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Impact of Post-Cooking Storage on the Glycemic Profile of Boiled Rice: Integrating Glycemic Index, Resistant Starch, and Post-Technological Stability

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Abstract

Post-cooking storage may modify the glycemic response of starchy foods; however, this effect is usually assessed only through the glycemic index (GI), without capturing the temporal dimension of the metabolic response. In this study, the effect of post-cooking storage on boiled rice was investigated using an integrated approach based on GI, resistant starch (RS) content, and the post-technological stability coefficient (PTSC). Storage significantly reduced GI, from 83.03 ± 15.02 (SD) in the freshly prepared sample to 43.55 ± 6.99 (SD) after prolonged freezing, while concurrently increasing RS from approximately 1.8% to nearly 4.0%. A strong inverse linear relationship was identified between RS and GI ($r = -0.935$, $p < 0.001$; $R^2 = 0.8735$). These changes are consistent with storage-induced starch retrogradation and reduced enzymatic accessibility of the starch matrix. PTSC analysis further suggested that GI reduction was not automatically equivalent to lower temporal variability in the glycemic response: refrigeration was associated with more negative and more dispersed PTSC values, whereas prolonged freezing was associated with lower GI, higher RS, and smaller temporal variations in the incremental area under the curve (iAUC). Overall, the results suggest that the isolated analysis of GI may not fully describe the effect of post-cooking storage on boiled rice. The combined interpretation of GI, RS, and PTSC may provide a more informative framework for evaluating the metabolic effect of storage and may help differentiate between regimes predominantly associated with a reduction in the amplitude of the glycemic response and those additionally characterized by lower temporal variability of that response.

Keywords: postprandial response; starch retrogradation; carbohydrate digestibility; cold storage; freezing; incremental area under the curve

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