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Feeding Soyaflakes Chiwada to Malnourished Preschool Children and its Impact on their Clinical Nutritional Status

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Abstract

Deficiency of major nutrient like protein and calorie along with deficiencies of micro nutrient is world health problem. Which reflect on the clinical signs and symptoms of nutritional deficiency diseases among preschool children. Supplementary feeding programmes are the emerging need in under nutrition for vulnerable segment in the population. The organoleptically high score soyflakeschiwada evaluated for its nutrient content and supplemented to preschool malnourished children @50 gm /day/ child. The nutritional qualities of soyaflakes chiwada here as moisture (4.1 per cent), ash (2.4 per cent), crude fiber (0.8 per cent), crude protein (21.4 per cent), iron (5.3 mg), calcium (74.0mg), zinc (2.7mg), β carotene (235. ug) and B complex vitamins like B_1 (0.2mg),B_2 (0.1mg)and B_3 (2.01mg) were found in soyaflakes chiwada. No significant changes were observed in nutritional qualities of soyaflakes chiwada when it was stored in high gauge package for 1 to 2 months It is very cheap and affordable to the below poverty line group of children. The clinical signs and symptoms of nutritional deficiency diseases in experimental group of preschool children were examined after every month till the end of experimental period (i.e. 6 months). Clinical examination of hair, face, lips eyes, ears, throat skin, bones and joints, nails and abdomen were done. Supplementation had shown a highly significant effect improving clinical signs and symptoms of preschool children.

Keywords: Soyaflakes chiwada, nutritional quality, clinical examination.

Introduction

In early 1950, soybean become available as a low cost high protein animal feed ingredient. Soyabean is very much popular food crop in most of the countries of the world where as large number of people is found of soya products. These are prepared from soya seeds. Soyabean is now getting wide acceptance in India. The soyabean have the potentially to become industrial raw material in dairy products and agricultural stuff. 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. 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. There are number of soya products which are prepared by using soyabean as a base which may be categorized as traditional soya food products, advanced soya products and innovative soya products. Extruded soya products are prepared by use of sorghum and defatted soyaflour[1].

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[2].

Sensory Evaluation: By the use of different combination and variation soyflakes chiwada was prepared. It was evaluated by organoleptically with the help of trained pannal of judges on a nine point Hedonic scale[3].

Nutritional Quality Assessment and Cost Calculation of Soyflakes Chiwada: 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 1975)[4]. Keeping qualities of soyaflakes chiwada were recorded after storage of soyaflakes chiwada for 0 to 1 month and 1 to 2 month packed in polythene and high gauge 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.

Clinical Examination of Experimental Group of Preschool Children: The clinical signs and symptoms about deficiency diseases in experimental group of preschool children were examined after every month till the end of experimental period

(i.e. 6 months). The averages of all the clinical signs and symptoms were compared with their same data of before supplementation. The clinical examination of hair, face, lips, tongue, gumes, teeth, eyes, nose, ears, throat, nails, skins, bones and joints, and abdomen were done[5].

Statical Analysis: The variations noticed in the nutritional qualities in the soyaflakes chiwada before and after its storage and improvements in clinical signs were calculated with the statistical significant differences by applying 't' test[6].

Results and Discussion

Nutritional Assessment: The data given in table I reveal the changes in proximate, sensory qualities and nutritional composition in soyaflakeschiwada 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 soyaflakeschiwada before and after processing was 4.6 to 4.4 per cent and 4.8 to 4.7 per cent respectively. There was no significant change seen in ash and moisture content between stored in poly and high gauge package. Similarly there was no significant change found in carbohydrates (48.0 to 47.2 g) content in chiwada before and after storage. The change in B complex vitamins content in soyaflakeschiwada poly package and high gauge were noted as vitamin B_1 (0.31 to 0.30 mg), vitamin B_2 (0.25 to 0.24 mg) and vitamin B_3 (2.01 to 2.00 mg). Whereas mineral content has been reduced at negligible amount after storage of soyaflakeschiwada. Decrease in the content of iron, zinc and calcium before and after processing were reported as (5.5 to 5.20mg,) (2.7 to 2.64mg) and (100.11 to 100.11 mg) respectively. The difference in crude fiber content noted as 0.80 g after storage. The no significant change has been seen only in crude fat, energy and βcarotene contents in soyaflakeschiwada after storage. The crude fat content was (15.3 to 15.0) g after storage. The energy content was (487.0 to 485.0) kcal and β carotene was (202.0 to 201.5 µg) after storage[7].

Clinical examination of hair, face and lips: The clinical signs and symptoms about deficiency diseases in experimental group of preschool children was examined after every month till the end of experimental period (i.e. 6 months). The averages of all the clinical signs and symptoms were compared with their same data of before supplementation. The data about clinical examination was presented in tables 2 to 5.

The data about clinical signs and symptoms observed in term of hair, face and lips of experimental groups of preschool children was given in table 2.

The data about clinical signs and symptoms of hair of different experimental groups of children was found as normal luster, discolored, dry, pigmented and spaice (thin hair). Group I children noted 76.0 per cent normal luster of hair and it was increased at higher significant level to 100.0 per cent after supplementation. The normal luster hair in control group of children was recorded as 52.0 per cent before experiment, it was found decreased as 32.0 per cent after experiments. No change in discoloration of hair in control group children found after experiments. The problems of pigmented hair which has noted in children before supplementation were reduced after supplementation in supplemented groups of children. The complaints of sparse (thin) hair was also decreased in Group I.

It shown increased from after supplementation from 68.0 to 100.0 per cent in group I children. The opposite picture was noticed in control group of children. These children were decreased the normal face and increased the signs and symptoms of odema and white patches on face after experimentation period. Increasing the normal hair texture, lusture, thickness and decreasing the signs and symptoms like discolouration, dryness and sprad in these children after supplementation is a good indicator of improving the protein energy status. Generally the deficiency of vitaminB_2 reflected by their signs and symptoms on lips. The signs and symptoms of vitamin B_3 and B_2 such as angular stomatitis and cheilosis were slowly decreased in group I children.

Clinical examination of internal mouth of experimental groups of children: Internal mouth of the experimental groups of children was examined by clinically. Signs and symptoms on gumes, tongue and teeth of these children were assessed before and after supplementation. The relevant data was presented in table 3. A similar observations were recorded by Anandan et.al. (1985)[8] in the preschool children.

However majority of the children of both the groups found a normal healthy gumes. Deficiency of vitamin C i.e. bleeding gumes was noticed 4 (16.0 per cent) in groups I children before supplementation. Intake of food and vegetables are found where rare in these children hence they may be suffered this deficiency. The signs and symptoms of deficiency of vitamin C disappeared in all the preschool children after 6 months of experiment. Deficiency of iron and vitamin C reflected on health of tongue. Symptoms like pale and red bleeding cracks on either sides appears due to deficiency of iron and vitamin C. Such types of signs and symptoms were observed in preschool children. In groups of children had normal tongue. 21 (82.0 per cent) in group I, observed a normal tongue before supplementation. Control group of children found adding their numbers and increasing the signs and symptoms of deficiency due to iron and vitamin C. It also reported to decreasing the per cent of normal tongue children after the experimental period. It shown that, 21 children of normal tongue decreased to 18 numbers with more complaints, signs and symptoms of related deficiency. Before supplementation more children with normal teeth found in group I as 22 i.e (88 per cent), There was no any significant difference noticed in normal teeth or discoloured teeth children in control group before and after experiment.

Clinical examination of eyes, nose, ears and throat of experimental groups of children: The data about signs and symptoms of relevant deficiencies in eyes, nose, ears and throat among experimental groups of children before and after supplementation was reported in table 4.

Where as night blindness was observed in 8 percent of children in group I and 4 percent in control group before experimentation. In group I nightblidness cured had cent per cent. The supplementary feeding with soyaprducts did not show any positive effects for minimizing the signs and symptoms related with eyes. It may requires long terms proper supplementation. A similar findings were noted by Donnen et.al. (1998)[9] and Ching and Birmingham[10].

16 per cent children of group I reported a discharged ears before supplementation. After supplementation there was no change found in the prevalence of discharged ears among these children. A similar observation was noted in control group of children. Some children from group I prevalence of waxy ears. They were as 16.0 per cent by group I. There signs and symptoms among these children disappeared after supplementation. In control group 12 per cent children were suffered from waxy ears.

Majority children from both the groups were shown a normal throat. However, some children i.e. 16.0 per cent from group I, children were having patched in throat. These patches were found disappeared after the supplementation by maximum preschool children. But the patches in throat remain unchanged in 16.0 per cent children of control group.

Clinical examination of skin, bones and joints, nails and abdomen of experimental groups of children: The data about clinical examination of nails, skin, bones and joints, and abdomen of experimental groups of children before and after supplementation was presented in table 5.

It expressed that, maximum children from both the experimental group were having normal nails. However, some of them were had uncleaned, dirty and pale nails. Uncleaned and dirty nails may be due to improper personal hygiene and reflected as unhealthy nails of the children. Where as pale nails indicates the prevalence of signs and symptoms of iron deficiency. 20.0 per cent from group I the sign of pale nail disappeared after supplementation.

Skin scabies and excema are mostly related deficiencies of B complex vitamin and vitamin A. However, 64.0 per cent children from group I noted normal skin. Another 20, 16. the signs and symptoms related to scabies and excema disappeared after supplementation in these children.

Skin scabies and excema were also reported in 24.0 and 16.0 per cent in control group of children before experimentation. After six month of experiments 16.0 and 4.0 per cent children shown scabies and excema respectively in this group. However, the per cent of normal skin children from group I increased by highly significant level after experimentation. Even the children from control group was also found significantly increased a normal skin from 60.0 to 80.0 per cent.
Clinical examination of abdomen in maximum children in group I shown as normal 84.0 per cent respectively before supplementation. However, 16.0 per cent children from group I reported as pot belly before experiment, found disappeared after supplementation. 84.0 per cent children from control group recorded as normal abdomen before supplementation. The pot belly children increased from 16.0 to 20.0 per cent after experimental period in control group. (Vonshak 1997)[11].

Conclusion

It can be concluded that after supplementation of soya flakes chiwada to malnourished preschool children form six month shown positive impact on clinical examination i.e. Hair, face, lips, eyes, skin, bone, nail etc. It again concluded that soyaflakes children could be a effective supplementary food to combat malnutrition.

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Table-1
Nutritional Quality of Soyaflakes Chiwada with its Storage Stability

Nutritionqualities	Soyaflakes Chiwada in Poly Package			Soyaflakes Chiwada stored in high gauge package		
	Up To I Months	1 to 2months	't'test	Up To I Months	1 to 2months	't'test
Moisture(%)	4.6	4.4	0.104 NS	4.8	4.7	0.052 NS
Ash (%)	2.4	2.37	0.015NS	2.3	2.29	0.005 NS
Crude protein(g)	27.7	26.9	0.418 NS	27.7	26.5	0.628 NS
Crude fat(g)	15.3	15.0	0.157NS	15.3	14.9	0.209NS
Carbohydrate (g)	48.0	47.2	0.41NS	48.0	48.0	-----
Energy(kcal)	487.0	485.0	1.04 NS	487.0	484.0	1.570 NS
B Carotene(ug)	202.0	201.0	0.523 NS	202.0	201.5	0.261 NS
Vitamin B_1(mg)	0.31	0.30	0.0052 NS	0.31	0.29	-----
Vitamin B_2(mg)	0.25	0.25	0.010NS	0.25	0.24	0.0052NS
Vitamin B_3(mg)	2.01	2.01	0.005NS	2.01	2.00	0.005NS
Crude fiber(g)	0.80	0.80	----	0.80	0.80	----
Iron (mg)	5.30	5.30	0.052 NS	5.30	5.20	0.157 NS
Zinc(mg)	2.70	2.70	0.026NS	2.70	2.64	0.026 NS
Calcium(mg)	100.11	100.11	1.21NS	100.11	1.21	1.21NS

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

Table-2
Clinical Examination of Hair, Face and Lips of Experimental Groups of Children

	Clinical signs Symptoms	(N=25) Group I			(N=25) Group II		
		BS	AS	't'	BS	AS	't'test
Hair	Normal luster	19(76.0)	25(100)	4.3**	13(52.0)	8(32.0)	3.8**
	Discolored	2(8.0)	-		9(36.0)	9(36.0)	-
	Dry	1(4.0)	-		1(4.0)	4(16.0)	2.8*
	Pigmented	2(8.0)	-		1(4.0)	3(12.0)	2.6**
	Space	14.0)	-		1(4.0)	1(4.0)	-
	Total	25(100)	25(100)		25(100)	25(100)	
Face	Normal	17(68.0)	25(100)	3.5**	15(60.0)	9(36.0)	3.6**
	Odema	2(8.0)	-	-	2(8.0)	3(12.0)	2.6*
	Moon	-	-	-	-	-	-
	White patches	6(24.0)	-	-	8(32.0)	13(52.0)	3.5**
	Total	25(100)	25(100)		25(100)	25(100)	
Lips	Normal	16(64.0)	25(100)	3.7**	21(84.0)	18(72.0)	2.6*
	Angular stomatitis	4(16.0)	-		3(12.0)	4(16.0)	2.4*
	Cheilosis	5(20.0)	-		1(4.0)	3(12.0)	3.1*
	Total	25(100)	25(100)		25(100)	2(100)	

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

Table-3
Clinical Examination of Internal Mouth of Experimental Groups of Children

	Clinical signs and Symptoms	(N=25) Group I			(N=25) Group II		
		BS	AS	't'	BS	AS	't'test
Gumes	Normal	21(82.0)	25(100)	2.6*	25(100)	25(100)	0.0NS
	Bleeding	4(16)	-	-	-	-	-
	Total	25(100)	25(100)		25(100)	25(100)	
Tongue	Normal	21(82.0)	25(100)	2.6*	21(84.0)	18(72.0)	2.5*
	Pale	2(8.0)	-		4(16.0)	7(28.0)	2.6*
	Red	2(8.0)	-		-	-	-
	Total	25(100)	25(100)		25(100)	25(100)	
Teeth	Normal	22(88.0)	25(100)	2.5*	20(80.0)	20(80.0)	0.0NS
	Mottled enamel	-	-		-	-	-
	Discoloured	3(12.0)	-		5(20.0)	(20.0)	
	Total	25(100)	25(100)		25(100)	25(100)	0.0 NS

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

Table-4
Clinical Examination of Eyes, Nose, Ears and Throat of Experimental Groups of Children

	Clinical signs Symptoms	(N=25) Group I			(N=25) Group II		
		BS	AS	't'	BS	AS	't' test
Eyes	Normal	23(92.0)	25(100)	1.6 NS	24(96.0)	24(96.0)	-
	Nightblindness	2(8.0)	-	-	1(4.0)	1(4.0)	-
	Bitot spot	-	-	-	-	-	-
	Conjectival xerosis	-	-	-	-	-	-
	Total	25(100)	25(100)		25(100)	25(100)	
Nose	Normal	25(100)	25(100)	-	25(100)	25(100)	-
	Deviated	-	-	-	-	-	-
	Total	25(100)	25(100)		25(100)	25(100)	
Ears	Normal	18(72.0)	25(100)	-	19(76.0)	19(76.0)	-
	Waxy	4(16.0)	-	-	3(12.0)	3(12.0)	-
	Discharged	3(12.0)	-	-	3(12)	3(12)	-
	Total	25(100)	25(100)		25(100)	25(100)	0.0 NS
Throat	Normal	21(84.0)	25(100)	-	21(84.0)	21(84.0)	-
	Enlarged	-	-	-	-	-	-
	patches	4(16.0)	-	-	4(16.0)	4(16.0)	-
	Tonsils	-	-	-	-	-	-
	Total	25(100)	25(100)		25(100)	25(100)	0.0 NS

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

Table-5
Clinical Examination of Skin, Bones and Joints, Nails and Abdomen of Experimental Groups of Children

	Clinical signs and Symptoms	**(N=25 Group I**			**(N=25) Group II**		
		BS	**AS**	**'t'**	**BS**	**AS**	**'t'test**
Nail	Normal	17(68.0)	25(100)	4.7**	17(68.0)	20(80.0)	1.3NS
	Unclean	-	-	-	-	-	-
	Dirty	3(12.0)	-	-	3(12.0)	-	-
	Pale	5(20.0)	-	-	5(20.0)	5(20)	-
	Total	25(100)	25(100)		25(100)	25(100)	-
Skin	Normal	16(64.0)	25(100)	5.1**	15(60.0)	20(80.0)	2.5*
	Scabis	5(20.0)	-	-	6(24.0)	4(16.0)	-
	Excema	4(16.0)	-	-	4(16.0)	1(4)	-
	Total	25(100)	25(100)	-	25(100)	25(100)	-
Bones & Joints	Normal	25(100)	25(100)	-	25(100)	25(100)	-
	Deformities	-	-	-	-	-	-
	Osteomycities	-	-	-	-	-	-
	Knockness	-	-	-	-	-	-
	Rickets	-	-	-	-	-	-
	Rossary	-	-		-	-	
	Total	25(100)	25(100)		25(100)	25(100)	0.0 NS
Abdomen	Normal	21(84.0)	25(100)	2.6*	21(84.0)	20(80.0)	1.3 NS
	Potbelly	-4(16.0)	-	-	4(16.0)	5(20.0)	1.3 NS
	Enlarged liver	-	-		-	-	-
	Total	25(100)	25(100)		25(100)	25(100)	07.0 NS

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