Effect of Different Drying Methods on Nutrient Retention Characteristics of the Pearl Millet-based Functional Food Supplement Ingredients

A.K. Taniya *, and S. Vasantharuba
Department of Agricultural Chemistry, Faculty of Agriculture, University of Jaffna, Sri Lanka
*taniyaashokkumar@gmail.com

The development of functional foods requires careful selection of processing conditions that preserve the nutritional quality of raw materials while ensuring their suitability for formulation and storage. Cereals and legumes such as pearl millet (Pennisetum glaucum), green gram (Vigna radiata), and peanuts (Arachis hypogaea) are nutritionally rich; however, their macro and micronutrient content is susceptible to degradation during thermal processing. Therefore, identifying ingredient-specific processing conditions is essential. This study evaluated the effects of Low Temperature Long Time (LTLT) and High Temperature Short Time (HTST) processing on selected raw materials to identify the most suitable condition for nutrient retention and functional food application. Pearl millet, green gram, and peanuts were cleaned and processed under controlled LTLT and HTST conditions, followed by drying and grinding. The processed samples were compared with raw materials to assess the influence of thermal treatment on nutritional stability. The findings indicated clear ingredient dependent responses to processing conditions. Moisture content, expressed on a wet basis, decreased substantially after processing and was approximately 2-8%, indicating suitability for storage. Protein content of green gram and peanuts remained relatively stable under both processing conditions, with values in the range of 22-26% for green gram and 25-30% for peanuts. HTST processing resulted in greater moisture reduction in these two ingredients, suggesting improved shelf-life potential. In contrast, pearl millet exhibited higher protein retention under LTLT processing, with protein values of 10-13%, whereas HTST- treated pearl millet showed reduced protein levels of approximately 5-8%, indicating greater sensitivity to high-temperature exposure. Carbohydrate content remained within expected ranges for cereals and legumes (approximately 60-70%), with only marginal variation between processing conditions. Overall, the results confirm that HTST processing is suitable for green gram and peanuts, while LTLT processing is more appropriate for pearl millet, emphasizing the importance of ingredient-specific thermal processing strategies in functional food development.

Keywords: Functional food, HTST drying, Proximate analysis, Nutrient retention, LTLT drying