

Study of nutritional composition analysis of soya based formulated food products

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Formulation means making all possible combinations. Hence, formulation of food products has been done with its varying amount of different food groups in different food products. Formulation of the soya products are made by taking into account the nutritional quality, acceptability and the use of these products as a supplementary foods to the malnourished preschool children. The most traditional and familiar foods in the family and among the children are purposefully selected *i.e.* soyaladoo, soyachakali and soyachiwada are the most traditional and familiar products in Maharashtra State in particular Kolhapur district, these products are selected for the formulation with soybean, cereal rice flakes and other legume like Bengal gram dal and roasted Bengal gram dal etc. variations are made according to the ingredients required for the preparation of the products. Where as the variations in the procedure in the preparation of products such as roasting and frying, use of sweetening agent, use of flavoring agent, use of coloring agent etc. Their nutrient analysis after storage have not shown any significant change except carbohydrates, energy and B complex vitamins in all soya products.

Key Words : Soyaladoo, Soyachakali, Soyachiwada

How to cite this article : Ghatge, N.S. (2014). Study of nutritional composition analysis of soy abased formulated food products. *Food Sci. Res. J.*, 5(1): 7-10.

INTRODUCTION

Soybean is one of the most important legumes having more than 40 per cent protein combined with 20 pre cent oil Deshapande (1990). It can be effectively used for supplementing cereal based products due to of its amino acids profile. Beside its has a good source of minerals, vitamins antioxidants and better neutraceutical properties (Ketarpau and Goyal, 2008). Soybean 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.

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 soybean, 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 plague built up in arteries (atherocleorosis) (Messina, 1997).

Hence, by taking into account the different properties of soybean, it is considered to use for the preparation of different supplementary food products. The data regarding formulation, preparation and evaluation of soya by products were collected.

METHODOLOGY

Soyaladoo:

The local varieties of soybean *i.e.* MACH-58 and Bengal gram *i.e.* Pragati Phule were procured from the market. It was cleaned, washed, dried, coarsely ground, dehulled and made into flour separately by use of grinding machine. Soyaladoo was prepared by use of appropriate formulations.

Soyachakali:

Local varities of soybean MC HS 58 and rice *ie.* Ratanagri

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were procured from market, cleaned, washed, dried roasted and ground separately. The appropriate formulations combinations were used for the formulation of and preparation of soyachakali.

Soyafakes chiwada:

Local varieties of soybean *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 soybean for the preparation of soyafakes.

Preparation of soya products:

After the formulation of these products were prepared by using standard procedures given by Thangamma Phillips (1971).

Sensory evaluation of soya products:

By use of these different combinations the soyaladoos, Soyachakali and Soyachiwada were prepared and evaluated by organoleptically with the help of trained panel of judges on a nine point "hedonic scale" given by Amerine *et al.* (1965).

Chemical analysis of soya products:

High scored soyladoo, Soyachakali and Soyachiwada were analyzed in sensory evaluation for moisture content,

total ash, major nutrients like crude protein, fat, carbohydrates, B complex vitamins, minerals such as iron, calcium zinc and crude fibre with the use of methods described in A.O.A.C. (1975).

Storage stability and statistical analysis of soya products:

The organoleptic nutritional qualities of soyaladoo, Soyachakali and Soyachiwada were carried out after its storage for 0 to 1 month and 1 to 2 months packed in polythene and high gauge packing material at room temperature. The differences noticed among this was calculated by statistically. The obtained data were analysed by statistical significant at $p < 0.05$ level, S. E. and CD. at 5 per cent level by the procedure given by Gomez and Gomez (1984).

OBSERVATIONS AND ASSESSMENT

The results of the present study as well as relevant discussions have been presented under following sub heads:

Nutritional analysis:

Table 1 represent the precise picture of average major nutrients content in content of 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 were noted more in

Table 1: Average major nutrients content in soya by products

Sr.No.	Major nutrients(per 100g)	Soya by products			't' Test
		Soyaladoo Mean \pm SD(a)	Soyachakali Mean \pm SD(b)	Soyafakes chiwada Mean \pm SD(c)	
1.	Moisture (per cent)	11.6 \pm 2.2	11.4 \pm 1.2	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 (per cent)	3.1 \pm 1.7	2.9 \pm 0.9	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	93.1 \pm 0.7	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	1065.0 \pm 1.4	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	30.8 \pm 1.5	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	22.8 \pm 1.7	22.9 \pm 0.7	a vs b (0.92) NS b vs c (0.03) NS c vs a (1.13) NS

* indicate significance of value at $P=0.05$, NS=Non-significant

soyafakes chiwada. Among these products lower values of carbohydrate (86.7g), energy (826 k.cal), total protein (28.0 g) were shown in soyafakes chiwada. Major nutrients content between soyachakali and soyafakes chiwada did not found significantly different.

The data about average vitamins content in different soya by products are presented in Table 2. It revealed that, thiamine (0.36) mg and β carotene (1186.6) μ g in soyaladoo were more than that of soyachakali and soyafakes chiwada. The content of riboflavin (mg) and niacin (mg) were recorded significantly more in soyafakes chiwada as 0.27 and 7.11, respectively. It

may be due to the use of groundnuts and it was prepared by oil roasting instead of deep frying. The least content of these vitamins was noticed in soyachakali. It indicated that, the use of deep frying method in the preparation of soyachakali decreased in content of B complex vitamins like riboflavin, *i.e.* β carotene.

The soya by products were also evaluated for their mineral contents. The data about minerals such as calcium, iron and zinc content in different soy by products are presented in Table 3. Iron (mg) content was observed significantly higher in soyaladoo (6.3) than that of soyachakali (4.9). The values of

Table 2: Average vitamins content in soya by products

Sr. No.	Vitamin content (per 100g)	Soya by products			't' Test
		Soyaladoo Mean \pm SD	Soyachakali Mean \pm SD	Soyafakeschiwada Mean \pm SD	
1.	Thiamine (mg)	0.36 \pm 0.01	0.32 \pm 0.39	0.29 \pm 0.49	a vs b (0.14) NS b vs c (0.11) NS c vs a (2.85) *
2.	Riboflavin (mg)	0.18 \pm 0.03	0.19 \pm 0.01	0.27 \pm 0.03	a vs b (0.05) NS b vs c (2.98)* c vs a (3.04) *
3.	Niacin (mg)	3.35 \pm 0.15	5.27 \pm 0.98	7.11 \pm 2.22	a vs b (2.77) * a vs b (2.65) * c vs a (2.81) *
4.	Carotene (μ g)	1186.6 \pm 4.49	968.5 \pm 3.11	1127.8 \pm 4.81	a vs b (1.22) NS b vs c (2.78) NS c vs a (2.86) NS

* indicate significance of value at P=0.05, NS = Non-significant

Table 3: Average minerals content of different soya by products

Sr. No.	Minerals (per 100g)	Soya by products			't' Test
		Soyaladoo Mean \pm SD (a)	Soyachakali Mean \pm SD (b)	Soyafakeschiwada Mean \pm SD (c)	
1.	Calcium(mg)	286.5 \pm 8.6	245.5 \pm 4.1	273.8 \pm 3.5	a vs b (3.21) * b vs c (3.09)* c vs a (1.26) NS
2.	Iron (mg)	6.3 \pm 0.9	4.9 \pm 1.4	5.8 \pm 0.6	a vs b (2.61) * b vs c (0.81)NS c vs a 0.50)NS
3.	Zinc (mg)	3.8 \pm 0.7	2.1 \pm 0.6	2.5 \pm 0.1	a vs b (2.70)* a vs b (0.74) NS c vs a (1.21) NS

* indicate significance of value at P=0.05, NS = Non-significant

Table 4: Proximate composition of soya by products after its storage

Sr. No.	Proximate composition (per 100g)	Soya by product							't' test		
		Soya ladoo		Soya chakali		Soyafalkes chiwida		(a ₁ vs b ₁)	(b ₁ vs c ₁)	(c ₁ vs a ₁)	
		(a)	(a ₁)	(b)	(b ₁)	(c)	(c ₁)				
1.	Moisture (per cent)	11.6	11.3	11.4	11.1	11.8	11.6	(0.26)NS	(2.11)*	(0.41)NS	
2.	Ash (per cent)	3.1	3.0	2.9	2.9	3.6	3.5	(0.05)NS	(2.35)*	(1.20)NS	
3.	Carbohydrate (g)	95.4	95.3	93.1	93.0	86.7	86.3	(1.40)NS	(2.51)*	(2.70)*	
4.	Total protein (g)	32.1	30.6	30.8	29.6	28.0	27.2	(0.04)NS	(2.54)*	(2.86)*	
5.	Crude fat (g)	24.0	23.8	22.8	22.6	22.9	22.6	(0.11) NS	(0.0)NS	(0.21)NS	

a,b,c,- Average nutritional values of the soya by products before storage, a₁, b₁, c₁ – average nutritional values of the soya by products before storage for 2 months at room temperature,* and ** indicate significance of values at P=0.05 and 0.01, respectively, NS=Non-significant

Table 5: Proximate composition of soya by products after its storage

Sr. No.	Proximate composition (per 100g)	Soya by product								
		Soya ladoo		Soya chakali		Soyaflakes chiwada		't' test		
		(a)	(a ₁)	(b)	(b ₁)	(c)	(c ₁)	(a ₁ vs b ₁)	(b ₁ vs c ₁)	(c ₁ vs a ₁)
1.	Thiamine (mg)	0.36	0.31	0.32	0.31	0.29	0.26	(0.0)NS	(2.41)*	(2.41)*
2.	Riboflavin(mg)	0.18	0.1	0.19	0.17	0.27	0.24	(0.06)NS	(2.62)*	(2.87)*
3.	Niacin (mg)	3.35	3.19	5.27	5.04	7.11	6.61	(2.49)*	(1.28)NS	(2.63)*
4.	carotene (µg)	1186.6	1184.8	968.5	967.9	1127.8	1126.9	(3.44)**	(3.19)**	(2.60)*
5.	Calcium (mg)	288.4	288.1	247.6	247.2	245.5	24.51	(3.26)**	(1.10)NS	(3.19)**
6.	Iron (mg)	6.4	6.3	5.3	5.3	4.9	4.8	(0.82)NS	(0.69)NS	(0.71)NS
7.	Zinc (mg)	4.1	4.0	2.3	2.3	2.1	2.10	(2.50)*	(0.08)NS	(2.48)*

a,b,c,- Average nutritional values of the soya by products before storage, a₁,b₁,c₁ – average nutritional values of the soya by products before storage for 2 months at room temperature, * and ** indicate significance of values at P=0.05 and 0.01, respectively, NS=Non-significant

zinc (mg) were noticed significantly more in soyaladoo (3.8) than soyachakali (2.1). Among these by products all the mineral content were noted more in soyaladoo. Soyafakes chiwada was found in second position. Where as less mineral contents (calcium, iron, zinc) were found in soyachakali.

Evaluation of storage stability of soya by products:

The keeping quality of the soya by products namely soyaladoo, soyachakali, soyaflakes chiwada was evaluated by organoleptically and nutritionally. These products were kept in polythene and high gauge package for 1 to 2 months at room temperature. The data regarding the change in sensory qualities and proximate nutrients after storage are presented in Tables 4 and 5.

The data shown in Table 4 indicated that, all the proximate compositions namely, moisture, ash, carbohydrates, total protein and crude fat were not changed after longer period storage of soya by products. In comparison between the storage of these soya by products, proximate compositions like carbohydrates (95.39), total protein (30.69) and crude fat (23.89) were observed more in soyaladoo. Where as per cent of moisture (11.6) and ash (3.5) were noted more in soyaflakes chiwada. Carbohydrates 26.3 g and total protein (27.29) mg content were noticed less after storage of chiwada.

The data regarding the content of vitamins and minerals after storage of soya by products are given in Table 5. It expressed that there were very less change in B complex vitamin in soyaproducts after storage. But there were no significant change in minerals content in all soya products after storage.

Conclusion:

It can be concluded that all soyaproducts were rich in nutrient. But among all soyaproduct the nutritional composition of soyaladoo was high followed by soyaflakes chiwada and soya chakali even after storage.

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Received : 29.08.2013; Revised: 27.02.2014; Accepted : 05.03.2014