, Ca, vitamin A and B and Fibre.^[4] Due to this high content of Mg and Ca, it reduces insulin resistance and enhances optimum glucose uptake. High fibre content of rosemutta rice reduces the absorption of carbohydrates, thus decreasing the incidence of Diabetes Mellitus.

4. Samba Rice

Samba rice is cultivated mainly in Sri Lanka and some parts of India like Tamilnadu. The grain itself is harder and when cooked it is less fluffy. Samba rice fills the stomach in minimal quantity and there by decreases the calorific value.^[5]

It is a rich source of amino acids, thus improving the muscle growth. It is highly recommended for prevention and treatment of gastrointestinal disorders like diarrhoea, morning sickness and colitis, due to its low fibre content.

5. Sona Masuri

It is grown in Punjab, Karnataka, Kerala, Andhra Pradesh and West Bengal. Sonamasuri is medium-grain rice with aromatic odour, light weight and low in starch content.

This rice is having low fat and low sodium, thus reducing the risk of developing cardiovascular diseases.^[6]

6. Navara Rice

Navara rice is the unique rice cultivated only in northern parts of Kerala from time immemorial. It is mostly used in traditional systems of medicine like Siddha and Ayurveda for treating musculoskeletal disorders.^[7]

Uses of Navara Rice

i. Navarakizhi

Navarakizhi is a special type of treatment in external Siddha therapy method used for treating neuromuscular disorders. Navara rice is boiled in kurunthottikashayam and then cows' milk. The cooked rice is taken in cloth bags (kizhi) used for massaging and fomentation therapy purpose.

ii. Navaratheppu

In this method Navara rice is cooked as mentioned above and applied directly with light warmth for arthritis, paralysis, muscular degeneration, skin diseases, etc.,

iii. Karkidakka kanji

During the month of karkidakam (July and August - in Tamil- Aadi month) a special type of gruel, called as

karkadiga kanji is prepared with Navara rice as Preventive and Rejuvenative therapy. It is prepared using navara rice and special herbs like cardamom, cumin, dry ginger, nutmeg, cloves, black cumin, *Sidarthombifolia*(bala), *Strobilanthes ciliates* (sahachara), green gram, broken wheat, coconut milk, cow's milk, etc.^[8]

7. Bamboo Rice

Bamboo rice is collected from bamboo (*Bauhinia tomentosa*) by tribes of the residing forest from the seeds of Bamboo flower. The nutritious and health value of bamboo rice is remarkable contributing the health benefits of chlorophyll and a rich green color that's retained when cooked.^[9]

Bamboo rice controls blood sugar, cholesterol and it is recommended for pregnant women to overcome vitamin deficiency.

It is very rich in fibre content, thus preventing constipation. Diabetic patients are recommended to consume bamboo due to its low glycemic index (GI) of 20 instead of normal rice.

Glycemic Index

Glycemic index (GI) is a number associated with a particular type of food that indicates its effect on a person's blood glucose level. A value of 100 represents the standard, an amount equivalent to pure glucose.

GI represents the total rise in a person's blood sugar level following the consumption of a particular food. GI takes into account only the available carbohydrates in a food. Food may contain fat and other components that contribute to the total rise in blood sugar level, these are not reflected in GI.

Generally the rice with GI of

- 55 or < = Good
- 56 – 69 = Medium
- 70 or > = Not recommended

Factors that affect the GI of a food

- How much fibre the food contains? The more of fibre, lower is the GI.
- How ripe the fruit or vegetable is? The riper these foods are, the faster their carbohydrates are digested and absorbed, and the higher the GI.
- How much the food was processed before you bought it? The more it was processed, the higher the GI.

Consumption of foods with a low GI may support your body cells to utilize insulin more effectively, so the cells will take up more blood sugar to convert it into energy. This process lowers the amount of sugar in your blood.

Glycemic index and Diabetes

Foods that are broken down rapidly during digestion and release glucose rapidly in to the blood stream tend to have a high glycemic index. Foods that break down more slowly, releasing glucose gradually into the blood stream tend to have low glycemic index.^[10]

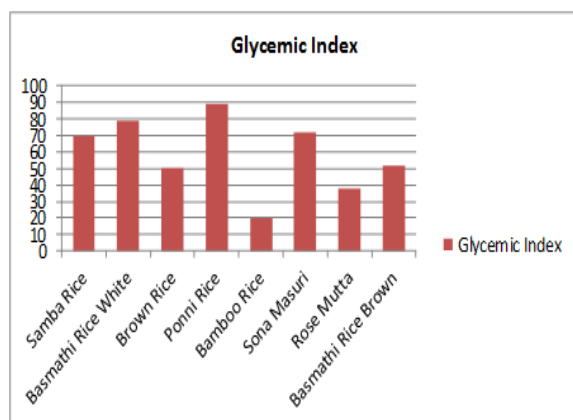
Wholegrain rice varieties have the lowest GI (glycaemic index) of all rice types, which means once digested it releases its energy slowly and keeps blood sugar levels more stable, which is a crucial part of diabetes management.^[11] On the other hand, sticky and risotto type rice have much higher GI, which are less suitable in a diabetic diet. The varying GI of rice depends on the type of carbohydrate presence in the grains.^[12]

GI of certain common foodstuffs^[13]

- Glycemic index of white rice – 64
- Glycemic index of wheat – 58
- Glycemic index of custard – 43
- Glycemic index of orange – 43
- Glycemic index of jowar – 77
- Glycemic index of kambu – 55

Rice Varieties and GI

Name	Glycemic Index
Bamboo Rice	20
Rose Matta Rice	38
Ponni Rice	89
Samba Rice	70
SonaMasuri	72
Basmathi Rice White	79
Basmathi Rice Brown	52
Brown Rice ^[14]	50



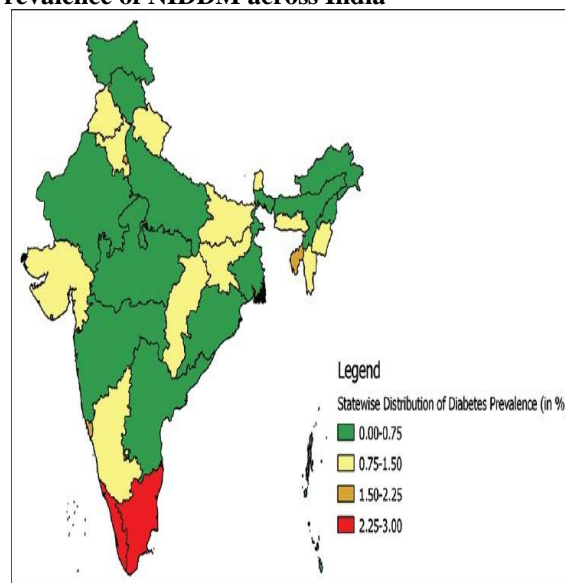
India is a vast, diverse and populated country, but the people who live here are ethnically heterogeneous. This heterogeneity is significant in difference in region, culture, tradition, language, food habits and life style.

Many cultures use rice as staple in their diet and it is almost always ponni rice.^[15] Most of the general public are considering the rice varieties and its influences, but according to the American diabetes association this is far from the truth. The only kind of rice that diabetics have

to consume is brown rice and wild rice, which are whole grain rice varieties.^[16]

Documents and observations are proving that a person with diabetes must choose whole grain rice (with germ and bran).

Prevalence of NIDDM across India



Diabetes is fast growing potential epidemic in India with more than 62 million individuals are currently diagnosed. Burden of diabetes may impose various drawbacks such as coronary artery disease, stroke etc upon India in the near future.^[17]

Diabetes patients are higher in the four southern states of India viz Karnataka, Tamilnadu, Andhra Pradesh and Kerala than the other states, which is according to the results of a country wide blood testing campaign conducted under the national programme for prevention and control of diabetes.^[18]

The aetiology of diabetes in India is multifactorial and it includes genetic factors coupled with environmental influences associated with upcoming living standards, steady urban migration and lifestyle changes. The diversity of diabetes in India varies according to the consumption of diet and lifestyle.

South India has a higher prevalence of diabetes, when compared to north India, which suggests that diabetes may be due to increased consumption of polished and processed rice, instead of whole grain cereals.

Indians are genetically pre disposed to the development of coronary artery disease due to dyslipidaemia and low levels of high density lipoproteins, these determinates more Indians are easily prone to development of complications of diabetes at an early age (20 to 40 yrs) indicates that diabetes must be carefully screened and monitored regardless of patient age in India.^[19]

	Number and Prevalence of Prediabetes%	Number and Prevalence of diabetes%	Total number with diabetes and prediabetes
Tamilnadu	4.8 million (10%)	3.9 million (8%)	8.7 million
Maharashtra	6 million (8%)	9.2 million (13%)	15.2 million
Jharkhand	1 million (5%)	1.5 million (8%)	2.5 million
Chandigarh	0.12 million (14%)	0.13million (15%)	0.25 million
Projection for whole of India	62.4 million	77.2 million	139.6 million

Indian Council of Medical Research-India DIABetes (ICMR-INDIAB) study n=13,055
Multiple logistic regression analysis showed that age, male sex, family history of diabetes, urban residence, abdominal obesity, generalised obesity, hypertension and income status were significantly associated with diabetes.
Anjana RM Diabetologia 2011;54:3023

Poor glycaemic control, a factor that has been observed in the Indian diabetic population is responsible for micro and macro vascular changes that present with diabetes and pre dispose diabetic patients to other complications such as diabetic myonecrosis and myocardial infarction.

Furthermore, there is a lack of clinical standards, for the commencement of insulin therapy among the patient communities. The most common apprehension is related to the complexities of the insulin regimen and concerns about weight, hypoglycaemic events and fear of insulin prick.

The medicos of India are targeted about the followings:

- Diabetes prevention
- Screening and early detection of diabetes
- Counselling
- Self-management through life style modifications
- Therapeutic management of diabetes

CONCLUSION

Comprehensively this review article concludes that, diet with a high Glycemic Index and low fibre content increases the risk of NIDDM. High fibre intake is associated with a lower risk of bowel cancer, reduced risk of type 2 diabetes complications, increased satiety and weight management. Intake of wholegrain foods has been associated with lower risk of heart disease and stroke.

Further, it is suggested that, grains have to be consumed in a minimally refined form to reduce the risk of diabetes. Hence, the bran of rice or the whole grain cereals pave the way to reduce the incidence of NIDDM. Whereas, consumption of highly refined and polished rice/cereals increases the incidence of NIDDM^[20]

This article facilitates the rice consumers to make appropriate choice about the rice, which are suitable for their health. Hence, diabetics have to consider from the grass root level for obtaining the appropriate health benefits by adopting proper dietary options.

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