

Mixture Design Approach for Optimization of Complementary Food Formulation from Sorghum, Soybean, Karkade Seed and Premix for Better Nutritional and Sensory Qualities

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Abstract

Consumption of nutritionally poor complementary foods in developing countries is among the main contributing factors to malnutrition of infants and young children. Therefore, this study aimed to optimize the nutritional and sensory properties of complementary food made from malted sorghum, blanched soybean, boiled karkade seeds and premix. A constrained D-optimal mixture experimental design with 18 runs were generated by design expert software to evaluate and optimize the formulation. The constrained formulations used comprises: 40-60% malted sorghum, 20-30% blanched soybean, 10-20% boiled karkade seeds and 10% premix (5% figl leaf powder, 4.5% sugar and 0.5% iodized table salt). Statistical model evaluation and optimization were done using D-optimal mixture design expert software. Sensory evaluation was conducted using 53 untrained panelists on two selected formulations along with the control (local formulation). The study shows that with an increasing the ratio of blanched soybean and boiled karkade seeds flour in the blend a significant ($p < 0.05$) increase in protein, fat, energy and mineral contents with decreased tannin and phytic acid of high mineral bioavailability except oxalate:Ca ratio in the formulations were observed. The optimal blending ratio was 45.0% malted sorghum, 26.0% blanched soybean, and 19.0% boiled karkade seeds flour plus 10.0% premix. The gruel samples made from the new formula were significantly ($p < 0.05$) liked in terms of aroma, flavor, mouthfeel and overall acceptability than the control sample. The findings suggested that the optimal mix of these traditionally processed ingredients can alleviate protein-energy malnutrition and micronutrient deficiency and replace expensive commercial infant complementary foods sold in the market.

Keywords: Complementary foods, Figl leaves, Karkade seeds flour, Mineral bioavailability, Nutritional optimization

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