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COMMON NUTS SUBSTITUTE PREPARED FROM SOYBEANS. 2. SOY NUT IN POPULAR ORIENTAL SWEETS

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Abstract

The most famous oriental sweets (halwa baladi) exemply fied by Hommoseia kors , (chickpea) , semsimea kors (sesame), folea Kors peanut) and alaf pieces (sesame in kors and peanut in filler) prepared with 0% , 50% and 100% soy nut (difference of 100 was the common nut considered) were processed and analyzed for nutritional value and organoleptic properties. The decrease of energy value was negligible due to incorporation of soy nut . The nutritional value was highest for 100% soy nut sweets (soyea kors and 100% soy nut filler alaf) with regard to (EAA), level of amino acid score (A.S.) grams consumed to meet protein and EAA daily reuqirement of man or child (G.D.R.), and percent satisfaction of protein and EAA daily requirements for man when consuming 150 gm of the product (P.S. /150) , EAAI, B.V. and PER). This was also true when partial substitution with 50% soy nut was practiced compared to the control sample (100% common nut). Organoleptic properties were not affected when 50% soy nut was replaced with an equal amount of common nut. Saya Kors (100% soy nut) was recommended for Commercial production as a new baladi sweet of desirable organoleptic characteristics and improved nutritional value.

INTRODUCTION

Nuts substitues are now Produced in foreign countries to face the continuous increase in price of common nuts price (Gonzalez, 1972; Rosenbaum, 1980). Of

course common nuts are rich in flavour and contain varible amounts of protein , fat, minerals and carbohydrates. However, the protein is deficient in 2-6 of the essentail amino acids (Paul and Southgate 1978; FAO; 1982; Pennington and Church, 1983). On the other hand soybeans are rich in protein which is low only in suphur amino acids (FAO , 1982; Nabila Y. El-Sanafiry, 1983). This work was conducted to study the effect of soy nuts on the nutritional value of the popalar oriental sweets.

MATERIALS AND METHODS

Processing

Soy nuts were prepared from soybean seeds by softening and roasting as described by Refaat (1988). Halwa baladi or oriental sweets of the present study were the disks (kors) of hommoseia (Chickpea), semsimea (sesame) , folea (peanut) and alaf (peanut -sesame disk sweet). These sweets were prepared by the common method applied commerically in a halwa baladi plant in Cairo. Ingradients for each processing lot were : 10kg sugar, 8kg glucoses syrup, 4.5 kg water and 10 kg of certain common roasted nut. Soy nut was used to replace the common nuts partially at the level of 50% or totally 100% to give soyea kors.

Analytical methods

Moisture , protein (N x 6.25, Kjeldahl method), fat (hexane solvent , Soxhlet apparatus) and ash were determined using the methods describved in the A.O.A.C. (1980). The curde fibers were determined using the method given by Pearson (1971) . Carbohyrates were calculated by difference. The energy value was caluclated by multiplying protein and carbohydrates by 4.0 and fat by 9.0.

Amino acids composition was determined aftrer HCL hydrolysis , using paper chrmoatography method as described by Block (1958) . Tryptophan was determined colorimetrically after alksaline hydrolysis using 14% barium hydroxide solution according to the method obscribed by Blauth *et al.* (1963).

Grams consumed of food articles (on wet weight baisi) to cover the daily requirements (G.D.R.) of humans were calculated using the energy daily needs as given by N.R.C. (1980): children 1 - 3 years 1300 Kcal, Children 4-6 years 1700 Kcal, children 7 - 10 years 2400 Kcal, male 11-14 years , and adult males 23 - 50 years

2700 Kcal , female 11 - 14 years 2200 Kcal and adult femal 23 - 50 years 2000 Kcal . Percent satisfaction of protein daily needs of human upon consumption of 150g of food products (P.S. /150) was calculated . Similary , G. D. R. values for protein wre calculated using the daily requirements in gram as given by the N.R.C. (1980) : Children 1-3 yeras 23, children 4-6 years 30 Children 7-10 years 34, male 11-14 yares 45, males 23-50 years 56, female 11 - 14 years 46 and females 23 - 50 years 44 . P.S. / 150 values for Protein were also calculated.

Amino acid scores (A.S.) wre calculated using the reference protein given by FAO/ WHO (1973) through dividing the concentration of tested protein in essential amino acid by its corresponding concentration of the FAO Pattern. values (gm/ 16gmN) for reference protein are : isoleucine 4.0 , leucine 7.0, lysine 5.5 , threonine 4.0 , tryptophan 1.0, valine 5.0, methionine + cystine 3.5 and phenylalaninie + tyrosine 6.0 . A.S. value less than 1.0 indicates deficienvy in considered essential amino acid (EAA). The EAA which showed the highest deficiency was called first limiting amino acid (L.A.)

Essential amino acid index (E.A.A.I.) and biological value (B.V.) were determined according to the method described by Oser (1959) using the values of EAA (g/16 g N) samples for isoleucine, leucine, lysine, threonine , tryptophan , valine, methionine + cystine and phenylalanine + tyrosine. Protein efficiency ratio (PER) of the tested food was calculated based on the amino acid concentration (g/16 g N) according to the following equations given by Alsmeyer *et a l.* (1974).

PER1 = -0.684 + 0.456 (Leucine) -0.047 (Proline).

PER2 = -0.468 + 0.454 (Leucine) -0.105 (Tyrosine).

PER3 = $\frac{-1.816 + 0.435 \text{ (Methionine)} + 0.78 \text{ (Leucine)}.}{+ 0.211 \text{ (Histidine)} - 0.944 \text{ (Tyrosine)}.}$

G.D.R. values for individual EAA were calculated using the daily requirements given by N. R. C. (1973) in grams which were for children 10-12 years, adult male 23-50 years and adult femal 23-50 years as follows respectively: isoleucine 1.26 , 0.84., 0.66, Leucine 1.89, 1.12, 0.88; lysine 1.98, 0.84, 0.66; threonine 1.26 , 0.56 , 0.44; tryptophan 0.18, 0.21, 0.165, valine 1.125, 0.980, 0.77, methionine + cystine (sulphur amino acids) 0.99, 0, 70, 0.55 and phenylalanine + tyrosine (aromatic amino acids) 0.99, 1.12, 0.88. The highest G.D.R. value amongest indivdual EAA indicates restricting amino acid (R.A.). When the aformentioned values are consumed , the daily needs of humans in all EAA including the R.A. will be simply

covered P.S./150 for R.A. was also calculated .

Organoleptic evaluation for taste, aroma, colour consistency (texture) and overall acceptaoility was carried out by 10 Panelists according to Molander (1980) using & scale from (1to 10) in which : very good 8-9, good 6-7, fair 4-5, poor 2-3 and very poor 0-1. Results were analyzed statistically according to Sendecor and Cochram (1971).

RESULTS AND DISCUSSION

It should be noted that alaf which is not a disk shaped (as halwa kors), but is a piece of sweet (with sesame) filled with peanut was included in this group , because the sugar base has the same composition as the white disk.

1 - Gross chemical coposition

From the results in Table 1, incorporation of soy nuts, Partially or totally , raised the protein content. In general the comosition of different common nuts and soy nut affected also the level of other nutrients in sweets (fat, ash, fibers, carbohydrates and energy value). As shown in Table2, incorporation of soy nut particularly at 100% levles decreased markedly the G.D.R. values for protein , while P.S./ 150 value increased . In this connection, soya beens had be the best score for protein . For example, if children of 7-10 years old, received 150g of hommoseia kors, 31.37% of their daily needs in protein will be met , in contrast to 45.62% for soyea kors. On the other hand the decrease in energy might be negligible, for the same previous exmple P. S. /150 values for energy were 28.80, 24.45 and 26.62%, respectively.

2 - Amino acids composition

Data presented in tables 3 show that the amino acid composition of traditional halwa kors differed according to the kind of roasted nut used uring Processing as such nuts are the only source of protein in theses sweets. When compared to the FAO Pattern and A. S. were determined, all these oriental sweets showed deficiency in one or more of the essential amino acids (EAA). Hommoseia kors was low in three EAA (leucine, valine, methionine+cystine), semsimeia kors was low in 2 EEA (iso-

Table 1. Chemical composition of halwa kors

Samples			Moisture %	Protein %	Fat %	Ash %	Fiber %	Carbohydrate %	Energy value Cal./100gm
Soy kors	100% soy nut	WWB	6.51	13.57	6.11	1.63	1.70	70.48	391.19
		MFB	93.49	14.52	6.54	1.74	1.82	75.38	418.46
Hommosea Kors	100% chickpea	WWB	7.07	7.11	1.75	1.45	2.50	80.12	366.83
		MFB	92.93	6.5	1.88	1.56	2.69	86.22	392.40
	50% chickpea 50% soy nut	WWB	6.80	10.34	3.93	1.54	2.11	75.28	377.85
		MFB	93.2	11.06	4.22	1.65	2.26	80.78	405.46
Semsimea Kors	100% seasame	WWB	6.18	8.55	19.49	1.22	1.76	62.80	460.81
		MFB	93.82	9.11	20.77	1.30	1.88	66.94	491.13
	50% sesame + 50% soy nut	WWB	6.36	11.06	12.79	1.41	1.74	66.64	425.91
		MFB	93.64	11.81	13.66	1.51	1.86	71.16	454.82
Folea Kors	100% peanut	WWB	6.00	9.11	16.67	0.93	0.74	66.55	452.67
		MFB	94.00	9.69	17.73	0.99	0.79	70.80	481.53
	50% peanut + 50% soy nut	WWB	6.40	11.33	12.15	1.27	1.22	68.41	521.29
		MFB	93.60	12.11	19.68	1.36	1.30	73.08	450.11
Alaf	100% peanut filler	WWB	5.24	8.64	20.77	1.23	1.78	63.43	465.40
		MFB	94.79	9.12	8.25	1.30	1.88	66.93	491.13
	100% peanut filler	WWB	6.67	12.72	8.84	1.56	1.71	69.09	401.49
		MFB	93.33	13.63	13.93	1.67	1.83	74.03	430.20
	50% peanut filler +50% soy nut filler	WWB	6.02	10.64	14.82	1.40	1.74	66.23	433.01
		MFB	93.98	11.36		1.49	1.85	70.48	460.70

WWB : wet weight basis
* E; Gendi (1981).

MFB : Moisture free basis

Table 2. Evaluation of energy value and protein of halwa kors.

Samples		Factors	Energy						Protein						
		Sex	Child			Male	Female		Child			Male		Female	
		Age *Years)	1-3	6-4	7-10	11-14 & 23 - 50	11-14	23 - 50	1-3	6-4	7-10	11-14	23-50	11-14	23-50
		Daily needs	1300 Cal.	1700 Cal.	2400 Cal.	2700 Cal.	2200 Cal.	2000 Cal.	23 Cal.	30 Cal.	34 Cal.	45 Cal.	56 Cal.	46 Cal.	44 Cal.
Soy kors	100% soy nut	G.D.R.	332	34.52	614	590	562	511	170	221	251	332	413	339	324
		P.S./150	45.14	46.3	24.45	736	26.67	29.34	88.050	67.85	59.87	45.23	36.35	44.25	46.6
Hommosea Kors	100% chickpea	G.D.R.	354	32.37	654	20.38	600	545	324	422	478	633	788	647	619
		P.S. / 150	42.33	450	22.93	715	25.01	27.15	46.37	35.55	31.37	23.70	19.50	23.19	24.24
	50% chickpea + 50% soy nut	G.D.R.	344	33.34	635	20.99	582	559	222	290	329	435	542	445\	426
		P.S. / 150	43.60	369	23.62	586	25.76	28.34	67.44	51.70	45.62	34.47	27.70	33.71	35.25
Semsimea Kors	100% seasame	G.D.R.	282	40.66	521	25.60	4.77	434	269	351	398	526	655	538	515
		P.S. / 150	53.17	399	28.80	634	31.42	34.56	55.76	47.75	37.72	28.50	22.90	27.88	29.15
	50% sesame + 50% soy nut	G.D.R.	305	37.58	564	23.66	517	470	208	271	307	407	506	416	398
		P.S. / 150	49.14	376	26.62	567	29.04	31.94	72.13	55.30	48.79	36.87	29.63	36.07	37.7
Folea Kors	100% peanut	G.D.R.	287	39.94	530	25.15	486	442	253	329	373	494	615	505	48.3
		P.S. / 150	52.23	404	28.29	641	30.86	33.92	59.41	45.55	40.19	30.37	24.40	29.70	31.06
	50% peanut + 50% soy nut	G.D.R.	309	37.17	750	23.41	522	475	203	265	300	37.77	494	36.95	388
		P.S. / 150	48.61	365	27.33	580	30.69	31.69	73.89	26.65	49.99	521	30.35	532	38.63
Alaf	100% peanut filler	G.D.R.	279	41.07	516	25.86	473	430	266	347	394	28.80	648	28.17	506
		P.S. / 150	53.7	423	29.09	673	31.73	34.91	56.35	43.20	38.12	354	23.14	362	29.46
	100% peanut filler	G.D.R.	324	35.43	598	22.31	548	498	181	236	267	42.40	440	41.48	43.36
		P.S. / 150	46.33	38.21	25.09	624	27.37	30.11	82.96	36.60	56.12	421	34.07	431	412
	50% peanut filler +50% soy nut filler	G.D.R.	300		554	24.06	508	462	215	281	318	35.60	524	34.8.	36.41
		P.S. / 150	49.96		77.07		29.52	32.48	69.65	53.40	47.12		28.61		

Table 3. Amino acid composition of halwa kors protein (gm/16 gm N).

	soyea kors		Hommosea kors				Semsimea kors				Folea kors				Alaf					
	Soy nut 100%		Peanut 100%		Peanut 50% + Soy nut 50%		Seasome100%		Sesame 50% + Soy nut 50%		Almond100%		Almond 50% + Soy nut 50%		Peanut filler 100%		Soy nut filler 100%		Sesame 50% + Soy nut 50%	
	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S
Agrinine	8.65		9.70		9.03		12.37		10.08		10.79		9.50		11.01		0.10		0.85	
Histudine	2.49		2.38		2.45		2.57		2.53		2.30		2.40		2.35		2.49		2.46	
Ioleucine	4.88	1.22	4.56	1.14	4.76	1.19	3.79	0.95	4.47	1.12	3.90	0.98	4.47	1.21	3.896	0.97	4.78	1.20	4.42	1.11
Leucine	7.81	1.12	6.72	0.96	7.43	1.06	7.49	1.07	7.66	1.09	6.84	0.98	7.44	1.06	97	0.996	7.74	1.11	7.42	1.06
Lysine	6.67	1.12	6.66	1.12	6.68	1.22	3.12	0.57	5.30	0.96	3.72	0.68	5.50	1.00	3.65	0.66	6.28	1.14	5.26	0.96
Methionine	1.54		1.22		1.43		3.10		2.14		0.99		1.33		1.33		1.72		1.55	
Phenylalanine	5.19		6.53		5.64		4.53		4.92		5.64		5.36		5.49		5.13		5.26	
Threonine	4.18	1.05	4.70	1.18	4.35	1.09	4.12	1.03	4.17	1.04	3.14	0.79	3.77	0.94	3.31	0.83	4.17	1.04	3.85	0.96
Tryptophan	1.31	1.31	1.23	1.23	1.25	1.25	1.73	1.73	1.06	1.46	1.01	1.01	1.20	1.20	1.13	1.13	5.43	1.33	1.42	1.24
Valine	5.53	1.11	4.84	0.97	5.29	1.06	5.00	1.00	5.32	1.06	4.75	0.95	5.22	1.04	4.79	0.96	2.62	1.09	5.17	1.00
Tryosine	2.46		3.28		2.72		3.73		2.95		4.32		3.20		4.24		1.71		3.27	
Cystine	1.67		1.64		1.97		1.91		1.76		1.21		1.49		1.32		3.81		1.54	
Protine	3.81		4.25		3.96		3.82		3.83		4.42		4.05		4.33		22.83		4.02	
Alanine+gutamic	22.63		21.13		22.13		24.45		23.32		24.86		23.53		24.81		16.13		23.61	
Clycine+asoartic	16.42		15.90		16.24		13.62		15.38		17.4		16.84		16.82		5.13		16.42	
serine	5.17		5.27		5.22		4.79		5.03		4.79		5.02		4.79		3.43		5.00	
Methionine+Cystine	3.21	0.92	2.86	0.82	3.10	0.89	5.01	1.43	7.87	1.11	2.20	0.63	2.82	0.81	2.65	0.76	7.75	0.98	3.09	0.88
Phenfalamine+tyrosine	7.65	1.28	9.81	1.64	8.39	1.40	8.26	1.38		1.31	9.96	1.66	8.56	1.43	9.73	1.62		1.29	8.53	1.42
E.A.A.I.	78.98		77.36		78.31		75.38		78.52		63.32		73.32		66.14		78.82		73.99	
B.V.	74.36		72.59		73.63		70.43		73.86		68.19		68.19		60.36		74.18		68.92	
PER_1	2.6983		2.1806		2.5180		2.5519		2.6290		2.2273		2.5183		2.2908		2.6664		2.5106	
PER_2	2.8194		2.2385		2.6165		2.5408		2.6999		2.1838		2.5738		2.2512		2.7709		2.5573	
PER_3	3.1489		1.3622		2.5224		2.3959		2.8387		0.3571		2.0514		0.6924		3.0215		2.078	

E.A.A.I. : Essemtial Amino Acid Index.
B.V. : Brological Value %
PER : Protein Efficiency Ratio.
A.S. : Amino Acid Score.

leucine, lysine) and folea was low in 6 acids (isoleucine, leucine, lysine, threonine, valine, methionine + cystine) The limiting amino acid (L.A.) which showed the lowest A. S. for hommoseia and foleia kors was methionine + cystine) A.S. = 0.82 and 0.63, respectively), while for semsimeia kors and alaf it was lysine (A. S. 0.75 and 0.66). For soya L. A. was methionine + cystine, but the deficiency was not observed (A. S. =0.92). Incroporation of soy nut (at the tevel of 50%) favoured the quality of protein in sweets due to the decrease in the number of deficient EAA, while it raised the A.S. of deficient EAA. Such improvement of quality was confirmed by the increase of EAAI, B. V. and PER (Table 3), as well as the decrease of G. D. R., P. S. /150 for R. A. (Table 5) due to the increase of EAA concentration in food (Table 4) . The resutls of Tables 3 and 5 show that R. A. and L. A. might be different. Moreover, R. A. was sometimes affected by sex and age. When consuming the amount of sweets needed to cover the protein daily requirements for humans , the EAA daily requirements will be met as well.

3- Organloptic evaluation

The resutls in Table 6 show that although soy nut had actually a special flovour , it was desirable and soy nut sweets were accepted by panelists . In as much as 8 and 9 scores, both mean "very good" No differences were indicated in rating samples of hommosea kors propared with 100% chickpea and 50% chikpea + 50% soy nut. The same applies to the other sweets. Soyea kors (100% soy nut could be recommended for production at a commercial scale as a new product of markedly high nutritional value and less expensisve than the treaditional products. This also extends to 50% common nut + 50% soyn nut sweets.

Table 4. Amino acid composition of halwa kors (gm/100 gm sample).

Amino Acids	Soyea Kors	Hommosea Kors		Semsimea Kors		Folea Kors		Alaf		
	100% soy nut	100% Chickepea	50% Chickpea + 50% Soy nut	100% Sesame	50% Chickpea + 50% Soy nut	100% Peanut	50% Chickpea + 50% Soy nut	100% Peanut filler	100% Soynut filler	50% Peanut filler+ 50% Soy nut filler
Agrinine	1.17	0.69	0.93	1.06	1.12	0.98	1.08	0.95	1.16	1.05
Histudine	0.34	0.17	0.25	0.22	0.28	0.21	0.27	0.20	0.32	0.26
Ioleucine	0.66	0.32	0.49	0.32	0.49	0.36	0.51	0.34	0.61	0.47
Leucine	1.06	0.48	0.77	0.64	0.85	0.62	0.83	0.60	0.99	0.79
Lysine	0.91	0.47	0.69	0.27	0.59	0.34	0.62	0.32	0.80	0.17
Methionine	0.21	0.09	0.15	0.27	0.24	0.09	0.15	0.12	0.22	0.56
Phenylalanine	0.70	0.46	0.58	0.39	0.54	0.51	0.61	0.47	0.65	0.41
Threonine	0.57	0.33	0.45	0.35	0.46	0.29	0.43	0.29	0.35	0.13
Tryptophan	0.18	0.09	0.13	0.15	0.16	0.09	0.14	0.10	0.17	0.55
Valine	0.75	0.34	0.55	0.43	0.59	0.43	0.59	0.41	0.69	0.35
Tryosine	0.33	0.23	0.28	0.32	0.33	0.39	0.36	0.37	0.33	0.17
Cystine	0.23	0.12	0.17	0.16	0.20	0.11	0.17	0.11	0.22	0.43
Protine	0.52	0.30	0.41	0.33	0.42	0.40	0.46	0.37	0.49	0.25
Alanine+gutamic	3.07	1.50	2.29	2.09	2.58	2.27	2.67	1.45	2.90	23
Clycine+asoartic	2.29	1.13	1.68	1.17	1.70	1.59	1.91	0.41	2.05	1.72
serine	0.70	0.38	0.54	0.41	0.56	0.44	0.57	0.23	0.44	0.53
Methionine+Cystine	0.44	0.21	0.32	0.43	0.44	0.20	0.32	0.84	0.98	0.34
Phenfalamine+tyrosine	1.03	0.69	0.86	0.71	0.87	0.90	0.97			0.91

Table 5. Evaluationof amino acid composition of high protein oriental sweets.

Amino Acids	Soyea Kors			Hommosea Kors						Semsimea Kors					
	Soy nut 100%			Peanut 100%			Peanut 50% Soy nut 50%			Sesame 100%			Sesame 50% Soy nut 50%		
	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman
Isoleucine	191	127	100	394	263	206	257	171	135	394	263	206	257	171	135
Leucine	178	166	83	394	233	183	246	146	114	295	175	138	222	132	104
Lysine	218	92	73	421	179	140	287	122	96	773	311	244	336	142	112
Threonine	221	89	77	382	170	133	217	124	98	360	160	126	274	122	96
Tryptophan	100	117	92	200	233	183	139	162	127	120	140	110	113	131	103
Valine	150	131	103	331	288	227	205	178	140	262	228	179	191	166	131
Methionine+Cystine	225	159	125	471	333	262	209	219	172	230	163	128	225	159	125
phenvlalanine+Tyrosine	96	109	85	144	162	128	115	130	102	139	158	124	114	129	101
Restricung amino Acid (R.A.)	Methionine + Cystine			Methionine + Cystine			Methionine + Cystine			Lysina			Lysina	Isoleucin e	Isoleucin e
G.D.R. for R.A.	225	159	125	471	333	262	309	219	172	773	311	244	336	171	135
G.D.R. for Protein	332	413	324	633	788	619	435	542	426	26	655	515	407	506	398
P.S./150 based on R.A.	66.67	94.29	120.00	31.82	45.00	27.27	48.49	68.57	87.27	20.46	48.21	61.36	44.70	94.29	120.00
P.S./150 based on protein.	45.23	36.35	46.26	23.70	19.05	24.24	34.47	27.70	35.25	28.50	22.90	29.15	36.87	29.63	37.71
First Lmiting amino Acid (L.A., based on A.S.).	Methionine + Cystine			Methionine + Cystine			Methionine + Cystine			Lysina			Lysina		

Child : 11-14 years.
Man : 23 -50 years.
Woman : 23 -50 years.

Count . Table 5.

Amino Acids	Alaf Kors						Alaf								
	Soy nut 100%			50% Peanut + 50% soy nut			100% Peanut filler			100% soy nut filler			Peanut filler 50% Soy nut filler50%		
	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman
Isoleucine	350	233	183	247	165	129	371	247	194	207	138	108	268	179	140
Leucine	305	181	142	225	133	105	315	187	147	191	113	89	239	142	111
Lysine	582	247	194	319	136	107	619	263	206	248	105	83	354	150	118
Threonine	432	193	152	293	130	102	435	193	152	238	106	83	307	137	107
Tryptophan	200	233	183	129	150	118	180	210	165	106	124	97	139	162	127
Valine	262	228	179	191	166	131	274	239	188	163	142	112	205	178	140
Methionine+Cystine	495	350	275	309	219	172	430	304	239	225	159	125	291	206	162
phenvlalanine+Tyrosine	110	124	98	102	116	91	118	133	105	101	114	90	109	123	97
Restricung amino Acid (R.A.)	Lysina	Methionine + Cystine	Methionine + Cystine	Methionine + Cystine			Methionine + Cystine			Methionine + Cystine			Methionine + Cystine		
G.D.R. for R.A.	582	350	275	319	219	172	619	304	239	249	159	125	354	206	162
G.D.R. for Protein	494	615	483	397	494	388	473	648	509	548	440	346	508	524	412
P.S./150 based on R.A.	25.76	42.86	54.55	46.97	68.57	87.27	24.24	49.29	62.73	60.61	94.29	20.00	42.42	72.86	92.73
P.S./150 based on protein.	30.37	24.40	31.06	37.77	30.35	38.63	31.73	23.14	29.46	27.37	34.07	43.36	29.52	25.61	36.41
First Lmiting amino Acid (L.A., based on A.S.).	Methionine + Cystine			Methionine + Cystine			Lysina			Methionine + Cystine			Methionine + Cystine		

Child : 11-14 years.
Man : 23 -50 years.

Table 6. Organoleptic evaluation of halwa kors (average scors).

Treatment / Factor	Folea		
	Chickpea 100%	50% chickpea + 50% soy nut	100% soy nut (soyea kors)
Aroma	9a	8a	9a
Taste	8a	8a	9b
Texture	8a	9a	9a
Colour	9a	8a	8a
Overall acceptability	9a	8a	9a
	Semsimea kors		
	sesame 100%	50% seame + 50% soy nut	100% soy nut (soyea kors)
Aroma	8a	9a	9a
Taste	8a	9a	9b
Texture	8a	9a	9a
Colour	9a	8b	9a
Overall acceptability	8a	9a	9a
	Folea kors		
	peanut 100%	50% Peanut + 50% soy nut	100% soy nut (soyea kors)
Aroma	9a	9a	9a
Taste	8b	9a	9a
Texture	8a	8a	9a
Colour	9a	9a	9a
Overall acceptability	8a	9a	9a
	Alaf		
	peanut 100% filler	50% Peanut + 50% soy nut	100% soy nut filler
Aroma	9a	9a	9a
Taste	7a	9ab	8b
Texture	8a	9b	8a
Colour	8a	9b	8a
Overall acceptability	8a	9b	8a

Figures given similar letters indicate no significant difference.

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إستخدام فول الصويا بديل للمكسرات الشائعة
٢-مكسرات الصويا فى بعض الحلوى الشرقية الشهيرة

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أأنواع الحلوى الشرقية أو الحلوى البلدى الأكثر إنتشاراً وهى حمصية قرص ، سمسمية قرص، فولية قرص وقطع العلف (السمسم فى القرص والفول السودانى فى الحشو) تم تجهيزها بإستخدام صفر ، ٥٠ ، ١٠٠٪ فول صويا (المتبقى من المائة هو المكسرات الطبيعية حسب المنتج) وتم تصنيعها وتحليلها بالنسبة للقيمة الغذائية والخواص الحسية ، وقد اتضح أن الإنخفاض فى الطاقة كان طفيفاً ويمكن إهماله عند إستخدام مكسرات الصويا فى الحلوى . وأقصى قيمة غذائية لوحظت كانت فى الحلوى قرص المجهز مع ١٠٠٪ مكسرات الصويا (صوبية) بالنسبة لمحتوى البروتين ، عدد الأحماض الأمينية الأساسية الناقصة ، درجة الحامض الأمينى الأساسى ( )، عدد الجرامات التى يلزم تناولها من المنتج لسد الإحتياج اليومى للرجل أوالمرأة أو الطفل من البروتين أو الحامض الأمينى الأساسى عند تناول ١٥٠جم من المنتج ، دليل أوسر الأحماض الأميبية االأساسية ، القيمة البيولوجية للبروتين ونسبة كفاءة البروتين ( )،وقد كان هذا أيضا صحيحاً فى حالة الحلوى المجهزة مع ٥٠٪ مكسرات صويا بالمقارنة بالعينة الكنترول عند أستبدال ٥٠٪ من المكسرات الصويا . كما أن الصوبية قرص (١٠٠٪ مكسرات صويا)ينصح بإنتاجها على نطاق تجارى كمنتج حلوى بلدية جديدة ذو خواص حسية مرغوبة وقيمة غذائية متطورة .