Development, nutritive content and shelf life of home processed supplementary foods

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Abstract. Four low cost supplements containing whole wheat, pearl millet, bengal gram, green gram grain and amaranth leaves employing roasting and malting methods were developed. Nutritional evaluation showed that chemical composition of developed supplements was within the range prescribed for processed supplements and could meet satisfactorily one third requirements of protein, energy, iron and calcium for young children. Developed supplements were stored in three packings, polythene bags, tins with lids, glass bottle with lids (each 1 kg capacity, under ambient temperature (24-32 °C) and RH (70-80%) for a period of 30 days and analysed for moisture, peroxide value, fat acidity and alcoholic acidity. Stored samples were also evaluated organoleptically. The values of moisture, peroxide value, fat acidity and alcoholic acidity of stored samples were within the range of prescribed specifications for processed supplements. Storage of supplements for 30 days resulted in non-significant changes in organoleptic traits except for taste and aroma of bajra based supplements on 20th and 30th day of storage. In spite of these variations, all the supplements were found to be acceptable till 30th day of storage.

Introduction

Adequate nutrition during infancy and early childhood, a period of rapid growth and crucial for laying foundation for life time, is of paramount importance for fostering all round physical, mental and emotional development to the optimum levels. Under five years, mortality rate of the children in India is as high as 95 per one thousand as against 6 per thousand in affluent countries [1]. Lack of proper feeding practices, poverty, ignorance, food fads and delayed supplementation are pertinent predisposing factors for the etiology of rampant malnutrition among young children in India. Economically affluent elites meet the nutritional requirement of their children by feeding commercial weaning foods but the cost induced in transportation, storage and distribution of these commercial products make them beyond their reach of a common man [2]. There is, hence, an urgent need to develop least cost nutritious supplements which is possible by the judicious combinations of less expensive foods available in a rural household. Use of simple and inexpensive processing
techniques generally employed in a rural household will be instrumental in making such supplementary foods readily available to a rural mother.

**Materials and methods**

The concept of multimixes and four food square system [3] was adopted for selecting the staple, protein and energy supplement. A number of permutations and combinations with the locally grown and commonly consumed food stuffs were theoretically calculated for protein content, essential amino acid profile and chemical score. In cereals, wheat, pearl millet and among pulses bengal gram and green gram were selected for the present study. Groundnut was also included as it is a rich source of energy and protein and is locally available in rural areas of Haryana. Jaggery was added to increase the energy density of the supplements and also to provide iron. Amaranth leaves (*Amaranthus Gangeticus*) were also added with its advantage of providing minerals.

The grains of wheat (WH-283), pearl millet (CJ 104), green gram (K-851), bengal gram (G-130) were obtained from the Directorate of Farms, Haryana Agricultural University, Hisar, in a single lot. Jaggery, groundnuts and amaranth leaves were procured in one lot from local market of Hisar. The grains were cleaned for dust and other extraneous materials and stored at room temperature in plastic containers.

Based on the fact that essential amino acid content of the supplements should be similar to that of egg protein (Standard reference protein source) and the supplements satisfy fully the young child supplementary feeding guidelines of providing at least one-third of recommended dietary allowances of nutrients, the proportions of adding cereal, pulse and oil seeds in the ratio of 4:1:1 were decided for the development of supplements. This proportion was kept deliberately simple so that the technology can be transferred easily to the household or village level.

The ingredients in the ratio of 4:1:1:4 were mixed for the preparation of all the four supplementary foods. Supplement I and II were prepared by roasting of wheat and malting of pulses while supplement III and IV by roasting of bajra and malting of pulses. The compositional analysis and cost of the supplement (per serving) is given in Table 1. Cost of each supplement was calculated on the basis of price of each ingredient in the local market (compared with the cost of commercial weaning food (Cerelac)).

*Processing methods.* Simple home scale processing methods were used in the preparation of supplements so that mothers could follow these techniques at household level. Roasting and malting of the grains (the traditional methods commonly employed in rural families) were employed in processing of different ingredients. Roasting and malting are reported to have nutritional advantages. Roasting was done as it reduces significantly most of the antinutritional factors.