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COMMON NUTS SUBSTITUTE PREPARED OF SOYBEANS: 4 - SOY NUTS IN SOME BALADI SWEETS-MALBAN, DOMEA, ASALEA AND AGWA BEL -SUDANI.

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Abstract

Some oriental sweets such as malban (Turkish delight with walnut), domea (dried Turkish delight with peanut), asalea (cane syrup sweet with peanut centre) and agwa bel-sudani (date with peanut) were prepared and analyzed. Samples with replacement of 50% or 100% of common nuts with soy nut were also analyzed. Control samples of all sweets were low in protein content (3.36 - 7.33%). At 50% and 100% soy nut level, the protein content was raised to 6.11 - 9.01 and 8.88 - 10.64%, respectively. The protein of malban control sample was low in 4 essential amino acids (EAA), while that of domea, asalea and agwa bel-sudani was low in 6 EAA. Replacement of common nuts with soy nut decreased the number of deficient EAA and raised the nutritional and biological values of such sweets. It should be noted that agwa bel- sudani was not deficient in aromatic EAA because peanut protein is rich in phenylalanine+tyrosine . Organoleptic evaluation proved that 50% and 100% soy nut sweets were acceptable by panelists. It is suggested, therefore, to produce 100% soy nut sweets as cheap products of higher nutritional value.

INTRODUCTION

Malban (Turkish delight),domea (dried Turkish delight), asalea (cane syrup "molasses" sweet) and agwa bel-sudani (date paste with peanut) are some of the popular baladi sweets in Egypt produced with nuts (Anon; 1978). In the west, orien-

tal confectionary attracted the interest of research workers who analyzed them in Germany (Anon, 1981) . When confection is made of fruit, the fruits should be a main ingredient and not a flavouring component only (Kellerman, 1983). Because children are fond of sweets, it is thought to improve their protein quality and to some extent their protein quantity. This was made by replacing the common nuts partially or completely with soy nut. Rakosky (1969) , Eigor *et al.* (1980) and Anon (1986) used soybeans and full-fat soy flour in preparation of various confections, fruit sweets and fruit nut masses.

MATERIALS AND METHODS

Processing

Malban (Turkish delight), domea (dried Turkish delight), asalea (cane syrup sweet with roasted peanut centres) were prepared in a baladi sweets plant using the common methods applied commercially. Ingredients used for each processed lot of malban or domea was : sugar 25kg , glucose syrup 12kg , water 65 kg, citric acid 25gm , starch 3kg, and walnut 15kg. The ingredients for asalea were : sugar 10kg , glucose syrup 10kg , water 6kg , molasses 10kg, and roasted peanut 10kg . Mechanical drying for malban pieces was done to obtain domea. To prepare agwa bel - sudani, minced date (agwa) (80.95%) was mixed with minced roasted peanut (19.05%) . All sweets samples were prepared with replacement of 0, 50 and 100% of common nut with soy nut prepared according to Omnia G. Reffat (1983).

Analytical methods

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

Amino acid composition was determined after HCl hydrolysis using paper chromatography method as described by Block (1958) . Tryptophan was determined colorimetrically after alkaline hydrolysis using 14% barium hydroxide solution ac-

cording to the method of Blauth *et al.* (1963).

Grams consumed of food articles (on wet weight basis) to cover the daily requirements (G.D.R.) of humans were calculated using the daily energy needs as given by N.R.C. (1980) : Children 1-3 years 1300 Kcal, children 4- years 1700 Kcal, children 7-10 yrears 2400 Kcal, male 11-14 years and adult males 23-50 years 2700 Kcal, female 11-14 years 2200 Kcal and adult female 23 - 50 years 200 Kcal. Then per cent satisfaction of daily needs of humans in protein upon consumption of 150 gm of food products (P.S. /150) were calculated. Similary, G.D.R. values for protein were calculated using the daily requirements in grams as given by the N.R.C. (1980) : children 1-3 years 23, children 4-6 years 30, children 7-10 years 34, male 11-14 years 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.) were calculated, using the reference protein given by FAO/WHO (1973) through dividing the concentration of the tested protein in essential amino acid by its corresponding concentration of the FAO pattern. Values (gm/16 gm N) for reference protein are : isoleucine 4.0 , leucine 7.0, lysine 5.5, threonine 4.0 , tryptophan1.0, valine 5.0, methionine + cystine 3.5 and phenylalanine+tyrosine 6.0. A.S. value less than 1.0 indicates deficiency 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 indicated by Oser (1959) using the values of EAA (gm /16 gm N) found in samples for isoleucine , leucine , lysine, threonine, tryptophan, valine, methionine + cystine and pehnylalanine + tyrosine. Protein efficiency ratio (PER) of the tested food was calculated based on the amino acids concentration (gm/16 gm N) according to the following equations given by Alsmeyer *et al.* (1974).

$$PER_1 = -0.684 + 0.456 \text{ (Leucine)} - 0.047 \text{ (Proline)}.$$

$$PER_2 = -0.468 + 0.454 \text{ (Leucine)} - 0.105 \text{ (Tyrosine)}.$$

$$PER_3 = -1.816 + 0.435 \text{ (Methionine)} + 0.78 \text{ (Leucine)} + 0.211 \text{ (Histidine)} - 0.944 \text{ (Tyrosine)}.$$

G.D.R. values for individual EAA were calculated using the daily requirements given by N.R.C. (1973) in gm which were for children 10-12 years, adult man 23-

50 years and adult female 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 amongst invidual EAA indicates restricting amino acid (R.A.). When the mentioned value is 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 acceptability was carried out by the aid of 10 panelists according to Molander (1960) using the following Jndging scale : very good 8-9, good 6-7, fair 4-5, poor 2-3 and very poor 0-1. Results were analyzed statistically according to Snedecor and Cochran (1971).

RESULTS AND DISCUSSION

1 . Gross chemical composition

Malban, domea, asalea and agwa bel-sudani were prepared and analyzed. The first product was stuffed with walnut, while the other 3 sweets with peanut. Agwa bel sudani is a date-nut mass prepared with peanut which do not belong to sugar products, but it showed low protein content as malban, domea and asalea (Table 1). Control samples of the 4 sweets had 3.36 - 7.33% protein. Replacement of 50% common nuts with equal proportion of soy nut raised the protein from 3.36 to 6.11% (81.85% increase) for malban, from 6.51 to 8.09% (24.27% increose) for domea, from 7.33 to 9.01% (22.92% increase) for asalaea and from 7.33 to 8.50 % (15.96% increase) for agwa bel - sudani. Complete replacemet of common nut with soy nut raised protein contents to 8.88 , 9.64 , 10.64 and 9.68% , thus leading to 164.29, 48.08, 45.16 and 22.06% increase in protein content , respectively. Therefore G.D.R. values for protein decreased, while P.S./150 value increased markedly when soy nut replaced the common nut, particularly at 100% level of replacement . This had improved the nutritional value, (Table 2), however, changes in the nutritional value based on energy were also slight (Table1).

Table 1. Chemical composition of some oriental sweets.

Samples			Moisture %	Protein %	Fat %	Ash %	Fiber %	Carbohydrate %	Energy value Cal./100gm
Malban (Turkish Delight)	Walnut 100%	WWB	20.52	3.36	13.70	0.44	0.31	61.67	383.42
		MFB	79.48	4.23	17.24	0.55	0.39	77.59	482.44
	soy nut 100%	WWB	19.34	8.88	4.02	1.06	1.12	81.30	334.02
		MFB	80.66	11.01	4.99	1.31	1.39	63.61	414.15
	Walnut 50% + Soy nut 50%	WWB	19.62	6.11	8.88	0.76	0.72	79.43	358.80
		MFB	80.08	7.63	11.09	0.95	0.90	68.75	448.05
Domea (Dried Turkish Delight)	Peanut 100%	WWB	11.65	6.51	11.91	0.65	0.53	77.81	408.23
		MFB	88.53	4.37	13.48	0.74	0.60	71.13	4621.04
	Soy nut 100%	WWB	17.51	9.64	4.36	1.15	1.21	81.31	362.32
		MFB	87.49	11.02	4.98	1.31	1.38	69.94	414.14
	Peanut 50% + soyn nut 50%	WWB	12.10	8.09	8.11	0.91	0.85	79.56	385.11
		MFB	87.90	9.70	9.23	1.04	0.97	72.37	438.11
Asalea (Cane syrup Sweet)	Peanut 50%	WWB + MFB	4.79 95.21	7.33 7.70	13.11 13.77	1.82 1.91	0.58 0.61	76.01 74.14	436.79 458.77
	Soy nut 100%	WWB	6.86	10.64	4.71	2.34	1.31	79.60	381.51
		MFB	93.14	11.42	5.06	2.51	1.41	73.25	409.62
	Peanut 100% + Soy nut 50%	WWB	5.83	9.01	8.87	2.09	0.95	77.78	408.87
		MFB	94.17	9.57	9.42	2.22	1.01	63.54	467.54
Agwa Bel - Sudani (Date-Peanut Alass)	Peanut 100%	WWB	14.25	7.33	9.32	2..13	3.41	74.10	428.61
		MFB	85.75	8.55	10.89	2.48	3.97	65.10	33.47
	Soy nut 100%	WWB	14.81	9.68	3.67	2.50	3.91	65.43	391.43
		MFB	85.19	11.36	4.31	2.94	4.59	76.80	349.89
	Peanut 50% + soy nut 50%	WWB	14.67	8.50	6.49	2.31	3.66	64.37	410.05
		MFB	85.33	9.69	7.61	2.71	4.29	75.43	323.30
Date		WWB	17.70	3.00	0.5	2.00	3.70	76.70	392.89
		MFB	82.30	3.65	0.61	2.43	4.50	93.70	

WWB: Wet weight basis

MFB: Moisture free basis FAO (1982)

Table 2. Evaluation of energy value and protein of some oriental sweets.

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.
Malban (Turkish Delight)	Walnut 100%	G.D.R.	339	443	626	407	574	522	685	893	1012	1339	166	1369	1310
		P.S./150	44.24	33.83	23.96	21.30	26.14	28.76	21.91	16.80	14.82	11.20	9.00	1096	1146
	soy nut 100%	G.D.R.	389	503	719	808	659	599	259	338	383	507	631	518	496
		P.S. / 150	38.54	29.47	20.88	18.56	22.77	25.05	57.91	44.40	39.18	29.60	23.79	28.96	30.77
	Walnut 50% + Soy nut 50%	G.D.R.	362	474	669	753	613	557	376	491	557	737	917	753	720
		P.S. / 150	41.40	31.66	22.46	19.93	24.46	26.91	39.85	30.5	26.97	20.37	16.37	19.92	20.83
Domea (Dried Turkish Delight)	Peanut 100%	G.D.R.	319	416	588	661	539	490	353	461	552	691	860	707	676
		P.S. / 150	47.10	36.02	25.51	22.68	27.83	30.62	42.46	32.55	28.72	21.70	17.44	21.23	22.19
	Soy nut 100%	G.D.R.	359	469	662	743	607	552	239	311	2353	467	581	977	456
		P.S. / 150	41.81	31.97	22.65	20.13	24.70	27.17	62.87	48.20	42.53	32.13	25.82	31.44	32.86
	Peanut 50% + soyn nut 50%	G.D.R.	338	441	623	701	571	519	284	371	420	556	692	569	544
		P.S. / 150	44.44	33.98	24.07	21.40	26.26	28.8	52.76	40.45	35.09	26.97	2.64	26.38	27.58
Asalea (Cane syrup Sweet)	Peanut 50%	G.D.R.	298	389	550	618	480	458	314	406	464	614	764	628	600
		P.S. / 150	50.40	38.54	27.30	24.27	29.78	32.76	47.80	36.65	32.34	24.43	19.64	23.90	24.99
	Soy nut 100%	G.D.R.	44.02	446	629	708	577	524	216	282	320	423	526	432	414
		P.S. / 150	318	33.66	32.84	21.20	27.01	28.61	69.39	53.20	46.94	35.47	28.50	34.70	36.27
	Peanut 100% + Soy nut 50%	G.D.R.	47.18	416	587	660	538	489	255	333	377	500	622	511	488
		P.S. / 150	354	36.08	25.55	22.72	27.88	30.67	58.76	45.05	39.75	30.03	24.13	29.37	30.72
Agwa Bel - Sudani (Date-Peanut Mass)	Peanut 100%	G.D.R.	42.41	463	653	735	599	544	314	409	464	614	764	628	600
		P.S. / 150	390	32.43	22.97	20.42	25.06	27.57	47.80	36.65	32.34	24.43	16.63	23.90	24.99
	Soy nut 100%	G.D.R.	38.48	510	720	810	660	600	238	310	351	465	579	475	455
		P.S. / 150	372	29.42	20.84	18.53	22.74	25.01	63.13	48.40	42.71	32.27	52.93	31.57	33.00
	Peanut 50% + soy nut 50%	G.D.R.	40.27	48.6	686	772	629	577	271	353	400	529	659	541	518
		P.S. / 150	402	30.87	21.87	14.44	23.86	26.24	55.44	42.50	37.50	28.33	22.7	27.72	28.98
Date		G.D.R.	37.30	526	747	835	681	619	767	100	1133	1500	1867	1533	1467
		P.S / 150	28.35	28.53	20.21	17.97	22.014	24.25	19.5	15.00	13.24	10.00	8.04	9.78	10.23

2. Amino acids composition

From the results in Table 2, malban 100% walnut was deficient in 4 essential amino acids (EAA), but at 50% and 100% soy nut level , the deficiency was noticed for 1 EAA only; limiting EAA (L.A.) was not the same in all cases. Substitution of common nut with soy nut raised the amino acids score of deficient EAA. For domea and asalea prepared from 100% soy nut domea was deficient in only 2 and 1 EAA, respectively. According to FAO (1986), Proteins of dates and peanut are deficient in 7 and 6 EAA, respectively . Control samples of agwa bel - sudani were deficient in 6 EAA. Incorportation of soy nut at 50% level did not change the number of deficient EAA but raised the A.S. of them . At 100% soy nut level, the deficiency was found only for 2 EAA . Therefore replacement of common nut (Walnut or peanut) with soy nut has improved the nutritional and biological values of the products and their proteins. This was indicated also by the increase of EAAI, B.V., PER, P.S./150 for R.A., and the decrease of G.D.R. value for R.A. (Tables 3,4 and 5).

According to FAO (1982), dates protein was low in 6 EAA. This was also found in the present study for the control sample of agwa bel - sudani in addition to phenylalanine + tyrosine. But due to the high concentration of aromatic EAA in peanut, agwa bel - sudani was not deficient in phenylalanine + tyrosine (Table 3).

3. Organoleptic evaluation

The results of Table 6 indicated that both 50% and 100% soy nut sweets were acceptable by the panelists. Therefore, products with 100% soy nut could be suggested as a less expensive sweet with higher nutritional value than the control sample prepared with common nuts.

Table 3. Amino acid composition of some oriental sweets (gm/16 gm N).

	Malban (Turkish Delight)						Domea (Dried Turkish Delight)						Asalea (Can syrup sweet)						Agwa Bel-Sudani (Date - peanut mass						Date	
	Walnut 100%		Soy nut 100%		Walnut 50% + Soy nut 50%		Peanut 100%		Soy nut 50%		Peanut 50% + Soy nut 50%		Peanut 100%		Soy nut 100%		Peanut 50% + Soy nut 50%		Peanut100%		Soy nut 100%		Peanut 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	9/16 gN	A.S	9/16 gN	A.S	9/16 gN	A.S
Agrinine	11.62		8.67		10.11		10.69		8.68		9.49		10.70		8.71		9.50		8.37		7.452		7.83		3.60	
Histidine	2.09		2.48		2.29		2.30		2.48		2.41		2.33		2.48		2.43		2.08		27		2.19		1.58	
Isoleucine	4.20	1.05	4.87	1.22	4.5	1.10	3.92	0.98	4.91	1.23	4.51	1.13	3.90	0.98	4.91	1.23	4.48	1.12	3.45	0.86	4.31	1.08	3.94	0.99	2.29	0.57
Leucine	7.65	1.09	4.49	1.11	7.70	1.10	6.86	0.98	7.78	1.11	7.41	1.06	6.85	0.98	7.78	1.11	7.42	1.06	6.13	0.88	7.03	1.00	6.64	0.95	4.27	0.61
Lysine	3.31	0.60	6.68	1.22	5.01	0.91	3.73	0.68	6.67	1.21	5.50	1.00	3.74	0.68	6.68	1.22	5.50	1.00	3.56	0.65	5.80	1.06	4.83	0.88	3.01	0.55
Methionine	2.31		1.52		1.84		0.98		1.53		1.31		1.00		1.54		1.31		1.09		1.07		1.32		1.30	
Phenylalanine	4.65		5.21		4.91		5.69		5.21		5.40		5.67		5.18		5.37		4.75		4.64		4.68		2.30	
Threonine	3.9	0.99	4.19	1.05	4.11	1.03	3.12	0.78	4.16	1.04	3.74	0.94	3.14	0.79	4.18	1.05	3.76	0.94	3.02	0.76	3.85	0.96	3.48	0.87	2.82	0.69
Tryptophan	0.96	0.96	1.31	1.31	1.12	1.12	1.00	1.00	1.30	1.30	1.18	1.18	1.00	1.00	1.27	1.27	1.17	1.17	1.59	1.56	1.66	1.66	1.63	1.63	2.75	2.75
Valine	4.82	0.96	5.52	1.10	5.61	1.03	4.75	0.95	5.49	1.10	3.22	1.04	4.75	0.95	5.51	1.10	5.21	1.04	4.30	0.56	5.0	1.00	4.70	0.94	2.75	0.63
Tyrosine	3.35		2.46		2.89		4.34		2.47		1.49		4.31		2.48		3.20		3.54		2.35		2.88		3.14	
Cystine	1.78		1.76		1.73		1.21		1.67		4.06		1.20		1.67		1.47		1.61		1.85		1.75		2.03	
Proline	4.76		3.82		4.28		4.41		3.38		23.33		4.42		3.83		4.07		4.92		4.34		4.59		2.10	
Alanine+glutamic	24.58		22.59		23.59		24.89		22.61		16.45		24.86		22.61		23.52		21.68		20.79		21.18		2.10	
Glycine+aspartic	15.81		16.46		6.12		17.48		16.45		5.02		17.47		16.42		16.58		15.49		15.22		15.35		5.50	
serine	5.20		5.18		5.18		4.80		5.16		2.80		4.78		5.16		5.03		4.37		4.75		4.59		15.34	
Methionine+Cystine	3.91	1.12	3.19	0.91	3.57	1.02	2.49	0.63	3.20	0.91	8.62	0.80	2.20	0.63	3.21	0.92	2.78	0.79	2.70	0.77	2.92	0.83	3.06	0.87	11.60	0.71
Phenylalanine+tyrosine	8.00	1.33	7.369	1.27	7.80	1.30	10.03	1.67	7.68	1.28		1.44	9.98	1.66	7.66	1.28	8.57	1.43	8.29	1.38	6.99	1.17	7.56	1.26	3.50	0.81
E.A.A.I.	65.51		78.88		74.31		63.41		78.81		73.08		63.43		78.68		72.92		63.97		74.19		70.70		55.67	
B.V.	62.95		74.25		69.25		57.39		74.17		67.93		57.41		74.03		67.75		57.5		64.14		65.33		48.95	
PER_1	2.5807		2.6750		2.6260		2.6260		2.6837		2.5041		2.2319		2.6837		2.5082		1.8800		2.3177		2.1281		1.0046	
PER_2	2.6534		2.7967		2.7244		2.7244		2.048		2.5580		2.1894		2.8037		2.5647		1.9433		2.4769		2.2440		1.2574	
PER_3	2.3561		3.6990		2.7454		2.7454		3.1100		2.0025		0.3850		3.1043		2.0334		0.53.67		2.3934		1.6808		0.4972	

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

Table 4. Amino acid composition of some oriental sweets (g/100 g sample).

Amino acids	Malban (Turkish Delight)			Domea (Dried Turkish Delight)			Asalea (Can syrup sweet)			Agwa Bel-Sudani (Date - peanut mass			Date
	Walnut 100%	Soy nut 100%	Walnut 50% + Soy nut 50%	Peanut 100%	Soy nut100%	Peanut 50% + Soy nut 50%	Peanut 100%	Soy nut100%	Peanut 50% + Soy nut 50%	Peanut 100%	Soy nut100%	Peanut 50% + Soy nut 50%	
Arginine	0.39	0.77	0.62	0.70	0.84	0.77	0.78	0.93	0.86	0.61	0.72	0.67	0.11
Histidine	0.07	0.22	0.14	0.15	0.24	0.20	0.17	0.2	0.22	0.15	0.22	0.19	0.05
Isoleucine	0.14	0.43	0.28	0.26	0.45	0.73	0.29	0.52	0.40	0.25	0.42	0.34	0.07
Leucine	0.26	0.59	0.47	0.45	0.64	0.60	0.50	0.83	0.67	0.45	0.68	0.56	0.13
Lysine	0.11	0.14	0.31	0.24	0.15	0.45	0.07	0.71	0.50	0.26	0.56	0.41	0.09
Methionine	0.07	0.46	0.11	0.06	0.50	0.11	0.42	0.16	0.12	0.08	0.10	0.11	0.04
Phenylalanine	0.16	0.37	0.30	0.37	0.40	0.44	0.23	0.55	0.48	0.35	0.45	0.40	0.09
Threonine	0.13	0.12	0.25	0.20	0.13	0.30	0.07	0.45	0.34	0.22	0.37	0.30	0.08
Tryptophan	0.03	0.49	0.07	0.07	0.53	0.10	0.35	0.14	0.11	0.12	0.16	0.14	0.08
Valine	0.16	0.22	0.32	0.31	0.24	0.42	0.32	0.59	0.47	0.31	0.48	0.40	0.08
Tyrosine	0.11	0.15	0.18	0.28	0.16	0.26	0.09	0.26	0.29	0.26	0.23	0.25	0.06
Cystine	0.06	0.34	0.11	0.08	0.37	0.12	0.32	0.18	0.13	0.12	0.18	0.15	0.06
Proline	0.16	2.06	0.26	0.29	2.18	0.33	1.82	0.41	0.37	0.36	0.42	0.39	0.17
Alanine+glutamic	0.23	1.46	1.44	1.62	1.59	1.90	1.82	2.41	2.12	1.59	2.01	1.80	0.46
Glycine+aspartic	0.53	0.36	0.99	1.14	0.50	1.36	0.35	1.75	1.52	1.14	1.47	1.31	0.35
serine	0.18	0.26	0.32	0.31	0.31	0.41	0.16	0.55	0.45	0.31	0.46	0.39	0.11
Methionine+Cystine	0.13	0.68	0.48	0.14	0.74	0.23	0.74	0.34	0.25	0.20	0.28	0.26	0.10
Phenylalanine+tyrosine	0.27			065		0.70		0.81	0.77	0.61	0.68	0.65	0.15

Table 5. Evaluation of amino acid composition of some oriental sweets.

Amino Acids	Malban (Turkish Delight)									Domea (Dried Turkish Delight)											
	Walnut 100%			Soy nut 100%			Walnut 50% + Soy nut 50%			peanut 100%			Soy nut 100%			peanut 50% + Soy nut 50%			peanut 100%		
	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman			
Isoleucine	900	600	671	293	195	153	450	300	235	485	323	254	268	179	140	341	227	178	135	290	228
Leucine	727	431	339	274	162	128	402	238	187	420	249	196	252	149	117	315	187	147	378	224	179
Lysine	1300	464	600	336	142	112	639	271	213	325	350	275	309	131	103	440	187	147	733	311	244
Threonine	969	431	339	341	151	119	504	224	176	630	280	220	315	140	110	420	187	147	548	244	191
Tryptophan	600	700	550	150	175	138	257	300	236	257	300	236	139	162	127	180	201	165	257	300	236
Valine	703	613	481	230	200	157	352	306	241	363	316	248	212	185	145	268	233	183	351	280	220
Methionine+Cystine	762	539	423	341	241	190	450	318	250	707	500	393	319	226	177	430	304	239	619	438	34
phenylalanine+Tyrosine	367	415	326	126	165	129	206	233	183	152	172	135	134	151	119	141	160	126	134	151	199
Restricting amino acid (R.A.)	Lysine			Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine	
G.D.R. for R.A.	1300	764	600	341	241	190	639	318	250	825	500	393	319	226	177	440	304	239	733	438	344
G.D.R. for Protein	1339	1667	1310	507	631	496	737	917	720	691	860	707	467	581	456	556	692	544	614	764	600
P.S./150 based on R.A.	3.33	19.64	25.00	43.94	62.14	79.00	23.49	47.14	60.00	18.18	30.00	38.18	46.97	66.43	84.55	34.09	49.29	62.73	20.46	34.29	43.64
P.S./150 based on protein.	11.20	9.00	11.46	29.60	23.79	30.27	20.37	16.37	20.83	21.70	17.44	22.19	32.13	25.82	32.86	26.97	21.67	27.58	24.43	19.63	24.99
First Lmiting Amino Acid (L.A., based on A.S.).	Lysine			Methionine + Cystine			Lysine			Methionine + Cystine			Methionine + Cystine			Methionine + Cystine			Methionine + Cystine		

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

Table 5 cont.

Amino Acids	Asalea (cane syrup sweet)						Agwa Bel - Sudani Date-Peanut Mass)									Date		
	Soy nut 100%			peanut 50% + Soy nut 50%			peanut 100%			Soy nut 100%			Peanut 50 % + soy nut 50 %					
	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman
Isoleucine	242	162	127	315	210	165	504	336	264	300	200	157	371	247	194	1800	1200	941
Leucine	228	135	106	282	167	131	420	249	196	278	165	129	338	200	157	1451	562	977
Lysine	279	118	93	396	168	132	762	323	254	354	150	118	483	205	161	2200	933	733
Threonine	280	124	98	371	165	129	573	255	200	341	151	119	420	187	147	1575	700	550
Tryptophan	129	150	118	164	191	150	150	175	138	113	131	103	120	150	118	225	263	206
Valine	191	166	131	239	209	164	252	306	241	234	204	160	281	245	193	1250	1089	856
Methionine+Cystine	291	206	162	396	280	220	495	350	275	354	250	196	381	269	212	990	700	550
phenylalanine+Tyrosine	122	138	109	129	146	114	162	184	144	146	165	129	152	172	135	660	747	587
Restrictive amino Acid (R.A.)	Methionine + Cystine			Methionine Lysine + Cystine			Lysine Methionine + Cystine			Methionine + Cystine			Lysine Methionine + Cystine			Lysine + Isoleucine		
G.D.R. for R.A.	291	205	162	396	280	220	762	350	275	354	250	196	483	269	212	2200	1200	943
G.D.R. for Protein	423	526	410	500	622	488	314	764	544	465	579	600	529	259	272	1500	1867	1467
P.S./150 based on R.A.	51.52	72.86	92.73	37.88	53.57	68.48	19.70	42.86	54.55	42.42	60.00	76.36	31.06	55.71	70.91	6.82	12.50	15.91
P.S./150 based on protein.	35.47	28.50	36.27	30.03	24.13	30.72	24.43	19.63	27.57	32.27	25.93	25.01	28.33	22.77	26.24	10.00	8.04	10.23
First Limiting Amino Acid (L.A., based on A.S.).	Methionine + Cystine			Methionine + Cystine			Lysine			Methionine + Cystine			threonine			Lysine		

Table 6. Organoleptic evaluation of some oriental sweets (average scores).

Treatments	Malban (Turkish Delight)		
	100% Walnut	100% Soy nut	50% Walnut + 50% Soy nut
Aroma	8^a	8^a	9^b
Taste	8^a	9^a	9^a
Texture	9^a	8^a	9^a
Colour	9^a	9^a	8^a
Overall acceptability	9^a	9^a	9^a
	Domea (Dried Turkish Delight)		
	100% peanut	100% Soy nut	50% peanut + 50% Soy nut
Aroma	8^a	9^a	9^a
Taste	7^a	8^{ab}	8^b
Texture	8^a	9^a	8^a
Colour	8^a	9^b	9^a
Overall acceptability	8^a	9^a	9^a
	Asalea (cane syrup sweet)		
	Almond 100%	Soy nut 100%	Almond 50% + Soy nut 50%
Aroma	9^a	9^a	9^a
Taste	7^a	8^{ab}	9^b
Texture	8^a	9^a	8^a
Colour	8^a	8^a	9^b
Overall acceptability	8^a	9^a	9^a
	Agwa Bel-Sudani (peanut mass)		
	100% peanut	100% Soy nut	50% peanut + 50% Soy nut
Aroma	9^a	9^a	9^a
Taste	9^a	9^a	9^a
Texture	7^a	9^b	7^a
Colour	7^a	9^b	8^{ab}
Overall acceptability	8^a	9^b	8^a

Figures given similar letters indicate no significant difference.

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بديل للمكسرات الشائعة مجهز من بذور الصويا : ٤-مكسرات الصويا في بعض الحلوي البلدية-الملبن ،الدوميه، العسلية والعجوة بالسوداني

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تم تجهيز وتحليل بعض أنواع الحلوي الشرقيه مثل الملبن (المحشو بعين الجمل) والدومية (ملبن مجفف محشو بالفول السوداني) والعسلية (حلوي من العسل الأسود ومحشو بالفول السوداني) والعجوة بالسوداني. وقد حللت أيضا بعض العينات المجهزه مع استبدال ٥٠٪ ، ١٠٠٪ من المكسرات الطبيعية بمكسرات الصويا . وقد لوحظ أن عينات المقارنه منخفضه في محتواها من البروتين (٣,٣٦ - ٧,٣٣٪) الذي ارتفع باستبدال ٥٠٪ ، ١٠٠٪ من المكسرات الطبيعية بمكسرات الصويا الي ٦,١١ - ٩,٠١ ، ٨,٨٨ ، ١٠,٦٤ ٪ علي التوالي . وقد كان بروتين الملبن لعينة المقارنه ناقصا في ٤ أحماض أمينيه أساسيا بينما بروتين الدوميه والعسلية والعجوة بالسوداني لعينه المقارنه كان ناقصا في ٦ أحماض أمينيه أساسية. واستبدال المكسرات الطبيعية بمكسرات الصويا قللت عدد الأحماض ألامينيه الناقصه ورفعت القيمه الغذائية للمنتج والقيمه الحيويه للبروتين في كافه المنتجات . ويلزم أن نشير الي أن العجوة بالسوداني لم تكن ناقصه في الأحماض الأمينيه الاساسية العطريه المعروف نقصانها في بروتين البلح لان بروتين السوداني غني في الفينيل ألاثين + نيروسين . ولقد دلت الاختبارات الحسيه علي أن الحلوي المجهزه مع ٥٠٪ ، ١٠٠٪ مكسرات صويا كانت مقبوله من المحكمين ، ولذلك يقترح إنتاج الحلوي مع ١٠٠٪ مكسرات صويا لأنها ستكون بذلك رخيصة الثمن وذات قيمه غذائية أعلي.