International Research Journal of Medical Sciences _____ ISSN 2320 –7353
Vol. **1(10),** 13-16, November **(2013)** *Int. Res. J. Medical Sci.*

Soychakali Supplementation to Malnourished Preschool Children and its Impact on Nutrient Intake

N.S. Ghatge
Pravara Rural Education Society's; Home Science and BCA College, Loni. Taluka -Rahata, District-Ahmednagar, MS, INDIA

Available online at: www.isca.in, www.isca.me
Received 8th October 2013, revised 30th October 2013, accepted 15th November 2013

Abstract

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, return the child to physiological, immunological and biochemical normality. The organoleptic qualities like taste, texture, flavour and over all acceptability of the soychakali were evaluated. Highly scored by the panel soyachakali was selected for feeding. The nutritional qualities likes major nutrients such as energy(465.0kcal), proteins (19.3 g) and fats (20.8 g) content found more in soychakali. The micro nutrients such as iron (4.9 mg), zinc (2.1 mg) and calcium (245.5 mg) were also observed higher range in soychakali It also noted, very less antinutrtional factors like phytate phosphorous (122 mg), tannin (0.29 mg), tryspin inhibitor activity(3.5. ml), acid detergent fiber (1.08g), cellulose (0.79g) and lignin(0.29ml). It has shown better keeping qualities up to two months when stored in a high gauge package at room temperature. Soychakali has also shown very low production cost. Hence, it found very cheap and affordable to the below poverty group of children .Significant improvements in nutrients intake was shown in supplemented group. The soychakali was given @ 50 g/ child/day.

Keywords: Nutrient intake, soychakali and supplementary feeding.

Introduction

Protein calories malnutrition, deficiencies of vitamin A, iodine and iron are now also a current health and nutritional problems after more than 60 years of independence in India. The major causes like poverty, lack of education and nutritional knowledge, poor medical facilities, non availability of proper food, poor sanitary and unhygienic conditions are still remain as such as at grass root levels. According to Health National family survey (NFHS), preschool children are one of the most important vulnerable sections of the population. Soyabean is higher in protein than other legumes and many animal products. The protein derived near by 40 per cent by soybean. However, the quality of soya protein that is most remarkable health care professionals across the global recognizes. The superiority in quality of soya protein considers equivalent to that of the other high quality protein sources. It has been also significant that the amino acids of the protein of Soyabean are much similar to those of cow milk protein[1].

Material and Methods

Local varieties of soybean MC HS 58 and rice i.e. Ratanagri were procured from market. It is cleaned washed dried roasted and ground separately. The different combinations were used for the formulation of and preparation of soychakali.

Sensory Evolution: By the use of three different combination soychakali was prepared and evaluation by organoleptically with the help of trained panel of judges on a nine point Hedonic scale[2].

Chemical analysis of soyproducts: Chemical analyses for moisture content, total ash, major nutrient like crude protein, fat, carbohydrates, B complex vitamins, minerals such as iron, calcium, zinc and crude fiber with the use of method described in AOAC[3].

Statical Analysis: The organoleptical qualities of soychakali was carried out after it storage for 0 to 1 month and 1 to 2 month packed in polythene and highgaage packaging materials at room temperature. The differences noticed among this were calculated by statically and also nutrient intake before and after feeding with one month interval. For six month procedure[4].

Results and Discussion

Biochemical compositions and storage stability of soychakali: The data given in table 1 reveals the storage changes in proximate, biochemical compositions and sensory qualities in soychakali kept in different packages for 0p to 1 and 1 to 2 months at room temperature. The changes in per cent of moisture and the content of B complex vitamins and β carotene in soychakali were noticed at significant level after two months of storage (table 1).

The per cent of proximate compositions such as and protein was found decreased at highly significant level i.e. 22.12. to 21.02 in the chakali stored unto 2 months of period. Where as the value of B complex vitamins such as vitamins B_1 (0.45to 0.26 mg) vitamin B_2 (0.39 to 0.28mg) and vitamin B_3 (1.27 to 1.92mg)

were observed reduced significantly in the soychakali. Similarly significant change was seen for βcarotene (230.0 to 288.9) µg for 2 months[5]. Non significant effect was noticed in the changes of minerals and crude fiber contents in the soylchakali after 2 months of storage. Table 1 represents that, soychalali stored in polythene and high gauge packages for 2 months was noticed reduced its sensory qualities. As compared by packaging material, less change in sensory qualities were observed in the soychakali stored in tetra package.

Except mineral contents a remarkable loss in B complex vitamins, β carotene, and protein. Sensory qualities are noticed in soya chakali for two months of period at room temperature. This loss can be minimized by storage of soychakali in tetra package. The cost of production of soychakali is affordable. Hence, it is concluded that the soychakali prepared with this formulation is more beneficial to combat the malnutrition especially in children[6].

Average major nutrient like calorie, protein, fats and minor nutrients such as vitamins and minerals intake by experimental groups were expressed in table 2. The mean calorie intake by soyachakali supplemented group of children. Soyachakali group 1060.6 ±6.2 Kcal (72.6 per cent) and soyaflakes group as 924.3 ±3.1 Kcal (63.3 per cent). The control group had lower calorie intake i.e. 634.2 ±5.3 Kcal (43.4per cent).

The mean protein intake by soyachakali supplemented group by soyachakali group i.e. 16.9±4.2g. (65.1per cent) and The control group reported the protein intake only 10.0±2.7g.(38.5per cent), it was noted as poorly adequate level. The mean fat intake by. Preschool children in group I recorded 19.5±0.3g. Only 10.3±2.1g. average fat intake was found in control group of children which noted as poorly adequate i.e. (41.3per cent). It was noted as 0.60±0.1mg in group I. Control group found consumed vitamin B_1 as 0.31± 0.06mg. Vitamin B_2 or riboflavin consumption recorded was 0.61±0.71 higher than soyachakali group. The control group consumed only 0.33±0.1mg (38.8per cent) intake of riboflavin which reported as poorly adequate level. The mean intake of vitamin B_3 or niacin. It was noted in group I (i.e.0.61±0.1mg). Minimum average intake of niacin was observed in. A similar average intake of vitamin C was noted by group I i.e. 27.2±1.7mg intake of vitamin C (i.e.22.4±1.4mg) was noticed in control group. In case of fat soluble vitamin like β carotene intake by supplemented groups was noticed higher than control group. Among all, group I had highest intake of β carotene. The average intake of calcium by the children who supplemented with soyachakali. In group I it was noted as 192.9 ± 6.6 mg. The control group consumed only 168.6±5.5 mg calcium. The average iron intake by soyachakali group I as 6.8±2.7 mg (68.4per cent). The intake of iron by control group shown as 5.6±2.2 mg (56.1 per cent). The zinc intake by 4.5(45%) was noticed as 3.8±0.6 mg (38.0per cent)[7].

Average major nutrients intake like calories, protein and fat by experimental group was compared with their before supplementation intake level. The relevant data was presented in table 3 gives an idea about the comparison in average major nutrient intake like calorie, protein and fats before and after supplementation in experimental groups[8].

Highly significant increased up to 72.6 per cent in group I was seen after supplementation. Calorie intake after six months. There was no significant change noticed in average calorie intake of control group. Average protein (9.0 g) intake in group I before supplementation recorded increased at highly significant (16.9 g) after supplementation. Where as the average intake of protein after supplementation was slightly found decreased in control group as compared with their intake before supplementation.

Group I found highly significant increased in fat intake (19.5g) after supplementation, but this fat intake was not modernly adequate (77.8 per cent). Where as control group noted a non significant fat intake as compared between their before and after six months of experimental period[9].

The data about average vitamin intake including vitamin B_1, B_2, B_3, vitamin C and β carotene by different experimental groups was recorded in table 4 of vitamin B_2 (71.8) after supplementation. No significant difference was noticed in control group regarding intake vitamin B_2 before and after supplementation.

Group I reported increasing level of vitamin B_3 intake from 42.0 to 63.0 per cent. This increase in the intake of vitamin B_3 noted as highly significant level among group I and II. However, this increase level of vitamin B_3 intake in group I was not shown at adequate level. Control group did not found any change in the intake of vitamin B3 after 6 months experimental period[10].

The average intake of vitamin C was not reported any difference among both experimental groups as in before and after supplementation period.

β carotene intake was highly significant increased in a group I, after supplementation. Group I, β carotene 117.6±1.5(73.5). Control group was also noted increase in β carotene intake at significant level (from 20.4 to 47.3 per cent) after experimental period[11].

The data about average intake of minerals namely calcium, iron and zinc by different experimental groups before and after supplementation was given in table-5. It revealed that, calcium intake was found increased at highly significant level experimental group I i.e. group. They reported near by fifity per cent deficient in calcium intake. No significant difference was reported in the intake of calcium after experimental period in control group[12].

Iron intake was noticed increased at highly significant level. Secondly group I reported as increase in iron intake at

significant level (from 51.4 to 68.4 per cent) after supplementation period. Where as there was no significant difference noted in the intake of iron by control group after supplementation.

The average zinc intake of group I 15.9per cent to 45 per cent. In control group it was 38 per cent.

Table-1
Biochemical Changes in Soy Producton Storage

Sr No	Nutrient	Soy chakali		
		Up to 1 Month	1 to 2 Month	`t' test
1	Moisture %t	8.69	8.01	2.218*S
2	Ash %	13.92	3.06	0.267*S
3	Protein g/100gm	22.12	21.01	3.705**S
4	Fiber %	51.45	1.40	0.166NS
5	Fat %	9.99	9.09	0.60NS
6	Carbohydrates g/100gm	54.57	53.07	5.007*S
7	Iron g/100gm	7.01	6.99	0.066NS
8	Zincmg/100gm	4.05	4.00	0.667NS
9	Calcium mg/100gm	159.9	159.6	1.001NS
10	B carotene Ug/100gm	230.0	288.9	3.672**S
11	B1 mg/100g	0.45	0.26	2.155**S
12	B2 mg/100g	0.39	0.28	1.981*S
13	B3mg/100g	1.69	1.27	1.920*S

NS-non significant, *Significant at 1 per cent level. ** Significant at 5 per cent level.

Table-2
Average Nutrients Intake of Experimental Groups

Sr. No.	Nutrients	Group I Mean ± S.D.	Group± IIMean±S.D
1	Calories (K.cal)	1060.6± 6.2(72.6)	634.2± 5.3(43.4)
2	Protein (g)	16.9±4.2(65.1)	10.0±2.7(38.5)
3	Fat (g)	19.5 ±4.0(77.8)	10.3±2.1(41.3)
4	Vitamin B_1 (mg)	0.60±0.1(76.5)	0.31±0.1(41.3)
5	Vitamin B_2(mg)	0.61±0.1(71.8)	0.33±0.07(38.8)
6	Vitamin B_3 (mg)	0.61±0.1(63.0)	0.40±0.9(42.0)
7	Vitamin C(mg)	27.2±1.5(68.0)	22.4±1.4(56.0)
8	β Carotene (µg)	1176±8.5(73.5)	757.1±7.9(47.3)
9	Iron (mg)	6.8±2.7(68.4)	5.6±2.2(56.1)
10	Calcium (mg)	192.9±6.6(48.0)	168.6±5.5(42.0)
11	Zinc (mg)	4.5±0.4(45.0)	3.8±0.6(38.0)

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

Conclusion

The highly significant change was seen in major nutrient like calorie,protein and fat after supplementation of soyachakali for a period of six month. The significant change is seen in mineral intake of supplementd groups. But in case of vitamins Only β carotene intake was highly significant. From this it can be conducted that soyachakali can improve major nutrient intake of malnourished child.

Table-3
Average Major Nutrients Intake of Experimental Groups with Their Before and after Supplementation

Sr. No.	Nutrients	Group I Mean ± S.D.			Group II Mean ± S.D.		
I Major nutrients		BS	AS	't'value	BS	After6months	't' value
1	Calore (K.cal)	745±10.2(59)	1060±6.2(72)	10.6**	634±86.6(43.)	635±86.5(43.4)	0.15NS
2	Protein	9.0±1.2(34.3)	16.9±4.2(61)	6.8**	9.0±1.3(34.3)	10.0±2.7(38.5)	0.70NS
3	Fat (g)	5.5±0.7(21.8)	19.5±4.0(78)	6.9**	10.00±1.3(40)	10.3±2.1(41.3)	1.10NS

Group I - Experimental group supplementation with soyachakali. 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
Average Vitamins Intake of Experimental Groups With Their Before And After Supplementation.

Sr.No.	Vitamins	Group I Mean ± S.D.			Group II Mean ± S.D.		
		BS	AS	't'value	BS	After 6months	't' value
1	Vitamin B(mg)	0.4±0.1(57.6)	0.60±0.1(76.5)	3.2**	0.30±0.0(40.0)	0.31±0.1(41.3)	1.7NS
2	VitaminB_2(mg)	0.5±0.1(63.5)	0.61±0.1(71.8)	2.8*	0.30±0.1(36.8)	0.33±0.07(38.8)	1.3 NS
3	Vitamin B(mg)	0.4±0.1(42.0)	0.61±0.1(63.0)	3.4**	0.40±0.1(42.0)	0.40±0.9(42.0)	0.0 NS
4	Vitamin C(mg)	27.0±3.7(67.5)	27.2±1.5(68.0)	0.70NS	22.0±3.0(55.0)	22.14±1.4(56.0)	0.10NS
5	βCarotene(µg)	576±6.736.0)	1176±8.5(73.5)	3.9**	326±4.5(20.4)	757.1±7.9(47.3)	2.8**

Group I - Experimental group supplemented with soyachakali. 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
Average Minerals Intake of Experimental Groups with Their Before and After Supplementation

Sr.No.	Minerals	Group-I Mean ± S.D.			Group II Mean ± S.D.		
		BS	AS	't' value	BS	After 6 months	't' value
1	Calcium(mg)	102.0±3.9(25.5)	192.9±6.6(48.0)	3.4**	157.0±1.4(39.3)	168.6±5.5(42.0)	0.7NS
2	Iron (mg)	5.1±0.6(51.4)	6.8±2.7(68.4)	2.7*	5.6±2.2(56.1)	5.6±2.2(56.1)	0.2NS
3	Zinc (mg)	1.6±0.(15.9)	4.5±0.4(45.0)	2.7*	3.8±0.5(38.0)	3.8±0.6(38.0)	0.2NS

Group I - Experimental group supplemented with soyachakali. 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

References

1. Carrington M. Siddaling, Bird eye view soyabean, *The Ind. J. Nutri and Diete*t, **35,** 145 **(2008)**

2. Amerine, M.A., Pangborn, R.M. and Roessler, E.B. Principles of Sensory Evaluation of Food. Academic Press, New York. **. (1965)**

3. AOAC Approved methods of analysis 14th edn association of official analytical chemist washington D.C. **(1984)**

4. Gomez, K.A. and Gomez, A.A. Statistical procedures for agricultural research, Willey International John Willey and Sons, New York. **(1984)**

5. Ghatge N.S., "Supplementation of Nutraceutical Food to Malnourished Preschool Children and Its Impact on Biochemical Examination" *Res. J. Family, Community & Consumer Sci.* Vol. **1(1),** 2-6, **(2013)**

6. Ghatge N.S. **"**Impact of Soyladoo Feeding on Biochemical Analysis of Malnourished Preschool Children" *Res. J. Family, Community & Consumer Sci.* Vol. **1(2),** 6-9, April **(2013)**

7. Ghatge N.S. **"**Clinical nutritional status of Malnourished Preschool Children After Supplementation of Soyladoo" *Res. J. Family, Community and Consumer Sci.* Vol. **1(3),** 18-24, **(2013)**

8. Ghatge N.S. **"**Feeding Soyaflakes Chiwada to Malnourished Preschool Children and its Impact on Motar Development" *Res. J. Family, Community and Consumer Sci.* Vol. **1(4),** 1-5, June **(2013)**

9. Ghatge N.S. **"**Impact of Soya product Supplementation on Major Nutrition Intake of Preschool Malnourished Children" *Res. J. Family, Community and Consumer Sci.* Vol. **1(5),** 1-4, July **(2013)**

10. Ghatge N.S. **"**Biochemical Status of Malnourished Preschool Children after Supplementation of Soychakali*" Res. .J. Recent. Sci.* Vol. **2(1) ,** 312-315 **(2013)**

11. Ghatge N.S. "Supplementation 0f Nutraceutical Food to Malnourished Preschool Children and its Impact on Biochemical Examination" RJFCCS **1(1),**2-6**(2013)**

12. Ghatge N.S. **"**Feeding Soyaflakes Chiwada to Malnourished Preschool Children and its Impact on their Clinical Nutritional Status" *Res. .J. Medical .Sci.* Vol. **1(7),** 22-27**(2013)**