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Original Article

Is the design of dietary based studies enough with a quantitative description?

Ismael San Mauro Martín, Sara Bermejo de las Heras, Elena Garicano-Vilar
Research department, Research Centers of Nutrition and Health (CINUSA group), Madrid, Spain
E-mail: info@grupocinusa.es

Summary. *Objective:* A proper diet, from a macronutrients quantitative point of view, does not imply it is qualitatively correct. We demonstrate that quantitative dietary advice may be qualitatively deficient. *Design and setting:* A search for suitable recommendations of macronutrients contribution to total energy intake was performed. Two similar quantitative (15-25% proteins, 45-60% carbohydrates and 20-35% fat) but qualitatively different weekly menus were designed using DIAL software. Menu A provides more fibre, MUFAs, vitamins, minerals and minor components of the diet than menu B and PUFAs/SFA index is higher. In menu B, SFA, cholesterol, glucose and sucrose levels are higher. *Results:* Menu A has better qualitative contribution of carbohydrates, fat, vitamins and minerals; it is better adjusted to the dietary reference values, and provides more phytochemicals components. It also has more fibre and less simple sugar. Menu B provides plenty of fructose mainly from soft drinks. *Conclusions:* Diet may be deficient if only planned taking in consideration the quantitative aspect. All of this can generate wrong study analyses and conclusions.

Key words: diet habit, nutrients, qualitative evaluation, quantitative evaluation

Introduction

The analysis of the populations' dietary patterns is a topical issue. The traditional Mediterranean diet (MD) pattern (1), and somewhat less known, Japanese model (2), arouse interest of experts for their protective action against chronic diseases (cardiovascular diseases (CVD) (1, 2), cancer (3), diabetes (4, 5), neuronal and degenerative diseases (6). However, it must be kept in mind that the key to these two dietary patterns is part of a healthy lifestyle (7, 8). Thus, efforts over the past 50 years have led to set of science-based nutritional requirements and dietary guidelines, in order to be transmitted to professionals in the field and society. Scientific authorities are responsible for issuing these nutritional recommendations, understood by Mataix-Verdú (2009) (9) as a series of mainly quantitative parameters, which if followed by individuals, allows them have an "optimal" health. In this case, three recommendations of organisms of great recognition in Spain and Europe have been selected: Spanish Society for the Study of Obesity (SEEDO), Fundación Española de la Nutrición (FEN) and European Food Safety Authority (EFSA).

SEEDOs recommendations are collected in the Federación Española de Sociedades de Nutrición, Alimentación y Dietética (*FESNAD)-SEEDO* Consensus (2011) (10), gathered after the review of existing scientific data to make recommendations to the maximum evidence, and whose principal objective is to prevent obesity and its co-morbidities. In the document, it is recommended that consumption of carbohydrates equals or exceeds 50% of total energy intake (recommendation grade C, according to the SIGN system) (11); most of complex carbohydrates type (more than 25g/day fibre, and less than 10% of simple sugars). Regarding the lipids, the document recognizes as rigorous limit the one issued by the EFSA: between 20-35% (if olive oil is consumed) of total energy intake (12). It adds the recommendation to limit con-

sumption of trans fats. As for proteins, the evidence regarding their consumption is insufficient to draw any recommendation, but limits the consumption of meat and meat products to prevent weight gain (recommendation grade C) (10).

El libro blanco de la nutrición en España (13), produced by the FEN, issues recommendations based on reviews of sources of information concerning the nutritional status of the Spanish population. As a recommendation for carbohydrates, it states that they should contribute between 55-60% of total energy intake, preferably being of complex type. It emphasizes the importance of dietary fibre, counselling the consumption of 25-30 g/day of non-absorbable carbohydrates and increase the consumption of products made of whole wheat flour, legumes, vegetables, fruit and vegetables, and decrease the consumption of pastries. Lipids should provide between 20-35% of total energy intake, less than 10% of saturated fatty acids (SFA), and less than 7% of polyunsaturated fatty acids (PUFAs). As for proteins, it recommends providing 0.8 g of protein/Kg of body weight/day, representing 8-15% of the contribution to the total energy intake. It is important to obtain proteins through high biological value proteins.

Finally, the EFSA sets dietary reference values (DRV), providing a recommendation for carbohydrates of 45-60% of total energy intake, with important fibre intake (25 g/day) (14). However, the expert committee considers that there is insufficient evidence to set a minimum limit of carbohydrate intake, so this is an illustrative percentage (14). As for proteins and lipids, it recommends the consumption of 13-20% of proteins of total energy intake (15), and 20-35% of lipids (12). It stresses the importance of limiting consumption of SFA (less than 10% of total energy intake) and trans fats, because it claims that there is sufficient evidence to confirm that a high consumption of both causes an increase in plasma cholesterol and, consequently, the risk of CVD. Adults must pay attention to consumption of omega-3 (ω3) polyunsaturated fatty acids, consuming 250 mg/day, to reduce the risk of CVD.

Some studies (16-18) have gone into more detail within these official recommendations. The contributions of each macronutrient to the total energy values are not static, they may vary through stages of life, especially during first years (16) and old age (17, 18).

These recommendations are used by professionals in nutrition and health for setting standards in the correct nutrition, through food and health, of the population they serve, either in public health services, private services or managing quality control of scientific studies and recommendations of public health and community nutrition (9).

Despite all this, a study has shown that the quantitative character of a diet (proportion of energy provided by each macronutrient) is not comparable to its qualitative nature (quality of macronutrients) (16). A diet based on whole grains, as opposed to a refined grain-based diet is an example. Empirical evidence has shown that increasing obesity is associated with increased consumption of foods based on refined products. This is due to the 50% decrease of postprandial energy expenditure compared to whole grain foods, according to Barr and Wright (19), while consumption of whole grains has been linked in several studies with a decrease in weight and body mass index (BMI) (20, 21); getting itself to manifest, in some cases, a decrease of up to 22% probability of becoming overweight just with a regular consumption of whole grain breakfast cereals (22). Some authors suggest (23, 24) that these whole grains protective actions versus refined grains, owing to grains fibre, contains, along with fibre from fruits, vegetables and legumes, phytochemicals extracts that are responsible for important antioxidant, anticancer and anti-inflammatory functions beneficial for health. The amount of plentiful and varied phytochemicals in grains could be the reason of the many protective effects of whole grains versus refined grains, and one of the reasons that could explain the differences between the quantitative and the qualitative diet. However, such protection is attributed to a synergistic effect of the complex mixture of phytochemicals in plant foods and/or whole grain foods, and not to a specific isolated phytochemical. Its mechanism and even interactions remains a challenge (25).

In order to establish indicative of the quality values of the diet, Diet Quality Index (DQI) algorithms have been developed to evaluate their overall quality (based on quantities of certain nutrients, foods, or both) and to categorize individuals according to their

more or less healthy eating pattern, and in that way determine risk factors for non-communicable chronic diseases (26). It is important to use accepted and validated methods by the international community to estimate food consumption as accurately as possible and avoid biases (for invalidity) and random errors (for inaccuracy) (27).

It is hypothesized that studies based on dietary treatments, and/or based on diets with different characteristics, show incomplete information to understand the study's design and results.

Due to the emergence of important studies in the field of nutrition, we believe that a more detailed methodology conducted in such studies is necessary to avoid bias in future studies and for better understanding. A quantitative diet is not enough to understand and determine whether a dietary treatment or a food pattern is appropriate or not.

The aim of this study is to demonstrate that dietary advice only from a quantitative point of view may be wrong or deficient in quality.

Methods

A search for suitable recommendations of the contribution of macronutrients to total energy intake, issued by the FESNAD (10), FEN (13) and EFSA (12) was performed; besides a bibliographical search in the main databases (PubMed, EMBASE, SciELO).

Two standard weekly menus (menu A or "healthy" and menu B or "unhealthy"), with a similar quantitative profile, but qualitatively different were designed. The quantitative profile used to make the menus is recommended by the EFSA (12): 15-25% of total energy should be provided by proteins, 45-60% by carbohydrates and 20-35% by fat. The DIAL software was used for nutritional calibration of menus (28). For their evaluation, we used the recommendations of the EFSA (12) one of Europe's greatest scientific rigor agencies. DRV of FESNAD (29) were used to inform recommendations of specific micronutrients for the Spanish population; for a healthy male aged 20-29 years.

Results

Table 1 lists the nutritional evaluations of menu A (Table 2) and menu B (Table 3, according to the EFSA recommendations (12) and the DRV of the FESNAD (29). These two menus, despite being normocaloric and having a quantitative profile according to the EFSAs guidelines, have some notable qualitative differences. According to the results obtained through the DIAL software, the amounts of sugars in both cases are much higher than recommended (less than 10% of total energy intake). However, it is noteworthy that this recommendation applies, according to World Health Organization (WHO), to all added sugars and sugars naturally present in foods such as honey, syrups and fruit concentrates, but not fruits as such. The software also incorporates mono- and disaccharides in these products to the calculated amounts of sugars, as well as vegetables or leafy vegetables. Furthermore, it can be seen in Table 1, how levels of glucose and sucrose are substantially higher in menu B; although in menu A fructose levels are higher (mainly due to abundant consumption of fruits). Fructose levels in menu B are also high (23.9 g/day) due to a high cola consumption. The contribution of fibre in menu A is four times higher (93 g/day) than in menu B (18.9 g/day), which barely reaches the recommended intake (25 g/day). It is mostly insoluble fibre in both menus.

Although the lipids profile of both menus follows the recommendations, levels of MUFAs are higher in menu A (39.6 g/day). In menu B, SFA levels, even being within the recommendations (less than 10% of total energy intake), are higher than in menu A (8.9% and 6.8%, respectively). The same happens with cholesterol (294 mg/day in menu B versus 174 mg/day in menu A), which are also at the boundary of the recommendations (300 mg/day). In addition, the PUFAs/SFA index is higher in menu A (0.87 vs. 0.71, respectively), although in both cases it is within the reference values (0.5, according to the EFSA), so the quality of dietary fat is better.

As for the content of micronutrients, menu A provides more vitamins B1, B2, B6 and folate, where the B menu does not reach the recommended DRV (300 ug/day), as well as vitamin C (60 mg/day), and vitamin E (15 ug/day); but does reach DRV for vita-

min K (120 ug/day). However, the menu B provides more vitamin B12, vitamin A and vitamin D, although none reach its DRV (5 ug/day). It must be emphasized that, despite menu B provides more vitamin A, menu A provides more carotenes. Within the mineral intake, it can be seen in Table 1, how menu A provides greater quantity of all minerals analyzed (calcium, iron, magnesium, zinc, potassium and phosphorus), except for sodium and selenium that are more abundant in menu B. Neither menu covers the DRV for iodine (150 ug/day), but it is slightly higher in menu A (119 ug/day). The calcium provided by menu B is less than calcium supplied by the other menu, and is close to the established DRV limit (900 mg/day). Finally, it can be seen in Table 1 that menu A also provides greater amounts of minor components of the diet, such as b-sitosterol, campesterol, estigamsterol, and oxalic, malic and citric acids, although there are no recommendations or DRV for them.

Discussion

Paying attention to diets quality is critical because all its nutrients and minor components together not only decrease the risk of certain diseases, but also decrease of mortality from cardiovascular causes, diabetes mellitus (22%, approximately) (2) and cancer (15% less, approximately), as well as for a reduction in overall mortality from any cause (30). Phytochemicals are compounds of plant products (31) with important antioxidant, anticarcinogenic and anti-inflammatory effects (25).

Phytochemicals appear to be responsible for the benefit of the intake of certain foods in larger quantities in humans. A review conducted in 2004 (24) about the preventive effect of phytochemicals on cancer, suggests that there is strong epidemiological evidence on the reduction of cancer risk (lung, colon, liver, esophagus, cervix, oral cavity, stomach, bladder, pancreas and ovary) with a regular intake of fruits and vegetables, due to its phytochemicals content. Furthermore, it was found that the risk of cancer was twice as high in people with low intake of fruits and vegetables. Although the antioxidant activity of phytochemicals and their action against free radicals is clear, the mechanisms of action are still being debated. These include a potential effect of the regulation of expression and cell differentiation, antiviral and antibacterial action, and even enzymes and immune system modulation. Among the more than 5000 identified phytochemicals in fruits, vegetables and grains (24), one of the most studied are flavonoids. Its intake is known as a preventive factor for CVD (25). Flavonoids are significantly inversely related with myocardial infarction, coronary artery disease and low-density-lipoproteins of cholesterol (LDL-c) levels of plasma, apparently due to a modulation of the synthesis and the absorption of cholesterol, among other actions (25, 32).

Effects of phytochemicals have also been shown on legumes consumption. In a recent review of the preventive effect of legume consumption in chronic diseases (23), it was observed that consumption may provide protection against CVD, type 2 diabetes, hypertension, and even inflammation but, as said above, the synergistic effects of these compounds still remains a challenge. Since phytochemicals are more plentiful and varied in the outer layers of the grains (33), the protective effect is also observed in products rich in fibre, such as whole grains. In a cohort study (34) over 289,900 women without measurable disease, followed for 10 years, was observed that there were, within the group consuming whole grains (2-4 servings/day), minor cases of hypertension and CVD, against those who preferentially consumed refined grains, showing a possible role of whole grains in prevention of diseases. Others have also shown a significant risk reduction of type 2 diabetes (relative risk (RR) of 3 servings/day of whole grains = 0.68) compared to foods based on refined grains (RR 3 servings/day of refined grains = 0.95) (35). Furthermore, whole grains consumption has been associated with a decreased risk of mortality of up to 17% compared to those who ate predominantly refined grains (33).

Another essential part of the diets quality are sugars added to foods. The recommendations on consumption of organizations such as the EFSA (29), indicate that sugars should not exceed 10% of total caloric intake. The WHO, however, in their new recommendations (36) reduces sugar intake to < 5% of the total caloric intake (about 25 g/day). This applies to monosaccharides and disaccharides added to foods by manufacturers or consumers; and naturally present

Table 1. Menus A and B nutritional assessment.

	Recomendatıon[15,26]	Menu A or "Healthy"		Menu B or "Unhealthy"	
Energy (Kcal)		2180		2208	
Proteins (%)	15-25	104 g	19.1%	84.2 g	15.3%
Carbohydrates (%)	45-60	265.96g	48.8%	281 g	52.8%
Lipids (%)	20-35	79.5 g	32.1%	77.4 g	31.4%
Simple sugars (g)		103		165+	
Total fibre (g)	>25	93^		18.9*	
Soluble fibre (g)		10.1^		3.5	
Insoluble fibre (g)		24.6^		9.6	
Fructose (g)		27.1		23.9	
Glucose (g)		19.7		30.8^	
Sacarose (g)		19.6		75.1^	
Cholesterol (mg)	<300	174		297*	
SFA (%)	<10	16.7 g	6.8%	21.8 g	8.9%
MUFAs (%)	15-20	39.6 g	16.4%	32.4 g	13.2%
PUFAs (%)	6-11	14.5 g	6%	15.6 g	6.4%
Tiamin (mg)	1.2	2.1^		1.6	
Riboflavin (mg)	1.6	2.8^		1.8	
Niacin (mg)	18	44		44.4	
Vit. B_6 (mg)	1.5	2.9^		2.2	
Vit. B_{12} (mg)	1.5	9.6		10.9	
Folate (mg)	300	450^		260*	
Vit. C (mg)	60	180^		53*	
Vit. A (mg)	700	740		1175^	
Retinol		140		910^	
Carotene		3385^		1570	
Vit. D (mg)	5	3.5*		4.6*	
Vit. E (mg)	15	10.8* ^		5.4*	
Vit. K (mg)	120	535^		123	
Calcium (mg)	900	1260^		920	
Iron (mg)	9	31.6^		15.6	
Iodine (mg)	150	119* ^		81.1*	
Magnesium (mg)	350	706^		390	
Zinc (mg)	9.5	15.5^		10.8	
Sodium (mg)	1500	1725		1870	
Potassium (mg)	3100	5940^		3450	
Phosphorus (mg)	700	2200+		1795	
Selenium (mg)	55	135		140	
B-sitosterol		82.2^		16.9	
Campesterol		6.7^		1.7	
Estigmasterol		8.5^		1.5	
Oxalic acid		0.84^		0.14	
Malic acid		2.5^		0.37	
Citric acid		3.8^		0.75	

Nutrient data accompanying the symbol "" do not reach the marked recommendations. Nutrient data with the "+" symbol provide 20% more than the opposite menu and nutrient data with the "^" symbol contribute 30% or more than the opposite menu.*

Table 2. Menu A or "healthy"

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Breakfast	Green tea with skimmed milk (100 ml) and stevia (10 g). Whole wheat bread (60 g), orange (150 g), olive oil (10 g), natural tomato (30 g)	Green tea with skimmed milk (250 ml) and stevia (10 g), whole wheat bread (60 g), tomato (30 g), olive oil (10 g), pineapple (200 g)	Green tea with skimmed milk (250 ml) and stevia (10 g), whole wheat bread (60 g), avocado (30 g), olive oil (10 g), apple (200 g)	Green tea with skimmed milk (250 ml) and stevia (10 g), whole wheat bread (60 g), orange (150 g), olive oil (10 g), natural tomato (30 g)	Green tea with skimmed milk (250 ml) and stevia (10 g), whole wheat bread (60 g), tomato (30 g), olive oil (10 g), pineapple (200 g)	Green tea with skimmed milk (250 ml) and stevia (10 g), whole wheat bread (60 g), light Philadelphia cheese (30 g), avocado (30 g), apple (200 g)	Green tea with skimmed milk (250 ml) and stevia (10 g), whole wheat bread (60 g), olive oil (10 g), natural tomato (30 g), orange (150 g)
Mid-morning snack	Apple (200 g), walnuts (20 g)	Raspberry (100 g), fresh cheese (50 g), honey (10 g)	Banana (150 g), skimmed plain yogurt (125 g)	Pear (200 g), hazelnuts (20 g)	Honey (10 g), fresh cheese (50 g)	Almonds (20 g), dark chocolate (>80%) (25 g)	Banana (200 g), fresh cheese (50 g)
Lunch	Chickpeas salad (70 g) with tomato (200 g) and onion (50 g). Pork fillet (150 g), olive oil (10 g), flax seeds (20 g), whole wheat bread (50 g), skimmed plain yogurt (125 g)	Eggplant tempura (200 g), flour (10 g), olive oil (10 g), fresh hake (200 g), mushroom (80 g), whole wheat bread (50 g), kiwi (100 g)	Fry lightly whole wheat pasta (70 g) with zucchini (80 g), natural tomato (80 g), olive oil (10 g), oregano and basil. whole wheat bread (50 g), mandarin (100 g)	Fry lightly whole wheat rice (70 g) with mushrooms (60 g), onion (30 g) and soy sprouts (50 g). Olive oil (10 g), whole wheat bread (50 g), pineapple (200 g)	Noodles soup (30 g), with chickpeas (40 g) and hen (50 g), grilled salmon (120 g), carrot (50 g), potato (120 g), olive oil (10 g), whole wheat bread (50 g), raspberries (150 g)	French beans salad (70 g) with spinach (50 g), onion (50 g) and tuna (60 g), olive oil (10 g), whole wheat bread (50 g), cherries (150 g)	Avocado (200 g) filled with potato (100 g), tomato (50 g), sardines (150 g), lettuce (30 g), cucumber (80 g) and onion (50 g), olive oil (20 g), vinegar (5 g), whole wheat bread (50 g), pear (150 g)
Afternoon snack	Green tea with skimmed milk (100 ml) and stevia (10 g), quince (20 g), fresh cheese (50 g)	Skimmed yogurt (125 g), oat (20 g)	Green tea with skimmed milk (100 ml) and stevia (10 g), dark chocolate (25 g)	Dried dates (40 g), green tea with skimmed milk (100 ml) and stevia (10 g)	Green tea with skimmed milk (100 ml) and stevia (10 g), natural almonds (15 g)	Skimmed yogurt (125 g), oat (20 g), strawberries (150 g)	Green tea with skimmed milk (100 ml) and stevia (10 g), dark chocolate (25 g)
Dinner	Artichoke (150 g), fresh mackerel (125 g), baked potato (200 g) with oregano, olive oil (10 g), whole wheat bread (50 g), kiwi (100 g)	Endive (70 g) with avocado (50 g), apple (60 g) and grilled asparagus (70 g), olive oil (10 g), whole wheat bread (50 g), plum (150 g)	Boiled cauliflower (100 g), potato (200 g), grilled chicken fillet (150 g), olive oil (10 g), vinegar (5 g), whole wheat bread (50 g), apricot (200 g)	Tomato salad (80 g), lettuce (30 g), onion (50 g), raisins and blueberry (50 g), steak (150 g), olive oil (20 g), whole wheat bread (50 g), plain yogurt (125 g)	Egg omelette (120 g), boiled green beans (80 g) with carrot (50 g), potato (200 g), olive oil (10 g), whole wheat bread (50 g), loquat (80 g)	Boiled potatoes (200 g) with mushrooms (150 g). Lettuce (30 g), tomato (80 g), onion (50 g) and pine nuts salad (30 g). Olive oil (20 g), vinegar (5 g), whole wheat bread (50 g), apple (200 g)	Steamed mussels (100 g), White rice with peas (100 g) and Brussels sprouts (100 g), olive oil (10 g), whole wheat bread (50 g), plum (200 g)

Table 3. Menu B or "unhealthy"

	DAY 1	DAY 2	DAY 3	DAY 4	DAY 5	DAY 6	DAY 7
Breakfast	Coffee with whole milk (250 ml), sugar (10 g), chocolate cereals (50 g)	Coffee with whole milk (250 ml), sugar (10 g), whole wheat bread (50 g) with ham (30 g)	Coffee with whole milk (250 ml), sugar (10 g), biscuits (50 g)	Coffee with whole milk (250 ml), sugar (10 g), chocolate cereals (50 g)	Coffee with whole milk (250 ml), sugar (10 g), whole wheat bread (50 g) with ham (30 g) and olive oil (10 g)	Coffee with whole milk (250 ml), sugar (10 g), biscuits (50 g)	Coffee with whole milk (250 ml), sugar (10 g), chocolate cereals (50 g), walnuts (30 g)
Mid-morning snack	Cola drink (333 ml)	Cola drink (333 ml)	Cola drink (333 ml)	Cola drink (333 ml)	Cola drink (333 ml)	Cola drink (333 ml)	Cola drink (333 ml)
Lunch	Steak (200 g) with baked potato (200 g), Lettuce (30 g) and tomato (80g) salad, olive oil (10 g), whole wheat bread (50 g), natural yogurt (125 g)	Chard (150 g), fresh hake (200 g), mushrooms (50 g) with garlic (5 g), olive oil (10 g), whole wheat bread (50 g), Cola drink (333 ml)	Egg pasta (70 g), fry lightly with zucchini (80 g) and walnuts (20 g), olive oil (10 g), whole wheat bread (50 g)	White rice (70 g) fry lightly with mushrooms (30 g), onion (20 g) and Emmental cheese (10 g), olive oil (10 g), whole wheat bread (50 g), Cola drink (333 ml)	Noodles soup (30 g), with chickpeas (40 g) and hen (50 g), sole (120 g), olive oil (10 g), whole wheat bread (50 g)	Baked turkey thigh (250 g), onion (100 g), apple (100 g), white wine (150 ml), olive oil (10 g), whole wheat bread (50 g), Cola drink (333 ml)	White rice (70 g), fried tomato (50 g), swordfish (150 g), olive oil (10 g), whole wheat bread (50 g)
Afternoon snack	Cola drink (333 ml), loaf of bread (40 g) with sliced cheese (10 g) and ham (30 g)	Cola drink (333 ml), natural yogurt (125 g)	Cola drink (333 ml), loaf of bread (40 g) with pate (40 g)	Cola drink (333 ml), natural yogurt (125 g)	Cola drink (333 ml), loaf of bread (40 g) with ham (40 g)	Cola drink (333 ml), natural yogurt (125 g)	Cola drink (333 ml), loaf of bread (40 g) with sliced cheese (10 g) and ham (30 g)
Dinner	Artichokes (50 g) with *Serrano* ham (8 g), fresh mackerel (125 g), olive oil (20 g), whole wheat bread (50 g), natural yogurt (125 g), Cola drink (333 ml)	Endives (70 g) with Roquefort cheese (45 g), apple (60 g) and walnuts (20 g), turkey ham (20 g), whole wheat bread (50 g)	Fry lightly cauliflower (100 g), grilled chicken fillet (150 g), olive oil (15 g), whole wheat bread (50 g), natural yogurt (125 g), Cola drink (333 ml)	Tomato (80 g), onion (50 g), sweet corn (30 g) and sardines (150 g) salad, balsamic vinegar (5 g), olive oil (10 g), whole wheat bread (50 g)	Cheese omelette: egg (120 g) and Emmental cheese (20 g), boiled green beans (80 g) with carrot (50 g), olive oil (10 g),whole wheat bread (50 g), plain yogurt (125 g), Cola drink (333ml)	Boiled potatoes (200 g) with pine nuts (30 g), pork fillet (150 g), olive oil (10 g), whole wheat bread (50 g)	Steamed mussels (150 g), white rice (60 g) and stir fried artichokes (100 g) with garlic, olive oil (10 g), whole wheat bread (50 g), natural yogurt (125 g), Cola drink (333 ml)

in honey, syrups and fruit concentrates, yet do not refer to fruits, vegetables and other plant products.

One of the monosaccharides in the spotlight is fructose. A high intake of fructose has been linked to an increased risk of obesity, type 2 diabetes, CVD, metabolic disease, nonalcoholic fatty liver disease and fructose malabsorption, which may secondarily alter the flora and intestinal motility (37-39). Drinks with added sugars, such as soft drinks, are the main source of added sugars in the diet (37). Most of sugars in them are fructose, added in the form of 'high in fructose corn syrup (37-39). The fructose added from this com-

pound is directly linked to an increased risk of CVD derived from an increased fat deposition in viscera and atherogenic dyslipidemia (37). The main problem of excess fructose stems from the prolonged consumption of these type of foods and not from eating foods that contain it naturally (like fruits and honey), in a healthy diet. Furthermore, in the case of fruit, it is presented as a protective factor in the development of obesity and cardiovascular disease (38, 39). One of the most healthful eating patterns studied is the MD, and this is mainly due to its high quality. The MD is characterized by a high consumption of plant foods (minimally processed), fruit as the typical dessert, olive oil as the primary fat and moderate consumption of dairy products, fish, eggs and poultry. Follow up on MD can significantly reduce the risk of chronic disease and even reduce the risk of mortality (10). As seen in the results, menus A and B are clear examples of how the quantitative value of the diet does not always correlate with quality points that have been discussed above. Menu A or "healthy" has lower amounts of added sugars, higher amounts of fibre (and thus phytochemicals), better quality of fat and increased amounts of micronutrients.

The ENIDE study (40), conducted between 2009-2010 on the nutritional assessment of the Spanish diet (in terms of energy and macronutrients), threw unsatisfactory results in terms of diets quality in the Spanish population. Most had an unbalanced calorie profile (42% of total dietary intake as fat, 40% as carbohydrate and between 16-18% as protein), and the same happened with the lipid profile (more than 10% of the contribution was in form of SFA, 4.6% as PUFAs, and 15-20% in the form of monounsaturated fatty acids (MUFAs). There was, also, a high consumption of meat and meat products, and products high in sodium, fat and added sugars, facing a very low intake of vegetables, fruits and vegetables, and low consumption of cereals, predominantly refined. However, the situation seemed to partially improve in 2013, according to data of food consumption in Spain from the Ministry of Agriculture, Food and Environment (41). An increased consumption of basic foods, such as bread, rice, pasta and legumes, was observed (although not specified "whole grain" or "refined grain"), as well as vegetables and fish, reducing the consumption of meat and meat products, but also the consumption of fruits.

It is therefore necessary to continue investing efforts to inform and advise the society on the diets quality. Promote the consumption of whole grains (at least 3 servings per day) (35), fruits (3 servings per day) and vegetables (2 servings per day) (13), dried fruits, nuts and fish. Also reduce consumption of simple sugars (less than 10% of total energy intake (12), although some agencies, such as the WHO, have begun to recommend less than 5% of the total energy intake (36) and solid fats. On the other hand, one should not lose sight of the importance of determining if the population does or not follow a healthy or quality diet and the costs in which it may incur (30).

These factors are important considering relevant studies published in high impact journals in this science field, in which the effectiveness of different diets are compared (42-48).

Conclusion

According to the results obtained in the menus, it becomes clear how diet may be deficient in terms of quality, if only planned taking into account the quantitative aspect. High qualitative value diets have been linked to the prevention of chronic diseases such as obesity, CVD, type 2 diabetes, hypertension and cancer, as well as to a possible decrease in mortality derived from them and even overall mortality from any cause. Therefore, dietary advice should focus not only on establishing an adequate caloric profile, but also pay look closely to the type of carbohydrates and fats, and minority dietary components such as vitamins, minerals and phytochemicals.

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Correspondence:
Ismael San Mauro Martín
CINUSA Group.
Paseo de la Habana 43. 28036, Madrid, Spain.
E-mail: info@grupocinusa.es