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Full Length Research Paper

Evaluation of weaning foods formulated from germinated wheat and mungbean from Bangladesh

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The aim of this study was to develop a weaning food for the children of Bangladesh by using available resources, for this purpose five weaning formulations (F_1 to F_5) based on germinated wheat and mungbean sugar and skim milk powder were processed and evaluated. For preparation of germinated wheat and mungbean flour, seeds were soaked in water for 12 h at 30°C ± 2, germinated for 60 h at 33.5°C ± 2 in a seed germinator, dried at 60°C for 8 h, dehulled, roasted at 145°C 2 min and milled, after which weaning foods formulations samples were developed by mixing the ingredients. The prepared formulations samples were investigated for proximate composition, functional properties (bulk density, water and oil absorption capacities, swelling power and water soluble index) and sensory evaluation. The proximate composition results indicated that the moisture for (5.26 to 5.12), protein (28.627 to 17.325), ash (3.144 to 2.609) crude fiber (1.865 to 1.321) and carbohydrate (69.561 to 60.2456) were significantly different ($p > 0.05$) but were within the range of the standard specifications for weaning foods. Fat content (1.336 to 1.234), however, was low when compared to the standard specifications even though values were significantly different ($p>0.05$) when compared with the formulations. Calculated values for total energy provided by the blends ranged from 377.825 to 376.600 kcal/100 g dry matter which was significantly different ($p > 0.05$). The functional properties of weaning food formulations were not significantly ($p >0.01$) different. The overall acceptability score was highest (7.45) in F_3 weaning food followed by F_4 (7.20) ranging from 'like slightly' to 'like moderately. The F_3 weaning food was satisfactorily acceptable. The composition and functional properties of F_3 (44% wheat flour 36% mungbean flour, 10% skim milk powder and 10% sugar) and F_2 (56% wheat flour 24% mungbean flour, 10% skim milk powder and 10% sugar) formulations were close compared to the standard specifications and hence have a good potential for use as weaning foods.

Key words: Weaning, food, germinated, wheat, mungbean.

INTRODUCTION

Bangladesh is the eighth most populous country in the world and one of the poorest. Although recent progress has been made in reducing the incidence of poverty and malnutrition, the fact remains that roughly half of its 126 million citizens live in deprivation while roughly half of all children under 6 years show some evidence of chronic malnutrition (World Bank, 2003). Malnutrition is one of the most serious problems in Bangladesh. One main reason is scarcity and high price of protein food of animal origin.

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Most children between the age 4 months and 2 to 3 years suffer from malnutrition. The reasons behind this fact are generally low incomes, poor sentimental conditions and lack of education. It is essential to educate families to use locally produced foods (Cameron and Hofvender, 1983). Malnutrition and poor growth during infancy affects a large portion of the world's population; more than 800 million children under 5 years of age suffer from malnutrition and growth failure (Gupta and Sehgal, 1991). Such morbidity is responsible for more than 10 million deaths per year in this age group. Protein-energy malnutrition accounts for the higher infant mortality rate in India (95/1000 live births) compared to that in developed countries (Dahiy and Kapoor, 1994). There is a need for nutritious weaning foods that are acceptable and affordable to low income populations. Guidelines state that an ideal weaning food must be nutrient dense, easily digestible, of suitable consistency and affordable to the target market (FAO/WHO, 1985).

Therefore, development of supplementary foods based on locally available cereals and legumes has been suggested by the Integrated Child Development Scheme (ICDS) and Food and Agriculture Organization (FAO) to combat malnutrition among mothers and children of low socio-economic groups. In developing countries, cereals (wheat, oat, milt and sorghum) and legumes (soy and Bengal gram) are commonly available. Evidence indicates that it is quite possible to improve the nutrient quality and acceptability of these cereals and legumes and exploit their potentials as human foods by adopting newer scientific processing methods (Natarajan et al., 1979). Three cereals: wheat, maize and rice together comprise at least 75% of the world's grain production. It is clear that humanity has become dependent upon cereal grains for the majority of its food supply (Mangelsdorf, 1966). The inclusion of various cereals and legumes in the development of infant food supplements has been extensively investigated (Griffith, 1998). Cereals, the main source of calories in the south Asian diet, are adequate in methionine and cysteine and are a good source of B-complex vitamins but limiting in lysine. Most legumes are rich in lysine but low in sulfur amino acids, allowing the combination of cereals and legumes into complementary blends at about an equal 50:50 ratio of the two proteins (Hellendoorn, 1979).

The mungbean (*Vigna radiata* (L.) wilczek) has been grown in the Indo-Pak subcontinent since ancient times, where the diet is mostly cereal-based and is a well studied plant for its nutritional value and medicinal importance. It is often praised as a "green pearl" because of its richness in protein, starch, minerals, vitamin B, and amino acids. It is consumed as a seed, sprout, or in processed forms that include cold jellies, noodles, cakes, and brews. It is used as dhal; to make curries; sweet and salty soups; is broiled and toasted with onion, chili and salt; in sweet and salt penal (rice preparation); and patties and sweets of different kinds (Thirumaran and Seralathan, 1988). Because of its high protein content, easy digestibility and being almost free from flatulence-causing factors; it is preferred for feeding babies and convalescents. Furthermore, it is also consumed in many forms: as boiled dry beans, bean sprouts, green beans, noodles and bean cakes (Abd el-moniem, 1999). It is known that legumes contribute significantly towards protein, mineral and B-complex vitamin needs of people in developing countries. Hence, supplementation of wheat flour with inexpensive staples, such as cereals and pulses, helps in improving the nutritional quality of wheat products (Sharma, 1999). At present, there are no weaning foods manufactured in Bangladesh from locally available food resources. Only a small sector of the community uses imported baby foods. There is, therefore, an urgent need to conduct studies that help in production of weaning foods based on locally-available materials and evaluate their composition and properties. The aim of this study was to develop a weaning food for the children of Bangladesh by using available resources.

MATERIALS AND METHODS

Dried wheat and mungbean seeds were purchased from the market of Bangladesh and kept in an airtight polyethylene bags at room temperature in a dry place. The storage time was less than 2 weeks before use.

Preparation of wheat and mungbean flour

Wheat (WF) and mungbean (MF) flour samples prepared by taking 300 g of wheat and mungbean seeds were sterilized by soaking in ethanol 2% for 1 min. The seeds were then soaked in tap water for 12 h at room temperature. The soaked seeds were germinated in a plastic tray lined with wet paper towels. Two layers of wet paper towels were used to cover the seeds to prevent rapid moisture loss. They were germinated in the seed germinator at 33.5 ± 2°C and watered 2 to 3 times a day for 60 h. The sprouts were washed and dried at 60°C for 12 h in an electric oven (Contherm, Quantherm 200 L, Contherm Scientific, Lower Hutt, New Zealand). The dried sprouts were ground in a hammer mill (Culatti, Model: JKA Werk, Type: DCFH, Germany) and sieved with a 60 mesh screen (Model BS 410, Endeco London, England). The flour was put, in triplicates, into polyethylene bags and packed in a glass container. They were stored in a refrigerator at 4°C until nutritional analysis.

Formulations of weaning food

Weaning foods were formulated to meet the nutrient requirements of children ages 4 months to 1 year (FAO/WHO, 1985). In addition to breast milk, for the first 4 to 6 months, a baby should be provided with 96 kcal/kg of energy per day. The level of protein needed is 14 to 15.5 g protein/day of a quality equivalent to that in milk or eggs (FAO/WHO, 1985). Germinated wheat flour, mungbean flour mixture, skim milk powder and sucrose were blended. The compositions of formulation are shown in Table 1. The blends were prepared in duplicate and the results of all analysis were reported as the means of three replicates. The complete processing steps of weaning food are shown in Figure 1.

Biochemical analysis

Analyses were carried out on duplicate formulation, for each sample; three determinations were made. The crude fat was estimated by exhaustive extraction with petroleum ether (B.P.40 to 0°C) using a Soxhlet apparatus (AOAC, 2004). The micro Kjeldahl method was used for the determination of protein (N × 6.25). The moisture, ash and crude fiber contents were determined by the AOAC (2004) methods total carbohydrate was obtained by difference (100 – (% moisture + % crude protein + % crude fat + % ash) while food energy was calculated by multiplying the values of crude protein, fat and carbohydrate by factors of 4, 9 and 4, respectively, finding the sum of their products and expressing, the result in kilocalories (Osborne and Voogt, 1978). All reagents used were of analytical grades.

Table 1. Formulations of weaning food prepared from germinated wheat and mungbean seed flour.

Ingredient (%)	Formulations				
	F_1	F_2	F_3	F_4	F_5
Munbean flour (MF)	12	24	36	48	60
Wheat flour (WF)	68	56	44	32	20
Full fat milk powder (MP)	10	10	10	10	10
Sucrose (S)	10	10	10	10	10
Ratio of ingredients	1.2:6.8:1:1	2.4:5.6:1:1	3.6:4.4:1:1	4.8:3.2:1:1	6.:2:1:1

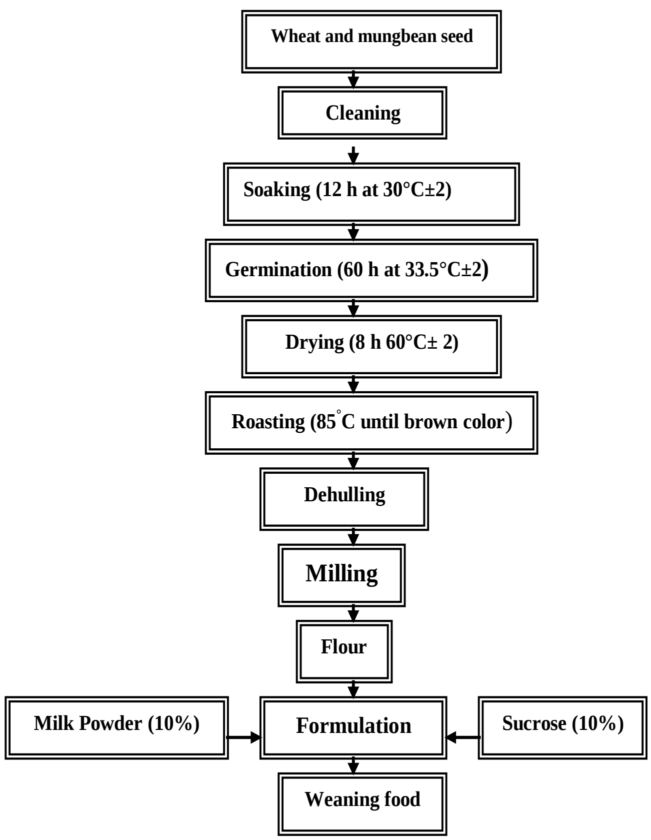

Figure 1. Flow diagram of weaning food formulation from germinated wheat and mungbean flour.

Functional properties

pH

The pH was measured by making a 10% (w/v) flour suspension of each sample in distilled water. Each sample was then mixed thoroughly in a plastic beaker, and the pH was recorded with an electronic pH meter (Model PHN-850, Villeur-Banne, France).

Water and oil absorption capacities

The water and oil absorption capacities were determined by the method of Sosulski (1976). 2 g weaning food sample was mixed with 20 ml distilled water or refined soybean oil (S.G. 0.9084) and was allowed to stand at ambient temperature (32°C) for 30 min, then centrifuged (Hettich Universal II, Germany) for 30 min at 2000 × g. Water and oil absorption capacity was expressed as percent water or oil bound per gram flour. Water or oil capacity of the flour = Wt. of water or oil absorbed/ Wt. of sample.

Bulk density (BD)

The BD (packed and loosed) was determined according to the method described by Okaka and Potter (1977). 50 g sample was put into a 100 ml graduated cylinder. The cylinder was tapped 40 to 50 times and the bulk density was calculated as weight per unit volume of sample. BD = Wt. of flour/ volume of the bulk flour.

Foam capacity (FC)

The FC was determined as described by Narayana and Narsinga (1982) with slight modifications. 2 g weaning food sample was added to 50 ml distilled water at 30°C in a 100 ml measuring cylinder. The suspension was mixed and shaken for 5 min to foam. The volume of foam at 30 s after whipping was expressed as FC using the formula. FC = Difference in Vol. / Vol. before blending.

Swelling power

Swelling power was determined through the method described by Leach et al. (1959) with modifications for small samples. 1 g of the weaning food sample was mixed with 10 ml distilled water in a centrifuge tube and heated at 80°C for 30 min. This was continually shaken during the heating period. After heating, the suspension was centrifuged at 1000 × g for 15 min. The supernatant was decanted and the weight of the paste was taken. The swelling power was calculated as swelling power = weight of the paste / weight of dry flour. Swelling power = Wt. of the paste / Wt. of dry flour. Water

Water solubility index (WSI)

WSI was measured according to the method of Anderson et al. (1996). Two and half g of weaning food sample was dispersed in 25 ml of distilled water taking care to break up any lumps using a glass rod. After 30 min of stirring, the dispersion was rinsed into tarred centrifuge tubes made up to 32.5 ml and then centrifuged at 3000 × g for 10 min. The supernatant was then decanted and the weight of its solid content determined after it had been evaporated to a constant weight. The WSI was then calculated as: WSI = wt of dissolved solids in supernatant/ Wt. of dry flour sample.

Sensory evaluation

Sensory evaluation was conducted in the Sensory Evaluation Laboratory, Department of Food Technology and Rural Industries Bangladesh Agricultural University, Mymensingh Bangladesh. A total of 10 panelists, ranging in age from 20 to 40 years and who included students and staff of the Department of Food Technology and Rural Industries, Bangladesh Agricultural University, Mymensingh Bangladesh participated in this study. Samples were evaluated in a soundproof, humidity-controlled sensory room with individual booths. Incandescent lighting was used to mask any color differences that might influence a panelist's judgment. Evaluations were held once a day in the mid-afternoon three times a week. A total of three replications were completed. Weaning food samples were placed in 20 ml white plastic cups with lids. All cups were coded with three digit random numbers, served at room temperature and the order of serving for each judge was randomized. Panelists were instructed to remove the lid and reconstitute the samples with warm water (50°C) to 20% total solids concentration. The judges evaluated the samples for color and appearance, flavor, odor, texture and overall acceptance on a 9 point scale ranging from like extremely (9) to dislike extremely (1).

Statistical analysis

Results are presented as mean values and standard deviations. Data were subjected to analysis of variance (ANOVA) where applicable and a difference was considered to be significant at $p \leq 0.05$. Means were separated using Duncan's multiple comparison tests.

RESULTS AND DISCUSSION

Proximate composition of raw material

The results on the proximate analysis of the wheat and mungbean seeds are presented in Table 2. The moisture content in wheat seed (13.42 ± 0.030) was higher than in mungbean (9.200) while fat and carbohydrate contents were higher in wheat seed than in mungbean, however, protein, ash and crude fiber was higher in mungbean seed than in wheat. The results on the proximate analysis of the wheat and mungbean seeds showed similarities with the findings presented by Meiners et al. (1976). Legumes and cereals are a good source of carbohydrates, protein and dietary fiber, an important source of vitamins and mineral elements.

Proximate composition of weaning food formulations

The results on the proximate analysis of the weaning food formulations are presented in Table 3. The moisture for (5.26 to 5.12), protein (28.627 to 17.325), ash (3.144 to 2.609) crude fiber (1.865 to 1.321) and carbohydrate (69.561 to 60.2456) were significantly different (p>0.05). The fat content of weaning food formulations (1.336 to 1.234) and protein content ranged between 28.627 to 17.325 were significantly different (p>0.05) Ash contents determined were very close to the predicted values.

Calculated values for total energy provided by the blends ranged from 377.825 to 376.600 kcal/100 g dry matter and were significantly different ($p>0.05$). The prepared weaning food formulations were close to the specifications for weaning foods (Harper and Jansen, 1985). The fat content (1.336 to 1.234) was low when compared to the specifications.

The protein content of weaning food formulations ranged between 28.627 to 17.325 according to the Indian Council of Medical Research (1981) the recommended optimal protein calorie requirement for pre-school going is 7.1% in total mixed diets and all the formulation provided optimum recommended dietary allowance (RDA) with respect to protein (10 to 12%) as recommended by World Health Organization (1985). The results indicated that all the five formulations were adequate in protein for weaning purposes. Ash contents determined were very close to the predicted values. None of the formulations was significantly different from the rest. Total energy calculated from the formulations ranged from 377.825 to 376.600 kcal/100 g dry matter basis was similar to specification. These values are similar to the acceptable and typical energy levels of 375 kcal/100 g dry weight provided by industrially processed weaning foods and predicted energy levels (Heimendinger, 1989).

Functional properties of weaning food formulations

Results related to the three functional properties studied are summarized in Table 4. The pH of F_1 - F weaning food (6.06 to 5.96) were not significantly (p >0.01) different. F_2 had highest pH value (6.06) and F_1 had the lowest (5.96) pH value. The bulk densities of F_1-F_2 weaning food (0.5 to 0.63) were not significantly (p >0.01) different. F_2 had the highest bulk density value (0.63) and F_4 had the lowest. Germination decreased ($p<0.05$) water absorption capacities but increased (p <0.05) fat absorption capacities of all weaning food formulations studied. The water absorbance capacities (which indicate the volume of water needed to form a gruel with a suitable thickness for child feeding) of the five formulations ranged between (1.24 to 1.53 g/L g). The water absorbance capacities for all weaning food formulations were not significantly (p >0.01) different with in formulation. The mean score for BD and all formulation ranged between (1.12 to 1.41) and were not significantly (p >0.01) different from one another. Mean values for swelling capacity are presented in Table 4, which showed that maximum swelling capacity was recorded for F_3 (1.948) and minimum for F_4 (1.611) and others fell in between these values. Germination increased foam capacity and foam volume (Table 4).

Foams prepared from weaning food formulation ranged from (22.64 to 38.23%). Mean values for WSI are presented in Table 4. Results showed that maximum WSI was recorded for F_1 (0.746) and minimum for F_5 (0.548) and were not significantly different from that of weaning

Table 2. Proximate analysis wheat and mungbean seed on dry weight basis.

S/N	Name of components (%)	Wheat	Mungbean
1	Moisture (%)	13.42 ± 0.030	9.20 ± 0.20
2	Proteins (%)	12.23 ± 0.030	25.430 ± 0.30
3	Fat (%)	1.63 ±0.020	1.53 ± 0.030
4	Ash (%)	1.52 ± 0.020	3.22 ± 0.20
5	Fiber (%)	1.43 ± 0.011	2.22 ± 0.20
6	Carbohydrate (%)	69.76 ± 0.10	58.40 ± 0.30

Table 3. Proximate composition of weaning foods formulations prepared from germinated wheat and mungbean seed flour.

Formulation	Moisture (%)	Ash (%)	Fat (%)	Crud fiber (%)	Proteins (%)	Carbohydrate (%)	Food energy K.cal/100 g
F_1	5.26^{a} ± 0.105	2.609^{c} ± 0.097	1.234^{a} ± 0.108	1.865^{a} ± 0.131	17.325^{e} ± 0.795	61.739^{a} ± 1.84	376.600^{a} ± 0.948
F_2	5.20^{a} ± 0.097	2.792^{bc} ± 0.102	1.267^{a} ± 0.113	1.755^{a} ± 0.143	19.425^{d} ± 0.908	69.561^{a} ± 1.36	376.625^{a} ± 0.814
F_3	5.152^{a} ± 0.117	2.87^{b} ± 0.127	1.30^{a} ± 0.114	1.654^{ab} ± 0.089	23.975^{c} ± 0.986	65.082^{a} ± 1.47	377.161^{a} ± 0.869
F_4	5.13^{a} ± 0.085	2.976^{ab} ± 0.108	1.335^{a} ± 0.107	1.432^{bc} ± 0.139	26.30^{b} ± 0.977	62.829^{a} ± 1.31	377.825^{a} ± 0.820
F_5	5.12^{a} ± 0.065	3.144^{a} ± 0.113	1.336^{a} ± 0.097	1.321^{c} ± 0.110	28.627^{a} ± 0.975	60.2456^{a} ± 141	377.511^{a} ± 0.716

F_1 (12% MF + 68% WF + 10% MP + 10% S), F_2 (24% MF + 56% WF + 10% MP + 10% S), F_3 (36% MF + 44% WF + 10% MP + 10% S), F_4 (48% MF + 32% WF + 10% MP + 10% S), F_5 (60% MF + 20% WF + 10% MP + 10% S).

Table 4. Physical properties of weaning foods formulations prepared from germinated wheat and mungbean seed flour.

Formulation	pH	Pack BD (g/cm^{-3})	Lose BD (g/cm^{-3})	WAC (ml/g)	OAC (ml/g)	SC (%)	FC (%)	Solubility (%)
F_1	5.96^{a} ± 0.53	0.583^{a} ± 0.10	0.583^{a} ± 0. 10	1.53^{a} ± 0.10	1.418^{a} ± 0.07	1.896^{ab} ± 0.09	27.358^{c} ± 0.59	0.746^{a} ± 0.07
F_2	6.06^{a} ± 0.39	0.630^{a} ± 0.12	0.630^{a} ± 0. 09	1.52^{a} ± 0.10	1.267^{b} ± 0.11	1.796^{bc} ± 0.10	22.641^{d} ± 0.77	0.749^{a} ± 0.06
F_3	6.01^{a} ± 0.43	0.613^{a} ± 0.08	0.613^{a} ± 0. 06	1.44^{ab} ± 0.10	1.137^{bc} ± 0.06	1.948^{a} ± 0.03	32.685^{b} ± 0.79	0.605^{b} ± 0.04
F_4	6.02^{a} ± 0.29	0.547^{a} ± 0.07	0.547^{a} ± 0. 06	1.31^{bc} ± 010	1.258^{bc} ± 0.07	1.738^{cd} ± 0.06	37.354^{a} ± 0.69	0.585^{b} ± 0.10
F_5	6.05^{a} ± 0.38	0.576^{a} ± 0.08	0.576^{a} ± 0. 08	1.248^{c} ± 0.10	1.123^{c} ± 0.05	1.611^{d} ± 0.06	38.235^{a} ± 0.60	0.548^{b} ± 0.07

F_1 (12% MF + 68% WF + 10% MP + 10% S), F_2 (24% MF + 56% WF + 10% MP + 10% S), F_3 (36% MF + 44% WF + 10% MP + 10% S), F_4 (48% MF + 32% WF + 10% MP + 10% S), F_5 (60% MF + 20% WF + 10% MP + 10% S).

food formulations. An important functional significance of bulk density is in the preparation of weaning food formulations. Germination has been reported to be a useful method for the preparation of low bulk weaning foods (Malleshi and Desikachar, 1981). The water absorbance capacities need to be lowered in order to produce a more nutritious and suitable weaning food. This could be achieved by reducing the viscosity of the starchy components by malting (Desikachar, 1980). A less bulky food contains a higher nutrient content since the volume of the food is low. The

Table 5. Sensory evaluation of weaning foods formulations prepared from germinated wheat and mungbean seed flour.

Formulation	Flavour	Mouth feel	Colour and appearance	Consistency	Overall acceptability
F_1	$6.60^c \pm 0.10$	$6.20^c \pm 0.10$	$6.70^c \pm 0.10$	$6.30^d \pm 0.10$	$6.45^a \pm 0.10$
F_2	$6.50^c \pm 0.10$	$6.30^c \pm 0.10$	$6.73^c \pm 0.10$	$6.40^d \pm 0.10$	$6.50^b \pm 0.10$
F_3	$7.40^a \pm 0.10$	$7.40^a \pm 0.10$	$7.60^a \pm 0.10$	$7.40^a \pm 0.10$	$7.45^c \pm 0.10$
F_4	$6.80^b \pm 0.10$	$7.40^a \pm 0.10$	$7.40^b \pm 0.10$	$7.20^b \pm 0.10$	$7.20^c \pm 0.10$
F_5	$6.60^c \pm 0.10$	$6.50^b \pm 0.10$	$6.70^c \pm 0.10$	$6.60^c \pm 0.10$	$6.60^c \pm 0.10$

F_1 (12% MF + 68% WF +1 0% MP + 10% S), F_2 (24% MF + 56% WF + 10% MP + 10% S), F_3 (36% MF + 44% WF + 10% MP + 10% S), F_4 (48% MF + 32% WF + 10% M P+ 10% S), F_5 (60% MF + 20 % WF + 10% MP + 10% S).

oil absorbance capacity of germinated weaning food formulations was equally higher than that of ungerminated weaning food formulations. The mean score for all formulations ranged between (1.12 to 1.41) and were not significantly (*p* >0.01) different from one another. The germination of grains has also been reported to enhance the oil absorbance capacity of the flours produced from it (Giami and Bekebain, 1992). The mechanism of oil absorption may be explained as a physical entrapment of oil related to the non polar side chains of proteins. Generally the water absorbance capacities of the weaning food formulations were systematically higher than their oil absorbance capacity. The formation of stable foam is essential in the preparation of several traditional legume based food products in Nigeria (Mcwatters, 1985) WSI decreased with an increase in the germinated flour content of the weaning food formulations. Legumes are the ideal ingredient for the production of such quick foods (Mbofung, 1999).

Sensory evaluation

The mean scores of different sensory parameters of the weaning foods are shown in Table 5. The flavor of F_3 weaning food (7.37) was significantly (p <0.05) higher than that of F_1 and F_5 (6.60) for both weaning foods. The mean scores for mouth feel, color appearance, and consistency of weaning foods were significantly different (p > 0.05). The mean score for mouth feel (7.40) was highest in F_5 which were significantly different (p > 0.05). While the mean scores for colour and appearance for F_3 (7.60) were highest among the all weaning formulations and differed significantly at (p > 0.05).The mean score for consistency highest (7.40) in the F_3 formulation significantly different (p > 0.05). The overall acceptability score exhibited highest (7.45) in F_3 weaning food followed by F_4 (7.20) the overall acceptability scores of the various sensory attributes are shown in Table 5. Generally the F_3 weaning food was satisfactorily acceptable. Sensory evaluation shows that although five formulations were slight variations in taste, flavour and overall acceptability, all the formulations were liked by the trained panelists. None of the panelists developed any side effects like diarrhea and emesis after the sensory evaluation The overall acceptability score findings showed that weaning food formulations ranged from ‘like slightly’ to ‘like moderately.

Conclusion

The weaning formulations in the present study are based on commonly consumed, low-cost food materials locally-available in Bangladesh. Two of the formulations (F_3 and F_2) showed compositional, functional and nutritional properties. They will be potentially suitable for use as weaning foods, both at the home and commercial levels. The fact that these formulas are inexpensive, easily available and nutritious could make them effective in solving some of the nutrition problems facing infants and children

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