

Development and evaluation of low cost nutrient dense supplements for children (1-3 years)

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■ **ABSTRACT** : Nutritional status in children is most vulnerable during the weaning stages when both macro and micro nutrients may be insufficient to maintain growth and development. The pattern of supplementary feeding during the first year of life is increasingly recognized as important determinants of malnutrition. The present study was conducted leading the objective to fulfill the nutritional requirement of children in early years of life as it is the growing period of physical as well as mental development of children. The main point that should be considered while planning that one serving should fulfill 1/6 nutritional requirement. The recipe was analyzed in its nutrient content using AOAC method and the result showed the nutrient content of one serving of the recipe as compared to calculated. The nutrient comparison between calculated value and analyzed value of the supplement (A) showed that the analyzed value of moisture, protein, fat were 4.5, 6.6g, 8.9 g, respectively, that was as same as calculated. The carbohydrate and energy content were 37.2 g, 249.8 kcal, respectively. Nutrition composition of supplement (B) showed moisture, protein, fat 5.79g, 5.32g, 15.4 g, respectively. The carbohydrate and energy content were 35.39 gm, 250.16 kcal, respectively. Both planned supplements were low cost as the price for one serving was less than Rs. 5 The nutrient analysis showed that supplements were nutrient dense, having rich amount of energy, protein, fat those are essential for growth and development of children.

■ **KEY WORDS** : Evaluation, Supplement, Low cost nutrient

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A dietary supplement, also known as food supplement or nutrition dense supplement, is a preparation intended to supplement the diet and provide nutrients, such as vitamins, minerals, fibre, fatty acids, or amino acids, that may be missing or may not be consumed in sufficient quantities in a person's diet. Breast milk is no doubt the best food for a baby. But as the baby grows and the process of weaning starts, the need of supplementary baby food also gets importance. An average baby starts getting supplementary food from the age of 4 months. The transition in the food habits of the toddlers continues till one year. During this period, the baby is given different supplementary recipes. Nutritional status in children is most vulnerable during the weaning stages when both macro and micro nutrients may be insufficient to maintain growth and development. The pattern of

supplementary feeding during the first year of life is increasingly recognized as important determinants of malnutrition. There is lot of supplementary baby food available in the market. These foods are manufactured by reputed brands. Many of the supplementary infant foods on sale are also organic and they are very high in hygiene and nutrients. But there is an option for the new mothers to show their babies that they care them. They can prepare the organic baby foods themselves at home. The present study was conducted leading the objective to fulfil the nutritional requirement of children in early years of life as it is the growing period of physical as well as mental development of children.

■ RESEARCH METHODS

Considering supplementary, feeding the supplements

were planned that were simply homemade preparation and were in low cost. For this purpose, total 6 number of supplements were planned and cost were calculated through market price survey. There were two supplements which were low cost selected for standardization.

Supplement A -Dalia porridge

Supplement B -Corn cutlet

While standardization of the recipe in terms of amount (g), it was considered that 5-6 time small serving given to

child, so one serving of the recipe should fulfill the 1/6 nutritional requirement of child. ICMR recommended the following nutritional requirement /day for children 1-3 years.

Table A shows the nutritional calculation of supplement A (1 serving) and also the cost per serving. Cost per serving indicates that supplement is low cost.

Method of preparation :

– Roast broken wheat in a pan.

Nutrient	Full day requirement	1/6 requirement
Energy (kcal/day)	1240	206
Protein (g/day)	22	3.6
Fat (g/day)	25	4.16
Calcium (mg/day)	400	66.6
Iron (mg/day)	12	2
Retinol (µg/day)	400	66.6
-Carotene (µg/day)	1600	266.6
Thiamin (mg/day)	0.6	0.1
Riboflavin (mg/day)	0.7	0.116
Niacin (mg/day)	8	1.3
Pyridoxin (mg/day)	0.9	0.15
Ascorbic acid (mg/day)	40	6.66
Folic acid (µg/day)	30	5
Vitamin B12 (µg/day)	0.2-1.0	0.16

Table A: Nutrient calculation of supplement A(dalia-porridge)-1 serving

Ingredient	Amount	Cost	Energy (kcal)	Protein (g)	Fat (g/day)	Iron (mg)	Fibre (g)	Calcium (mg/day)	-Carotene (µg/day)	Thiamin (mg/day)	Riboflavin (mg/day)	Niacin (mg/day)
Daliya	15g	0.39	51.9	1.77	0.225	0.79	0.18	6.15	9.6	0.0675	0.0255	0.825
Moong Dal	10g	0.72	34.8	2.45	0.12	0.39	0.08	7.5	4.9	0.047	0.021	0.24
Milk	50ml	1.2	58.5	2.15	3.25	0.1	-	10.5	80	0.02	0.05	0.5
Sugar	10g	0.31	39.8	0.01	-	0.01	-	0.10	0.6	-	0.004	-
Oil	5g	0.32	45	-	5	-	-	-	125	-	-	-
Groundnut	5g	0.12	28.35	1.26	2.00	0.12	1.00	4.5	1.85	0.045	0.006	0.995
Total		3.07	258.3	7.64	10.6	1.42	1.26	28.75	221.95	0.1795	0.1065	2.56

Table B : Nutrient calculation of supplement B(corn cutlet) 1 serving

Ingredient	Amount	Cost	Energy (kcal)	Protein (g)	Fat (g/day)	Iron (mg)	Fibre (g)	Calcium (mg/day)	-Carotene (µg/day)	Thiamin (mg/day)	Riboflavin (mg/day)	Niacin (mg/day)
Corn	20 g	0.8	68.4	2.22	0.72	0.46	0.54	2	18	0.084	0.02	0.36
Besan	15 g	0.6	54	2.56	0.795	0.69	0.585	30.3	0.69	0.045	0.022	0.435
Potato	20 g	0.4	19.4	0.32	0.02	0.096	0.08	2	4.8	0.02	0.002	0.24
Spinach	10 g	0.12	2.6	0.2	0.07	0.435	0.06	7.3	558	0.001	0.026	0.05
Coriander leaves	5 g	0.15	2.2	1.65	0.03	0.071	0.06	9.2	345.9	0.002	0.003	0.04
Tomato	10 g	0.20	2	0.09	0.02	0.064	0.08	4.8	35.1	0.012	0.006	0.04
Onion	5 g	0.07	2.95	0.09	0.005	0.06	0.03	2	0.75	0.004	0.001	0.025
Pea	10 g	0.2	0.1	0.72	0.01	0.15	0.4	2	8.3	0.025	0.001	0.08
Oil	15 g	0.975	135	-	15	-	-	-	-	-	-	-
Total		3.515	286.6	7.72	16.53	1.86	2.03	59.3	971.5	0.187	0.067	1.26

- When half done, add dhal and continue roasting till light brown.
- Add water to the above, cook till soft and slightly thick (semi solid).
- Remove from fire. Add milk, sugar and oil. Boil for a few minutes and serve.

Table B shows the nutritional calculation of supplement B (1 serving) and also the cost per serving. Cost per serving indicates that supplement is low cost.

Method of preparation :

- Boil potato in salted water, peel and then mash.
- Clean, wash and chop green chilies and coriander leaves.
- Heat oil add coriander seeds.
- When it crackles, add ginger paste, garlic paste, green chilies and stir for a movement. Add red chili powder, coriander powder, and turmeric powder while stirring continuously.
- Then add different portions of wheat, bajra, corn mixes and cooked and dry.
- Add potato, adjust salt and continue cooking till spices completely dries up.
- Remove and cool it, now mix well with bread crumbs.
- Divide into small equal portions; give each portion a cutlet shape. Deep fry in moderate, hot oil until crisp.

Nutrient content analysis :

The recipe was analyzed in its nutrient content using standard procedure (Jain and Mogra, 2006) and the result showed the nutrient content of one serving of the recipe as compared to calculated. Carbohydrate and calorie contents were determined by calculation method. All analyses were done in triplicate using standard procedure.

RESEARCH FINDINGS AND DISCUSSION

The present study was conducted leading the objective to fulfil the nutritional requirement of children in early years of life as it is the growing period of physical as well as mental development of children. The recipe was analyzed in its nutrient content using AOAC method and the result showed the

nutrient content of one serving of the recipe as compared to calculated.

Table 1 and its corresponding histo gram (Fig. 1) show the nutrient comparison between calculated value and analyzed value of the supplement A (Daliya porridge). It indicated that the analyzed value of moisture, protein, fat were 4.5, 6.6 g,8.9 g, respectively. The carbohydrate and energy contents were 37.2 g. 249.8 kcal, respectively (Fig.2).

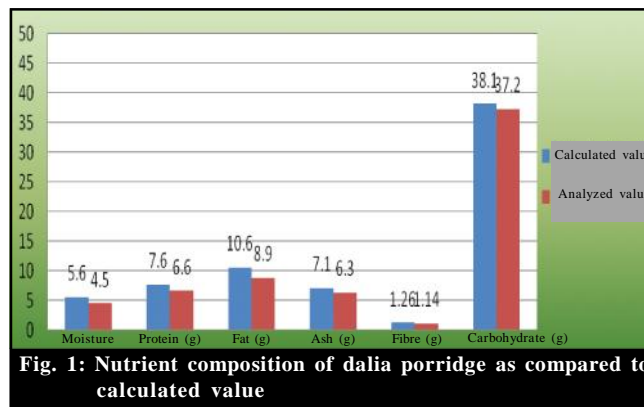


Fig. 1: Nutrient composition of dalia porridge as compared to calculated value

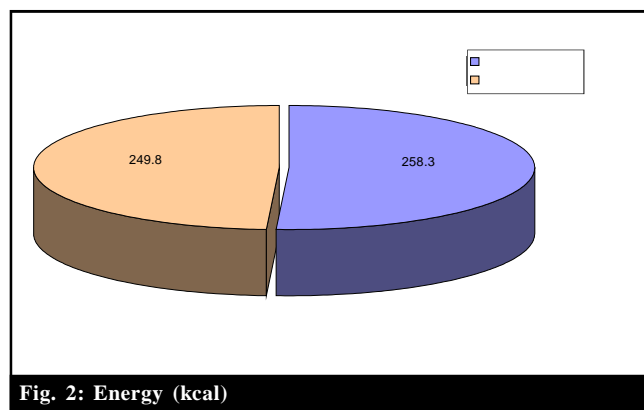


Fig. 2: Energy (kcal)

Results of Table 2 and Fig.3 show the nutrient comparison between calculated value and analyzed value of the recipe. It showed that the analyzed value of moisture, protein and fat were 5.79,5.32,15.4 g, respectively. The carbohydrate and energy content were 35.39 g. 250.16 kcal, respectively (Fig. 4).

Name of the nutrient	Calculated value	Analyzed value
Moisture	5.6	4.5
Protein (g)	7.6	6.6
Fat (g)	10.6	8.9
Ash (g)	7.1	6.3
Fibre(g)	1.26	1.14
Carbohydrate	38.1	37.2
Energy (kcal)	258.3	249.8

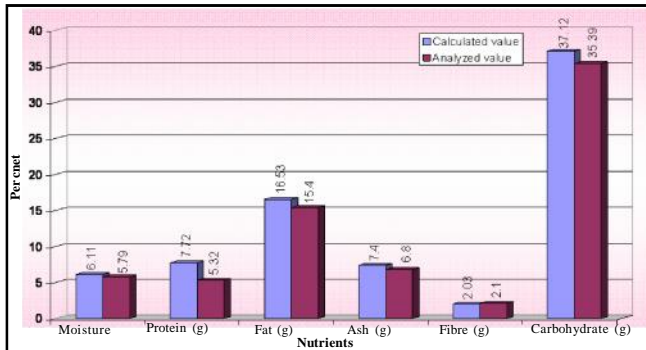


Fig. 3: Nutrient composition of corn cutlet as compared to calculated value

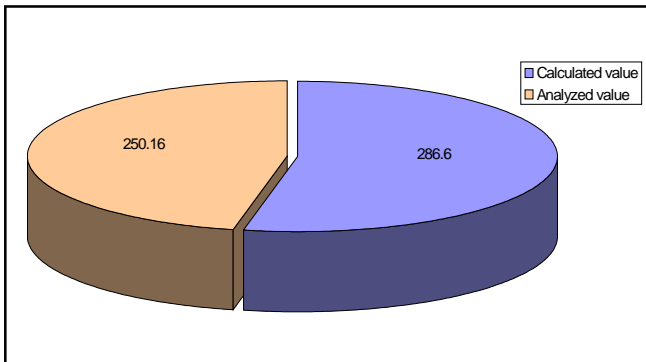


Fig. 4: Energy (kcal)

that both of the supplements were having rich amounts of nutrients.

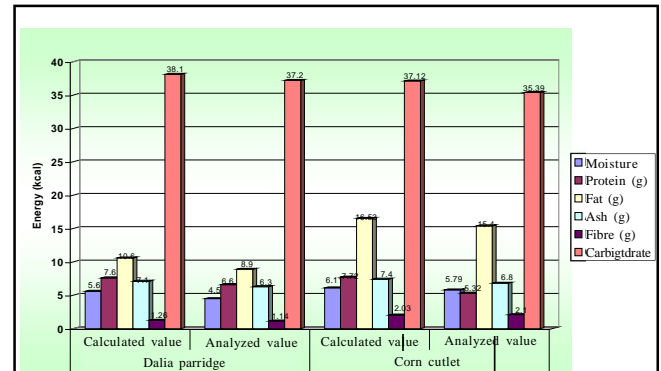


Fig. 5: Nutrient composition of recipes as compared to calculated value

Table 3 and Fig.5 show the nutrient composition of supplements as compared to calculated value. It indicated

Name of the nutrient	Calculated value	Analyzed value
Moisture	6.11	5.79
Protein (g)	7.72	5.32
Fat (g)	16.53	15.4
Ash(g)	7.4	6.8
Fiber(g)	2.03	2.1
Carbohydrate	37.12	35.39
Energy (kcal)	286.6	250.16

Name of the nutrient	Supplement A (Dalia porridge)		Supplement B (Corn cutlet)	
	Calculated value	Analyzed value	Calculated value	Analyzed value
Moisture	5.6	4.5	6.11	5.79
Protein (g)	7.6	6.6	7.72	5.32
Fat (g)	10.6	8.9	16.53	15.4
Ash(g)	7.1	6.3	7.4	6.8
Fiber(g)	1.26	1.14	2.03	2.1
Carbohydrate	38.1	37.2	37.12	35.39
Energy (kcal)	258.3	249.8	286.6	250.16

Conclusion :

The present study was conducted leading the objective to fulfil the nutritional requirement of children in early years of life as it is the growing period of physical as well as mental development of children. The recipe was analyzed in its nutrient content using AOAC method and the result showed the nutrient content of one serving of the recipe as compared to calculated. The nutrient comparison between calculated value and analyzed value of the supplement (A) showed that the analyzed values of moisture, protein, fat were 4.5, 6.6 g, 8.9 g, respectively, that was as same as calculated. The carbohydrate and energy contents were 37.2 g, 249.8 kcal, respectively. Nutrition composition of supplement (B) showed moisture, protein, fat 5.79 g, 5.32 g, 15.4 g, respectively. The carbohydrate and energy contents were 35.39 g, 250.16 kcal, respectively. Both planned supplements were low cost as the price for one serving was less than Rs.5 The nutrient analysis showed that supplements were nutrient dense, having rich amount of energy, protein, fat those are essential for growth and development of children.

Studies carried out at the NIN had shown that if roasted coarsely ground cereals, pulses and oilseeds mixture is provided to households free of cost, the mothers were willing and able to give this to young children three to four times a day; as a result there was improvement in timely introduction

of complementary food. The goals for the 12th Plan are to: Enhance early initiation of breast-feeding (colostrum feeding) from the current level of 15.8 per cent (as per NFHS 2) to 50 per cent and enhance the complementary feeding rate at six months from the current level of 33.5 per cent (as per NFHS 2) to 75 per cent. The present study can be supportive in this concern as both planned supplements were low cost as the price for one serving was less than Rs. 5 The nutrient analysis showed that supplements are nutrient dense, having rich amount of energy protein, fat those are essential for growth and development of children.

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