

COMPARING OF NUTRIENTS CONTENT AND CALORIFIC VALUE IN THE DIETS OF POLES AND GREEKS LIVING IN ATHENS

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ABSTRACT

Background. Diet is generally defined as a set of behaviors, on the choice of certain foods, their consumption, and it is conditioned by various factors. Each model is shaped feeding in a given place and time by repeated regularly eating and dietary habits. Polish migration to Greece contributed not only to change their place of residence, but also forced them to adapt to a new country. In the literature, foreign language is used for this purpose, the concept of acculturation, which can be distinguished in many aspects of life as well as on the diet. Acculturation related to a diet is called acculturation nutritional and can cause desirable or undesirable effects on nutrition.

Objective. To compare calorific intakes and core nutritional components in the daily diets of Poles and native Greeks, residing in Athens.

Materials and methods. Three repeats of completing a 24-hour food questionnaire were performed for the study. Results were compared with known nutritional requirements and recommendations (according to weighted means). *Subjects:* These were recruited at the turn of 2010/2011 in Athens and consisted of 66 persons aged 19-26, 31-50 and 51-65 years of whom 31 were Polish and 35 Greek. In the former, 18 (58%) were women and 13 (42%) men, whilst in the latter 19 were women (54%) and 16 men (46%).

Results. Daily dietary intakes of calories were 1832 kcal for the Poles but 1628 kcal for the Greeks. Significant differences were observed between the subject groups for daily dietary intakes of calories, total carbohydrate, fibre, saturated fatty acids (SFA) and poly-unsaturated fatty acids (PUFA). In women subjects, both Polish and Greek, these significant differences were seen in calorific and carbohydrate intakes, whereas for Polish and Greek men such differences were limited only to dietary fibre.

Conclusions. The daily diets of Poles and Greek subjects living in Athens did not meet recommended standards of proper nourishment.

Key words: *nutrients, calories, daily dietary intakes, Poles, Greeks, Athens, saturated fatty acids, SFA, poly-unsaturated fatty acids, PUFA*

STRESZCZENIE

Wprowadzenie. Sposób żywienia jest na ogół definiowany jako zbiór zachowań, dotyczących wyboru określonych produktów spożywczych, ich konsumpcji i jest on uwarunkowany różnymi czynnikami. Każdy model żywienia kształtowany jest w danym miejscu i czasie przez powtarzające się regularnie nawyki oraz zwyczaje żywieniowe. Migracja Polaków do Grecji przyczyniła się nie tylko do zmiany ich miejsca zamieszkania, ale również zmusiła ich do adaptacji w nowym kraju. W literaturze obcojęzycznej używa się do tego celu pojęcia akulturacji, które może być rozróżniane w wielu aspektach życia, również dotyczących diety. Akulturacja związana z dietą nazywana jest akulturacją żywieniową i może wywołać pożądane, bądź niepożądane skutki w odżywianiu.

Cel. Celem pracy było porównanie podaży energii i składników podstawowych w całodziennych racjach pokarmowych Polaków mieszkających w Grecji, jak i rdzennych Greków, mieszkańców Aten.

Material i metody. Przeprowadzono wywiady żywieniowe z ostatnich 24 godzin przed badaniem, powtórzone trzykrotnie. Wyniki porównano z wymaganiami i zaleceniami żywieniowymi. W badaniach wykonanych w latach 2010/2011 w Atenach uczestniczyło 66 osób w wieku 19-26, 31-50 and 51-65 lat, z których 31 stanowili Polacy i 35 Grecy.

Wyniki. W całodziennych racjach pokarmowych Polaków podaż energii wynosiła 1832 kcal, natomiast Greków - 1628 kcal. Nie stwierdzono istotnych różnic statystycznych w całodziennych racjach pokarmowych Polaków (n = 31) i Greków (n = 35), w zakresie podaży energii, węglowodanów ogółem, błonnika, SFA oraz PUFA. Jeśli chodzi o całodziennie racje pokar-

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mowe polskich (n = 18) i greckich (n = 19) kobiet to nie zaobserwowano istotnych różnic w podaży energii i węglowodanów ogółem, podczas gdy wśród polskich (n = 31) i greckich (n = 16) mężczyzn stwierdzono istotne różnice w podaży błonnika. **Wnioski.** Całodzienne racje pokarmowe zarówno osób pochodzenia polskiego, mieszkających w Grecji jak i greckiego – mieszkańców Aten nie realizowały przyjętych norm i zaleceń prawidłowego odżywiania.

Słowa kluczowe: składniki odżywcze, energia, dzienne racje pokarmowe, Polacy, Grecy, Ateny, błonnik, węglowodany, nasycone kwasy tłuszczowe, SFA, wielonienasycone kwasy tłuszczowe, PUFA

INTRODUCTION

Migration throughout Europe is a widespread phenomenon. When migrants change their country of residence, changes in dietary habits often concomitantly happen, that so bear a direct effect their health [10]. Poles living in Greece are one of the oldest and one of the ten largest immigration groups in Greece. Currently, the Polish Embassy in Athens estimates that there are around 30,000 to 35,000 Poles living in Greece [6]. Information on the inhabitant's nutritional preferences can therefore be essential to food producers, dieticians and nutrition experts.

Many studies have demonstrated that the risk of heart disease, cancer, *Parkinson's* and *Alzheimer's* disease are decreased in those living around and adopting the traditional Mediterranean Sea diet [1]. The first results were published by *Keys* whose thesis was subsequently confirmed by many other studies. It was additionally proved that this 'Mediterranean diet' (MD) also has beneficial effects on fat metabolism, blood pressure, blood coagulability and the BMI [7]. Its pro-healthy features arise from a high intake of vegetable foodstuffs, but low intakes of animal products. The main components of the MD are cereal products from whole grains, vegetables, fruit (3 portions per day), and pulses and legumes (3-4 weekly portions). Dairy products are consumed twice daily, whereas fish and seafood 5-6 times weekly, with red meat and its products 4 times per month. The high olive oil intake, which is typical in these regions, was regarded as the valuable source of monounsaturated fatty acids (MUFA) and vitamin E. Alcohol intake was limited to 1-2 glasses of red wine per day. The MD diet was consequently low in calories but rich in macrocomponents, vitamins and mineral compounds and, as such, it has played an important role in preventing cardiovascular system disease. This way of nutrition has been characteristic in the inhabitants of villages and country towns, whereas in cities the so called 'western' diet, that is rich in fat, is starting to predominate.

The study aim was to compare the dietary intakes of calories and core components for Poles and native Greeks living in Athens.

MATERIALS AND METHODS

The study was performed at the turn of 2010/2011 in Athens among 66 people of whom 31 were Polish and 35 Greek.

A 24-hr food questionnaire, repeated three times, was completed by both these subject groups. The sizes of consumed portions were assessed on the basis of an 'Album of products and meals portions' [12], from which calorific values and core nutrients' content in the daily diet were calculated. To this end, the *Energia v. 4.1* computer programme was used with the 'Tables of chemical composition and nutritional value of foodstuffs' [5], providing the database. The programme allowed for 10% losses arising from food processing. Results were compared with standards and recommendations (according to weighted mean) and calculated by the following formula:

$$Z = \frac{S_1U_1 + S_2U_2 + \dots + S_xU_x}{100}$$

where:

Z = weighted mean of nutrient demand per person,

$S_1S_2\dots S_x$ = calorific demand for each member from 'x' group,
 $U_1U_2\dots U_x$ = percentage share of a given groups' participation.

Standards and recommendations used for the calculations have been earlier described by *Jarosz* and *Bulhak-Jahymczyk* [2] based on the average demand – EAR. On account of the large differences in standards and recommendations (related to age and gender) as well as to simplify the calculations, female and male subjects were divided into the following age groups; 19-30, 31-50 and 51-65 years (Table 1). The weighted mean of the calorific demands as calculated by the above formula were 2012 kcal for women and 2878.4 kcal for men.

Table 1. Demographic characteristics of Polish and Greek subjects participated in the study

Poles and Greeks				
Age	Women		Men	
	n=37	% of group	n=29	% of group
19-30	22	59%	22	76%
31-50	13	35%	6	21%
51-65	2	5%	1	3%

Using the STATISTICA PL, in v. 9.0 by StatSoft programme, statistical analysis was performed allowing a comparison of calorific and macronutrients intakes to be made between the Polish and Greek diets. The test used was the non-parametric *Mann-Whitney U*, adopting a $p \leq 0.05$ level for significance.

RESULTS

Among the 31 Poles 18 (58%) were women and 13 (42%) men, whilst for the 35 Greeks, 19 were women (54%) and 16 men (46%). Compared with the Greeks, Poles were more physically active where 15 subjects (48%) declared an average level and 10 (32%) had high levels of physical activity. Most of the Greeks (16 ie. 46%) were not physically active. The majority in both groups were young people, aged 19-30 years (64.5% Poles, 68.6% Greeks). The average age of the Poles was 28.7 years for women and 29 years for men, but in Greeks these were 31.7 years for women and 28 years for men. The results of the studies are presented in tables 2-4.

Table 2. The energy and nutrients supply in daily food rations of Poles (n= 31) and Greeks (n= 35)

Parameters	Unit	Average value of analyzed variable		U <i>Mann-Whitney</i> test p
		Poles	Greeks	
Energetic value	kcal	1832	1628	0.02*
Total protein	g	69.9	66.0	0.31
Animal protein	g	46.5	45.3	0.67
Vegetable protein	g	23.2	20.7	0.12
Total fat	g	69.9	84.5	0.10
Total carbohydrates	g	224.9	195.1	0.04*
Fiber	g	18.1	14.8	0.03*
SFA	g	28.0	24.7	0.006*
MUFA	g	31.3	29.7	0.39
PUFA	g	11.7	9.5	0.006*
Cholesterol	mg	270.5	239.9	0.14

*differences statistically significant at $p < 0.05$

The daily dietary calorific intakes for Poles was 1832 kcal but 1628 kcal for the Greeks. In both groups, the calorific intakes were lower than the calculated demand. Polish women met this demand at 84%, whereas Greek females at 73%. Polish men achieved the calorific EAR standard at 71%, whereas the Greeks at 63%. Dietary calorific intakes were higher in Polish women than Greek women; respectively 1680.1 kcal, (ie. 84% of recommendations) vs. 1466.0 kcal (ie. 73%). Likewise in men, the Poles' calorific intakes were higher than in Greeks; respectively on average 2041.8 kcal (ie. 71% of recommendations), vs. 1819.6 kcal (ie. 63%).

Total daily intakes of dietary protein was on average 69.9 g (range: 39–129 g) for the Poles and 66.0 g (range: 41.7-113.6 g) for the Greeks. According to the calcula-

ted weighted mean, the EAR recommended protein allowance for women should be 58.8 g, and 77.2 g for men. On average, the dietary daily intake of protein in Polish women was 62.6 g (107% of the standard), out of which 41.6 g, (212% of the recommendations), was of animal origin and 21.0 g, (54% of the recommendations), was vegetable derived protein. Greek women consumed 58.9 g of this nutrient and thus properly fulfilled standard at 100%. The intake types of protein were however unsuitable in both Greek and Polish women where about 40.6 g (207% of the recommendations) was of animal origin, but only 18.3 g (47% of the recommendations) were vegetable derived. In Polish men the protein intake was 79.4 g (ie. 103% of the recommendations), of which 53.2 g (207% of the recommendations) was animal protein, but only 26.2 g (51% of recommendation) was vegetable derived. Greek protein intakes were 74.5 g (97% of the recommendations) for men, of which 50.9 g (198% of the recommendations) was animal protein, but only 23.6 g (46% of the recommendations) came from vegetables. Summing up, respectively 38.9% and 57.9% of Polish and Greek women along with 61.5% and 62.5% of Polish and Greek males fulfilled dietary recommendations for consuming vegetable protein within the 30-50% range.

The subjects' diets met the demand by more than 110% to the recommended levels. Despite the fact that the ratio of vegetable to animal protein in a healthy adult diet should be 2:1, none of the surveyed groups' meals fulfilled this particular condition.

The Poles' daily diet delivered an average 224.9 g of carbohydrates (range: 95-334 g), whereas the Greeks yielded 195.1 g (range: 110.1-360.2 g). According to the EAR standard, calculated as the weighted mean, the daily dietary intake should however provide women with 276.6 g of carbohydrates and men with 395.8 g. It was therefore observed that both these groups consumed too little of this nutrient. In detail, Polish women received 211.6 g of carbohydrates in their diet, accounting for 77% of recommended standard. In Greek women, this was even less at 172.9 g (63% of the standard) of dietary carbohydrate. Carbohydrate intakes for Polish men was 243.2 g (61% of the recommended standard), whereas the Greeks' daily diet delivered 221.4 g of carbohydrates (56% of the recommended standard).

According to the established recommendations, the amount of fibre necessary in a daily diet should be at least 30 grams per day. In general, the Poles' daily meals were richer in this nutrient than for Greeks, being 18.1 g (range: 8.7 – 33.2 g) for the former and 14.8 g for the latter (range: 7.2 – 27.3 g). Daily dietary fibre intakes in Polish women were 15.9 g (53% of the recommendations), whereas they were 13.6 g (45% of the recommendations) for Greek women. Polish men consumed 21 g of dietary fibre (70% of the recommendations), whereas

Table 3. The average supply of energetic value and core nutrients in investigated group of Polish (n=18) and Greek (n=19) women

Nutrients	Unit	Average supply		Standard deviation (±SD)		Minimum		Maximum		Median		Standards and recommendations – weighted mean	% of standards realisation	
		Polish women	Greek women	Polish women	Greek women	Polish women	Greek women	Polish women	Greek women	Polish women	Greek women		Polish women	Greek women
energetic value*	kcal	1680.1	1466.0	359.9	353.7	1000.0	1006.0	2275.0	2181.0	1683.5	1344.0	2012.0	84	73
total protein	g	62.6	58.9	13.0	13.9	39.0	41.7	82.3	96.0	62.4	54.0	58.8	107	100
animal protein	g	41.6	40.6	9.1	11.8	27.7	24.8	62.9	65.4	40.6	37.8	19.6	212	207
vegetable protein	g	21.0	18.3	6.1	6.2	10.6	9.8	34.6	35.7	20.0	16.0	39.2	54	47
total fat	g	69.9	63.1	15.1	16.4	40.3	27.4	98.4	109.5	66.4	60.9	65.7	106	96
total carbohydrates*	g	211.6	172.9	64.5	55.2	95	110.1	318.2	320.6	203.1	157.4	276.6	77	63
fiber	g	15.9	13.6	4.8	4.1	8.7	7.2	29.6	23.2	16.0	12.4	30	53	45
SFA	g	26.8	23.1	7.2	7.2	15.4	10	43	41.5	26.8	21.9	16.7	160	138
MUFA	g	27.8	27.3	6.4	7.8	15	10.6	38	48.0	27.8	25.9	34.7	80	79
PUFA	g	10.9	8.5	1.8	6.1	1.8	4.9	19.9	11.8	10.9	8.0	13.4	81	63
cholesterol	mg	238.0	217	119.9	122.3	119.9	91.0	368.1	659.3	238	182.5	300	79	72

*differences statistically significant at p< 0.05

Table 4. The average supply of energetic value and core nutrients in investigated group of Polish (n=13) and Greek (n=16) men

NUTRIENTS	Unit	Average supply		Standard deviation (±SD)		Minimum		Maximum		Median		Standards and recommendations – weighted mean	% of standards realisation	
		Polish men	Greek men	Polish men	Greek men	Polish men	Greek men	Polish men	Greek men	Polish men	Greek men		Polish men	Greek men
energetic value	kcal	2041.8	1819.6	332.2	382.4	1376.0	1321.0	2478.0	2711.0	2005.0	1755.0	2878.4	71	63
total protein	g	79.4	74.5	18.1	17.6	49.7	46.9	129.0	113.6	79.7	71.0	77.2	103	97
animal protein	g	53.2	50.9	15.0	13.9	31.8	29.7	95.3	76.3	50.2	48.4	25.7	207	198
vegetable protein	g	26.2	23.6	6.3	6.3	17.9	14.1	37.2	37.9	24.7	22.0	51.5	51	46
total fat	g	84.5	75.1	18.4	16.6	53.7	50.5	110.8	108.4	83.6	72.5	96.9	87	78
total carbohydrates	g	243.2	221.4	49.4	60.6	162.5	128.1	334.4	360.2	231.3	210.5	395.8	61	56
fiber*	g	21.0	16.3	6.1	4.6	12.9	8.9	33.2	27.3	20.4	16.8	30	70	54
SFA	g	29.6	26.6	6.6	5.3	19.4	18.1	42.8	36.5	29.0	26.4	20.7	143	129
MUFA	g	36.2	32.6	9.1	9.6	20.6	18.5	48.8	53.6	35.5	29.8	59.7	61	55
PUFA	g	12.9	10.8	2.9	4.2	5.6	3.8	17.3	21.1	13.4	10.0	19.2	67	56
cholesterol	mg	315.6	267.1	125.6	92.0	164.7	105.7	587.3	444.8	248.8	247.4	300	105	89

*differences statistically significant at p< 0.05

this was 16.3 g (54% of the recommendations) for Greek men. Thus in general, the fibre content delivered in the diet for each group was very low.

Average intakes of dietary fat was 69.9 g for the Polish group but in Greeks this was 84.5 g. When compared to men, more women's diets (respectively 38.9% and 36.8% of Polish and Greek women) met recommended standard values for this nutrient, lying within the correct range of 90-110%. In men, the corresponding values were 38.5% and 43.8% for respectively Poles and Greeks that fell within the standard 70-90% range for fats.

The daily dietary content of saturated fat acids (SFA) was respectively 28 g and 24.7 g in Poles and Greeks, which exceeded the recommendations. The values for Polish women were 160% of the recommendations and 138% for Greek women, whilst for men these were respectively 143% and 129% in Poles and Greeks. In contrast to SFA, dietary MUFA were delivered in low quantities. Polish and Greek women fulfilled the MUFA recommendations, respectively at 80% and 79% cases whereas in men this was respectively 61% and 55% for Poles and Greeks. In parallel, 33.3% of the Polish women's dietary intakes met the recommendations in 90-110% and in the 70-90% ranges.

Dietary intakes of MUFA in Greek women (36.8%), mostly fulfilled the recommendations for this fat in the 50-70% range. However some women from both groups showed MUFA intakes above the recommendations by over 130%. For Polish men, the daily MUFA dietary intake varied where 38.5% satisfied the recommendations in the 50-70% range whilst a little less (30.8%) met them in 70-90% range and the same amount at 30-50%. Dietary intakes of MUFA in Greek men fulfilled the recommendations in 50% cases, within the range of 30-50%, therefore this diet delivered the least of the aforementioned fatty acids from all of the investigated groups. Furthermore, PUFAs were not delivered in sufficient quantities, with their dietary demand being met in the 50-70% range by respectively 33.3% and 57.9% of Polish and Greek women along with respectively 46.2% and 37.5% of Polish and Greek men.

The daily diet for Poles contained 270.5 mg of cholesterol and for Greeks 239.9 mg. Diets of Polish women delivered 238 mg cholesterol, fulfilling 79% of the recommendations, whereas Greek women's diets delivered 217 mg per day, which accounted for 72% of the recommendations. Men were found to consume cholesterol in greater amounts, with the Polish diets delivering 315.6 mg per day (105% of the recommendations) and the Greek diet delivering 267.1 mg of cholesterol meeting 89.0% of the recommendations.

Significant differences were observed in the diets of Poles and Greeks for delivered calories, carbohydrate, fibre, SFA and PUFA. For Polish and Greek women,

significant differences were seen in delivered calories and total carbohydrate. However only a significant difference was seen in delivered dietary fibre for Polish and Greek men.

DISCUSSION

The daily Polish diets met the nutrient demand to greater extent than the Greek ones. Significant differences were observed in dietary calories, total carbohydrate, fibre, saturated and polyunsaturated fatty acids. Both Poles and Greek diets delivered excessive animal protein and saturated fatty acids whereas too little vegetable protein, total carbohydrate were consumed according to the recommendations.

The reason for the higher calorific content in Polish meals may be related to the higher physical activity of Poles. In a study by *Sygnowska* and *Waśkiewicz* [11] on 658 men and 671 women, with variable physical activity, those who were more physically active ate higher calorific meals compared with those not being physically active at all. A similar result was indicated in the presented study.

Significant differences were observed in dietary saturated fatty acids with Poles consuming more than the Greeks. However in both groups, saturated fatty acids delivered in the diets were above recommended levels. This being likely caused by excessive intakes of animal protein. A diet rich in saturated fatty acids is not a healthy one and can lead to cardiovascular system diseases or obesity developing.

There was also more carbohydrate and fibre featuring in Polish meals. On average, 18.1 g per day of dietary fibre was delivered by Polish meals compared to 14.8 g for the Greek meals. Nevertheless, both values are too low according to recommended levels of >30 g per day.

Similar results were obtained by *Piorecka* et al. [8] for the diets of adult women from Cracow, in which total fats and cholesterol were delivered in appropriate amounts however total carbohydrates and fibre were too low. In addition, too much animal protein was consumed, whereas the vegetable protein consumption was too low. These results are mirrored in the present work in the diets of both Poles and Greeks.

The percentage calories derived from core dietary nutrients deviated from WHO/FAO recommendations which should be 10-15% from protein, 55-75% from carbohydrates and 15-30% from fats. The nutrient deviations found in Polish and Greek diets were however similar

A 2005 study [9] demonstrated a similar structure in the dietary calories delivered by the meals of healthy women, aged 30-60 and living in Athens, who had

completed a 24-hrs food questionnaires. Their diets showed 15% of calories came from protein, 43.2% from carbohydrates and 40% from fats.

Karamanos et al. [4] obtained similar results from a breakdown of delivered calories in the meals eaten in different countries where the percentage calories derived from carbohydrates was 45% and from fats 36.5%; the exception being protein which was 13.4% and was lower than in our study.

A study by *Johansson et al.* [3] stated that a too low calorific intake in diets occurs rather commonly. They also explained that there may be several reasons for a lowered calorific value; body weight, subject age, their physical attractiveness, confidence in an interviewer as well as difficulties in remembering what a meal consisted of within the last 72 hrs. Another influencing factor often found, was the willingness and ability to share information about consumed foodstuff products with an interviewer. The presented study showed that a further and important factor should be taken into account ie. the subject's level of understanding English, (in which the questionnaire was prepared), especially for the Greeks. The study subjects were chosen at random, however they were asked prior to interview about how good their English was, which in all cases proved to be very good. Nonetheless, the necessity to translate the names of local dishes and products could make it difficult for them to easily express their thoughts and, in effect, to communicate with an interviewer.

CONCLUSIONS

1. The dietary intake of Poles and native Greeks living in Athens did not meet the recommended standards of proper nourishment. In addition, they did not fulfil the recommendations defined by the pyramid of a Mediterranean diet.
2. The Poles' and Greeks' way of nourishment was typical of Western countries where diets are rich in animal fats, animal protein, saturated fatty acids and poor in carbohydrates and fibre.

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Conflict of interest

The authors declare no conflict of interest.

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