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RESEARCH PAPER

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Evaluation of nutritional characteristics of weaning food formulations

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SUMMARY :

Weaning food was developed in three different formulations *viz.*, F_1 (Malted wheat flour : Peanut flour: Banana flour :: 72 % : 23 % : 5 %), F_2 (Malted wheat flour : Peanut flour: Banana flour :: 62 % : 32 % : 6 %) and F_3 (Malted wheat flour : Peanut flour: Banana flour :: 68 % : 26 % : 6 %) at the lowest possible cost and in such a way that to meet and enriched the protein requirement of infant. The nutritional characteristic of developed weaning food was analyzed during the storage period of 90 days. The weaning food formulation with malted wheat flour, peanut flour and banana flour in the proportion of 62 % : 32 % : 6 % was found best in terms of nutritional content during the study period of 90 days. It contains 15.37-16.07 % protein, 11.56-12.33 % fat, 2.07-2.20 % ash, 63.23-63.29 % carbohydrate and 418.6-428.2 kcal energy.

KEY WORDS : Weaning food, Protein, Nutritional characteristics, Storage

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Nutritive quality of food is a key element in maintaining human overall physical well-being. The growth and survival of infants after the recommended period of exclusive breast feeding for up to six months depend on the nutritional quality of the weaning food that is used to feed the infants. The weaning period of infant's life is a period when the diet changes from complete breast feeding (upto 4-6 months) to the age when the child is able to eat a normal family food (around one to one and half year) and this does not imply the discontinuous breast feeding (WHO, 1995). The vulnerability of infants to problems associated with the weaning process is of global concern, but more especially developing economies. Chronic malnutrition has been and still remains persistent problem for young children in developing countries. The nutritional value of complementary food should meet the nutrient requirement of rapidly growing children and the food should be diverse with appropriate texture and given in sufficient quantity. A high proportion of the nursing mothers used locally available ingredients to formulate weaning foods for their babies. The nutritional compositions of these foods are of high quality and suitable as weaning foods, particularly for infants of low income parents who are unable to access

for commercial weaning foods (Ijarotimi and Ogunsemore, 2007). The precise cause growth failure is not clear, but must be due to one or a combination of factors like, insufficient dietary intake, defective digestion or absorption, increased metabolic demands etc. (Rowland, 1980). The most important form of malnutrition prevailing in India is protein calorie malnutrition (Chakaravarthy, 1997). A global study conducted on child mortality revealed that everyday 5000 infants and children succumb to death due to malnutrition. In India 47 per cent children with less than 3 years of age are malnourished. Out of which 18 per cent succumb to death due to anemia related to malnutrition (UNICEF, 2011).

The present work was designed to develop weaning foods using malted wheat flour incorporated with peanut flour and banana flour. The nutritional characteristic of developed weaning food was analyzed during the storage periods of 90 days.

EXPERIMENTAL METHODS

Procurement of raw materials:

The raw ingredients, wheat (*Triticum aestivem* L.), peanut and unripe bananas were procured from the local market of Jabalpur, M.P. All the raw materials were cleaned to remove dirt, stones and other inedible materials.

Preparation of flour:

Banana flour:

Unripe green bananas were washed thoroughly in running water to remove the adhering soil and extraneous matter. The bananas were peeled with the help of sharp knife and then slices of 2-3 mm thickness were prepared with the help of slicer. These disc shaped slices were then washed softly in potable water to remove the stickiness.

The banana slices were blanched with hot water (97°C) for 5 minutes. After blanching the surface water was drained out completely and the slices were taken for the drying. The drying was done at hot air oven for 24 h at 60°C. The dried banana slices were milled into flour.

Peanut flour:

The peanuts were sorted manually and all the defected kernels and foreign matters were removed. Cleaned peanut kernels were roasted in a roaster. During roasting peanuts were stirred thoroughly to achieve uniform roasting. The roasted peanuts were decorticated and then ground into flour.

Malted wheat flour:

Malted wheat flour was prepared by the method as described by Malleshi (1988).

Weaning food formulation:

The weaning food was formulated with linear programming (simplex mehtod) into three different formulations, *viz.,* F_1 (Malted wheat flour : Peanut flour: Banana flour :: 72 % : 23 % : 5 %), F_2 (Malted wheat flour : Peanut flour: Banana flour :: 62 % : 32 % : 6 %) and F_3 (Malted wheat flour : Peanut flour: Banana flour :: 68 % : 26 % : 6 %) at the lowest possible cost and in such a way that to meet and enriched the protein requirement of infant. The weaning food formulations were taken for storage in poly ethylene terephthalate (PET Jar) (400 g capacity) and the mixes were stored for a period of three months (90 days) at room temperature for the quality evaluation. The quality parameters of developed weaning foods were checked in each period of the months.

Nutritional evaluation:

Moisture contents of all the samples were estimated as per AOAC method (1984). The protein content of the dried samples was estimated by determining total nitrogen as per standard Micro-Kjeldahl method (AOAC, 1980). The titration value was determined. The protein content of the sample was obtained by multiplying the nitrogen with a factor 6.25. Fat content was estimated by ether extract method as per the procedure of AOAC (1980). Total ash content of the developed weaning food was analyzed as per the procedure of AOAC (1980). The carbohydrate content of the sample on dry weight basis was calculated by difference method recommended by Gopalan and Bala Subramannian (1991). The energy value of sample was calculated using physiological fuel value *i.e.* 4, 9, 4 kcal per gram of protein, fat and carbohydrate, respectively as per AOAC (1980).

Statistical analysis:

The data obtained in the experiment was analyzed statistically for the test of significance by using Complete Randomized Design (CRD) for two factor analysis to test for F-values. With the help of the technique of sum

of square and mean square, the ANOVA table was formed for the data. When F-calculated value is found to be larger than the F-tabulated value, we say that the factors are found to be significant including the value of critical difference (CD).

EXPERIMENTAL FINDINGS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Nutritional evaluation:

The moisture content of fresh weaning food formulations ranged from 6.17 % (F_2 formulation) to 6.50 % (F_3 formulation). For all weaning food formulations the moisture content increased gradually with increases in storage period (Fig. a). No significant difference was observed in moisture content of the weaning food formulations during the storage period. The increase in moisture content of weaning food formulation during storage may be due to the transferred of moisture from the surrounding to the weaning food. Similar observations were obtained by Uchechukwu-Agua (2015).

The protein content of the freshly prepared weaning food formulations were 13.83, 16.07 and 15.25 % for F_1, F_2 and F_3 formulations, respectively. It was observed that the formulation having higher proportion of peanut flour contained higher amount of protein. The protein contents of all the weaning food formulations degraded with increment in storage period (Fig. b), this may be due to the deterioration of protein by micro-organism and environmental factors. A significant difference was found in protein content of weaning food formulations as increased in the storage period.

The fat content of the freshly prepared weaning food formulations were 9.00, 12.33 and 10.33 % for F_1, F_2 and F_3 formulations, respectively. It was observed that F_2 formulation which has highest proportion of peanut flour (32 %) obtained highest amount of fat (12.33%) among the three formulations, while the formulation F_1 with lowest proportion of peanut flour (23 %) have lowest fat content (9.00 %). The high value of the fat content in formulation with higher proportion of peanut is due to high amount of fat in peanut as compared to malted wheat flour and banana flour. A significant difference of fat content of weaning food formulations was observed as increased in the storage period. The fat content of all weaning food formulations decreased with increases in storage duration (Fig. c), the decreased in fat could be attributed to the lipolytic activities of the enzyme lipase and lipoxidase (Agrahar- Murugkar and Jha, 2011), which resulted in the decline in fat content.

The ash contents of the freshly prepared weaning food formulations were 2.20, 2.20 and 1.93 % for F_1, F_2 and F_3 formulations, respectively. The ash content of all the weaning food formulations were gradually decreased as increases in the storage period (Fig. d), this apparent decreased in the ash content of the formulations during storage is probably due to moisture ingress in the formulation during storage. The decrease in ash content may be due to the decreases of minerals in the formulation during the storage period. A significant difference in ash content of weaning food formulations was observed as increased the storage period.

The carbohydrate content of freshly prepared weaning food formulations were 68.50, 63.23 and 66.11 % for F_1, F_2 and F_3 formulations, respectively. It was observed that the formulation having higher proportion of malted wheat flour contained higher amount of carbohydrate. The carbohydrate content of F_1 formulation gradually increased as increased in the storage period but F_2 and F_3 weaning food formulations showed that the carbohydrate contents were first decreased after one month of storage and then increases gradually till the end of the storage period (Fig. e). A significant different in carbohydrate content of weaning food was observed as increased in the storage period of weaning food formulations. The increased in carbohydrate content could be due to the variation of other parameters (moisture, protein, fat and ash) during the storage period (Ogbonnaya and Hamza, 2015).

The energy content of the freshly prepared weaning food formulations were 410.3, 428.2 and 418.5 kcal for F_1, F_2 and F_3 formulations, respectively. A significant different in energy content of weaning food formulation was observed as increased in the storage period. The energy contents of weaning foods decreased gradually as increases in the storage period (Fig. f), this may be due to the variations of the energy attributes such as protein, fat and carbohydrate.

Conclusion:

Peanut flour can actually be used in malted wheat

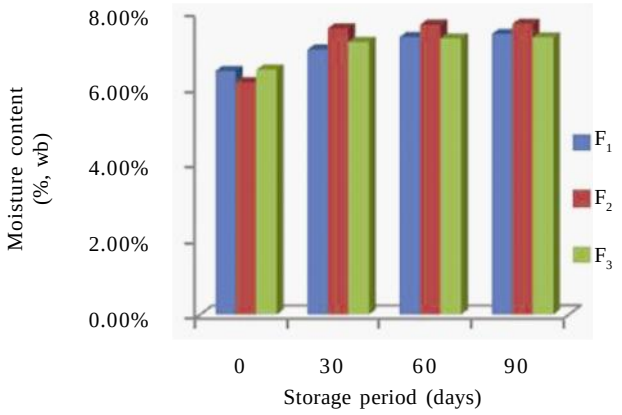

Fig. (a)

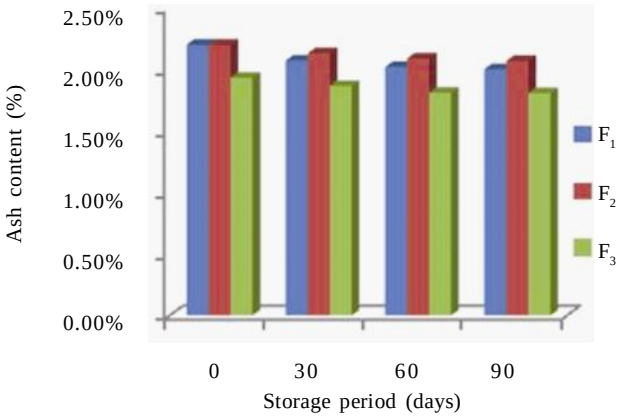

Fig. (d)

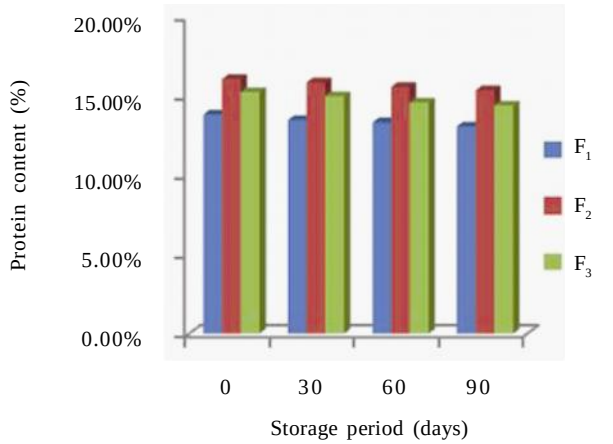

Fig. (b)

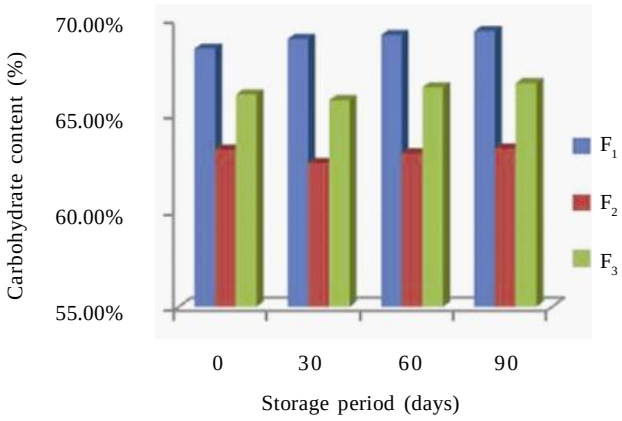

Fig. (e)

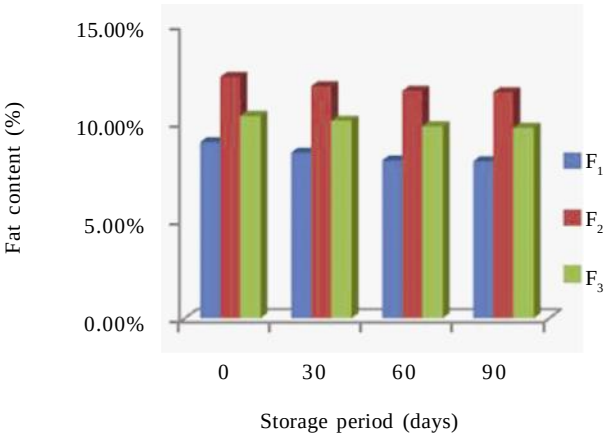

Fig. (c)

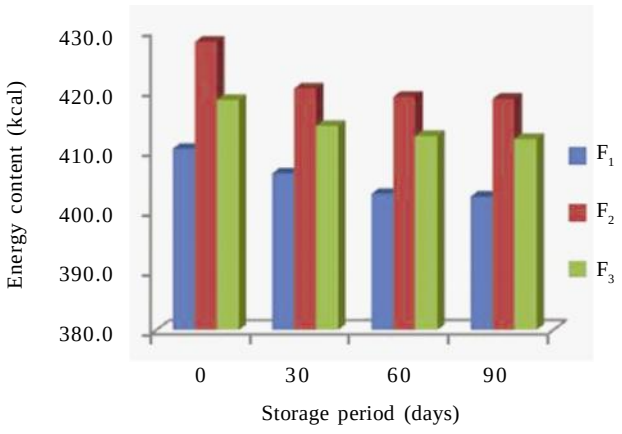

Fig. (f)

Fig. 1 : Effect of composition and storage period on moisture content (a), Protein (b), Fat (c), Ash (d), Carbohydrate (e) and Energy (f) content of weaning food formulations

based weaning food as an acceptable protein and mineral supplement. The weaning food formulations developed in the study successfully produced, weaning food high in protein and energy with acceptable functional and excellent nutritional quality. The weaning food formulation with malted wheat flour, peanut flour and banana flour in 62 % : 32 % : 6 % proportion was found best during the study period of 90 days. It contains 15.37-16.07 per cent protein, 11.56-12.33 per cent fat, 2.07-2.20 per cent ash, 63.23-63.29 per cent carbohydrate and 418.6-428.2 kcal energy. Therefore, it can be strongly recommend for further study to determine the feasibility of producing the diets commercially at a large scale.

LITERATURE CITED

Agrahar-Murugkar, D. and Jha, K. (2011). Influence of storage and packaging conditions on the quality of soy flour from sprouted soybean. *J. Food Sci. & Technol.*, **48**: 325– 328.

Association of Official Analytical Chemists (AOAC) (1980). *Official methods of analysis*, 13th Edn., Washington, D.C. p: 114

Association of Official Analytical Chemists (AOAC) (1984). *Official methods of analysis.* 13th Edn., Washington, D.C. p: 131.

Chakravarthy, M. (1997). Development of central foods based on malted cereals. Ph. D. Thesis, University of Mysore, Mysore.

Gopalan,C.R. and Balasubramannian, S.G. (1991). Nutritive value of Indian foods. National Institute of Nutrition. Ind. Coun. Med. Res. Hyderabad.

Ijarotimi, O.S. and Ogunsemore, M.T. (2007). Weaning foods and their impact on child-feed practices among low-income Nigerian mothers. *Food Nutr. Bull.*, **27**: 327-334.

Malleshi, N.G. (1988). Weaning foods. R.E.S.C. Scientific series No. 8, C.F.T.R.I., Mysore.

Ogbonnaya, Chukwu and Hamza, Abdullahi (2015). Effects of Moisture content and storage period on proximate composition, microbial counts and total carotenoids of cassava flour. *Internat. J. Innovative Sci., Engg. & Technol.*, **2**(11): 753-763.

Rowland, M.G.M. (1980). The weanling's dilemma, are we making progress?. *Acta Pediatr. Scand.*, **232**: 33-42.

Uchechukwu-Agua, A.D. (2015). Effect of packaging and storage condition on functional properties and quality attributes of cassava flour (CVS. 'TME 419' and 'UMUCASS 36'). M.Sc. Thesis, Department of Food Science, Stellenbosch University, Stellenbosch, South Africa.

UNICEF (2011). The world Bank, WHO and UNICEF joint child malnutrition estimates. *Reported by Mercedes-de-onis, Dawd Brown, Monika Blossner and Elaine Borghi.*

WHO (1995). Working group on infant growth. An estimation of infant growth the use of anthropometry in infants. *WHO Bull.*, **17**: 74.