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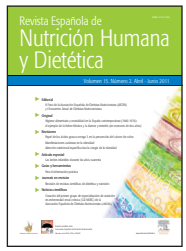

ORIGINAL

The importance of a registered dietitian in restaurants: a pilot study in Valencia (Spain)

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KEYWORDS
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Abstract University students have the option to purchase their meals at university restaurants; in general, food eaten away from home has high contents of saturated fat and energy. The aim of this work was to perform a pilot study of the nutritional adequacy of meals served at two university restaurants from Valencia. Energy, macronutrient and micronutrient contents were calculated and compared against the Spanish Recommended Dietary Intake (SRDI). Daily menus provided a high amount of energy; lunch from restaurant 1 provides 60 and 78%of the energetic SRDI for male and female, respectively. In restaurant 2 these values are 49.5 and 64.6%, respectively. Menus from one university restaurant are planned by a registered dietitian, and provide an amount of protein, energy and cholesterol closer to the SRDI. University restaurants may be useful to long-term successful dietary behavior changes by developing healthy menus, providing nutritional education and adequate dietary intakes with the help of the registered dietitian.

PALABRAS CLAVE
Restaurantes universitarios;
Evaluación de menús;
Contenido nutricional;
Estudiantes;
Comidas

La importancia del dietista-nutricionista en restaurantes: estudio piloto en Valencia (España)

Resumen Los estudiantes universitarios tienen la opción de seleccionar las comidas en los servicios de restauración universitarios, y en general las comidas realizadas fuera del hogar son energéticas y tienen alto contenido de grasas saturadas. El objetivo de este trabajo es llevar a cabo un estudio piloto de la adecuación nutricional de las comidas servidas en dos restaurantes universitarios en Valencia. Se calculó la energía y los contenidos de macronutrientes y micronutrientes y se los comparó con las ingestas dietéticas recomendadas (IR) para la población española. Los menús diarios tenían alto valor energético; el menú de un restaurante aporta el 60 y el 78%de las IR para varones y mujeres respectivamente. En el segundo restaurante estudiado, los valores son del 49,5 y el

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64,6%, respectivamente. En este segundo restaurante universitario trabaja una dietista, que ajusta los menús en cuanto a las cantidades energéticas, proteicas y de colesterol cercanas a las IR. Los restaurantes universitarios pueden ser útiles para llevar a cabo a largo plazo menús saludables, educación alimentaria y adecuadas ingestas dietéticas, siempre y cuando trabaje en ellos un dietista-nutricionista

Introduction

Dietary habits established by young adults when they are away from home may have a long-lasting impact on their health; dietary habits modify or determine risk factors of nutritionally related chronic diseases, e.g. coronary heart diseases, anemia and obesity. In general, taste and cost of food have become more important than nutritional concerns; in the case of students, the importance of nutrition disappears as a perception while convenience emerges[1-3].

University students have the option to purchase their meals at university restaurants; in Croatia, 36.5%of the students eat at the university restaurant more than once a day, and 37.1%once a day[4]. In Spain, eating away from home is an overall increasing habit[5]. Several reasons can explain the increased consume of meals away from home such as higher involvement of women in the labor force, higher family incomes, smaller households and a higher supply of affordable and convenient fast-food outlets. Studies have shown that foods away from home contribute to unhealthy diets, since these foods are generally highly dense in fat, total calories, and sodium[6]. Something similar happens regarding the diet of university students; university restaurant meals were found to have protein and lipid contents over the recommended intake and lower content of carbohydrates[7].

According to Nielsen et al[8] (2002), greater attention must be paid to food consumed away from home when shifting the composition of diet towards healthier food choices. Steptoe et al [9] (2001) observed unfavorable changes in health behavior among university students in 13 European countries during the last decade. Adverse changes in dietary habits of European university students show the need for correcting food and nutrient intakes[10]. University restaurants or cafeterias may be decisive for reaching the nutritional objectives for university students and could be optimal settings for influencing appropriate dietary behavior.

At the University of Valencia, restaurants make the effort to guarantee the hygienic quality of foods; however, menus are planned with an insufficient background on nutrition. It is important to consider that students sometimes are forced to be at the university for long periods of time, occasionally eating their three main meals at the university restaurant; if these menus do not provide an adequate nutrient intake, the student will not be able to compensate this lack during the day. These health concerns have been addressed by working with point-of-purchase sites at university restaurants at the beginning of this decade[10-13].

Because obesity, overweight and other nutritional related problems are frequent in the university population[14], the aim of this work was to carry out a pilot study of the nutritional value of foods available to students at two university restaurants from Valencia, Spain.

Methods and materials

Food collection

Two university restaurants participated in this study during 2009. Thirty daily menus for each season were analyzed (n=120, i.e. 30 for each season), daily lunch menus were chosen by random sampling. Menus from both restaurants offer two main courses (the student has to choose from three different options for each course), dessert (three choices), one piece of bread and one beverage (water, soda or juice).

Each serving was weighed at the restaurant; all ingredients (name and quantity) were recorded. Weight of seasoning choices (i.e. olive oil, mayonnaise, lemon) was obtained separately.

Nutritional value

Calculated nutritional values of the menus were obtained from the ingredients used and the total weight of the final product. Energy, macronutrient and micronutrient contents were calculated separately for each university restaurant using the "DIAL" program, version for Windows XP (ALCE Ingeniería, Madrid, Spain). This program contains a very complete database of foods, including typical Spanish recipes. It also allows uploading and evaluating new recipes. Nutrients and energy provided by the menus were compared against the Spanish Recommended Dietary Intake (SRDI) issued by the Nutrition Department (2004)[15].

Statistical methods

Results were analyzed using the Statistical Package for the Social Sciences (SPSS version 14.0 for Windows XP, Chicago, Illinois). Energy and nutrient content for each restaurant are given as the mean of 120 observations ± standard deviation. The Student t-test was used to view the differences between restaurant 1 and 2. Results were considered to be significant when the observed significance levels were $P<.05$.

Results

According to table 1, lunch from university restaurant 1 provides 60 and 78% of the daily recommended dietary energetic intake for male and female, respectively. In the university restaurant 2, it is 49.5 and 64.6% for male and female, respectively.

The Spanish Society of Community Nutrition[16] recommends to evenly distribute energy intake between proteins (13%), complex carbohydrates (>50%), total fat (≤30% or ≤35% if olive oil is the most important fat consumed), saturated fatty acids (SFA ≤10%), monounsaturated fatty acids (MUFA of 20%) and polyunsaturated fatty acids, (PUFA 5%). University restaurant 1 obtained the 59.6, 13.6 and 27.1% of energy from complex carbohydrates, proteins and total fat, respectively, while university restaurant 2 obtained 55.3, 13.9 and 30.9%, respectively.

Protein content of meals (table 1) in both university restaurants is higher than the SRDI for this nutrient (54 and 41 g/day for male and female, respectively)[15], with the exception of the requirement for university females in university restaurant 2. Several authors reflected that the university population consumed a diet with too much protein[7,10,17,18].

In other studies, daily cholesterol intake values in university population were too high, i.e. in Granada (Spain), university students consumed between 569 and 412 mg/day for males and females, respectively[17]. However, in our study, considering only lunchtime menus, these menus (table 1) have cholesterol contents below the SRDI[15]. Furthermore, this value for lunch provided by university restaurant 2 is similar to other studies[4,7,17].

Oil used at home and at these university restaurant meals as seasoning is olive oil in a high proportion (>75%)[10], but oil used for frying in these university restaurants is sunflower oil[11]. In this study, for both university restaurants, the PUFA/SFA ratio is higher than 0.5. However, the (PUFA+MUFA)/SFA values are 1.45 and 2.06 for university restaurant 1 and 2, respectively, while the SRDI for this ratio should be >2. The SRDI suggests that n-3 PUFAs must be situated in the range of 0.2-2 g/day; this recommended value is obtained in uni-

Table 1 Energy and nutrient content of menus in university restaurants (mean±SD)

	Restaurant 1	Restaurant 2	SRDI	
Energy (kJ)	7524±1488	6215.6±1676.2*	12540 (male)	9614 (female)
Energy (kcal)	1800±356	1487± 401*	3000 (male)	2300 (female)
Carbohydrate (g)	268.3± 25.3	205.6± 12.5*	—	
Protein (g)	60.8±7.5	51.7±9.1	54 (male)	41 (female)
Fat (g)	54.2±12.5	51.2±11.9*		
Cholesterol (mg)	150.8±48.5	102±25.9	<300	
SFA (g)	15.4±4.2	8.9±4.5		
MUFA (g)	14.0±4.8	12.5±4.3		
PUFA (g)	8.4±2.1	5.8±2.2		
PUFA n3 (g)	0.04±0.03	0.20±0.04	0.2-2	
Dietary fiber (g)	10.2±4.2	17.8±5.4	>25	
Vitamin A (μg)	287.8±78.9	400.2±85.3*	1000 (male)	800 (female)
Vitamin D (μg)	0.9±0.7	1.4±1.0	5	
Vitamin E (mg αTE)	28.5±10.8	26.8±9.8	12	
Vitamin K (μg)	187.5±101.1	195.3±102.3	—	
Vitamin C (mg)	60.5±54.3	68.6±35.8	60	
Thiamin (mg)	0.4±0.3	0.8±0.2	1.2 (male)	0.9 (female)
Riboflavin (mg)	1.1±0.8	1.3±0.9	1.8 (male)	1.4 (female)
Niacin (mg)	15.2±9.9	15.6±9.5	20 (male)	15 (female)
Vitamin B_6 (mg)	0.8±0.6	1.2±0.7	1.8 (male)	1.6 (female)
Folate (μg)	168.9±58.8	149.2±57.9*	200	
Vitamin B_{12} (μg)	5.6±4.3	4.8±2.1	2	
Calcium (mg)	287.5±47.8	325.8±84.2*	800	
Phosphorus (mg)	900.7±205.7	874.5±125.2	—	
Iron (mg)	9.1±6.8	9.2±5.4	10 (male)	18 (female)
Zinc (mg)	4.0±0.9	4.8±1.8	15	
Iodine (μg)	107.5±67.9	108.2±54.7	140 (male)	110 (female)
Sodium (mg)	2570.8±689.1	1842.3±450.3*	—	
Potassium (mg)	1687.2±87.4	1700.2±87.4	—	
Magnesium (mg)	174.5±85.7	185.9±99.9	350 (male)	330 (female)

SRDI: Spanish recommended dietary intake for the range of 20-39 years.
*Significant differences of values between establishment 1 and 2 ($P<.05$).

Table 2 Energy percentages of food groups in menus from university restaurants (g/100 g of total energy) ± SD

	Restaurant 1	Restaurant 2
Cereal products	38.5±10.9	42.3±11.8
Vegetables	17.3±8.7	21.5±9.1*
Meat	10.8±5.3	8.5±4.1
Fish	7.5±3.4	7.8±4.5
Eggs	7.2±3.9	5.2±2.1*
Fruit	6.5±4.2	9.2±6.4*
Added fat	5.6±3.4	4.2±2.1*
Desserts and added sugar	5.5±2.8	2.4±1.7*
Milk and dairy products	2.2±0.8	2.9±1.0

*Significant differences of values between restaurant 1 and 2 ($P<.05$).

versity restaurant 2 but not in 1 (table 1). These fatty acids are very important regarding aspects of good health due to that PUFAs maintain the fluidity and function of cell membranes and are precursors of eicosanoids; SFAs accelerate thrombus formation, whereas PUFAs do not, and the PUFA/SFA (P/S) ratio is an important determinant of thrombogenicity[19]. Furthermore, different PUFAs have different effects: n-6 PUFAs are antiatherogenic, whereas n-3 PUFAs are antithrombogenic. Such differences have been noted since the study of Greenland Eskimos[20]; it is well established that Greenland Eskimos have low incidence of cardiovascular disorders and they also have a bleeding tendency that may result from reduced platelet aggregation.

Fiber content ranged from 10.2 to 17.8 g for both university restaurants, which in contrast with similar studies and to the nutritional aim for fiber intake by Spanish population, is low; daily menus from a Croatian university restaurant4 provided more than 25 g of dietary fiber and 2.9%of these menus supplied more than 38 g. White[21] (1995) suggested a nutrition education program focused on fiber importance in a University residence hall dining center.

Micronutrient content of vitamin E, B_{12} and C, thiamine and niacin for both university restaurants is over the SDRI (table 1), as well as the content of vitamin A, D and B_6, riboflavin, folate, calcium, iron, zinc, iodine and magnesium. Our data is in agreement to that obtained by Oliveras Lopez et al[22] (2006).

The distribution of food groups served at these university restaurants is presented in table 2 arranged in nine categories. For both university restaurants, cereal and vegetables products are the most served foods. University restaurant 2 has a more varied offer of vegetables. Cereal products mostly consumed by the student are rice, pasta and bread; at university restaurant 2, the student has the option of choosing between two types of bread (whole meal and white). The vegetables more often served at both restaurants are lettuce, tomato, carrot, lamb's lettuce, cucumber and potatoes among others. University restaurant 1 served more quantity of meat, eggs, added fat, desserts and added sugar than university restaurant 2. Half of total fruit servings in both restaurants were comprised of only 7 items: orange juice (16%), bananas (8%), apple juice (7%), apples (7%), fresh grapes (5%), watermelon (4%) and peach (3%).

Discussion

Lunch should provide an average of 30-35%of the daily recommended dietary energetic intake and also adjust to the nutrient requirement[18]. Both university restaurants offer menus with energy values considerably higher than 35%; however, it is important to acknowledge that these highly energetic menus are not consumed entirely[10]. According to a previous study, university males and females consumed only 33 and 24%of total daily energy, respectively. Previous studies have obtained lower values for lunch at the University of Granada, Vigo (Spain) and Croatia[4,7,17]. García Segovia et al[18] (2001) evaluated seven university restaurants; the range of the energetic value was from 4234-7190 kJ/lunch (1013 to 1720 kcal/lunch). Lin et al[23] (1999) affirmed that foods people eat away from home are generally higher in energy and saturated fat and lower in calcium and dietary fiber content than foods eaten at home. Furthermore, studies also link eating out to higher energy consumption, overweight, and obesity in both adults and children[24-27]. In addition, it is not uncommon for restaurant entrees to contain one half to one whole day's worth of energy (4598 to 9823 kJ) (1100 to 2350 kcal)[28]. Overweight and obesity are recognized as an escalating epidemic, both affecting the University population[14,17,29]. López Martínez et al[17] (1994) suggested that these food patterns are similar to their fathers; nutritional education is a very important factor in order to reduce overweight and obesity at this age period.

A major nutritional concern in Mediterranean countries like Spain is the loss of the "Mediterranean diet", which is characterized by high consumption of fruits and vegetables and the scarcity of saturated fatty acids. Epidemiological evidence suggests that dietary patterns in Mediterranean countries are changing rapidly, with increased consumption of animal products and saturated fat to the detriment of vegetable foodstuffs[30]. The fact that fruit and vegetables intake has been associated with higher diet costs and the growing consumption of foods away from home may have contributed to this trend[31,32].

Generally, foods prepared away from home are higher in fat, sugar, and salt than home-prepared foods. Added sugars and added fats, now accounting for close to 40%of daily recommended energy intakes, help to keep down the cost of the Spanish diet[22]. Collison et al[33] (1986) determined that meals with the highest fat content (60%of energy from fat) and the highest total energy (6821.8 kJ per person per meal) were supplied by hotels, restaurants and public houses.

Regarding micronutrient content for university restaurants, vitamin C and thiamine intake of male and female and riboflavin intake of male may be considered adequate. Among the university population of Granada, intake of some minerals and vitamins were below 80%of the SRDI[34]. In another study from the same city, values below the SRDI of iron, magnesium and folate were found; a two fold SRDI value of calcium and a phosphorus value optimum to the calcium intake were observed[17].

According to a previous study[10], university population with special diet (weight reduction, ovo-lactovegetarian and vegetarian) (8% females and 6% males) is lower than that under a regular diet. Nonetheless, university restaurant 1 does not offer to the students the option to select foods for a special diet unlike university restaurant 2 that regularly offers these menus. Derricote et al[35] (1997) reflected the importance of offering this special diet in university cafeterias and revealed that lacto-ovogetarians and vegans menus had excessive levels of cholesterol and high fat calorie content.

In general, menus from university restaurant 2 offer a wider variety of food items, special diet menus and have lower energy content; these menus are organized by a dietitian; this reinforce the fact that dietitians and foodservice managers play a significant role in the prevention of foodborne illnesses. Several researchers worldwide have explored the posture of dietetic professionals in the promotion of food safety and the necessity to institute effective prevention and health promotion programs in restaurants targeted to university students[10,36]. In other studies, where dietitians have participated as part of a nutritional HACCP (Hazard Analysis and Critical Control Point) plan, it was suggested to reduce the diameter of the plate, from 28 to 20 cm; this change is very important to reduce portion sizes. The following strategy was to decrease energy density of menu items especially of energy-dense foods[12,13]. The present study also reflects the importance to include dietetic professionals in university restaurants given that they are qualified to guide and educate foodservice employees and the public towards healthier food choices. Further knowledge is necessary on nutritional adequacy of menus offered by restaurant services; university restaurants may be useful to long-term successful dietary behavior changes by developing healthy menus, providing nutritional education and adequate dietary intakes. Indeed, this age period is considered essential in the development of dietary habits of importance to future health.

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Conflict of interests

The authors declare no conflicts of interests.

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