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Suppementation of Nutraceutical Food to Malnourished Preschool Children and its Impact on Biochemical Examination

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Abstract

Supplementary feeding programmes are the emerging need in under nutrition for vulnerable segment in the population. Supplementary feeding must be the additional nutrients which are providing for the optional growth and desirable change in health status in particular. Hence, supplementary foods must be based on the formulation of the required nutrients for the treating of malnutrition, as well as food must has nutracetical properties which return in the child the physiological, immunological and biochemical normality. The supplementary feeding programme was conducted to malnourished preschool children for six months of period. Organoleptically high scored formulated soya flakes chiwada evaluated for its nutritional components and ant nutritional factors. Such soyaflakes chiwada was given @ 50g per child for experimental group I and no any supplementary foods was given to control group II. The cost of soyaflakes chiwada was affordable. The standard of ICMR about providing energy, protein and fat was maintained. Their biochemical parameters such as haemoglobin g/dl, serum protein g/dl, blood glucose level mg/dl; serum vitamin A µg/dl, serum iron µg/dl and serum zinc µg/dl were analyzed for the every month of interval during research work were analyzed. The significant change in their biochemical parameters has been seen.

Keywords: Soyaflakes chiwada, nutritional quality, Biochemical Examination.

Introduction

The infant and preschool children are extremely vulnerables. They succumb readily where the diet is poor in quantity, quality and infectious diseases and infestation are widespread. A soyabean is legume which has nutracetical properties. It is a legume as well as an oil crop. It is one of the natures wonder and nutritional gift for the human nutrition. Therefore many researchers have recommended soyabean supplementations in different forms of by products for the malnutrition treatment. Soyabean is a complete plant protein. Due to its high biological value and content good numbers of essential amino acids it can be use to prevent protein calorie malnutrition among vulnerable groups in the community.

Several recent scientific studies[1] have shown that regular intake of traditional soya foods may help to prevent breast cancer, postrate cancer, colon cancer and menopausal problems of women[2]. Due to presence of isoflavones and phytoesrogen in soyabean, it helps to prevents cancer by inhibiting the growth of existing tumor cells, and the risk of endometrial cancer.

Regular intake of soya product helps to prevent disease by lowering total cholesterol, low density lipoprotein, blood pressure and prevent plague built up in arteries (atherocleorosis)[3].

Soyabean contains fairly large amount of carbohydrates and very low quantity of starch hence it can be very suitable for diabetic patients. The other health benefits of soyabean are it prevents osteoporosis due to present of isflavones. It can be use in lactose intolerance conditions. Soyabean is a good source of lecithin which act as a emulsifier and helps to dispose fatty material from vital organs.

Material and Methods

Local varities of soyabean i.e. MH-CH-58 and readymade riceflakes were procured from local market. The processing techniques like cleaning, washing, soaking, germination, degermination, dehulling, boiling, pressing under controlled condition by use of flaking machine and drying were carried out on soyabean for the preparation of soyaflakes.

Sensory evaluation: By the use of different combination and variation soyflakeschiwada was prepared. It was evaluated by organoleptically with the help of trained pannal of judges on a nine point Hedonic scale[4].

Nutritional Quality Assessment: High scored soyflakes-chiwada in sensory evaluation was selected for the nutritional quality analysis. Moisture content, total ash, major nutrient like crude protein, fat, carbohydrates, B complex vitamins including vitamin B_1,B_2 and B_3, minerals such as iron, calcium, zinc and crude fiber were analyzed by use of methods described in AOAC Approved methods[5]. Keeping qualities of soyaflakeschiwada were recorded after storage of soyaflakeschiwada for 0 to 1 month and 1 to 2 month packed in

polythene and high package packaging material at room temperature. The production cost of the prepared product was calculated by taking into account the cost of every ingredients used in the preparation of soyaflakes chiwada.

Antinutritional Factors: The antinutritional factors present in soyaflakes chiwada were analyzed by Phytate phosphorous by Hauq. and Lantzseh[6]. Tryspin inhibitor activity Kakade Rachis Ghee and Paskes[7]. Tannin by Vansoest[8]. Acid detergent fiber by Gomez And Gomez[9]. Lignin and Cellulose by the determined values from acid detergent fiber.

Statical Analysis: The variations noticed in the nutritional qualities in the soyaflakeschiwada before and after its storage and changes in experimental groups were calculated with the statistical significant differences by applying's' test[10].

Selection of Malnourished Children: Selections of preschool malnourished children were done by evaluating weight for height and body mass index.

Biochemical Analysis: The nutritional status of the preschool children before and after the experimental period was evaluated through biochemical analysis method. The parameters such as haemoglobin g/dl, serum protein g/dl, blood glucose level mg/dl, serum vitamin A µ/dl, serum iron µg/dl and serum zinc µg/dl were analyzed by using microscopic electroformatic immunological and chromatographis method[11].

Result and discussion:

Assessment of nutritional quality: Before providing the supplementary foods, all the experimental group children were dewormed in previous night.

The data given in table I and II reveals the changes in proximate, sensory qualities and nutritional composition in soyaflakes chiwada before and after processing and its storage up to 1 month and 1 to 2 months kept in different packages at room temperature. The moisture and ash content of soyaflakes chiwada before and after processing was 6.6 to 4.9 per cent and 2.4 to 2.3 per cent respectively. There was no significant change seen in ash and moisture content between raw and finished form of chiwada. Similarly there was no significant change found in carbohydrates (. (49.5 to 48.3 g) content in chiwada before and after processing. The change in B complex vitamins content in soyaflakes chiwada before and after processing were noted as vitamin B_1 (0.33 to 0.31 mg), vitamin B_2 (0.29 to 0.26 mg) and vitamin B_3 (2.09 to 2.01 mg). Where as mineral content has been reduced at negligible amount before and after processing in the soyaflakes chiwada. Decrease in the content of iron, zinc and calcium before and after processing were reported as (5.5 to 5.30mg,) (2.8 to 2.70mg) and (100.11 to 99.11 mg) respectively. The difference in crude fiber content noted as 1.30 to 0.80 g before and after processing. The significant change has been seen only in crude fat, energy and βcarotene contents in soyaflakes chiwada before and after processing. The crude fat content was (9.1 to 15.3) g before and after processing. The energy content was (394.8 to 489.5) kcal and β carotene was (219.4 to 202.2 µg) before and after processing.

Production cost of soyaflakes chiwada: Total cost of production of soyaflakes chiwada was calculated on pilot-plant trial and depicted in table III. It reveals that, for one kilogram soyaflakes chiwada cost 32.65 Rs. Out of that 27.65 Rs. was incurred for raw materials and Rs. 5.00 for considered as a charges of processing and packaging cost. The total cost of soyaflakes chiwada was very much less than the cost of any other chiwada available in the market.

From above result it is concluded that soyaflakes chiwada formulated with 40:40 per cent soyaflakes and riceflakes roasted in 5g of soya oil and, use of 6g fried bengal gram dhal, , 10g fried ground nut., with the use of 2g of cumin seed as flavouring agent and 2 g of turmeric powder as colouring agent scored high by organoleptically.

The soyflakes chiwada prepared with above combination found very good nutritional quality. It content all most all nutrients rich especially protein. No significant change has been observed after storage in polythene package and high package at room temperature up to 2 months. The cost of production is affordable, hence it is concluded that the soyaflakes chiwada prepared with this formulation is more beneficial to combat the malnutrition especially in children.

Biochemical analysis of Experimental Groups of preschool children: Biochemical analysis its one of best and very reliable scientific method for assessment of nutritional status of the community.

The constituents in the blood such as blood glucose level, haemoglobin content, serum protein, serum vitamin A, serum iron and serum zinc were analyzed in the experimental groups of children before and after supplementation. The analysis of these biochemical parameters assessed by one month of internal for total period of six months. The data of average biochemical analysis of experimental group was given in Table IV. It explained that, Group I children found more average values of blood glucose i.e. 68. ±1.3(76..3) per cent haemoglobin 9.8±1.3(78.2) per cent, serum protein 6.0±0.8(89.7) per cent, serum vitamin A 87.0±2.3(58.07) per cent, serum iron111.0±2.4(65.2) per cent and zinc 1.02±2.0(72.9) per cent and in control group the values were blood glucose mg/dl 66.0±1.8, hemoglobin g/dl 7.6±1.0, serum protein g/dl 4.3±0.7, serum vitamin IU/dl 36.0±1.1, serum iron mg/dl 81.9±3.8 and serum zinc mg/dl 0.54±0.4 respectively.

The values were raised for all parameters but very high values seen in serum protein, haemoglobin followed by serum zinc, serum iron and vitamin A.

Table V represents the data regarding average biochemical assessment in particularly blood glucose and haemoglobin level in different level in different experimental groups of children before and after supplementation. It shown that, group I children had highly significant difference in their blood glucose level in before supplementation (63.7 mg/dl) and after supplementation. 68.7 mg/dl blood glucose level after supplementation respectively.

A similar observation were recorded about haemoglobin level of these experimental groups of children, In group I children reported a significant increased level of haemoglobin from 6.6 to 9.8g/dl after supplementation.

The data regarding average values of serum protein, vitamin A, iron and zinc of experimental group of children compared with before and after supplementation, it was presented in Table VI. Group I children also recorded increase of serum protein status at moderate level. Group I found to increase from 4.5 to 6.0 g/dl serum protein after supplementation. Significant difference after supplementation in control group of children.

However, this increased per cent of serum vitamin A level recorded in below the moderate level of their standard value. Group I children shown increased their serum vitamin A level from 40.2 to 87.0 IU/dl, which seems significant change. No significant change was observed in serum vitamin A level after experimentation among control group children.

Group I children also noted increased the serum iron level from 82.0 to 111.0 µg/dl. Control group of children reported a non significant increased in serum iron level significant change is seen.

In group I children shown increased serum zinc level from 48.6 to 72.9 per cent, In control group of children recorded a non significant increase in serum zinc level after supplementation.

Table-1
Nutritional quality of soyaflakes chiwada with its storage stability

Sr. No	Nutrition qualities	Soyaflakes chiwada(100)g			Storage stability					
					Polythene package			Tetra package		
		Raw form	Finis-hed form	't'test	Upto1 month	1 to 2 months	't'test	Upto1 month	1 to 2 months	't'test
1.	Moisture(%)	6.6	4.9	0.89 NS	4.8	4.6	0.104 NS	4.8	4.7	0.052 NS
2.	Ash(%)	2.4	2.3	0.64 NS	2.3	2.27	0.015 NS	2.3	2.29	0.005 NS
3.	Crude protein(g)	28.3	27.7	0.80 NS	27.7	26.9	0.418 NS	27.7	26.5	0.628 NS
4.	Crude fat(g)	9.1	15.3	2.69*	15.3	15.0	0.157 NS	15.3	14.9	0.209NS
5.	Carbohydrate (g)	49.5	48.3	0.54 NS	48.0	47.2	0.41 NS	48.0	48.0	-----
6.	Energy(kcal)	394.8	489.5	4.55**	487.0	485.0	1.04 NS	487.0	484.0	1.570 NS
7.	B Carotene (ug)	219.4	202.2	2.64*	202.0	201.0	0.523 NS	202.0	201.5	0.261 NS
8.	Vitamin B_1(mg)	0.33	0.31	0.26 NS	0.31	0.30	0.0052 NS	0.31	0.29	-----
9.	Vitamin B_2(mg)	0.29	0.26	0.12 NS	0.25	0.25	0.010 NS	0.25	0.24	0.0052NS
10.	Vitamin B_3(mg)	2.09	2.01	0.109 NS	2.01	2.01	0.005 NS	2.01	2.00	0.005NS
11.	Crude fiber(g)	1.30	0.80	0.60 NS	0.80	0.80	----	0.80	0.80	----
12.	Iron (mg)	5.50	5.30	0.104 NS	5.30	5.30	0.052 NS	5.30	5.20	0.157 NS
13.	Zinc(mg)	2.80	2.70	0.052 NS	2.70	2.70	0.026 NS	2.70	2.64	0.026 NS
14.	Calcium (mg)	100.11	99.11	1.21 NS	100.11	100.11	1.21 NS	100.11	1.21	1.21 NS

*Significant at 1 per cent level, ** Significant at 5 per cent level, NS Non significant

Table-2
Sensory qualities of soyaflakes chiawada after storage in different packages

Sr. No	Storage type and peroids	Organoleptic score				
		Colour	Flavour	Taste	Texture	Over all accepted
A	**Polyhene package**					
I.	up to 1 month	6.1	6.3	7.0	6.4	7.0
	1 to 2 month	5.4	5.2	5.4	5.2	6.2
II.						
	SE	0.350	0.451	0.802	0.601	0.395
	CD at 5%	0.0352	0.061	0.887	0.0665	0.044
B	**High gauge package**					
I.	up to 1 month	6.2	6.4	6.2	6.1	6.4
	1 to 2 month	5.1	5.0	4.8	4.2	5.8
II.						
	SE	0.551	0.702	0.802	0.952	0.3008
	CD at 5%	0.61	0.0665	0.0776	0.105	0.0332

Table-3
Cost calculation of prepared soyaflakes chiwada (per kg.)

Sr. No.	Ingredient	Soya Chiwada		
		Quantity (g)	Rate/unit	Cost (Rs.)
1	Soya flakes	500	20kg	10/-
2	Rice flakes	500	20kg	10/-
3	Roasted groundnut	50	50kg	2.5/-
4	Soya oil	25	50kg	1.25/-
5	Roasted bengal gramdhal	50	40kg	2/-
6	Cumin seed	10	160kg	1.6/-
7	Turmeric	10	20kg	0.2/-
8	Salt	10	10kg	0.1/-
9	Processing and packaging cost @ 20%	--	--	5.0/-
Total		32.65		

Table-4
Average Biochemical Analysis of Experimental Groups

Sr.No.	Biochemical analysis	Group I Mean ± S.D.	Group II Mean ± S.D.
1	Blood glucose (mg/dl)	68.7± 3.3 (76.3)	66.0 ± 1.8 (73.3)
2	Haemoglobin (g/dl)	9.8 ± 1.3 (78.2)	7.6 ± 1.0 (60.7)
3	Serum protein(g/dl)	6.0 ± 0.8 (89.7)	4.3±0.7 (65.5)
4	Serum Vitamin A (IU/dl)	87.0 ± 2.3 (58.0)	36.0±1.1 (24.0)
5	Serum Iron (µg/dl)	111.0±2.4 (65.2)	81.9±3.8 (48.2)
6	Serum Zinc (µg/ml)	1.02±2.0 (72.9)	0.54±0.9 (38.6)

Group I - Experimental group supplemented with soyaflakes chiwada, Group II - No supplementation i.e. control group, Figures in parantheses indicate percentage.

Table-5
Average Blood Glucose and Haemoglobin Level of Experimental Groups before and After Supplementation

Sr. No	Biochemical analysis	Group I Mean ± S.D.			Group III Mean ± S.D.		
I		BS	AS	't' value	BS	AS	't' value
1	Blood glucose (mg/dl)	63.7± 2.7 (63.0)	68.7± 3.3 (76.3)	3.1*	60.9± 1.9 (65.9)	66.0± 1.8 (73.3)	1.8NS
2	Haemoglobin(g/dl)	6.6± 0.9 (65.2)	9.8± 1.3 (78.2)	2.1*	7.2± 1.0 (60.0)	7.6± 1.0 (61.7)	-0.90 NS

Group I - Experimental group supplemented with soyaflakes chiwada, Group II - No supplementation i.e. control group,
Figures in Paran theses indicate percentage, * significant at 5 per cent level , ** significant at 1 per cent level, NS Non Significant,
BS – Before supplementation, AS – After supplementation

Table-6
Average Serum Protein, Vitamin A, Iron and Zinc Status of Experimental Groups before and after Supplementation

Sr. No.	Biochemical analysis	Group I Mean ± S.D.			Group II Mean ± S.D.		
II		BS	AS	't' value	BS	AS	't' value
1	Serum protein(gl/dl)	4.5 ±0.6 (67.1)	6.0 ± 0.8 (89.7)	3.41**	4.4 ± 0.7 (67.7)	4.3 ± 0.7 (65.5)	1.24 NS
2	Serum Vitamin A (IU/dl)	40.2 ±1.3 (27.8)	87.0 ± 2.3 (58.0)	2.88*	34.0± 1.1 (23.4)	36.0± 1.1 (24.0)	0.71 NS
3	Serum Iron (µg/dl)	82.0± 2.9 (48.3)	111.0± 2.4 (65.2)	2.74*	78.0± 2.8 (45.9)	81.9± 3.8 (48.2)	0.47 NS
4	Serum Zinc (µg/ml)	0.68 ± 0.2 (46.6)	1.02 ± 0.1 (72.9)	3.06**	0.57± 0.1 (40.7)	0.54± 0.2 (38.6)	0.64 NS

Group I - Experimental group supplemented with soyaflakes chiwada, Group II - No supplementation i.e. control group. Figures in Paran theses indicate percentage, * significant at 5 per cent level, ** significant at 1 per cent level, NS Non Significant, BS – Before supplementation, AS – After supplementation

Conclusion

On the whole, it can be concluded that, the supplementary feeding through soyaflakes chiwada found positive impact on improving the biochemical parameters of preschool malnourished children. Supplementation of nutracetical soyaflakes chiwada shown a highly significant effects on increasing blood glucose level, blood haemoglobin, serum protein, serum vitamin A, serum iron and serum zinc status of preschool children. All analyzed biochemical parameters noted increased moderate to normal standard level. It indicated that soyaflakes chiwada have effectively worked. These soyaflakes chiwada have capacity in improving the nutritional status of malnourished preschool children.

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