

# Study on impact of feeding soyaladoo and soyaflakes chiwada to malnourished pre-school children and their biochemical analysis

■ N.S. GHATGE

Received: 10.06.2015; Revised: 15.10.2015; Accepted: 24.10.2015

■ **ABSTRACT** : To prevent malnutrition among children in the country in a sustainable manner are a critical component in this endeavor. This would require a multipronged effected in the form of capacity building for nutritional research, programme intervention development and evaluation. To treat malnutrition among the preschool children the formulation of locally based protein rich product is done. Hence attempt was made to formulate soyabased food products such as soyaladoo and soyaflakes chiwada. Soya products were formulated and prepared by standard methods. Organoleptically selected soya products were analyzed for its chemical composition such as protein, fat, vitamins, minerals, and ant nutritional factors. These products were supplemented to pre-school malnourished children @ 40 g/head/day for six months. Pre-school malnourished children were graded according to grade of malnutrition. Their biochemical parameter such as serum iron ( $\mu\text{g}/\text{dl}$ ) serum proteins ( $\text{g}/\text{dl}$ ), serum vitamin A ( $\text{IO}/\text{dl}$ ), serum zinc ( $\mu\text{g ml}$ ), blood glucose  $\text{mg}/\text{dl}$  and Haemoglobin  $\text{g}/\text{dl}$  had done monthly for six months. It had shown highly significant changes on blood glucose level, haemoglobin, serum protein, serum vitamin A, serum iron and serum zinc states of pre-school children after supplementation of soyaproducts.

■ **KEY WORDS**: Soyladoo, Soyaflakes chiwada, Supplementary feeding

■ **HOW TO CITE THIS PAPER** : Ghatge, N.S. (2015). Study on impact of feeding soyaladoo and soyaflakes chiwada to malnourished pre-school children and their biochemical analysis. *Asian J. Home Sci.*, **10** (2) : 322-326.

Author for Correspondence :

N.S. GHATGE  
Pravara Rural Education Society's,  
Home Science and BCA College,  
Loni, Rahata, AHMEDNAGAR (M.S.)  
INDIA  
Email : nalinihemangi26@  
rediffmail.com

Soybean belongs to family leguminace and sub family papilionidae. 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 soybean supplementations in different forms of by products for the malnutrition treatment. Soyabean is very much popular food crop in most of the countries of the world

whereas large number of people is found of soya products are prepared from soya seeds. Several recent scientific studies (Messina and Barne Presky, 1994) have shown that regular intake of traditional soya foods may help to prevent breast cancer, postrate cancer, colon cancer and menopausal problems of women (Kaushik and Jaiswal, 2010). 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 plaque built up in arteries (atherocleorosis) (Messina, 1997).

## ■ RESEARCH METHODS

### Formulation :

Formulation and preparation of soyaladoo, soyachakali and soyaflakes chiwada was done by using standard method by Thangamme (1971).

### Sensory evaluation :

Soya products were prepared and evaluated organoleptically by "Hedonic scale" (Amerine *et al.*, 1965).

### Nutritional evaluation :

Nutritional quality analysis. Moisture content, total ash, major nutrient like crude protein, fat, carbohydrates, B complex vitamins including vitamin B<sub>1</sub>, B<sub>2</sub> and B<sub>3</sub>, minerals such as iron, calcium, zinc and crude fibre were analyzed by use of methods described in (AOAC, 1984 and Raghunramula *et al.*, 1983).

### Statistical analysis :

The analysis significant at  $p < 0.05$  level, S.E. and CD. at 5 per cent level by the procedure given by (Gomez and Gomez, 1984).

### Biochemical analysis:

The nutritional status of the pre-school 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  $\mu$ /dl, serum iron  $\mu$ g/dl and serum zinc  $\mu$ g/dl were analyzed by using methods given by Raghunramula *et al.* (1983).

## ■ RESEARCH FINDINGS AND DISCUSSION

Table 1 represent the precise picture of average major nutrients content in content different soya by products. It revealed that, the values of major nutrients like carbohydrate (95.4 g), energy (1070 k.cal), total protein (32.1g) and crude fat (24.0g) noticed more in soyaladoo than other soya by products. Per cent of moisture and ash werenoted more in soyaflakes chiwada. Among these products lower values of carbohydrate (86.7g), energy (826 k.cal), total protein (28.0 g) were shown in soyaflakes chiwada.

Table 1 : Average major nutrients content in soya by products				
Sr. No.	Major nutrients (per 100g)	Soyaladoo Mean $\pm$ SD(a)	Soyaflakes chiwada Mean $\pm$ SD(c)	't' Test
1.	Moisture (%)	11.6 $\pm$ 2.2	11.8 $\pm$ 1.7	a vs b (0.06) NS b vs c (1.10) NS c vs a (0.07) NS
2.	Ash (%)	3.1 $\pm$ 1.7	3.6 $\pm$ 1.5	a vs b (1.23) NS a vs b (1.61) NS c vs a (0.91) NS
3.	Carbohydrate (g)	95.4 $\pm$ 1.9	86.7 $\pm$ 3.1	a vs b (1.77) NS b vs c (2.65) * c vs a (2.81) *
4.	Energy (k.cal)	1070.0 $\pm$ 1.8	826.0 $\pm$ 3.6	a vs b (1.22) NS b vs c (2.78) * c vs a (2.86) *
5.	Total protein (g)	32.1 $\pm$ 1.7	28.0 $\pm$ 0.6	a vs b (1.07) NS b vs c (1.23) NS c vs a (2.61) *
6.	Crude fat (g)	24.0 $\pm$ 1.3	22.9 $\pm$ 0.7	a vs b (0.92) NS b vs c (0.03) NS c vs a (1.13) NS

\* indicates significance of value at P=0.05

NS=Non-significant

**Biochemical analysis of experimental groups of pre-school children :**

This utilization of food depends on the conversion of food into functional nutrients after its absorption. This relevance is any essential to study the facts and significance of food after consumption. Biochemical analysis is one of best and very relevant scientific method for assessment of nutritional status of the community. In this method biochemical parameters like blood, serum, plasma etc are used for the study.

The constituents in the blood such as blood glucose level, hemoglobin content serum protein, serum vitamin A, serum iron and serum zinc were analyzed in the experimental groups of children before and after supplementation.

The data of average in biochemical analysis of experimental group was given in Table 2. It explained that, Group I children found more average values of blood glucose *i.e.* 72.1 mg/dl, haemoglobin 10.2 g/dl, serum protein 6.2 g/dl, serum vitamin A 126.0 IU/dl and

**Table 2 : Average in biochemical analysis of experimental groups**

Sr. No.	Biochemical analysis	Group I Mean ± S.D.	Group II Mean ± S.D.	Group III Mean ±S.D.
1.	Blood glucos(mg/dL)	72.1±2.7(88.1)	68.7± 3.3(76.3)	66.0 ± 9.0(73.3)
2.	Haemoglobin (g/dl)	10.2±1.0(83.6)	9.8 ± 1.3(78.2)	7.6 ± 1.02(60.7)
3.	Serum protein(g/dl)	6.28 ±0.9(91.9)	6.0 ± 0.8(89.7)	4.3±0.7(65.5)
4.	Serum vitamin(IU/dl)	126.0±4.1(87.0)	87.0 ± 2.3(58.0)	36.0±1.1(24.0)
5.	Serum iron (µg/dl)	139.7 ± 1.9(82.2)	128.5±9.3(65.2)	105.4±6.8(48.2)
6.	Serum zinc (µg/ml)	1.09±2.1(77.9)	1.02±2.0(72.9)	0.54±0.9(24.0)

Group I - Experimental group with supplementation of soyaladoo.  
 Group II - Experimental group with supplementation of soyafakes chiwada .  
 Group III - No supplementation *i.e.* control group.  
 Figures in parantheses indicate percentage.

**Table 3 : Average of blood glucose and haemoglobin level of experimental groups before and after supplementation**

Sr. No.	Biochemical analysis	Group I Mean ± S.D.			Group II Mean ± S.D.			Group III Mean ± S.D		
		BS	AS	't' value	BS	AS	't' value	BS	AS	't' value
1.	Blood glucose (mg/dl)	66.5±2.7 (72.9)	72.1± 2.9 (88.1)	3.7**	63.7±2.7 (63.0)	68.7±2.3 (73.6)	3.1*	60.9±1.9 (65.9)	66.0±1.8 (72.4)	1.5NS
2.	Haemoglobin (g/dl)	7.7±1.1 (61.7)	10.2±1.4 (85.6)	3.8**	6.6±0.9 (65.2)	10.0±1.3 (78.2)	2.1*	7.6±1.0 (60.0)	7.8±1.1 (61.3)	-0.90NS

Group I - Experimental group with supplementation of soyaladoo.  
 Group II - Experimental group with supplementation of soyafakes chiwada.  
 Group III - No supplementation *i.e.* control group.  
 Figures in Parantheses indicate percentage.  
 \* and \*\* indicate significance of values at P=0.05 and 0.01, respectively  
 NS=Non-significant BS =Before supplementation AS =After supplementation

**Table 4 : Average of 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.			Group III Mean ± S.D.		
		BS	AS	't' value	BS	AS	't' value	BS	AS	't' value
1.	Serum iron (µg/dl)	50.7±6.9 (48.3)	79.6±10.9 (75.9)	5.40**	50.8±6.9 (48.3)	68.5±9.3 (65.2)	2.74*	50.5±6.8 (48.2)	52.5±6.8 (50.2)	0.47NS
2.	Serum protein(gl/dl)	4.1±0.6 (61.1)	6.1±0.8 (91.0)	4.41**	4.5 ±0.6 (67.1)	6.0±0.8 (89.7)	3.41**	4.4 ±0.7 (67.7)	4.9 ±0.5 (69.7)	1.24NS
3.	Serum vitamin A (IU/dl)	8.65±1.2 (25.1)	30.0±4.0 (87.0)	4.24**	9.23 ±1.3 (26.8)	20.0±2.3 (58.7)	2.88*	8.21±1.1 (23.7)	8.4±1.4 (25.7)	0.71NS
4.	Serum zinc (µg/ml)	9.19 ±1.3 (48.3)	15.5±2.1 (81.7)	3.73**	8.8 ±1.2 (46.3)	14.8± 2.0 (76.7)	3.06**	7.27±1.0 (38.2)	7.8±1.8 (40.2)	0.64NS

Group I - Experimental group with supplementation of soyaladoo.  
 Group II - Experimental group with supplementation of soyafakes chiwada .  
 Group III - No supplementation *i.e.* control group.  
 Figures in Parantheses indicate percentage.  
 \* and \*\* indicate significance of values at P=0.05 and 0.01, respectively  
 NS=Non-significant BS =Before supplementation AS =After supplementation

zinc 1.09 µg/m.

There was no major difference noticed in the average values of blood glucose level, serum protein, serum vitamin A, serum iron and serum zinc of group II children after supplementation. Haemoglobin level in group II children noticed as 9.8 g/dl, *i.e.* 78.2 per cent. Serum vitamin A observed in group II children as 87.0 IU/dl *i.e.* 58 per cent. All the average values of biochemical parameters were noted below the standard level in control group of children. Serum vitamin A (36.0 IU/dl) and zinc (0.54 µg/ml) level found drastically poor in this group of children.

The biochemical parameters which are analyzed after supplementation were compared with their previous *i.e.* before supplementation values. The relevant data was presented in Table 3 and 4 (Ghatge, 2012).

Table 3 represents the data regarding average biochemical assessment in particularly blood glucose and haemoglobin level before and after supplementation. It has shown that, group I children had highly significant difference in their blood glucose level in before supplementation (66.5 mg/dl) and after supplementation (72.1 mg/dl). Whereas group II increased from 63.7 to 68.7 mg/dl blood glucose level after supplementation.

A similar observation were recorded about haemoglobin level of these experimental groups of children. From 7.7 to 10.2 g/dl increased in haemoglobin level was reported by group I children after supplementation. Control group children did not shown any level after experimentation.

The data regarding average values of serum protein, vitamin A, iron and zinc of experimental group of children compared with before and after supplementation was given in Table 4. It indicated that, among these group of children. Group I scored serum protein level from 4.1 to 6.5 g/dl, which recorded as a normal protein level (91.0 %). Whereas in group II reported 4.5 to 6.0 g/dl serum protein after experimentation. There was slight increased in serum protein level from 4.4 to 4.9 g/dl, difference between before and after supplementation in control group of children (Ghatge, 2013).

Average value of serum vitamin A was noted higher in group I children. It was highly significant after supplementation (30.0 IU/dl). This increased per cent of serum vitamin A level in group I children noted in moderate normal level of their standard value. Group II

children also noticed increased the; level of serum vitamin A from 9.23 to 20.0 IU/dl after supplementation. A no significant change was observed in serum vitamin A level after experimentation among control group children.

Serum iron status found highly significant increased by 50.7 to 79.6 per cent in group I children. Control group of children reported 48.2 per cent to 50.2 per cent after experiment.

Highly significant increase was reported in the value of serum zinc among group I children. It increased from 9.19 15.5 µg/ml. which recorded as 81 per cent increased after supplementation. Where as group II children shown increased serum zinc from 46.3 to 76.7 per cent. Control group of children recorded a non significant increase in serum zinc level after supplementation.

On the whole, it can be concluded that, the supplementary feeding through soybyproducts found positive impact on improving the biochemical parameters of pre-school malnourished children. Among the soybyproducts supplementation of soyaladoo shown a highly significant effects on increasing blood glucose level, blood haemoglobin, serum protein, serum vitamin A, serum iron and serum zinc status of pre-school children. It indicated that soybyproducts have effectively worked. These products have capacity in improving the nutritional status of malnourished pre-school children.

## ■ REFERENCES

- Amerine, M.A., Pangborn, R.M. and Roessler, E.B. (1965).** *Principles of sensory evaluation of food.* Academic Press, New York, U.S.A.
- AOAC (1984). Approved methods of analysis 14<sup>th</sup> Edn association of official analytical chemist, Washington D.C., U.S.A.
- Ghatge, N.S. (2012).** Impact of soyaladoo feeding on biochemical analysis of Malnourished Preschool Children. *Food Sci. Res. J.*, **4**(1) : 67-70.
- Ghatge, N.S. (2013).** Supplementation of nutraceutical food to malnourished pre-school children and its impact on biochemical examination. *R.J.C.C.S.*, **1** (1) : 2-6.
- Gomez, K.A. and Gomez, A.A. (1984).** *Statistical procedures for agricultural research*, Wiley International John Wiley and Sons, New York, U.S.A.

**Kaushik, A. and Jaiswal, M. (2010).** A study on effect of soyaflour on post menopausal problems women of Gorakhpur District." A Paper presented at national seminar, at Lulknow (U.P.) on 23-24 oct :2 RJFCCS 1(1).

**Messina, M.J. (1997).** Soyfood their role in disease prevention and treatment in Liu Keshun." Editor Soybean chemistry. Technolog and utilization Chapman and Hall, New York: 443-447.

**Messina, M.J. and Barne Presky, V. (1994).** Soyintake and cancer risk. A critical Review of the literature and invivodata. *Nutri Cancer*, (095) **21**(2): 113 -131.

**Raghunramula, N., Nair, K.M. and Kulyansundram, S. (1983).** Annual Laboratory techniques. National Institute of Nutrition, Hyderabad (A.P.) INDIA.

**Thangamms, Phillips (1971).** "*Handbook of Indian works*", Kalyani Bool, New Delhi Ed. (1).

10<sup>th</sup>  
Year  
★★★★★ of Excellence ★★★★★