

# A COMPARATIVE BIOCHEMICAL ANALYSIS OF CARBOHYDRATE CONTENT IN VARIOUS RICE VARIETIES OBTAINED FROM THE LOCAL MARKET IN NAGPUR

Charjan V. Y.; Abraham B.; Karambhe S. A.; Paliwal S. D.; Dahilkar M.; Pahade P.; Juare V  
Department of Botany, Kamla Nehru Mahavidyalaya affiliated to Rashtrasant Tukadoji Maharaj Nagpur  
University, Nagpur.

EMAIL: [vaishalipalkrit@gmail.com](mailto:vaishalipalkrit@gmail.com)

## Abstract

Understanding the nutritional significance of paddy and rice varieties is essential for promoting a healthy diet. The research on flaking suitability aims to enhance the value-added products derived from rice, providing economic opportunities for farmers and entrepreneurs. Emphasizing the consumption of whole grains, such as brown rice, over processed white rice is crucial for maintaining optimal health and preventing chronic diseases associated with refined carbohydrates. The mean result of Anthrone test and Phenol test for total carbohydrates of 10 replications for basmati, Jaishreeram, suvarna, boiled rice and brown rice are as follows, Anthrone test 0.12, 0.10, 0.11, 0.12 and 0.13 mg/ml respectively and that of phenol test, 0.13, 0.07, 0.11, 0.18 and 0.16 mg/ml respectively. Brown rice is chosen as excellent grain choice for diabetic people as the fiber helps in maintains the blood sugar level under control (Rukmini and Raghuram, 1991) In addition, the fiber in brown rice helps to protect against colon cancer since fiber binds to cancer-causing chemicals, keeping them away from the cells lining the colon, henceforth it can help nonnalize bowel function, reducing constipation.

## Introduction:

The significance of food in sustaining human life is undeniable, with nutrients playing a crucial role in maintaining health. Nutrients are classified into organic (carbohydrates, proteins, fats, vitamins) and inorganic (dietary minerals, water, and oxygen). (Fieldhouse 1995) (Housten 2000). The study of nutrients, their relationship with food, and their impact on living organisms is known as nutrition. Malnourishment occurs when an individual lacks essential nutrients. (Grosvenor and smolin, 2002) A healthy diet is essential, and the food pyramid serves as a guide, emphasizing the importance of a balanced intake of various food groups.

**Significance of Food and Nutrients:** Food is essential for sustaining life as it provides the necessary nutrients that our bodies need to function properly. Nutrients can be broadly classified into organic and inorganic categories. Organic nutrients include carbohydrates, proteins, fats, and vitamins, while inorganic nutrients encompass dietary minerals, water, and oxygen. Each of these nutrients plays a vital role in supporting various physiological processes and overall health.

**Nutrition and Its Study:** Nutrition is the scientific study of how nutrients in food interact with our bodies, influence health, and impact overall well-being. It involves understanding the sources, functions, and effects of nutrients on human physiology. The field of nutrition encompasses research into dietary patterns, nutrient metabolism, and the relationship between diet and health outcomes.

**Malnourishment and Health Implications:** Malnourishment occurs when individuals do not receive adequate amounts of essential nutrients. This can lead to various health problems, ranging from nutrient deficiencies to impaired growth and development, weakened immune function, and increased susceptibility to diseases.

**Importance of a Healthy Diet:** A healthy diet is crucial for maintaining optimal health and preventing disease. The food pyramid serves as a visual guide to emphasize the importance of consuming a balanced mix of food groups, including fruits, vegetables, grains, protein sources, and dairy products. This balanced intake ensures that individuals receive a variety of nutrients necessary for overall well-being.

**Paddy (Oryza Sativa L.):** Paddy, specifically referring to *Oryza Sativa L.*, is a staple food crop globally, especially in regions like Asia. Rice, derived from paddy, serves as a primary source of carbohydrates and proteins in many diets worldwide. Understanding the production, nutritional composition, and health implications of rice consumption is essential for promoting dietary diversity and addressing nutritional needs. Paddy (*Oryza Sativa L.*) (USDA, 1992)

The production of paddy, scientifically known as *Oryza sativa L.*, is of immense importance globally, serving as a staple food for more than 60% of the world's population. India, in particular, plays a crucial role in global paddy production, contributing approximately one-fifth of the total output.

Rice, which is derived from paddy, is a high-energy calorie food primarily composed of carbohydrates and protein. This makes it a valuable dietary staple, especially in regions where rice consumption is prevalent.

Various varieties of paddy are cultivated worldwide to meet diverse culinary preferences and environmental conditions. The Asian continent, including countries like China, India, Indonesia, and Bangladesh, accounts for over 90% of the global production of paddy. The cultivation and consumption of rice in Asia are deeply rooted in cultural traditions and dietary practices, highlighting its significance as a staple food crop in this region. (Rice Market Monitor, 2017)

Rice production in India holds substantial significance on both national and global scales. As a major paddy producer, India contributes around one-fifth of the total global rice production annually. The trend in rice production in India has shown a consistent upward trajectory, particularly evident in the forecasted production figures for the years 2016 and 2017.

The rice industry is a crucial component of India's agricultural sector, supporting millions of farmers and contributing significantly to the country's economy. Various states across India play key roles in rice cultivation, with Chhattisgarh emerging as a notable player in this arena. Chhattisgarh ranks seventh among Indian states in terms of rice production, highlighting its importance in the overall landscape of rice agriculture within the country.

The sustained growth in rice production reflects India's commitment to enhancing agricultural productivity and ensuring food security for its vast population. Factors such as favorable climatic conditions, technological advancements in farming practices, and government policies supporting agriculture have contributed to the success of the rice industry in India.



Overall, the continued expansion and development of rice production in India underscore its critical role not only in meeting domestic food demands but also in shaping global rice markets and supply chains. Understanding the dynamics of rice production in India is essential for comprehending the complexities of agriculture and food security in one of the world's most populous countries. (Kumar and Prasad, 2017)

### Carbohydrates and Health:

Carbohydrates play a vital role in providing energy for bodily functions and physical activities. However, not all carbohydrate sources are equally nutritious. For years it has been assumed that complex carbohydrates cause smaller increases in blood glucose than simple carbohydrates. A growing body of data, however, contradicts this notion. Various starchy foods differ in their ability to induce plasma glucose and insulin responses (Crapo et al, 1976, 1971, 1980, 1981) and accumulating data suggest that the digestion of carbohydrates, particularly starch, is not a rate-limiting event and is often quite rapid because of the presence of sufficient amylolytic capacity in the gut (Wolever, 1990). In metabolic studies, postprandial glycemic responses to potato and white bread have been shown to be similar to the response to pure glucose (Wolever, et al, 1994) (Bantle, 1984). Refined carbohydrates, lacking essential components like fiber, vitamins, and minerals, can have adverse effects on health. Excessive consumption of processed carbohydrates is linked to increased risks of stroke, obesity, elevated triglyceride levels, and chronic diseases like diabetes and heart disease.

### Brown Rice vs. White Rice:

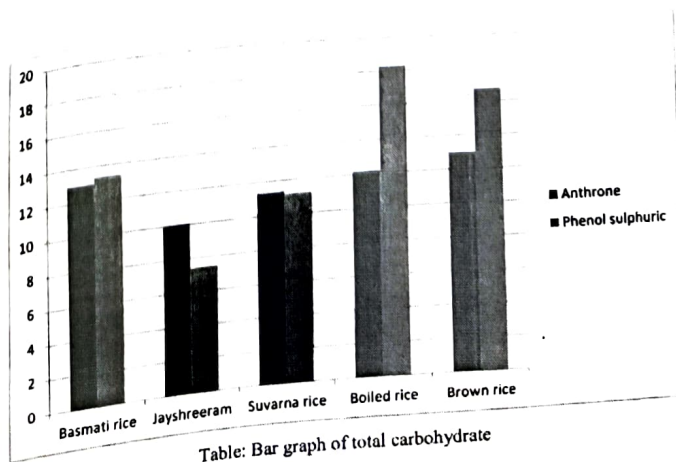
Brown rice, being unpolished, retains its bran layers, providing more nutrients compared to polished white rice. It is rich in B-complex vitamins, fiber, and antioxidants. Consuming brown rice is associated with benefits such as cholesterol reduction, blood sugar control (especially beneficial for diabetics), and protection against colon cancer. On the other hand, white rice, having undergone processing that removes the bran and germ, lacks some essential nutrients found in brown rice.

### Research Objective:

The research titled "A Comparative Biochemical Analysis of Carbohydrate Content in Various Rice Varieties Obtained from the Local Market in Nagpur" aims to study the physical and chemical characteristics of rice from selected varieties, and comparing carbohydrate content different varieties of rice.

### Results:

The mean result of Anthrone test and Phenol test for total carbohydrates of 10 replications for basmati, Jaishreeram, suvarna, boiled rice and brown rice are as follows, Anthrone test 0.12, 0.10, 0.11, 0.12 and 0.13 mg/ml respectively and that of phenol test, 0.13,



0.07, 0.11, 0.18 and 0.16 mg/ml respectively.

From the five Rice Sample study we came to find that sample Jayshreeram rice has low carbohydrates 0.10 mg/ml by anthronetest and 0.07 mg/ml by Phenol Sulphuric acid test and Boiled rice has maximum high carbohydrates 0.12 mg/ml by anthrone test and 0.18 mg/ml by Phenol Sulphuric acid test. It has been found that carbohydrates which diet can caused various diseases such as obesity and diabetes.

Brown rice is chosen as excellent grain choice for diabetic people as the fiber helps in maintains the blood sugar level under control (Rukmini and Raghuram, 1991) In addition, the fiber in brown rice helps to protect against colon cancer since fiber binds to cancer-causing chemicals, keeping them away from the cells lining the colon, henceforth it can help nonnalize bowel function, reducing constipation. According to Mckeown et al .2002 a cup of brown rice will provide up to 88.0% of the daily value for formagnese( Mckeown et. Al., 2002) This trace mineral helps produce energy from protein and carbhohydrates and is involved in the synthesis of fatty acids, which are important for a healthy nervous system, and in the production of cholesterol, which is used by the body to produce sex honnones (Liu 2002) nm is also a critical component of a very important antioxidant enzyme called superoxide dismutase. Superoxide dismutase (SOD) is found inside the body's mitochondria (the oxygen based energy factories inside most of our cells) where it provide protection against damage form the free radicals produced during energy production ( World's Healthiest Foods, 2009) In addition, the brown rice is also a major source of thiamin and niacin (Parenga et al., 20 I 0). According to the American Journal of Clinical Nutrition. In order to maintain a healthy body weight people are advised to consume brown rice rather than the polished rice.

### Conclusion:

The study on the comparative biochemical analysis of carbohydrate content in various rice varieties underscores the significance of making informed dietary choices for optimal health. The results revealed notable differences in carbohydrate content among different rice samples, with implications for potential health outcomes.

The findings emphasize the importance of understanding the nutritional composition of staple foods like rice, given its widespread consumption globally, especially in regions like India.

Moreover, the research sheds light on the potential health risks associated with high carbohydrate intake, particularly from refined sources. The links between excessive consumption of processed carbohydrates and conditions such as obesity and diabetes underscore the need for dietary awareness and conscious food choices.

The positive attributes of brown rice, including its role in blood sugar control for diabetics, protection against colon cancer, and contributions to overall nutritional well-being, make a compelling case for promoting its consumption.

The study encourages a mindful approach to food choices, urging individuals to prioritize whole, nutrient-rich grains like brown rice.

### Reference:

Bantle, J. (1984). Clinical aspects of sucrose and fructose metabolism. *Diabetes Care*, 12, 56-61.



- Crapo, P. A., Reaven, G., & Olefsky, J. (1976). Plasma glucose and insulin responses to orally administered simple and complex carbohydrates. *Diabetes*, 25, 741-747.
- Crapo, P. A., Reaven, G. M., & Olefsky, J. (1977). Post-prandial plasma-glucose and insulin responses to different complex carbohydrates. *Diabetes*, 26, 1178-1183.
- Crapo, P. A., Kolterman, O. G., Waldeck, N., et al. (1980). Postprandial hormonal responses to different types of complex carbohydrate in individuals with impaired glucose tolerance. *American Journal of Clinical Nutrition*, 33, 1723-1728.
- Crapo, P. A., Insel, J., Sperling, M., & Kolterman, O. G. (1981). Comparison of serum glucose, insulin, and glucagon responses to different types of complex carbohydrate in noninsulin-dependent diabetic patients. *American Journal of Clinical Nutrition*, 34, 184-190.
- Fieldhouse, P. (1995). *Food Ideology: Food & Nutrition*. London: Croom Helm.
- Grosvenor, M. B., & Smolin, L. A. (2002). *Nutrition from Science to Life*. Florida: Harcourt College Publishers.
- Housten, D. F., & Kohler, G. O. (2000). *Nutritional Properties of Rice: Prepared for Food and Nutrition Board National Research Council*.
- Liu, S. (2002). Intake of refined carbohydrates and whole grain foods in relation to risk of type 2 diabetes mellitus and coronary heart disease. *Journal of the American College of Nutrition*, 21(4), 298-306.
- McKeown, N. M., Meigs, J. B., Liu, S., Wilson, P. W., & Jacques, P. F. (2002). Whole-grain intake is favorably associated with metabolic risk factors for type 2 diabetes and cardiovascular disease in the Framingham Offspring Study. *American Journal of Clinical Nutrition*, 76, 390-398.
- Parenga, M., Judprasong, K., Srianujata, S., Jittinandana, S., Laoharojanaphand, S., & Busamongko, A. (2010). Study of nutrients and toxic minerals in rice and legumes by instrumental neutron activation analysis and graphite furnace atomic absorption spectrophotometry. *Journal of Food Composition and Analysis*, 23(4), 340-345.
- Rukmini, C., & Raghuram, T. C. (1991). Nutritional and biochemical aspects of the hypolipidemic action of rice bran oil: A review. *Journal of the American College of Nutrition*, 10, 593-601.
- Sakamoto, S., Hayashi, T., Hayashi, K., Murai, F., Hori, M., Kimoto, K., et al. (2007).
- U.S. Department of Agriculture, Center for Nutrition Policy and Promotion. (1992). *My Pyramid: USDA's Food Guidance System*.
- Wolever, T. (1990). The glycemic index. In G. Bourne (Ed.), *Aspects of some vitamins, minerals and enzymes in health and disease* (pp. 120-185). Basel, Switzerland: Karger.
- Wolever, T. M., Katzman-Relle, L., Jenkins, A. L., et al. (1994). Glycemic index of 102 complex carbohydrate foods in patients with diabetes. *Nutrition Research*, 14, 651-669.