

# Reduction of anti nutritional factors in differently processed supplementary soya products

N.S. Ghatge

Soyabean content different anti nutritional factors such as phytate phosphorus, trypsin inhibitor activity, tannin, acid detergent fibres, lignin and cellulose. These antinutritional factors reduced by using various processing techniques like roasting, soaking, frying autoclaving, boiling etc. Soya products such as *Soyaladoo*, soyachakali and soyaflakes chiwada were formulated by standard method and analyzed for its ant nutritional factors from raw material as well as finished products *Soyaladoo*, soyachakali and soyaflakes chiwada. The significant reuction in phytate phosphorus, trypsin inhibitor activity, tannin, acid detergent fibres, lignin and cellulose seen in *Soyaladoo*, soyachakali and soyaflakes chiwada, respectively.

**Key Words :** Soyladoo, Soyachakali, Soayflakes chiwada

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## INTRODUCTION

Soyabean 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 soyabean supplementations in different forms of by products for the malnutrition treatment. Supplementary food provide excess amount of particulars nutrient or nutrients required for good health. Hence, by keeping in view the feasibility in the preparation of formulated foods and due to nutritional significance of soya bean, its low cost, locally available and high amino acid profile it is planned to use the soyabean after proper processing techniques in the preparation of soya by products with its effect on the treatment of malnourished preschool children to overcome the problem. It has been also significant that the amino acids of the protein of

soyabean are much similar to those of cow milk protein Carrington (2008).

## METHODOLOGY

### Formulation:

Formulation and preparation of *Soyaladoo*, soyachakali and soyaflakes chiwada were done by using standard method Thangamms (1971).

### Sensory evaluation:

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

### The antinutritional factors :

Antinutritional factors estimates by using standards methods *i.e.* phytate phosphorus by Haug and Lantzsch (1983), trypsin inhibitor activity by Kakade *et al.* (1974), tannin by AOAC (1984) acid detergent fibre by Vansoet (1970), cellulose content of sample was calculated from the determined values of acid detergent fibre and lignin.

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**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).

**OBSERVATIONS AND ASSESSMENT**

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

**Evaluation of antinutritional factors in soya by products:**

The data regarding antinutritional factors present in different soya by products was depicted in tables 1 to 9.

Table 1 describes the average phytate phosphorus content in different soya by products. Phytate phosphorus present in raw ingredients of *Soyaladoo* was as 416.8 mg, 408.0 mg in soyachakali and 320.0 mg in soyaflakes chiwada. Significantly it was noted more in *Soyaladoo* than soyachakali and soyaflakes chiwada. Among the raw ingredients of the soya by products, it was noticed that phytate phosphorus less in soyaflakes chiwada.  $320 \pm 6.1$  mg Eclyclesdale and Camne (2002). This is due to tedious processing techniques used in the preparation

of soyaflakes chiwada. Highly significant decrease in phytate phosphorus were observed in the final soya by products. (160.0mg, 120.4mg and 130.6 mg) in *Soyaladoo*, soyachakali and soyaflakes chiwada, respectively.

Table 2 highlights the average trypsin inhibitor activity in different soyaproducts. Raw ingredients of all the soyaproducts recorded a non remarkable trypsin inhibitor activity. Among these ingredients, more trypsin inhibitor activity (29.9mg) was noticed in raw materials of soya chakali. Raw ingredients of *Soyaladoo* and soyaffakes chiwada were noted 26.9 and 25.5 mg. trypsin inhibitor activity, respectively (Manorama *et al.*, 1982). A significantly decreased in trypsin inhibitor activity, it was found in soya chakali *i.e.* 3.5 mg. It might be due to use of deep frying method (Kumar *et al.*, 2001).

The data given in Table 3 represent the average tannin content in different soya by products. The tannin content was more (0.56mg) in raw ingredients of soyaflakes chiwada. Tannin content of *Soyaladoo* and soyachakali was 0.49 mg. Among these products tannin content of soyachakali was (0.29 mg) it was less due to use of deep frying method.

The data shown in Table 4 expressed the acid

**Table 1 : Average phytate phosphorus (Mg) content in different soya by products**

Sr. No.	Phytate phosphorus (per 100g) in mg	Soya by products			't' Test
		<i>Soyaladoo</i> (Mean $\pm$ SD)	Soyachakali (Mean $\pm$ SD)	Soyaflakes chiwada Mean $\pm$ SD	
1.	Raw ingredients	416.8 $\pm$ 8.2	408.8 $\pm$ 8.2	320.0 $\pm$ 6.1	a vs b (3.2)* b vs c (5.3)** c vs a (6.1) **
2.	Final product	160.0 $\pm$ 5.7	120.4 $\pm$ 8.4	130.6 $\pm$ 3.9	a vs b (4.5)** b vs c (3.4)** c vs a (5.2) **
	'Z' Value	(18.5)**	(17.6)**	(9.8)**	

\* and \*\* indicate significance of values at  $P=0.05$  and  $0.01$ , respectively

**Table 2 : Average trypsin inhibitor activity content in different soya by products**

Sr. No.	Trypsin inhibitor activity (mg/ 100mg)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	26.9 $\pm$ 2.6	29.9 $\pm$ 2.1	25.5 $\pm$ 1.4	a vs b (1.22)NS b vs c (1.35)NS c vs a (0.94) NS
2.	Final product	5.5 $\pm$ 1.9	3.5 $\pm$ .08	4.2 $\pm$ 0.9	a vs b (1.30)NS b vs c (1.10)NS c vs a (0.88) NS
	'Z' Value	(4.11)**	(4.32)**	(4.18)**	

\* and \*\* indicate significance of values at  $P=0.05$  and  $0.01$ , respectively

NS=Non-significant

detergent content of raw ingredients of *Soyaladoo* was (2.03g). But it reduced significantly after the processing and making it into final product as *Soyaladoo* (1.31 g). Similarly, this acid detergent fibre decreased in raw material of soyachakali *i.e.* 1.96 g and been reduced to 1.08g final product of soyachakali. Significant loss of acid detergent fibre might be due to heavy processing application in the preparation of final product as *Soyaladoo* and soyachakali. There was no significant difference found in acid detergent fibre in raw material (1.48 g) and final product of Soyafakes chiwada (Ghatge,

2014).

The data presented in Table 5 gives an idea that, there was no remarkable content of lignin in the raw ingredients of all the soya by products. Out of this 0.95 g lignin was reported in *Soyaladoo*. It decreased in a final product (0.31g). Raw ingredients of soyachakali recorded 0.86 g lignin and reduced to 0.29 g in soyachakali. Less amount *i.e.* 0.58 g lignin was noticed in raw materials of soyaflakes chiwada and that to final product of soyaflakes chieada was (0.38g). It was significantly lowered in the final soyaflakes chiwada.

**Table 3 : Average tannin (Mg) content in different soya by products**

Sr. No.	Tannin (per 100g)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	0.49 $\pm$ 0.03	0.49 $\pm$ 0.02	0.56 $\pm$ 0.04	a vs b (0.0)NS b vs c (0.91)NS c vs a (0.91) NS
2.	Final product	0.34 $\pm$ 0.01	0.29 $\pm$ 0.01	0.31 $\pm$ 0.02	a vs b (1.40)NS b vs c (1.21)NS c vs a (0.62) NS
'Z' Value		(3.81)**	(3.99)**	(4.25)**	
* and ** indicate significance of values at P=0.05 and 0.01, respectively				NS=Non-significant	

**Table 4 : Average acid detergent fibre content in different soya by products**

Sr. No.	Acid detergent fibre (g/100g)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	2.03 $\pm$ 1.60	1.96 $\pm$ 0.85	1.48 $\pm$ 0.51	a vs b (0.75)NS b vs c (0.81)NS c vs a (2.68)*
2.	Final product	1.31 $\pm$ 0.91	1.08 $\pm$ 0.60	1.22 $\pm$ 0.44	a vs b (2.19)* b vs c (2.02)* c vs a (0.81) NS
'Z' Value		(2.92)*	(2.11)*	(0.96)NS	
* and ** indicate significance of values at P=0.05 and 0.01, respectively				NS=Non-significant	

**Table 5 : Average lignin content in different soya by products**

Sr. No.	Lignin (g/100g)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	0.95 $\pm$ 0.07	0.86 $\pm$ 0.04	0.58 $\pm$ 0.04	a vs b (0.06)NS b vs c (0.09)NS c vs a (0.31)NS
2.	Final product	0.31 $\pm$ 0.02	0.29 $\pm$ 0.02	0.38 $\pm$ 0.03	a vs b (0.05) NS b vs c (0.07) NS c vs a (0.10) NS
'Z' Value		(3.51)**	(3.45)**	(2.66)*	
* and ** indicate significance of values at P=0.05 and 0.01, respectively				NS=Non-significant	

The data regarding average cellulose content in different soya by products were presented in Table 6. The cellulose content in raw ingredients of *Soyaladoo*, soyachakali and soyaflakes chiwada were 1.08g, 1.10g and 0.90g, respectively. Non-significant reduction were noticed in the content of cellulose in raw ingredients of all soya by products. The cellulose content was lowered in all final soya byproducts.

The data shown in Table 7 expressed that, the acid detergent fibre in the raw ingredients of *Soyaladoo* was more (2.03g). But it was reduced significantly after the processing and making it into final product as *Soyaladoo*

(1.31 g). Similarly, this acid detergent fibre in raw material of soyachakali was 1.96 g it reduced to 1.08g in the final product. Significant loss of acid detergent fibre might be due to heavy processing application in the preparation of *Soyaladoo* and soyachakali. Whereas there was no significant difference found in acid detergent fibre in raw material (1.48 g) and final product as soyaflakes chiwada (1.22g).

The data present in Table 8 give an idea that, there was no remarkable content of lignin in the raw ingredients of all the soya by products. *Soyaladoo* content 0.95 g lignin. The lignin decreased in *Soyaladoo* (0.31g). Raw

**Table 6 : Average cellulose content in different soya by products**

Sr. No.	Cellulose (g/100g)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	1.08 $\pm$	1.10 $\pm$	0.90 $\pm$	a vs b (1.39)NS b vs c (1.22)NS c vs a (0.95)NS
2.	Final product	1.00 $\pm$	0.79 $\pm$	0.84 $\pm$	a vs b (1.98) * b vs c (0.06) NS c vs a (0.43) NS
	'Z' Value	(3.51)**	(3.45)**	(2.66)*	

\* and \*\* indicate significance of values at P=0.05 and 0.01, respectively  
NS=Non-significant

**Table 7 : Average acid detergent fibre content in different soya by products**

Sr. No.	Acid detergent fibre (g/100g)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	2.03 $\pm$ 1.60	1.96 $\pm$ 0.85	1.48 $\pm$ 0.51	a vs b (0.75)NS b vs c (0.81)NS c vs a (2.68)*
2.	Final product	1.31 $\pm$ 0.91	1.08 $\pm$ 0.60	1.22 $\pm$ 0.44	a vs b (2.19)* b vs c (2.02)* c vs a (0.81) NS
	'Z' Value	(2.92)*	(2.11)*	(0.96)NS	

\* and \*\* indicate significance of values at P=0.05 and 0.01, respectively  
NS=Non-significant

**Table 8 : Average lignin content in different soya by products**

Sr. No.	Lignin (g/100g)	Soya by products			't' Test
		<i>Soyaladoo</i> Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	0.95 $\pm$ 0.07	0.86 $\pm$ 0.04	0.58 $\pm$ 0.04	a vs b (0.06)NS b vs c (0.09)NS c vs a (0.31)NS
2.	Final product	0.31 $\pm$ 0.02	0.29 $\pm$ 0.02	0.38 $\pm$ 0.03	a vs b (0.05) NS b vs c (0.07) NS c vs a (0.10) NS
	'Z' Value	(3.51)**	(3.45)**	(2.66)*	

\* and \*\* indicate significance of values at P=0.05 and 0.01, respectively  
NS=Non-significant

**Table 9 : Average cellulose content in different soya by products**

Sr. No.	Cellulose (g/ 100g)	Soya by products			't' Test
		Soyaladoo Mean $\pm$ SD (a)	Soyachakali Mean $\pm$ SD (b)	Soyaflakes chiwada Mean $\pm$ SD (c)	
1.	Raw ingredients	1.08 $\pm$	1.10 $\pm$	0.90 $\pm$	a vs b (1.39)NS b vs c (1.22)NS c vs a (0.95)NS
2.	Final product	1.00 $\pm$	0.79 $\pm$	0.84 $\pm$	a vs b (1.98) * b vs c (0.06) NS c vs a (0.43) NS
	'Z' Value	(3.51)**	(3.45)**	(2.66)*	

\* and \*\* indicate significance of values at P=0.05 and 0.01, respectively

NS=Non-significant

ingredients of soyachakali content 0.86 g lignin it reduced to 0.29 g in final soyachakali. The legnin level was decreased significantly in syaladoo and soyachakali. The decreasing level of lignin content in final *Soyaladoo* and soya chakali observed highly significant. Significantly decreased in lignin content of soyaflakes chiwada observed.

The data regarding cellulose content in different soya by products were presented in Table 9. It shown that, cellulose content in raw ingredients of *Soyaladoo*, soyachakali and soyaflakes chiwada were as 1.08g, 1.10g and 0.90g, respectively. Non-significant difference was noticed in the content of cellulose in raw ingredients of all soya by products. The values cellulose content was lowered in all final products preparation.

### Conclusion :

Phytate phosphorus significantly reduced in soyaflakes chiwada. Most significant reduction in trypsin inhibitor activity was observed in soyachakali, it might be due to use of deep frying method. Among these products soyachakali was found very less tannin content due to deep frying method tannin might be reduced in soyachakali. Significant loss of acid detergent fibre might be due to heavy processing application in the preparation of final product as *Soyaladoo* and soyachakali. lignin content in final *Soyaladoo* and soya chakali observed as highly significant reduction.

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