AJHS.
Asian Journal of Home Science
Volume 9 | Issue 1 | June, 2014 | 223-226

Research Paper

e ISSN-0976-8351 | Open Access - www.researchjournal.co.in

Study on soya products supplementations and mineral intake of malnourished pre-school children

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Received: 13.03.2014; **Revised:** 08.05.2014; **Accepted:** 21.05.2014

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■ **ABSTRACT :** Malnutrition is a world wide health issue. It imposes a toll on child mortality, 53 per cent of deaths in children under 5 years in age are nutrition related. It may be due to the role of nutrients in disease and immunity. For improving better nutritional and health status of the family after making them aware about the consumption of prepared soya based food products, traditional base soyaproducts are prepared such as soyaladoo, soyachakali and soyaflakes chiwada. These products were evaluated for their minor and major nutrients.The status of minerals like iron, calcium and zinc etc. consumption significantly increased after supplementation of soya products to pre-school malnourished children for six months. The malnourished pre-school children were classified as grade II and III. These products were given to pre-school malnourished children @50 g product/day /child. It provides energy, protein and fat as per ICMR recommendation.

■ **KEY WORDS:** Soyladoo, Soyachakali, Soyaflakes Chiwada, Supplementary feeding

■ **HOW TO CITE THIS PAPER :** Ghatge, N.S. (2014). Study on soya products supplementations and mineral intake of malnourished pre-school children. *Asian J. Home Sci.*, **9** (1) : 223-226.

We live in a world of great inequity in terms of access to food and existing nutrition conditions both within and among countries. This is not only morally unacceptable but also has enormous costs in terms of human lives, affecting social and economic development. More than five million children die each year as a result of under nutrition (Muller and Krawinkel, 2005). Furthermore, billions of people suffer from vitamin and mineral deficiencies, especially of iron, iodine, vitamin A and zinc. Good nutrition is also constrained by inadequate safe drinking water and sanitation. Soybean is referred as vegetarian meat due to its high quality amino acid profile. It is less expensive legume as well as oilseed crop locally available. Due to excellence source of macro and micro and other biological properties, this can be use full formulation of high nutri mix weaning and supplementary foods to combat malnutrition and maintain good health and nutritional status of pre-schoolers.

■ RESEARCH METHODS

Formulation:

Formulation and preparation of soyaladoo, soyachakali and soyaflakes chiwada was done by using standard method.

Sensory evaluation:

Soya products were prepared and evaluated organoleptically with the help of trained panel of judges on a nine point "Hedonic scale" (Amerine *et al.*, 1965).

Nutritional evaluation:

Nutritional quality analysis. Minerals such as iron, calcium, zinc and crude fibre were analyzed by use of methods described in AOAC (1984).

Statistical analysis:

The obtained data were analyzed by statistical significant at $p < 0.05$ level, S. E. and C.D. at 5 per cent level by the procedure given by Gomez and Gomez (1984).

■ RESEARCH FINDINGS AND DISCUSSION

Fig. 1 expressesd the month wise intake of calcium in experimental groups during entire supplementation period. It revealed that, the month wise calcium intake was observed more in group III. 50.1 per cent calcium intake in the first month increased up to 61.0 per cent at last month of experimental period in group III. Second position was reported by group II. The month wise per cent intake of calcium in group II has shown in I month as 44.1, II month as 46.9, III month as 48.9, IV month as 50.1, V month as 52.5 and VI month as 54.0 per cent. Whereas group I noted III position in calcium intake during II,III, IV and V months. Control group observed lower intake of calcium in all the months except at initial month of experiment.

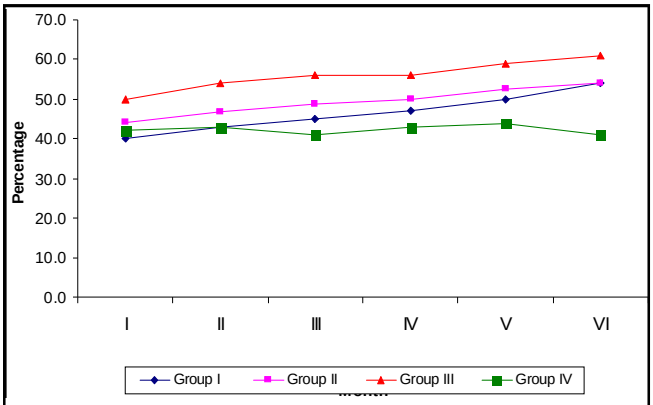

Fig. 1: Calcium intake of exprimental groups of pre-school children

The data regarding month wise intake of iron among all the experimental groups are depicted in Fig. 2. It represents that the increasing trend in iron intake was noticed as increased months of experiment in group I. Intake of iron in first month has shown as 40.0 per cent and it was noted increase as 45.9 per cent in II month, 50.2 per cent in III month, 55.3 per cent in IV month, 60.1 per cent in V month and 65.2 per cent in VI month. Iron intake in the months of I, II, III and IV was observed same in group II and III. But it was drastically increased in the months of V and IV in group II. A decreasing level of iron intake was noted in control group.

Fig. 3 explains the data about month wise zinc intake of all the experimental groups. It states that, there was no

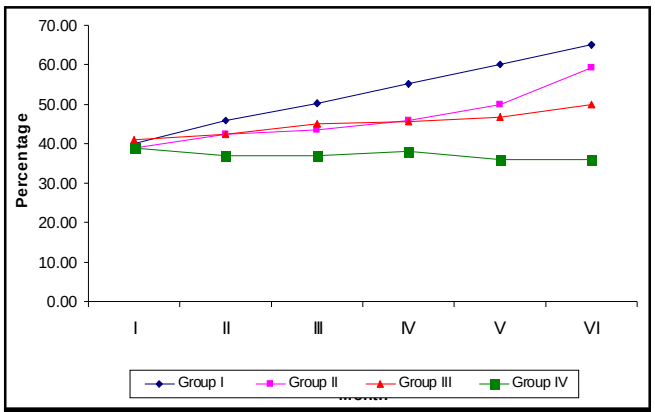

Fig. 2: Iron intake of experimental groups of pre-school children

remarkable change noticed in the intake of zinc by I, II, III, IV, V and VI month in group I, II and III. Slightly it was noted more in group II (55.2%) in the month of VI than that of group III (52.2%) and group I (55.0%). Control group was observed to have lower intake of zinc during entire period of supplementation. It was slightly decreased from 39.0 per cent to 37.0 per cent in the month of I to last, respectively.

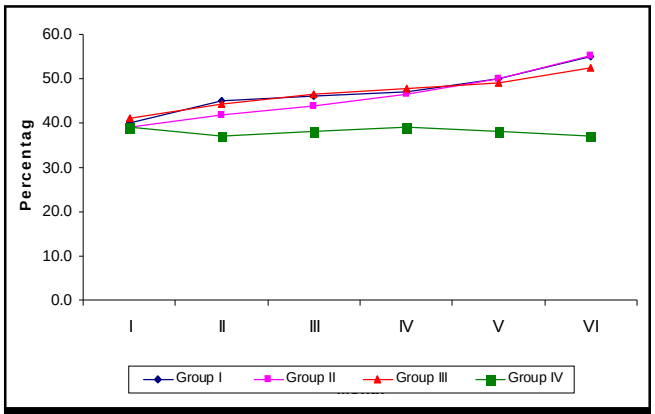

Fig. 3: Zinc intake of different experimental groups of pre-school children

The average intake of calcium by the children who supplemented with soyaladoo *i.e.* group I was recorded as more intake of calcium *i.e.* 262.8 (mg) ± 7.6. In group II, it was noted as 192.9 (mg) ± 6.6 and in group III, it was noticed as 221.9(mg) ± 3.1. None of the supplemented group found

Table 1: Average mineral intake of experimental groups

Sr. No.	Nutrients	Group I Mean ± S.D.	Group II Mean ± S.D.	Group III Mean ± S.D.	Group IV Mean ± S.D.
1	Iron (mg)	7.6 ±1.2 (76.4)	6.8±2.7 (68.4)	6.7±2.6 (68.8)	5.6±2.2 (56.1)
2	Calcium (mg)	262.8±7.6 (65.0)	192.9±6.6 (48.0)	221.9±3.1 (55.3)	168.6±5.5(42.0)
3	Zinc (mg)	4.6±0.7 (46.1)	4.5±0.4 (45.0)	4.6±0.8 (46.0)	3.8±0.6 (38.0)

Group I - Experimental group with supplementation of soyaladoo, Group II - Experimental group with supplementation of soyachakali
Group II - Experimental group with supplementation of soyaflakes chiwada, Group IV - No supplementation *i.e.* control group
Figures in paran theses indicate percentage.

Table 2 : 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.			Group III Mean ± S.D.			Group IV Mean ± S.D.		
		BS	AS	't' value	BS	AS	't' value	BS	AS	't'value	BS	After 6 months	't' value
1.	Calcium (mg)	82.0±1.2	182.0±3.4	6.7**	102.0±3.9	193.±2.3	3.4**	121±1.6	222.0±3.3	3.3**	157.0±1.4	168.0±2.9	0.7 NS
		(20.5)	(66.3)		(25.5)	(48.2)		(30.3)	(55.5)		(39.3)	(42.0)	
2.	Iron (mg)	5.1±0.7	7.6±1.0	3.8 **	5.1±0.6	6.8±0.9	2.7*	5.1±0.7	6.7±0.9	1.22 NS	5.6±0.5	5.6±0.5	0.2 NS
		(51.1)	(76.4)		(51.4)	(68.4)		(51.3)	(66.8)		(38.0)	(37.5)	
3.	Zinc (mg)	1.3±0.2	4.6±0.6	4.1**	1.6±0.2	4.5±0.6	2.7*	1.4±0.1	4.6±0.6	3.7*	3.8±0.5	3.8±0.5	0.2 NS
		(12.9)	(41.1)		(15.9)	(45.0)		(13.9)	(46.0)		(38.0)	(37.5)	

Group I - Experimental group with supplementation of Soyaladoo,
Group II - Experimental group with supplementation of Soyachakali,
Group III - Experimental group with supplementation of Soyaflakes chiwada,
Group IV - No supplementation *i.e.* control group,
Figures in paran theses indicate percentage, * and** indicate significance of values at P=0.05 and 0.01, respevtively
NS= Non-significant, BS – Before supplementation, ,AS – After supplementation

adequate intake of calcium. The control group consumed noted only 168.6 (mg) ± 5.5 calcium which was reported as poorly adequate.

The average iron intake by soyaladoo group I was found as 7.6 (mg) ± 1.20 and (76.4%) followed by soyaflakes group II *i.e.* 6.7 (mg) ± 2.6 and (68.8%) and soyachakali group III as 6.8 (mg) ± 2.7 and (68.4%). They ranked as I, II and III, respectively (Ghatge, 2013). The intake of iron by control group shown as 5.6 (mg) ± 2.2 and (56.1) per cent. The zinc intake by all supplemented groups was recorded as poorly adequate. Very poor intake of zinc by control group was noticed as 3.8 (mg) ± 0.6 and (38.0%).

The data about average intake of minerals namely, calcium, iron ad zinc by different experimental groups before and after supplementation are given in Table 2. It revealed that, calcium intake was found increased at highly significant level in all three experimental groups. Group I scored highest intake of calcium (66.0 %), followed by group III (55.5 %) and group II (48.2 %). However, none of these group found calcium intake at adequate level. 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.

Iron intake was noticed increased at highly significant level only in group I. It was noted as increased from 51.1 to 76.4 per cent iron intake after supplementation. Secondly group II reported as increase in iron intake at significant level (from 51.4 to 68.4 %) after supplementation period. Whereas there was no significant difference noted in the intake of iron by group III and control group after supplementation.

The average zinc intake in group I reported as highest score among all the experimental groups. It was found an increase in the intake of zinc level from 12.9 to 41.1 per cent after supplementation. It was noted as highly significant, but at below adequacy level. In group III, the intake of zinc before supplementation was very poor *i.e.* only 13.9 per cent, it was increased up to 45.0 per cent after supplementation. group II noted as in third rank, it scored 46.0 per cent intake after supplementation. All these groups were recorded as its intake of zinc was poorly adequate. They found deficient in zinc intake. No significant change was noticed in control group regarding intake of zinc after experimental group.

Conclusion:

On whole it can be concluded that supplementation of soyabased food products such as soyaladoo, soyachakali and soyaflakes chiwada have seen significantly increased mineral health consumption such as calcium, iron and zinc. Again it has been concluded that the soyaproduct can be used to treat the malnourished pre-school children.

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