



Importance of low glycemic index rice for current and future diet

Selvakumar Gurunathan*

Received: 12 February 2023 / Accepted: 29 June 2023 / Published: 30 September 2023

SRM College of Agricultural Sciences, SRM Institute of Science and Technology, Chengalpattu- 603 201, Tamil Nadu, India.

*Correspondence

Selvakumar Gurunathan

selvakug@srmist.edu.in; selvakumaragri@gmail.com

Dietary intervention is gaining attention as a preventive measure for common and major health problems that are related to diet, such as obesity, diabetes, heart problems, and even cancer. In this case, cereals are an unavoidable part of the world's nutrition; therefore, the development of cereal grains as a source of nutritional and health benefits is a major concern. Among the cereals, rice (*Oryza sativa* L.) is the most cultivated cereal and is the basic food for more than half of the population; it also serves these people as their primary carbohydrate source and thus plays a major role in meeting their energy requirement and nutrient intake. Since rice is the main staple food for humans, increasing its resistant starch, slow digestible starch and reducing the fraction of rapidly digestible starch content leads to reduced glycemic index to manage the diabetes and its related health complications.

Keywords: rice, resistant starch, glycemic index, diabetes, health

Introduction

Rice is the most crucial cereal crop and a staple for more than half the world's population. 'Rice is life' for humans, especially in the Asian subcontinent, where 90% of the world's rice is cultivated and consumed by 60% of the population-living (Khush & Virk, 2000). The starch of rice grains gives energy very easily, thereby having a relatively higher glycemic response (Cabral et al., 2022) as compared to most starchy foods (Chassy et al., 2008). Diabetes mellitus (DM), otherwise called Diabetes, is the most common endocrine disorder in developing and developed countries (Bruno & Landi, 2011). Diabetes is chronic illness which occurs when pancreas do not produce enough insulin, or it does not use effectively the one it produces. This results in elevated levels of glucose in the blood (hyperglycemia). Type 1 diabetes, also called insulin-dependent or childhood-onset diabetes, is characterized by a lack of insulin production, whereas type 2 diabetes, also called non-insulin-dependent or adult-onset diabetes, is due to ineffective use of insulin by the body. This is often due to overweight and physical inactivity. Type 2 diabetes, the commonest form (over 90% of all cases in the middle class and newly affluent populations), is at the centre stage of the diabetes epidemic, affecting 5.9% of the world adult population. However, nearly 80% of the world's diabetic population exists in developing countries, where people consume rice as their staple grain. Nowhere is the diabetes epidemic more striking than in India, where the World Health Organization (WHO) estimated that diabetes used to affect 32 million populations in the year 2000. International Diabetes Foundation (IDF) estimates the current number of diabetes subjects in India to be around 40.9 million and is further predicted to rise to 69.9 million by 2025.

One of the cause of Types 2 diabetes is the eating of carbohydrate-containing foods that raise the concentration of blood sugar in it. The GI was introduced by Jenkins et al. (1981) as the quantitative measure of ability for carbohydrates to raise blood glucose in time. The higher GI values correspond with the rapid increase of blood sugar content, whereas lower GI values correspond with the gradual increase of blood sugar content (Gelencsér, 2009). A

GI is created with a scale from 1 to 100, indicating the rate at which 50g of carbohydrates in a food get absorbed in the bloodstream as blood sugars (Jenkins et al., 1981). Compared to other cereals, it has comparatively high GI. Barley, for example, is 48, maize is 59, wheat is 39, oats comprise 49 and Finger Millet is 49 (Powell et al., 2002).

Conclusion

Literatures are reporting that it is the occurrence of deleterious mutations in key candidate genes (starch synthases) of starch pathways that alter their functional expression (mostly down-regulation). Such down-regulated expression of starch synthase genes changes the structural and nutritional properties of starch in the endosperm of rice. The starch fractions are divided into rapidly digestible starch (RDS), slowly digestible starch (SDS) and resistant starch (RS). The development of genotypes with low RDS and high RS will give the best combo to develop the low Glycemic index rice.

Acknowledgement

NIL.

Author contributions

SG: Prepared this manuscript solely.

Conflict of interest

The author declares no conflict of interest.

Ethics approval

Not applicable.

References

Bruno, G., & Landi, A. (2011). Epidemiology and costs of diabetes. *Transplant Proceedings*, 43(1), 327–329.

Cabral, D., Fonseca, S. C., Moura, A. P., Oliveira, J. C., & Cunha, L. M. (2022). Conceptualization of rice with low glycaemic index: perspectives from the major European consumers. *Foods*, 11(14), 2172.

Chassy, B., Egnin, M., Gao, Y., Glenn, K., Kleter, G. A., Nestel, P., Newell-McGloughlin, M., Phipps, R. H., & Shillito, R. (2008). Recent developments in the safety and nutritional assessment of nutritionally improved foods and feeds. *Comprehensive Reviews in Food Science and Food Safety*, 7, 50–113.

Gelencsér, T. (2009). *Comparative study of resistant starches and investigations of their application in starch-based products (bread and pasta)* (Doctoral dissertation, Budapest University of Technology and Economics (Hungary)).

<https://idf.org/our-network/regions-and-members/south-east-asia/members/india/>

<https://www.who.int/news-room/fact-sheets/detail/diabetes>

Jenkins, D. J. A., Wolever, T. M. S., & Taylor, R. H. (1981). Glycemic index of foods: A physiological basis for carbohydrate exchange. *The American Journal of Clinical Nutrition*, 34(3), 362–366.

Khush, G. S., & Virk, P. S. (2000). Rice breeding: Achievements and future strategies. *Crop Improvement*, 27(2), 115–144.

Powell, D. M., Reedy, S. E., Sessions, D. R., & Fitzgerald, B. P. (2002). Effect of short-term exercise training on insulin sensitivity in obese and lean mares. *Equine Veterinary Journal*, 34(1), 81–84.