COMMON NUTS SUBSTITUTE PREPARED OF SOYBEANS : 5- PARTIAL AND COMPLETE REPLACEMENT OF COMMON NUTS IN CONFECTIONERY AND CANDY (HALWA EFRENGEA).

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Abstract

In order to increase the quality and quantity of protein in some candy and confections (halwa efrengea), gozea, nougat, filled bonbon(foryh) and chocolate-nut centre were prepared with and without soy nut. Such practice increased protein content, but still gozea and nougat were not considered as source for protein. Control sample of chocolate-nut centre was a source of protein (11.76%) and its content increased to 12.67 and 13.56% when hazel nut replacement was carried out with soy nut at 50% and 100% levels. When bonbon filler was replaced with 50% soy nut the sample became a source of protein due to its increase from 1.75 to 7.22%. The quality of protein was also improved as indicated by the evaluation of amino acid composition when soy nut was added . Even at 100% substitution of common nut with soy nut, the obtained sweets were rated as good as the traditional product (control sample) based on organoleptic evaluation.

INTRODUCTION

Nuts are widely used in candy and confections for flavour and in decoration. Due to the use of nuts in small amounts, it is expected that the nutritional value received through nuts will not be high enough, particularly the protein . Children are actually fond of sweets, so that if a proper nut substitute is used, the nutritional value especially proteins might be raised in sweets, along with the reduction in sell-

ing price. In this regard, soybeans might be of special importance. Eigor *et al.* (1980) found that soybean products favour the manufacture of candy through decreasing of stickness and adhesion. Such products were also used in confections (Rakosky, 1969). Oil seeds and their products were used in preparation of morzipan and nougat (Wiesner, 1982; Mohr *et al.,* 1984). Full-fat soy flour was also used in various sweets such as nogat (Anon, 1986).

This work was conducted to investigate the influence of using soy nut as partial or total replacement of common nuts in candy and confectionery.

MATERIALS AND METHODS

Processing

A number of 4 Products, namely gozea, nougat, chocolate hazel nut centre and filled bonbons (foryh) were prepared in one of the candy factories (private sector) using the methods applied (commercially) in this plant . Ingredients used for each processing lot were as follows :

1. Gozea (coconut sweet)		**Treatment**
Sugar	10 kg	
Glucose syrup	3 kg	1 - 100 % hazel nut
Water	3 litres	2 - 100 soy nut
Coconut	5 kg	3-50 hazel nut + 50% soy nut

2. Nougat (nougah with sudani) : Peanut		**Treatment**
Sugar	18 kg	
Glucose syrup	30 kg	1 - 100 % peanut
Water	12 litres	2 - 100 soy nut
Rosed peanut	7 kg	3-50 peanut + 50% soy nut
Vanilla	50 kg	

A commercial additive called "hyfoma " 100 g.

3. Filled bonbon(foryh) (1 part coat + 2 parts filler)		Treatment
Coat:		1-100% normal filler
Sugar	30 kg.	2 - 50% normal filler+
Glucose syrup	42 kg.	50% soy nut
Water	10 litres	
Filler:		
Coconut oil	50 kg.	
Powdered sugar	70 kg.	
Dried skim milk	20 kg.	
Milled cracked cocoa	4 kg.	
Hazel nut essence	10gm	

4 . Chocolate - nut centre		Treatment
Powdered sugar	44 kg	
cocoa butter or its substitute	30 kg	1 - 100 % hazel nut
Dried skim milk	12 litres	2 - 100 %soy nut
Milled cracked cocoa	20 kg	3 - 50 % hazel nut + 50% soy nut
Roasted hazel nut	11 kg .	

Analytical methods

Mositure, protein (N x6.25, 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 energy value was calculated by multiplying protein and carbohydrates by 4.0 and fat by 9.0.

Amino acids composition was determined after HCL hydrolysis using paper chromatography as decribed by Block (1958). Tryptophan was determined colorimetrically after alkaline hydrolysis using 14% barium hydroxide solution according to the method of Blauth *et al.* (1963).

Grams consumed of food articles (on wet weight basis) to cover the daily reuirements (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 4-6 years 1700 Kcal, children 7-10 years 2400 Kcal, male 11-14 years 2200 Kcal and adult males 23 - 50 years 2700 Kcal. , female 11 - 14 years 2200 Kcal and adult female 23-50 years 2000 Kcal . Percent satisfaction of daily needs of humans in protein upon consumption of 150gm of food products (P.S. /150) was calculated . Similarly, G. D.R.values for protein were calculated using the daily requirements in grams 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 acids scores (A.S) were calculated, using the reference protein given by FAO/WHO (1973) through dividing the concentration of test protein in essential amino acid by its corresponding concentration of the FAO pattern. Values (g /16 g N) 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 phenylalanine + tyrosine 6. A. S. less than 1 indicates defficiency in considered essential amino acids (EAA). The EAA which showed highest defficiency 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 of Oser (1959) using the values of EAA (g /16 g N) found (in samples) for isoleucine, leucine, lysine, threonine, tryptophan, valine , methionine + cystine and phenylalanine+tyrosine. Protein efficiency ratio (PER) of test food was calculated based on the amino acids concentrations (g /16 g 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 grams which were for children 10-12 years, adult male 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

thionine + cystine (sulphur amino acids) , 0.99, 0.70, 0.55 and phenylalanine + tyrosine (aromatic amino acids) 0.99, 1.12, 0.88. Highest G.D.R. value amongst individual EAA indicates restricting amino acid (R.A.). When the mentioned 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 acceptability was carried out by aid of 10 panelists according to Molander (1960) using the following Judging 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

The gross chemical composition and evaluation of nutritional value for protein and energy of gozea (a coconut -sugar sweet), nougat (with peanut), chocolate-nut centre (with hazel nut) and foryh filled bonbon (the filler composed of sugar, coconut butter or substitute , skim milk and crude chocolate) as influenced by addition of soy nut are given in Tables 1 and 2 . Only chocolate-nut centre had tangible amount of protein (11.76%) while gozea, nougat and bonbon had very low content, being 1.92, 3.31 and 1.75%, respectively. Substitution of common nuts with soy nut at 50% and 100% levels increased protein contents to 21.35, 44.79; 24.47, 48.34; 312.57, and 7.74, 15.31% for gozea, nougat, bonbon and chocolate-nut centre, respectively. But still gozea, nougat (Tables 1 and 2) could not be considered as a source of protein due to their low content and high G.D.R. Values. Bonbon (only sample with soy nut) seems to be a good source of protein as indicated by G.D.R. and P.S./150 values. But chocolate-nut centre (11.76% protein), specially samples prepared with soy nut at the level of 50% (12.67% protein) or 100% (13.56%protein) are actually good sources of protein (Table 2). In this concern, soy nuts raised considerably the nutritional value of bonbon and chocolate-nut centre with regard to protein content.

2 . Amino acids composition

Data in Tables 3,4 and 5 show the amino acids composition and evaluation of

Table 1. Chemical composition of confectionery and candy

Sample			Moisture %	Protein %	Fat %	Ash %	Fiber %	Carbohydr-ate %	Energy value Cal./100gm
Gozea (coconut sweet)	Hazel nut 100%	WWB	6.75	1.92	15.98	0.58	1.97	72.80	442.70
		MFB	93.25	2.06	17.14	0.62	2.11	78.07	474.78
	Soy nut 100%	WWB	7.18	2.78	14.43	0.60	1.80	73.21	433.83
		MFB	92.82	3.00	15.55	0.65	1.94	78.86	467.39
	Hazel nut 50% + Soy nut 50%	WWB	7.64	2.33	14.96	0.59	1.87	72.61	434.40
		MFB	92.36	2.52	16.20	0.64	2.03	78.61	470.32
Nougat	Peanut 100%	WWB	8.00	3.31	6.06	0.34	0.27	82.02	395.86
		MFB	92.00	3.60	6.59	0.37	0.29	89.15	430.31
	Soy nut 100%	WWB	8.25	4.93	2.22	0.59	0.61	83.40	373.30
		MFB	91.75	5.37	2.42	0.64	0.67	90.90	406.86
	Peanut 5% + Soy nut 50%	WWB	8.12	4.12	4.14	0.47	0.44	82.71	384.58
		MFB	91.88	4.48	4.15	0.51	0.48	90.02	418.59
Filled bom-bon (foreh)	normal filler 100%	WWB	3.39	1.75	12.15	0.41	0.03	82.27	445.43
		MFB	96.61	1.81	12.58	0.42	0.03	85.16	461.40
	normal filler + soy nut 50	WWB	3.74	7.22	8.92	0.98	0.80	78.34	422.52
		MFB	96.26	7.50	9.27	1.02	9.83	81.38	428.95
Chocolate-nut centre	hazel nut 50%	WWB	2.82	11.76	33.90	2.97	1.05	47.50	542.14
		MFB	97.18	12.10	34.88	3.06	1.08	48.88	557.84
	soy nut 100%	WWB	2.94	13.56	30.85	3.00	0.72	48.93	527.61
		MFB	97.06	13.97	31.79	3.09	0.74	50.41	543.63
	hazel nut 50 % + soy nut 50%	WWB	2.89	12.67	32.37	2.99	0.88	48.20	534.81
		MFB	97.11	13.025	33.33	3.08	0.91	49.63	550.69
Milled cracked co-coa	Crude chocolate=*	WWB	2.30	8.00	55.00	3.20	2.60	26.60	633.40
		MFB	97.70	8.19	56.30	3.28	2.66	27.23	648.38

WWB : wet weight basis MFB : Moisture free basis

* E; Gendi (1981).

Table 2. Evaluation of energy value and protein of some high protein 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.
Gozea (coconut sweet)	hazel nut 100%	G.D.R.	294	284	542	610	497	452	1198	1563	1771	2344	2917	2396	6.55
		P.S./150	51.08	39.07	27.67	24.59	30.18	33.20	12.52	9.60	8.47	640	5.14	6.26	1583
	Soy nut 100%	G.D.R.	300	392	553	622	507	461	827	1079	1223	1619	2014	1655	9.48
		P.S. / 150	50.06	38.28	27.11	24.10	29.58	32.54	18.13	13.90	12.27	9.27	7.45	9.07	1888
	Harel nut 50% + Soy nut 50%	G.D.R.	299	391	552	622	506	640	987	1288	1459	1931	2403	1974	7.90
		P.S. / 150	20.12	38.33	27.15	24.13	29.62	32.58	15.70	11.65	10.28	7.77	6.24	7.90	1329
Nougat	Peanut 100%	G.D.R.	328	430	606	682	556	505	659	906	10.27	1360	1392	1390	11.28
		P.S. / 150	45.68	34.93	24.74	21.99	26.99	29.69	21.59	16.55	14.60	11.03	8.8	10.79	893
	Soy nut 100%	G.D.R.	348	455	643	723	589	536	457	609	690	913	1136	933	16.81
		P.S. / 150	43.07	321.94	23.33	20.74	25.45	28.00	32.15	24.65	21.75	16.43	13.11	16.08	1063
	Peanut 50% + Soy nut 50%	G.D.R.	338	442	624	702	577	520	558	728	825	1092	1395	1117	14.05
		P.S. / 150	44.38	3391	24.36	21.37	76.77	\28.84	26.78	40.60	18.181	13.73	11.05	13.44	2514
Filled bom-bon (foreh)	normal filler 100%	G.D.R.	292	382	539	606	494	449	1314	1714	943	2571	3200	2619	5.97
		P.S. / 150	51.40	39.30	27.84	24.75	30.37	33.41	11.41	8.75	7.72	3.83	4.69	5.71	24.61
	normal filler50% +soy nut 50	G.D.R.	308	402	568	639	521	473	319	416	471	623	766	637	374
		P.S. / 150	48.75	37.28	26.41	23.47	28.81	31.69	47.09	3.16	31.83	24.07	19.34	23.54	40.09
Chocolate-nut centre	hazel nut 50%	G.D.R.	240	314	443	498	406	40.66	196	255	289	383	476	391	325
		P.S. / 150	62.56	47.84	33.88	30.12	36.96	379	76.70	28.80	251	39.20	31.50	38.35	46.23
	soy nut 100%	G.D.R.	246	327	455	512	417	34.57	170	221	59.82	332	413	339	347
		P.S. / 150	60.88	46.55	32.98	29.31	35.97	374	88.44	67.80	268	42.23	36.32	44.22	34.198
	hazel nut 50 % + soy nut 50%	G.D.R.	243	318	449	505	411	374	182	237	55.90	563	442	393	550
		P.S. / 150	61.71	47.19	33.43	30.59	36.46	40.11	82.63	63.35	325	26.67	3394	41.32	22.27
Milled cracked cocoa	Crude choco-late=*	G.D.R.	505	268	379	426	347	316	288	375	35.29		700	575	
		P.S. / 150	107.70	55.89	39.59	35.19	43.19	47.51	52.17	40.40			21.43	26.09	

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

Amino acids	Gozea (Coconut sweet)						Nougat						Filled bonbon (Foryh)				Chocolate-nut centre						Milled cracked cocoa (crude chocolate	
	Hàzel nut 100%		Soy nut 100%		Hazel nut 50% + Soy nut 50%		Peanut 100%		Soy nut 100%		Peanut 50% + Soy nut 50%		Normal filler 100%		Normal 50% + Soy nut 50%		Hazel nut 100%		Soy nut 100%		hazel nut 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
Agrinine	13.07		11.01		11.85		10.75		8.68		9.51		3.42		8.06		4.38		4.66		4.47		6.40	
Histidine	2.11		2.33		2.24		2.34		2.47		2.47		3.22		2.58		3.06		3.03		3.05		1.92	
Isoleucine	5.67	1.42		1.29	5.31	1.33	3.93	0.98	4.91	1.23	4.51	1.13	5.37	1.34	4.96	1.24	5.34	1.34	5.21	1.30	5.30	1.33	3.34	0.96
Leucine	7.49	1.07	5.17	1.12	7.68	1.10	6.82	0.97	7.78	1.11	7.41	1.06	9.66	1.38	8.02	1.14	9.25	1.32	9.55	1.38	9.41	1.34	6.40	0.91
Lysine	4.22	0.77	7.82	1.02	5:10	0.93	3.74	0.68	6.67	1.22	5.51	1.00	7.94	1.44	7.81	1.42	7.41	1.35	7.77	1.44	7.56	1.38	4.16	0.79
Methionine	1.87		5.60		1.85		1.00		1.52		1.31		2.31		1.62		2.18		2.23		2.20		1.92	
Phenylalanine	4.95		1.83		5.11		5.64		5.18		5.35		4.42		5.11		4.45		4.63		4.51		5.44	
Threonine	3.67	0.92	4.00	1.00	3.87	0.97	3.15	0.79	4.19	1.05	3.80	0.95	4.82	1.21	4.25	1.06	4.68	1.17	4.72	1.18	4.69	1.17	4.16	1.04
Tryptophan	1.18	1.18	1.20	1.20	1.19	1.19	1.00	1.00	1.27	1.27	1.16	1.16	1.43	1.43	1.31	1.31	1.43	1.43	1.40	1.40	1.42	1.42	1.44	1.44
Valine	5.73	1.15	5.50	1.10	5.59	1.12	5.60	0.95	5.57	1.11	2.25	1.05	5.91	1.18	5.55	1.11	5.96	1.19	5.93	1.12	5.93	1.19	5.76	1.15
Tyrosine	2.96		2.61		2.75		3.15		2.48		3.22		4.81		2.79		4.61		4.24		4.46		2.08	
Cystine	1.47		1.63		1.57		1.00		1.68		1.49		1.17		1.60		1.22		1.30		1.28		1.92	
Proline	4.13		3.89		3.99		4.75		3.81		4.05		10.11		4.58		9.45		8.65		8.80		5.60	
Alanine+glutamic	22.82		22.84		22.83		4.33		22.65		23.53		22.51		22.1		22.54		22.60		22.55		23.20	
Glycine+aspartic	13.43		14.74		14.21		1.21		16.47		16.88		8.39		14.47		9.18		10.31		9.71		14.08	
serine	5.71		5.04		5.04		4.44		5.18		5.04		4.79		5.12		5.14		4.90		4.97		5.28	
Methionine+Cystine	5.71	0.95	3.46	0.99	3.46	0.98	24.86	0.63		0.80	2.80	0.80	3.48	0.99	3.22	0.92	3.40	0.97	3.53	1.01	3.48	0.99	3.84	1.10
Phenylalanine+tyrosine	3.34	1.32	7.83	1.31	7.83	1.31	17.49	1.66		1.54	8.57	1.43	9.23	1.54	7.87	1.31	9.06	1.51	8.87	1.48	8.97	1.50	7.52	1.25
E.A.A.I.	74.42		77.46		2.6306		63.51		78.78		73.14		90.07		81.51		88.01		88.41		88.38		73.10	
B.V.	63.39		72.70		71.47		57.50		74.14		69.99		86.45		77.12		84.20		84.64		84.61		67.95	
PER_1	2.5373		2.6991		2.6306		2.2172		2.6846		2.5046		3.2458		2.7579		3.0899		3.2643		3.1934		1.9712	
PER_2	2.6217		2.8082		2.7300		2.21736		2.8037		2.5580		3.4126		2.8833		3.2475		3.4225		3.3358		2.2192	
PER_3	2.4906		3.1074		2.8558		0.3448		3.0937		2.0067		2.8624		3.0832		2.6411		3.2398		2.9141		2.4528	

E.A.A.I. : Essemtial Amino Acid Index.
B.V. : Biological Value %
PER : Protein Efficiency Ratio.
A.S. : Amino Acid Score.
. Paul and Southgate (1978)

Table 4. Amino acid composition of cnfectionery and candy (g/100 g sample).

Amino acids	Gozea (Coconut sweet			Nougat			Filled bonbon (Foryh)		Chocolate-nut centre			Milled cracked co-coa crude chocolate
	Hazelnut 100%	Soy nut 100%	Hazel nut 50% + Soy nut 50%	Peanut 100%	Soy nut100%	Peanut 50% + Soy nut 50%	Normal filler 100%	Normal filler 50% + Soy nut 50%	Hazel 100%	Soy nut100%	hazel nut 50% + Soy nut 50%	
Arginine	0.25	0.31	0.28	0.36	0.43	0.39	0.06	0.58	0.52	0.63	0.58	0.51
Histidine	0.04	0.07	0.05	0.08	0.12	0.10	0.06	0.19	0.36	0.41	0.40	0.15
Isoleucine	0.11	0.14	0.12	0.13	0.24	0.19	0.09	0.36	0.63	0.71	0.69	0.31
Leucine	0.14	0.22	0.18	0.23	0.38	0.31	0.17	0.58	1.09	1.30	1.23	0.51
Lysine	0.08	0.16	0.12	0.12	0.33	0.23	0.14	0.12	0.87	1.05	0.99	0.33
Methionine	0.08	0.05	0.04	0.03	0.08	0.05	0.04	0.37	0.26	0.30	0.29	0.15
Phenylalanine	0.10	0.15	0.12	0.19	0.26	0.22	0.08	0.31	0.52	0.63	0.59	0.44
Threonine	0.07	0.11	0.09	0.10	0.21	0.16	0.09	0.10	0.55	0.64	0.61	0.33
Tryptophan	0.2	0.03	0.03	0.03	0.06	0.06	0.03	0.40	0.17	0.19	0.19	0.12
Valine	0.11	0.15	0.13	0.16	0.28	0.22	0.10	0.12	0.70	0.79	0.77	0.46
Tyrosine	0.06	0.07	0.06	0.14	0.12	0.06	0.08	0.33	0.54	0.58	0.58	0.17
Cystine	0.03	0.05	0.04	0.04	0.08	0.22	0.02	1.63	0.14	0.18	0.17	0.15
Proline	0.08	0.11	0.09	0.15	0.19	0.13	0.18	1.05	0.11	1.17	0.15	0.45
Alanine+glutamic	0.44	0.64	0.53	0.82	1.12	0.06	0.39	0.37	1.65	3.07	2.94	1.86
Glycine+aspartic	0.26	0.41	0.33	0.58	0.81	0.17	0.15	0.24	1.08	1.40	1.27	1.13
serine	0.11	0.14	0.13	0.16	0.26	0.97	0.08	0.57	0.61	0.66	0.65	0.42
Methionine+Cystine	0.07	0.10	0.08	0.07	0.16	0.70	0.06		0.40	0.48	0.45	0.30
Phenylalanine+tyrosine	0.16	0.22	0.18	0.33	0.38	0.21	0.16		1.06	1.21	1.17	0.61

Table 5. Evaluation of amino acid composition of confectionery and candy.

Amino Acids	Gozea (Coconut sweet									Nougat								
	Hazel nut 100%			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	1146	764	600	900	600	471	1050	700	550	969	6464	508	525	350	275	663	442	347
Leucine	1350	300	629	559	509	400	1050	622	489	522	87	383	497	295	232	610	361	284
Lysine	2475	1050	525	1238	525	413	1650	700	550	1650	700	550	600	255	200	861	365	287
Threonine	1500	500	629	1146	509	400	1400	622	489	1260	560	440	600	267	210	788	350	330
Tryptophan	900	1050	525	600	700	550	600	700	550	600	700	550	300	350	275	360	450	350
Valine	1023	591	700	750	653	513	565	754	592	703	613	481	402	350	2.75	511	446	500
Methionine+Cystine	1414	1000	786	990	700	550	1238	575	683	1414	1000	486	619	438	344	900	636	251
phenylalanine+Tyrosine	619	700	550	450	509	400	550	622	429	300	339	267	261	295	232	283	320	
Restricting Amino Acid (R.A.)	Lysine			Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Methionine + Cystine			Methionine + Cystine		
G.D.R. for R.A.	2475	1050	825	1238	7002	550	1650	875	688	1650	1000	786	619	438	344	900	636	500
G.D.R. for Protein	2344	2917	2292	1619	014	1583	1931	2403	1888	1360	1962	1329	9.13	11.36	893	1092	1359	1068
P.S./150 based on R.A.	6.96	14.29	18.18	15.15	21.43	27.27	12.12	17.14	21.82	9.69	9.38	11.93	24.24	21.45	27.27	16.67	14.73	18.75
P.S./150 based on protein.	6.40	5.14	6.55	9.27	7.45	9.48	7.77	8.24	7.94	11.03	8.87	11.28	16.43	13.21	16.81	13.73	11.04	14.02
First Lmiting Amino Acid (L.A., based on A.S.).	Lysine			Methionine + Cystine			Lysine			Methionine + Cystine			Methionine + Cystine			Methionine + Cystine		

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

Cont. table 5.

Amino Acids	Filled bonbon						Chocolate - nut centre									Milled cracked cocoa crude chocolate		
	Normal filler 100%			Normal Filler 50% + Soy nut 50%			Hazel nut 100%			Soy nut 100%			hazel nut 50% + Soy nut 50%					
	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman	Child	Man	Woman
Isoleucine	1400	933	733	350	233	183	230	133	105	178	118	93	183	122	96	407	271	713
Leucine	1112	959	518	326	193	152	173	103	81	145	86	68	154	91	72	371	220	173
Lysine	1414	600	471	356	150	118	228	97	79	189	80	63	200	85	67	600	255	200
Threonine	1400	622	489	407	181	142	229	102	80	197	88	69	207	92	72	382	170	133
Tryptophan	600	700	550	180	210	163	106	124	97	95	111	87	95	111	87	150	175	138
Valine	1125	980	770	281	245	193	161	140	110	142	124	98	146	127	100	245	213	167
Methionine+Cystine	1650	1167	917	413	292	229	248	175	138	206	146	115	220	156	122	330	233	183
phenylalanine+Tyrosine	619	700	550	174	197	154	93	106	83	82	93	73	85	96	75	162	184	140
Restricting Amino Acid (R.A.)	Lysine			Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine		Lysine	Methionine + Cystine	
G.D.R. for R.A.	1850	1167	917	413	292	229	248	175	138	206	146	115	220	156	122	600	271	213
G.D.R. for Protein	2571	3200	2514	623	776	609	383	476	374	332	413	325	355	442	347	563	400	550
P.S./150 based on R.A.	9.09	12.86	1636	36.36	51.43	65.44	60.61	85.71	109.09	72.73	102.86	30.91	68.18	96.43	122.73	25.00	55.36	70.46
P.S./150 based on protein.	5.83	4.69	5.97	24.07	19.34	24.60	39.20	31.50	40.09	42.20	36.32	46.23	42.23	33.94	43.19	26.67	21.43	27.27
First Lmiting Amino Acid (L.A., based on A.S.).	Methionine + Cystine			Methionine + Cystine			Methionine + Cystine						Methionine + Cystine			Lysine		

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

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

Treatment / Factor	Gozea (coconut sweet)		
	hazel nut 100%	Soy nut 100%	hazel nut 50% + Soy nut 50%
Aroma	9a	9a	9a
Taste	8a	9a	9a
Texture	8a	9a	9a
Colour	8a	9b	8a
Overall acceptability	8a	9a	9a
	Nougat		
	peanut 100%	Soy nut 100%	Peanut 50% + Soy nut 50%
Aroma	8a	9a	9a
Taste	8a	9a	9a
Texture	7a	7a	9b
Colour	9a	9a	9a
Overall acceptability	8a	9a	9a
	Filled bonbon(Foryh)		
	Normal filler 100%		Normal fille 50% + Soy nut 50%
Aroma	9a		8a
Taste	9a		9a
Texture	8a		9a
Colour	9a		9a
Overall acceptability	9a		9a
	Chocolate - nut centre		
	hazel nut 100%	Soy nut 100%	hazel nut 50% + Soy nut 50%
Aroma	9a	8a	9a
Taste	9a	9a	9a
Texture	8a	8a	9a
Colour	9a	9a	9a
Overall acceptability	9a	9a	9a

Figures in similar letters indicate no significant difference.

nutritional value based on this compose. The control samples of gozea, nougat and chocolate-nut centre were deficient in 3,6 and 1 of the essential amino acids (EAA), respectively. Replacement of the common nut with soy nut at the level of 50% improved the quality of protein (as indicated by the A.S., E.A.A.I., B.V., PER_1, 2 and 3, G.D.R. and P.S./150 values) and decreased the number of deficient EAA in case of nougat (from 6to 2). When substitution with soy nut was at the level of 100%, the number of deficient EAA decreased in gozea, nougat and chocolate-nut centre from 3 to 1, from 6 to 1 and from 1 to 0 (no deficiency), respectively. This practice had raised the nutritional value of the product and the biological value of protein . Bonbon seemed to be affected by the addition of soy nut, although the number of deficient EAA was not affected. For example, when a 23-50 years old woman (Table 5) consumes 150 g of control bonbon, 16.36% of her daily requirements in R.A. (restricting EAA) will be met, in contrast to as high as 65.46% for bonbon with soy.

3 . Organoleptic evaluation

From the results in Table 6, it is clear that all products prepared with soy nut were not only accepted, but also rated as good as the control sample.

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بديل للمكسرات الشائعه مجهز من بذور الصويا : ٥- الاستبدال الجزئي والكلي للمكسرات الدارجة في الحلوي الافرنجية

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لزيادة كمية وجوده البروتين في بعض الحلوي الافرنجية جهزت الجوزية والنوجا والبنبون المحشو (الفوريه) والشيكولاته بالبندق مع أوبدون مكسرات الصويا. ولقد وجد أن هذا يزيد من محتوي البروتين ولكن لا تصبح الجوزية والنوجا مصدرا للبروتين بهذه المعاملة أما الشيكولاته بالبندق فقد كانت من البدايه مصدرا للبروتين (١١,٧٦٪) وتصبح اغني بالبروتين عند استبدال البندق بمكسرات الصويا علي مستوي ٥٠٪ ، ١٠٠٪ (يصبح البروتين ١٢,٦٧٪ ، ١٣,٥٦٪ علي التوالي). وعندما يستعمل ٥٠٪ من المحشو الطبيعي للبنبون بمكسرات الصويا يصبح البنبون مصدرا للبروتين لارتفاع نسبته من ١,٧٥٪ الي ٧,٢٢٪ . وقد لوحظ أن جودة البروتين تتحسن أيضا عند إضافه مكسرات الصويا بناء علي تقييم تركيب الاحماض الأمينيه للعينات . وحتي علي مستوي استبدال ١٠٠٪ (بمكسرات الصويا) اتضح أن الحلوي الناتجة في مستوي جودة عينات المقارنة بناء علي الأختبارات الحسية.