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Food Intake Pattern of Malnourished Preschool Children after Supplementation of Soyaladoo

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Abstract

Malnutrition is the greatest threat to global public health. It has estimated that 178 million children are malnourished around the World. Whereas 40 per cent children are found under nourished among them 6.4 per cent are estimated severely malnourished in India. Hence 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. Hence effort had been made to formulate soyaladoo. The organoleptically high scored soyaladoo evaluated nutritionally for major nutrients such as energy(470.0kcal), proteins (20.1 g) and fats (22.0 g) content found more in soyaladoo. The micro nutrients such as iron (6.3 mg), zinc (3.8 mg) and calcium (286.5 mg) were also observed higher range in soyaladoo. It shown better keeping qualities upto two months when stored in a tetra package at room temperature. Such soyaladoo was given @ 50 g/ child/day. The soyaladoo supplemented group shown high significant change in major food groups i.e. cereals and legumes in group I. highly significant change was seen in fat and oil in soyaladoo supplemented group.

Keywords: Food intake pattern, soyladoo and supplementary feeding.

Introduction

Soybean is referred as vegetarian meat due to its high quality amino acids profile. It is less expensive legume as well as oil seed due to excellence source of macronutrients and other biological properties. Hence, it is used for the formulation of high nutritious weaning and supplementary foods. Most of the studies recommended that soybean can be used for the snacks food as well as weaning and supplementary food to combat the malnutrition and to maintain good health and nutritional status of preschool children Soyabean has high quality of amino acid, better protein digestibility[1-3]. It also contents a better lipoxidase activity, lecithin and lipid profile. Due to these qualities in soybean and soya products are used in the dietary treatment of various deficiencies diseases. Food is most important single factor in connection with the attainment and maintenance of health[4-6]. However, the processing techniques used in the preparation of these innovative soya products are delicious and homemade[7]. The traditional foods are most familiar in the community. It requires less skill for their preparations. Hence, such traditional and homemade based foods are chosen after the value addition and planned to use as a dietary treatment for the malnutrition in preschool children[8].

Material and Methods

The local varieties of soybean ie. MACH-58 and bengal gram ie. pragatiphule were procured from the market. It was cleaned, washed, dried, coarsely grind, dehulled and make into flour separately by use of grinding machine. Soyladoo was prepared.

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[9].

24 Hours Dietary Recall: The 24 hours dietary recall method is commonly used method in large nutritional surveys to collect dietary intake data of the individuals. This method is useful in compiling information on the kinds of foods eaten, the frequency of their consumption, perceptions of the community about foods, attitudes towards different types of foods and the special foods consumed during particular conditions i.e. infection, fever, allergies, surgery or any other diseases.

In this study by use of the method, the individuals were asked to recall in as much detail as possible. The food intake for the 24 hours was recorded in the structured questionnaire. The type of food consumed, amount of food, type of food preparation method used, time of food consumption and other details related to food intake were asked to the preschooler's mother and recorded. The dietary intakes were assessed in terms of cooked food with the help of standardized cup measures appropriate for the local conditions. These standardized cups, spoons etc. were used to help the respondent to easily recall the quantities of food consumed. Thus for the purpose of calculation, individual cooked intakes were converted into raw amounts of each food item by standardized recipe method. The 24 hours dietary recall

was taken for subsequent three days and means of each ingredient was taken as 24 hours dietary recall.

From the raw ingredients amounts, the nutritive value of each food item was calculated by using the nutritive values given by Gopalanet al.[10]. It was compared with recommended Dietary Allowances (R. D. A.) of nutrients for those of specific age groups. Along with nutritive value amount of each food group was calculated, recorded and compared with Balanced Dietary Allowance (B.D.A.) of the specific age of the preschool children.

Chemical Analysis of Soyproducts: High scored soyladoo in sensory evaluation was selected for chemical analyses. Such as 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[11].

Statical Analysis: The organoleptical qualities of soyladoo was carried out after it storage for 0 to 1 month and 1 to 2 month packed in polythene and tetra packaging materials at room temperature. The differences noticed among this were calculated by statically and also anthropometric measurements before and after feeding with one month interval. The obtained data was analyzed statically significant at $P < 0$, 0.5 levels SE and CD at 5 per cent level by procedure Gomez and Gomez[12].

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

Results and Discussion

Biochemical compositions and storage stability of Soyladoo: The data given in table 1 and 8 reveals the storage changes in proximate, biochemical compositions and sensory qualities in soyladoo kept in different packages for 0 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 soyladoo were noticed at significant level after two months of storage.

The per cent of proximate compositions such as fat and protein were found decreased at highly significant level i.e. 31.34 to 28.15 and 27.89 to 25.02 respectively in the ladoo stored upto 2 months of period. Whereas the value of B complex vitamins such as vitamins B_1 (0.50 to 0.31 mg) vitamin B_2 (0.38 to 0.29 mg) and vitamin B_3 (2.51 to 2.09mg) were observed reduced significantly in the soyladoo for 2 months. Non significant effect was noticed in the changes of mineral and crude fiber contents in the soyladoo after 2 months of storage.

The data about average food intake in II to VI months of experimental period with respect to different food groups by experimental groups of preschool children.

The table-2 it revealed that, the average cereal intake i.e. 151.3g was pointed higher in Group I. Control group found low average i.e. 95.3 g cereals intake.

The average mean of legume intake was reported highest i.e. Average legume intake was measured. Control group noticed lower average of legume (i.e.17.7±2.4g). It was noted as poorly adequate level (39.2 per cent). Average intake of green leafy vegetable was reported very low among both the experimental groups of preschool children. None of the group found adequate consumption of green leafy vegetable. Group I reported as 51.5 per cent where as Group I noticed in first position of average intake of other vegetables, roots and tubers (i.e. 73.6 per cent). Only Group I shown a normal adequate level (i.e. 96.3 per cent) of milk and milk products intake during entire experimental period. Among these experimental groups, the preschool children who supplemented with soyaladoo found moderately adequate level intake of oils and fats (i.e. 80.3 per cent). The average mean intake of egg, meat, fish and poultry was reported as highest as 28.3±3.9g. in Group I. It was shown as moderate adequate level (81.7 per cent) in this Group I. due to supplementation of sugar through soyaladoo for Group I preschool children, their average intake of sugar and jaggary found increased i.e.82.2 per cent.

On the whole it can be concluded that, Group I preschool children were only found taking cereals, legume, milk and milk products, oils and fat, egg/meat/fish/poultry, sugar and jaggary and other vegetables, roots and tubers intake at adequate level.

The average food intake of experimental groups after supplementation was compared with the same group of data before supplementation. This data was given in tables-3 The food intake in terms of food groups i.e. cereal and legume expressed in table-3 The average cereal intake by both the experimental group before experiment noted as 101g (i.e.57.7 per centand 94.3. g (i.e.51.5per cent) in both groupsrespectively. After supplementation cereal intake through soyaladoo significantly increased by 151.3g (i.e.86.5 per cent. . It was found increased as 36.6 g±4.9g 88.4 per cent in group I after supplementation

The data presented in table-4 expressed the changes in consumption of green leafy vegetables, root, tubers and other vegetables before and after supplementation in both the experimental groups. It revealed that, there was no significant difference was noticed in both the groups of preschool children in relation with the intake of green leafy vegetables, before and after supplementation period. The per cent of adequacy level in the consumption of green leafy vegetables before and after supplementation period noted very poor and inadequate. A similar observations were recorded in the consumption of roots, tubers and other vegetables among these experimental groups I. However, group I found slightly increased the intake of roots, tubers and other vegetables and reached to nearby moderate adequate level. The intake of other vegetables before and after

supplementation period in both groups was higher than green leafy vegetables. The soyaladoo group of children reported average intake of other vegetables, roots and tubers before and after supplementation period was as 29.4±4.0g. (73.6per cent) and 29.0±3.9g (72.5per cent) respectively, In the control these food group intake were shown before experimental as 17.0g (42.4 per cent) and as after experimental period 18.5g (45.0percent).

The data about mean intake of animal products taken by experimental groups before and after supplementation was reported in Table-5. From the above table it was seen that, the milk and milk products as well as egg/ meat/ fish/ poultry intake by both experimental groups of children were not observed any significant difference between in the intake of this food group before and after supplementation. Higher values about intake of milk and milk products were seen in soyaladoo group i.e.190.0ml and 192.6ml before and after supplementation period respectively. These average intakes noted at normal adequate level. Intake of milk and milk products very poor intake of milk and milk product was found in control group of children before and after experiment.

Table-1
Proximate and biochemical composition in soyladoo (per 100g) with its storage stability

Sr. No.	Bio-Chemical Compositions	Proximate and storage period		
		Up to 1 Month	1 to 2 Months	't' test
1	Moisture (%)	14.60	13.92	2.278*
2	Ash (%)	3.11	3.05	0.912 NS
3	Fat (%)	31.34	28.15	2.6.11**
4	Protein (%)	27.89	25.02	2.659**
5	Vitamins B_1 (mg)	0.50	0.31	2.155*
6	Vitamins B_2 (mg)	0.38	0.29	1.981*
7	Vitamins B_3 (mg)	2.51	2.09	1.920*
8	B. carotene (μ g)	239.00	237.10	1.992*
9	Iron (mg)	7.23	7.09	0.790 NS
10	Calcium (mg)	168.80	168.21	0.915 NS
11	Zinc (mg)	4.65	4.25	0.875 NS
12	Crude fibre (g).	1.85	1.82	0.048 NS

** - significant at 1 % level, * - Significant at 5% level, NS - Non significant

Table -2
Average Food Intake of Experimental Groups of Malnourished Preschool Children

Sr. No.	Nutrients Group I Mean ± S.D.		Group II Mean ± S.D.
1	Cereals (g)	151.3 ±20.6 (86.5)	95.3±13.0 (54.5)
2	Legume (g)	39.8±5.4 (88.4)	17.7±2.4 (39.2)
3	Green leafy vegetable (g)	32.2±4.4 (51.5)	14.0±1.9 (22.4)
4	Other vegetable/ Roots and tuber (g)	29.4±4.0 (73.6)	18.5±2.6 (45.0)
5	Milk and milk product (ml)	192.6±26.3 (96.3)	61.7±8.4 (30.8)
6	Oil and fats (g)	16.1±2.2 (80.3)	11.9±1.6 (69.5)
7	Egg /meat/ fish/ poultry (g)	28.5±3.9 (81.7)	22.2±3.0 (63.3)
8	Sugar and jaggary (g)	28.8±3.9 (82.2)	17.0±2.3 (48.6)
9	Roasted Bengal gram dhal (g)	_	_
10	Fruits (g)	_	_

Group I - Experimental group supplemented with soyaladoo, Group II - No supplementation i.e. control group, Figures in paran theses indicate percentage.

Table-3
Average Cereals and Legume Intake of Experimental Groups before and after Supplementation

Sr. No.	Food group	Group I Mean ± S.D.			Group II Mean ± S.D.		
Cereal and legume		BS	AS	't' value	Before 6 months	After 6 months	't' value
1	Cereals (g)	101.0± 1.8 (57.7)	151.3± 2.6 (86.5)	6.8**	94.3± 1.1 (54.0)	95.3± 1.0 (54.5)	0.5NS
2	Legume (g)	17.8± 1.4 (39.6)	39.8± 1.4 (88.4)	3.7**	17.7± 1.4 (39.2)	17.7± 1.4 (39.2)	0.1 NS

Group I - Experimental group supplemented with soyaladoo, 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-4
Average Green leafy vegetable, Roots and tuber, other vegetable Intake of Experimental Groups before and after supplementation

Sr. No.	Food group	Group I Mean ± S.D.			Group II Mean ± S.D.		
Vegetables		BS	AS	't' value	BS	After 6 months	't' value
1	Green leafy vegetable (g)	30.3± 4.1 (48.4)	32.2± 4.4 (51.5)	1.4NS	14.0± 1.3 (22.4)	14.0± 1.9 (22.0)	0.0 NS
2	Other vegetable Roots and tuber (g)	29.4± 4.0 (73.6)	29.0± 3.9 (72.5)	0.5NS	17.0± 2.3 (42.4)	18.5± 2.6 (45.0)	0.8 NS

Group I - Experimental group supplemented with soyaladoo, 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 Milk and Products and egg meat fish poultry Intake of Experimental Groups Before and after Supplementation

Sr. No.	Food group	Group I Mean ± S.D.			Group IIMean ± S.D.		
Animal products		BS	AS	't' value	BS	After 6 months	't' value
1	Milk and milk product (g)	190.0± 25.9 (95.0)	192.6± 26.3 (96.3)	1.7NS	60.0± 8.2 (30.0)	61.7± 8.4 (30.8)	1.2 NS
2	Egg meat fish poultry (g)	28.0 ±3.8 (80.0)	28.5± 3.9 (81.7)	0.8NS	22.0 ±3.0 (62.9)	22.2 ±3.0 (63.3)	0.3 NS

Group I - Experimental group supplemented with soyaladoo, 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-6
Average of fats and oils, Roasted Bengal gram dhal and Fruits Intake of Experimental Groups before and after Supplementation

Sr. No.	Food groups	Group I Mean ± S.D.			Group II Mean ± S.D.		
Others		**BS**	**AS**	**'t' value**	**BS**	**After 6 months**	**'t' value**
1	Oils and fats (g)	5.9 ± 0.8 (29.5)	16.1± 2.2 (80.3)	3.4 **	10.9± 1.5 (54.3)	11.9± 1.6 (69.5)	2.5 *
2	Sugar and jaggery (g)	13.9 ±1.9 (39.5)	28.8 ±3.9 (82.2)	5.3**	17.0 ±2.3 (48.6)	17.0 ± 2.3 (48.6)	0.0 NS
3	Roasted Bengal gram dhal (g)	_	_	_	_	_	_
4	Fruits (g)	_	_	_	_	_	_

Group I - Experimental group supplemented with soyaladoo, 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

It can be noted that there was no any significant difference shown in consumption of non vegetarian foods before and after supplementation among both the groups of children. Adequate level intake of non vegetarian foods before (80.0 per cent) and after (81.7 percent) supplementation period was only recorded in group I children. The comparative data regarding average intake of oils, fats, sugar, jaggary, roasted bengal gram dhal and fruits was depicted in table-6. It gives an idea that, average consumption of oils and fats in Group I shown highly significant increased after supplementation. It was notices as only 5.9 g before supplementation and increased significantly as 16.1g after supplementation. Average intake of oils and fats in group I children were expressed as moderately adequate level (80.3 per cent) after supplementation. Average intake of oils and fats in control group was pointed below the adequate level in before and after six months of experiment. The mean intake of sugar and jaggary by group I found increased at higher significant level. Before supplementation the amount was 13.9± 1.9g.(39.5 per cent) and after supplementation it was increased as 28.8± 3.9g. (82.2 per cent). It was noted as moderate adequate level.

Conclusion

From the above food intake pattern of all the groups of children it was seen that there was high significant change in major food groups i.e. cereals and legumes in I Highly significant change was seen in the intake of fats and oil in experimental groups I More significant change in sugar and jaggary intake was increase in soyaladoo group of children. It may be due to supplementation of sugar through soyaladoo during the period of supplementation for six months.

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