Development of a grain-milk functional beverage and evaluation of physico-chemical and sensory properties

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Consumer demand for functional foods is an increasing trend in the new century. The aim of this study was to develop a low-fat gluten-free functional multi-grain beverage by improving nutritional and flavor profiles. In the present study, a grain-based milk beverage was newly developed from grain extract, which was prepared by mixing selected grains at pre-determined grain ratios (sorghum: horse gram: red rice 'kuruluthuda'; 5: 2: 3 respectively) followed by soaking overnight, pressure cooking and blending with water (1: 3). Formulation of grain-milk beverages were performed in three grain extract ratios (60 %, 65 % and 70 %) with cow's milk, sesame milk, sweetener (Kithul treacle and sugar) and carrageenan followed by homogenizing and sterilizing at 121 °C for 15 min. The best formulations were selected as 70 % multi-grain extract, 15 % cow's milk, 8 % sesame milk, 7 % sugar and 70 % multi-grain extract, 15 % cow's milk, 5 % sesame milk, 10 % treacle while carrageenan as a stabilizer (0.1 %) based on the sensorial attributes. The total soluble solid, total acidity and pH of the beverage with sugar and treacle were (12.13 ± 0.06 %, 12.10 ± 0.1 %), (0.01 ± 0.001 %, 0.02 ± 0.001 %) and (6.11 ± 0.01, 5.8 ± 0.001) respectively. The chemical properties of fat, protein, crude fiber, total ash, carbohydrate, total sugar, and caloric value of grain-milk beverage containing sugar and treacle were (1.46 ± 0.02 %, 1.03 ± 0.01 %), (1.46 ± 0.12 %, 1.46 ± 0.10 %), (0.78 ± 0.13 %, 0.82 ± 0.01 %), (0.37 ± 0.01 %, 0.37 ± 0.01 %), (11.66 ± 0.01 %, 11.70 ± 0.01 %), (9.43 ± 0.001 %, 9.45 ± 0.001 %), and (66.06 Kcal, 65.41 Kcal) respectively. The mineral contents of grain-milk beverages containing sugar had Na (21.30 mg/100 mL), K (76.00 mg/100 mL), Ca (2.64 mg/100 mL) and Mg (15.56 mg/100 mL) while grain-milk beverages containing treacle had Na (14.90 mg/100 mL), K (74.80 mg/100 mL), Ca (2.41 mg/100 mL) and Mg (13.76 mg/100 mL) respectively. Vitamins B1, B2, B3, B6, B9, and E were not found, but Vitamin B5 levels were 1.9 mg/100 g and 2.1 mg/100 g, respectively. The developed beverages had acceptable organoleptic properties with high potential to be introduced as healthy functional beverages.

Keywords: *Sorghum, Horsegram, Red Rice, Grain-milk beverage, Functional beverage.*