

## ABSTRACT

The probiotic complementary food mixes were designed in the present study to help restore and maintain the natural flora in the gut, support the immune system of 6-24 month infants and further reducing diarrheal frequency which is considered as a root cause in contributing towards the major cause of under age five mortalities. Since there are limited data on probiotification of complementary foods, an attempt was made to assess the acceptability of the developed probiotic complementary food mixes based on the locally available cereals and legumes and to study its efficacy on the wistar strain albino rats. The proximate analysis of the raw ingredients was carried out to formulate the compositions. Based on the guidelines given by Bureau of Indian Standards (2006) for complementary foods, six different compositions (T<sub>1</sub> to T<sub>6</sub>) for complementary food mixes using raw ingredients such as rice, pearl millet, finger millet, wheat, mung bean, soyabean, sesame seed, and pumpkin seed were formulated and analysed in the present study. Two formulations with the highest energy density (ED) namely T<sub>6</sub> with an energy density of 443.49 kcal/100g sample (1855 kJ) and T<sub>4</sub> with an energy density of 437.50 kcal (1830 kJ) was subjected to further probiotification and further designated as CFM I and CFM II. Formulations with energy density between 300-550 kcal/100g of sample were selected for further probiotification using standard protocols which were then evaluated for acceptability using the score card method. The physical, nutritional, phytonutrient, and free radical scavenging activity of the probiotic complementary food mixes were studied using the standard protocols. *In-vitro* protein and starch digestibility of the probiotic complementary food mixes were estimated through standard methods. The shelf life properties of the developed probiotic complementary food mixes were analysed through their peroxide value, free fatty acid content, microbial viability, total fungal count and moisture content through standard methods. The *in vivo* efficacy for quality of the developed complementary food mixes were conducted through the animal model.

Out of the two formulations, CFM II was found to be highly acceptable and possessed high nutritional and functional properties in terms of moisture (3.85±0.01g), available carbohydrate (72.83±0.15 g), crude protein

(14.90±0.09 g), fat (6.60±0.05 g), crude fibre (6.12±0.07 g), and total minerals (2.00±0.05 g). The mineral content (in ppm) of CFM II constitute sodium (5.72 ± 0.24) potassium (432.38 ± 0.3) calcium (259.58±0.38), magnesium (6.85 ± 0.30), manganese (15.48 ± 0.42), iron (13.65 ± 0.52), zinc (4.84 ± 0.14), copper (14.15 ± 0.21), and phosphorus (55.11 ± 0.99). CFM II was found to have a free radical scavenging activity of 74.30%, improving nutraceutical potentials. The *in-vivo* studies on Wistar strain albino rats stated that both the products were effective in reducing the episodes of diarrhea along with increasing beneficial bacteria in the gut microflora, while also increasing total protein and total weight and maintaining the blood glucose. The probiotic fermentation resulted in favourable changes in nutritional profile of complementary food mixes resulting in increase in nutritional quality. The product has been published patent under the name “A process of preparation of probiotic complementary food mix and product thereof” with application number 202241007163/03/04/2021”.

Since there are no peer reviewed studies on probiotification of non-dairy foods, this study creates awareness on focusing on identifying proper probiotic fermentation technology that possesses good potential to develop nutritionally enriched complementary food mixes to improve the quality and quantity of all the nutrients for infants. Dissemination of this technology to the rural areas on a large scale will be helpful to the rural farm women to feed their children a nutritionally balanced food.