Bioavailability studies on Ragina & Energy Protein rich Foods

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The Horse gram (Dolichos Biflorus) which is commonly used for cattle feed can be diversified for human consumption with less investment. Processed Horse gram flour was prepared using puffing and roasting, processed Soya bean (Glycine max) flour was prepared by dehulling and roasting. The low cost energy protein rich products namely RAGINA and EPRF were prepared using the simple scale processing methods like germination, roasting and puffing, to improve the nutritional status. Horse gram has been identified as potential food resource for the tropics and also occupies an important place among pulses because of its ability to resist severe drought conditions. Soya bean is one of the best vegetable proteins and has tremendous potential to meet the protein deficiency in the cereal based Indian diets at a low cost. Product development can be taken as income generating activity in the rural areas by the illiterate women. Products can be included in supplementary feeding program in order to improve the nutritional status. India is the second most populous country in the world; 120 million women live in poverty. As per the National and Regional Survey , Prevalence of anemia 74% in children below 3 years of age , 85% in pregnant mothers and 90% among adolescent girls. In a developing country like India, there is a genuine need for nutritious food supplements which can be prepared from readily available raw materials [1]. Horse gram was selected as one of the ingredient in developing mixes. Vitamin A deficiency is prevalent among large segments of the society in many countries [2]. Two different products RAGINA and Energy Protein Rich Food (EPRF) were developed incorporating Red palm oil (obtained from the fruits of tree Elaeis guineensis Jacqat) 5% level which is a rich natural source of β carotene to improve the nutritional status of the vulnerable groups of the population .

The raw materials used in the preparations of the products such as Ragi and Soyabean were obtained from Regional Agricultural Research Station, Palem, Mahaboobnagar, Horsegram from local market, jaggery powder from Regional Agricultural Research Station, Anakapalli and Red Palm Oil from AP. Co-operative at Seeds Grower's Federation, Pedevagi were obtained.

Statistical analysis showed that calcium, Energy and β - Carotene values of Ragina are different from EPRF. No significant difference was observed in other minerals. Red Palm oil provides a solution to prevent vitamin A deficiency which is an alarming problem. It is a concentrated source (400 µg /g) of β – carotene, which is a precursor of vitamin A. The present study was undertaken to develop the low cost protein rich products which will be beneficial to improve the nutritional status of the vulnerable group of the population .Study conducted by Vijaya Khader and Aruna (2008) revealed that the supplementation of Red Palm Oil increased in height & weight of children, decreased in grade 111 and grade 1V malnutrition [3].

Growth and Protein efficiency ratio (PER): The gain in weights of rats and PER of the two developed products RAGINA and EPRF are significantly different with each at 5% level. The weight gain and PER of the rats fed on Ragina was markedly higher (62. 1g) and 2.2 than that observed with EPRF(37.8g) and 1.0 respectively. The higher weight gain of the rats fed on Ragina might be due to the puffing of horse gram .The processing increased the PER of protein as it destroys the anti-nutritional factors [4]. and results in better utilization of protein. Vijaya Khader and Venkat Rao ,1986 [5]reported that cooked dehusked horse gram gave a slightly higher PER than autoclaved whole horse gram. The increase in gain in weight may also be attributed to the germinated ragi used in Ragina. During germination the starch breaks down, which increases amylase and phosphorylase activity in respiratory metabolism and promote digestibility of the sprouted millet. Chandra Shekhar and Chitra, 1978[6] reported the protein quality of germinated horse gram to be higher than that of raw seeds. Similar results were reported by Sudha et al., 1994 [7]

Although the nitrogen intake of the rats fed on the diet Ragina (2.68 g) was comparatively lower than that of EPRF (3.45g) the weight gain was higher in case of Ragina (61.2 g). Reduced gain in weight of the rats fed on EPRF (42.9 g) may be due to the anti-nutritional factors present in the soybean which might have interfered with the protein utilization. The better gain in weight of Ragina was due to processing like germination and puffing of ragi and horse gram incorporated in the preparation of the product which might have increased the protein utilization [8].

Overall Digestibility: The food intake of rats fed on Ragina and EPRF are 26.77 g and 28.88 g and the overall digestibility is 85.69% and 86.38. No significant difference was observed between these products but they are significantly different from the control diet.

Organ weights: The weights of the kidney and brain of the rats fed on EPRF are comparable to that of rats fed on casein diet. Whereas, the kidney as well as brain weights of rats fed on Ragina are much lower as compared to rats fed on EPRF and casein diets. This may be due to the less protein content of the Ragina diet.

Serum Analysis: There is no significant difference between the developed products with regard to total protein, albumin, globulin and AIG ration; but markedly different from control group.

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