

## NUTRITIONAL EVALUATION OF THE FOODS DONATED BY "KHADEM AL-HARAMAIN AL-SHARIFAIN" TO PILGRIMS DURING HAJJ

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### **Abstract**

In *Hajj*, *Khadem Al-haramain Al-sharifain* donates millions of food packages, snack-type foods and cooked meals (rice with chicken) along with sweetened fruit drink, milk and mineral water. The food packages contain cream or processed cheese, few types of salted snacks and many types of sweet food items as biscuits, cookies, pastries, cakes and dates. In this study all food items were chemically analyzed to evaluate their nutritional value as well as their appropriateness to the occasion. Carbohydrates, fats and proteins were determined and energy values were calculated. Vitamin C,  $\beta$ -carotene, sodium, potassium and magnesium were determined. The average energy value for snack-type foods ranged from 1960.05-1986.73 calories, while averages for carbohydrates and proteins were 305.14-305.74g and 37.82-38.12g respectively. Fat content ranged from 73.92-77.35 g according to the types of pastries and cheeses included in the packages. For the cooked meal averages for energy, carbohydrates, proteins and fats were 846.55, 124.16, 41.60 and 21.07g, respectively. The cooked meal provides enough calories and protein, while snack-type foods provide high amounts of carbohydrates, fats and calories which are suitable for supporting activities associated with *Hajj* but providing low amount of protein. Sweet snacks increase sugar intake which has adverse effects on diabetic pilgrims and induce thirst. Therefore, it's suggested that sweet snacks should be replaced by slightly salted, low fat, whole grain biscuits. Also it's recommended to replace cream cheese with low fat hard cheese. It is advised that sauted vegetables are to be added to the cooked meals as well as fresh or unsweetened canned fruits to all food packages.

### **INTRODUCTION**

*Khadem Al-haramain Al-sharifain* is used to welcoming pilgrims during *Hajj* by providing lots of services and facilities as well as free food and water. Every year

millions of food packages (snacks and cooked meals) are donated to pilgrims who appreciate these donations since during this occasion it's too crowded to find food or drinks. Among pilgrims (more than 2 million annually) youth and old, healthy ones and others with various health problems such as diabetes, hypertension etc., and such differences demand special nutritional care and needs. Considering diabetes and hypertension, food provided must have low sugar as well as low sodium content. Foods must also provide the essential nutrients and caloric needs that meet the requirements of pilgrims since availability of food is altered in the areas where *manasik El Hajj* take place.

Sweet foods may raise blood glucose levels in diabetics and glucose intolerant people (Bantle *et al.* 1993, Malerbi *et al.* 1996), which may alter their abilities to do the obligatory *manasik*. Salted foods are not recommended since they adversely affect hypertensive people (Kotchen & Kotchen, 1991) and increase thirst sensation at times when water is scarce in the crowded areas where *manasik* are preformed.

## MATERIALS AND METHODS

Snack-type foods supplied by the national food companies in Saudi Arabia were individually wrapped. These include bran biscuits, cupcakes, maamoul, croissant, cookies, swiss-roll, tic-tac, dates with almond, plain biscuits, pastries, processed cheese, cream cheese, milk and fruit drink (artificial fruit juice). The cooked meal provided contains rice and chicken, only this food is freshly prepared.

### Sample preparation

All food samples: bran biscuits, cupcakes, maamoul, croissant, cookies, swiss-roll, tic-tac, dates with almond, plain biscuits, pastries, processed cheese, cream cheese and rice were dried at 50°C over night (under vacuum) and milled using brabender laboratory mill. The chicken bones were separated and the meat was dried before milling.

### Chemical analysis

Moisture, protein, fat, ash and total carbohydrates were determined according to AOAC (1995), while crude fibers were estimated by differences.

Vitamin C and  $\beta$ -carotene were determined according to AOAC (1990).

Potassium, sodium and magnesium were determined using Perkin Elmer atomic absorption spectrometer 3300 as described in AOAC (1990).

Calories were calculated as follows:

$$(g \text{ Carbohydrates} \times 4) + (g \text{ Protein} \times 4) + (g \text{ Fat} \times 9).$$

### Statistical analysis

Data is expressed as mean  $\pm$  SD.

## RESULTS AND DISCUSSION

The chemical composition of the analyzed food items are shown in Tables (1, 2 and 3). Snack type foods have the highest carbohydrate content as well as caloric value. Table (1) shows that these foods provide 305.14-305.74 g carbohydrate, 37.82-38.12 g protein while fat content varied from 73.92 – 77.35 g (according to the types of cheese and pastries included in the food packages), also caloric content of these foods varied from 1960.05-1986.73 calories. Cooked meals provide 41.60 g protein, 124.16 g carbohydrates, 21.07 gm fat and 846.55 calories. The table also shows the nutritive value of each item in the cooked meal (rice and chicken separately).

Table (2) shows vitamin C content of the offered food packages, which revealed that the highest vitamin C content is in the fruit drink (45.91 mg/100 g). Results for  $\beta$ -carotene indicated that the highest values were found in swiss-roll, cooked meal, tic-tac, cupcake, chicken and dates with almonds: 13228, 6463, 6229, 6072, 4719, 4599 ppm, respectively.

Table (3) represents the mineral content of the analyzed food items. Processed cheese has the highest sodium content (9933.38 mg/ 100g), maamoul has the highest potassium content (553.85 mg/100g), while bran biscuits have the highest magnesium content (180 mg/100g).

Food packages donated to pilgrims have very slight differences in their content of food items. Some items go short since large quantities are needed to fill these packages (7 million package/ season). When factories run out of certain items, they replace them with similar ones which results in the slight variation noticed in calories and nutrient content as shown in Table (1).

Results of this study revealed that the provided food packages contained quite a large amount of carbohydrate-rich items and plenty of fat but low in protein. The meals donated in such an occasion must provide enough energy- yielding nutrients so as to combat the stress associated with the occasion. Because many common snack-type foods are high in sugar, fat and sodium (Whitney *et al.* 1991) careful choices should be made to reduce problems associated with such foods (salt, sugar and fat) especially when given to pilgrims on the day of *ARAFAT*. Therefore planning snacks or meals for this occasion must depend on the Food Guide Pyramid to meet the required servings of each food group, while considering the nature of the occasion. This demands the avoidance of foods that can cause irritation of the gastrointestinal system or elevation of blood sugar or blood pressure.

It's worth notice that pilgrims may not receive both meals per day. They can get either one or luckily both. Therefore we cannot claim that the energy and fat content of these meals are more than the required.

Foods containing carbohydrate from whole grains, fruits, vegetables (Chandalia *et al.* 2000) and low fat milk (Hegsted *et al.* 1993, Hu *et al.* 1999) are healthy choices that must be considered when planning these packages. Choosing low glycemic index food (Brand *et al.*, 1991, Jarvi *et al.* 1999, Malerbi *et al.* 1996) is helpful since these foods may reduce postprandial hyperglycemia (Brand *et al.* 1991). According to the dietary guidelines, foods must provide 15-20% of total energy from protein, 55% from carbohydrates and 25-30% from fat with no more than 10% of the energy derived from saturated fat (U.S.D.A., 2000). Also the sodium content of foods must be controlled and not exceeding 3-5g per day (Kaplan, 2000).

Accordingly it was proposed that milk and cheese are to be replaced with low fat laban rayeb (curdled milk) and suitable amounts of hard, low-fat cheese to provide the body with enough calcium and protein, at the same time avoiding to some extent the problems related with milk consumption in many people (lactose intolerance) since in this occasion, gastrointestinal irritation should be avoided.

Replacing sweet biscuits with moderately salted, whole bran, low fat biscuits was recommended to avoid consuming large amounts of sugar which can raise blood glucose levels in diabetic pilgrims, in addition it increases the thirst sensation. Meanwhile slightly salted biscuits provide sufficient sodium to replace sodium loss related to stress during *Hajj* especially in hot weathers.

The juice provided must be of natural unsweetened types to avoid excessive sugar intake and to provide the minerals and vitamins needed by pilgrims although offered artificial drink seems to be enriched with Vit.C. It was also proposed that the food packages should contain fresh fruits in season which are easily handled (as to be cut in slices or halves). The most suitable fruits to be delivered to *Hajj* are apple, orange, banana, peach, pears and plums also unsweetened canned fruits can be provided.

The cooked meal is considered suitable since it provides reasonable amounts of nutrients and calories. It is preferred that vegetables as green peas and carrots should be added to increase the nutritive value of such meals, also unsweetened fruit salad or fresh fruits should be included in these meals.

The packages must be designed in a way so as to be easily handled while the pilgrims move from one place to another.

Table 1. Chemical composition and energy value of the analyzed food samples (dry matter):

Food sample	Weight (g)	Moisture %	Protein		Fat		Fiber %	Ash %	Carbohydrates		Calories (Kcal/ 100g)
			%	g	%	g			%	g	
A) Snack-type food											
Bran biscuits	30.72	7.00 ± 1.60	9.28 ± 0.85	2.65	23.00 ± 1.33	6.57	4.50 ± 0.63	2.50 ± 0.33	60.25 ± 1.78	17.21	138.56
Cupcakes	33.97	17.00 ± 1.18	8.11 ± 0.86	2.28	22.00 ± 1.26	6.20	0.90 ± 0.33	0.70 ± 0.25	68.21 ± 1.67	19.23	141.64
Maamoul	49.66	10.00 ± 1.05	6.93 ± 0.98	3.10	16.50 ± 1.42	7.37	1.20 ± 0.42	0.9 ± 0.23	71.02 ± 2.48	31.75	205.75
Croissant	30.24	13.00 ± 1.28	8.23 ± 0.80	2.16	21.00 ± 1.53	5.52	1.50 ± 0.54	0.80 ± 0.19	67.50 ± 1.60	17.76	129.36
Cookies	43.52	3.00 ± 0.99	6.85 ± 0.93	2.89	19.00 ± 1.12	8.02	0.90 ± 0.21	0.60 ± 0.21	73.50 ± 1.82	31.02	207.75
Swiss-roll	66.39	15.00 ± 1.12	6.40 ± 0.86	3.61	17.00 ± 1.43	9.59	1.60 ± 0.66	1.20 ± 0.35	71.90 ± 1.86	40.57	263.07
Tic-tac	42.28	3.50 ± 0.93	7.80 ± 1.01	3.18	16.00 ± 1.51	6.53	1.70 ± 0.82	1.20 ± 0.28	72.50 ± 1.70	29.58	107.07
Dates with almond	54.19	15.00 ± 1.38	7.70 ± 0.99	3.55	5.00 ± 1.10	2.30	4.90 ± 0.48	3.60 ± 0.33	75.60 ± 1.80	34.82	174.25
Plain biscuits	24.09	3.90 ± 0.91	8.55 ± 0.62	1.98	14.00 ± 1.27	3.20	1.60 ± 0.63	1.11 ± 0.28	74.12 ± 1.46	17.16	107.75
Pastries	57.03	13.50 ± 1.63	7.12 ± 0.83	3.51	11.50 ± 1.65	5.67	2.00 ± 0.45	1.20 ± 0.41	76.00 ± 1.75	37.49	214.87
Processed cheese	30.00	34.30 ± 1.68	20.28 ± 1.22	3.99	50.00 ± 1.82	9.85	0.60 ± 0.12	0.30 ± 0.11	28.30 ± 1.12	5.57	126.93
Cream cheese	36.00	45.60 ± 1.72	17.95 ± 1.62	3.51	56.00 ± 1.86	10.96	0.40 ± 0.11	0.20 ± 0.02	25.50 ± 1.17	4.99	132.00
Whole milk	244	88 ± 1.41	3.28 ± 0.21	7.38	3.28 ± 0.17	8.62	-	0.63 ± 0.04	4.50 ± 0.42	11.34	152.64
Fruit drink	244	89 ± 1.83	-	-	-	-	-	-	12.29 ± 0.31	29.98	119.95
Total	-	-	-	37.82 - 38.12	-	73.92-77.35	-	-	-	305.14-305.74	1960.05-1986.73
B) Cooked meal											
Chicken	288	62.66 ± 1.88	63.11 ± 1.79	40.04	24.81 ± 1.46	15.74	2.15 ± 0.33	2.30 ± 0.25	5.55 ± 1.65	3.52	315.89
Rice	174.46	52.00 ± 1.77	7.00 ± 0.82	9.68	6.50 ± 1.12	8.99	1.50 ± 0.52	1.00 ± 0.11	82.11 ± 1.92	113.51	573.61
Chicken & Rice	429.96	55.00 ± 1.68	21.02 ± 1.44	41.60	11.05 ± 1.33	21.07	1.70 ± 0.63	1.40 ± 0.26	65.12 ± 1.82	124.16	846.55

Table 2. Vitamin C &  $\beta$ -carotene content of the analyzed food samples.

Food sample	Vitamin C (mg/ 100g)	$\beta$ - carotene (ppm)
A) Snack-type food		
Bran biscuits	2.60 $\pm$ 0.22	3547 $\pm$ 1.75
Cupcakes	1.54 $\pm$ 0.17	6072 $\pm$ 1080
Maamoul	1.10 $\pm$ 0.12	3727 $\pm$ 1.65
Croissant	0.22 $\pm$ 0.08	330.7 $\pm$ 1.77
Cookies	0.80 $\pm$ 0.12	2585 $\pm$ 1.88
Swiss-roll	1.10 $\pm$ 0.32	13228 $\pm$ 1.97
Tic-tac	4.40 $\pm$ 0.71	6229 $\pm$ 1.55
Dates with almond	1.32 $\pm$ 0.82	4599 $\pm$ 1.37
Plain biscuits	1.10 $\pm$ 0.31	2735 $\pm$ 1.66
Pastries	0.66 $\pm$ 0.12	264 $\pm$ 1.73
Processed cheese	1.44 $\pm$ 0.77	3126 $\pm$ 1.81
Cream cheese	1.10 $\pm$ 0.44	2615 $\pm$ 1.66
Whole milk	0.82	287
Fruit drink	45.91	-
B) Cooked meal		
Chicken	1.21 $\pm$ 0.33	4719 $\pm$ 1.44
Rice	1.10 $\pm$ 0.22	2705 $\pm$ 1.48
Chicken & Rice	1.10 $\pm$ 0.31	6463 $\pm$ 1.55

Table 3. Mineral composition of the analyzed food samples.

Food sample	Sodium (mg/ 100g)	Potassium (mg/ 100 g)	Magnesium (mg/ 100g)
A) Snack-type food			
Bran biscuits	739.99	389.99	180.88
Cupcakes	612.08	105.39	126.64
Maamoul	389.37	562.14	149.16
Croissant	372.89	178.56	24.24
Cookies	55.89	31.47	13.85
Swiss-roll	393.96	90.38	23.11
Tic-tac	624.22	55.82	30.47
Dates with almond	117.99	468.14	60.4
Plain biscuits	418.39	553.85	38.63
Pastries	1272.23	217.34	139.26
Processed cheese	933.38	430.29	149.97
Cream cheese	555.53	480.86	165.7
Whole milk	49.18	151.64	13.52
Fruit drink	1.3	0.14	0.72
B) Cooked meal			
Chicken	686.12	151.88	155.5
Rice	658.1	495.09	158.5
Chicken & Rice	2712.44	345.66	152.3

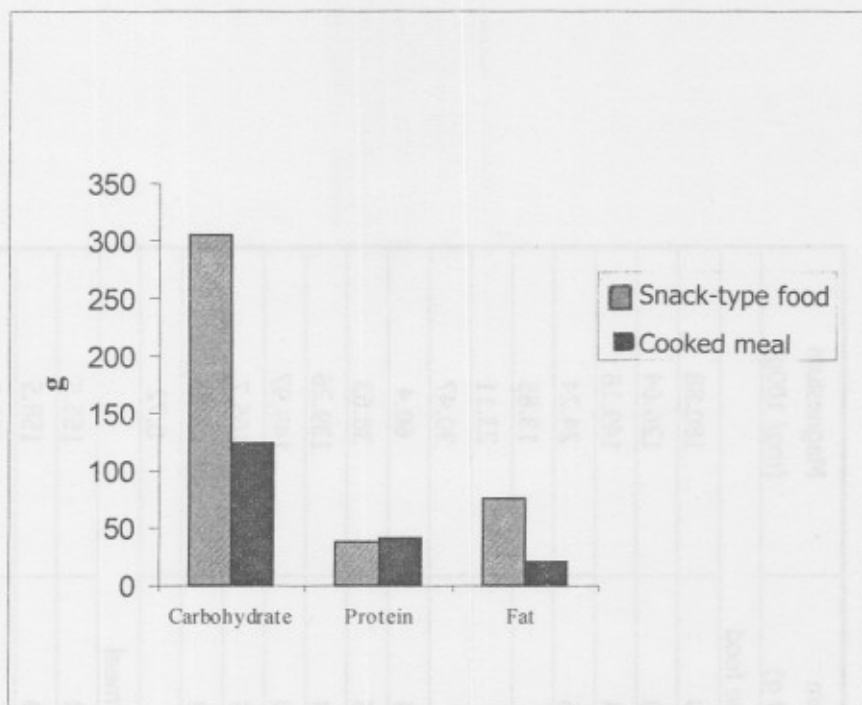


Fig. 1. Carbohydrate, protein and fat content of the analyzed food samples.

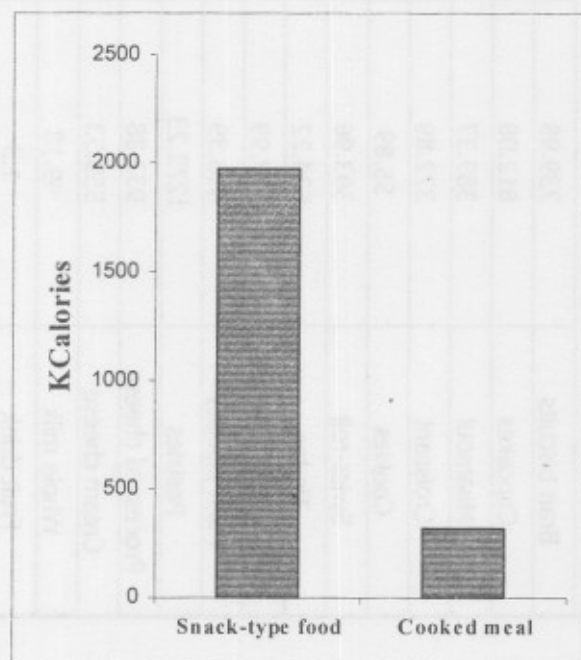


Fig. 2. Energy value of the analyzed food samples.



## REFERENCES

1. A.O.A.C. 1990. Official Methods of Analysis, 15<sup>th</sup> ed., Association of Official Analytical Chemists, Washington, DC.
2. A.O.A.C. 1995. Official Methods of Analysis, 16<sup>th</sup> ed., Association of Official Analytical Chemists, Washington, DC.
3. Bantle J.P., J.E. Swanson, W. Thomas and D.C. Laine 1993. Metabolic effects of dietary sucrose in type II diabetic subjects, *Diabetes Care*, 16: 1301-1305.
4. Brand J.C., S. Colagiuri, S. Crossman, V. Allen, D.C.K. Roberts and A.S. Truswell 1991. Low glycemic index food improve long-term control in NIDDM, *Diabetes Care*, 14: 95-101.
5. Chandalia M., A. Garg, D. Luthohann, K. Von Bergmann , S.M.Grundy and L.J Brinkley 2000. Beneficial effects of a high dietary fiber intake in patients with type 2 diabetes, *N. Engl. J. Med*, 342: 1392-1393.
6. Hegsted D.M., L.M. Ausman., J.A. Johnson and G.E. Dallal 1993. Dietary fat and serum lipids: An evaluation of the experimental data, *Am. J. Clin. Nutr.*, 57:875-883.
7. Hu F.B., M.J. Stampfer, E.B. Rjimm, J.E. Manson, A. Ascherio, G.A. Colditz, B.A. Rosner, D. Spiegelman , F.E. Speizer F.M. Sacks, C.H. Hennekens and W.C. Willett 1999. A prospective study of egg consumption and high risk of cardiovascular disease in men and women, *JAMA*, 281: 1387-1394.
8. Jarvi A., B. Karlstrom, Y. Granfeldt, I. Bjorck, N.G. Asp and B. Vessby 1999. Improved glycemic control and lipid profile and normalized fibrinolytic activity on a low glycemic index diet in type 2 patients with diabetes, *Diabetes Care*, 22: 10-18.
9. Kaplan N.M. 2000. Evidence in favor of moderate sodium reduction, *Am. J. Hypertens.* 13:8-13.
10. Kotchen T.A. and J.M. Kotchen 1991. Dietary sodium and blood pressure Interactions with other nutrients, *Am. J. Clin. Nutr.*, 65 (Suppl. 1): I150-I154.
11. Malerbi D.A., E.S..Pavia, A.L. Duarte and B.L. Wajchenberg 1996. Metabolic effects of dietary sucrose and fructose in type 2 diabetic subjects, *Diabetes Care*, 19: 1249-1256.
12. U.S. Department of Agriculture, U.S. Department of Health and Human Services 2000. Nutrition and Your Health, Dietary Guidelines for Americans. 5<sup>th</sup> ed., Home and Garden Bulletin No. 232.
13. Whitney E.N., C.B. Cataldo and S.R. Rolfes 1991. Understanding Normal and Clinical Nutrition. 3<sup>rd</sup> ed. West publishing Company, p: 423.

## التقييم التغذوي للأطعمة المقدمة من خادَم الحرمين الشريفين للحجاج أثناء الحج

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يقدم خادم الحرمين الشريفين حفظه الله قرابة سبعة مليون عبوة محتوية علي أطعمة خفيفة و أطعمة مطهية (الأرز و الدجاج) مع مشروب الفواكه و الحليب و الماء. و من الأطعمة الخفيفة المقدمة البسكوتات " الحلوة و المملحة " و الفطائر و الكيك و التمر. و كان الهدف من هذه الدراسة هو التقييم التغذوي لهذه الأطعمة و تقدير مدى ملاءمتها لهذه المناسبة. و قد تم التحليل الكيميائي لتقدير محتوى الأطعمة من الكربوهيدرات و الدهون و البروتينات و كذلك حساب القيمة السعرية لها ، كما تم تقدير فيتامين ج و بيتا كاروتين و بعض المعادن كالصوديوم و البوتاسيوم و الماغنسيوم. و كان متوسط السرعات للأطعمة الخفيفة يتراوح بين 1960 - 1987 سعراً بينما كان المتوسط للكربوهيدرات و البروتين يتراوح بين 305.1-305.7 و 37.8 - 38.1 جم علي التوالي ، و تراوحت نسبة الدهون بين 73.9 - 77.3 و ذلك تبعاً لنوع الفطيرات الدسمة و الجبن المقدم. و كان متوسط القيمة السعرية للوجبة المطهية 846.5 سعراً بينما كان المتوسط للكربوهيدرات و البروتين و الدهون 124.2 و 41.6 و 21 جم علي التوالي.

وقد أظهرت النتائج أن الوجبة المطهية تؤمن قدرًا كافيًا من الطاقة و العناصر الغذائية الأخرى بما يتناسب مع احتياجات الحجاج من الطاقة و المغذيات اللازمة للقيام بكافة الأنشطة المرتبطة بالحج. و لكن الأطعمة الخفيفة المقدمة كانت منخفضة في البروتين و مرتفعة في السكريات مما يؤدي إلي زيادة المتناول من السكر و ما لذلك من آثار سلبية علي مرضي السكر من الحجاج و أيضا يؤدي إلي زيادة الإحساس بالعطش ، لذلك يقترح الباحثون ضرورة استبدال البسكوتات الحلوة و الكيك باخري مصنعة من الدقيق الكامل و منخفضة في الملح و الدهون. كذلك استبدال الجبن الدهني الطري بالجبن الصلب قليل الدسم. و أيضا إضافة الخضروات السوتيه للوجبة المطهية مع إضافة الفواكه الطازجة أو المعلبة بدون سكر لكل الوجبات المقدمة.