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Need of improvement of diet and life habits among university student regardless of religion professed



Appetite

Silvia Navarro-Prado^a, Emilio González-Jiménez^{b,*}, Javier S. Perona^c, Miguel A. Montero-Alonso^d, Marta López-Bueno^a, Jacqueline Schmidt-RioValle^b

^a Department of Nursing, Faculty of Nursing, University of Granada, Melilla, Spain

^b Department of Nursing, Faculty of Health Sciences, University of Granada, Spain

^c Instituto de la Grasa-CSIC, Campus Universidad Pablo de Olavide, Edificio 46, 41013, Seville, Spain

^d Department of Statistics and O.I. Faculty of Social Sciences, University of Granada, Melilla, Spain

A R T I C L E I N F O

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ABSTRACT

At present, few studies have assessed the possible influence of culture and religion on healthy eating habits among the university population. The aim of this study was to identify differences in healthy and eating habits among university students of different religions. A cross-sectional study was performed with a sample population of 257 students (22.4 ± 4.76 y) at the campus of the University of Granada in Melilla (Spain). The quality of diet was assessed by the Healthy Eating Index (HEI) and the adherence to the Mediterranean diet by a validated score (MDS). There were a higher prevalence of overweight in Christian boys and girls compared to Muslims. Muslim students omit breakfast and dinner more often than Christians. Significant differences in sodium intake (p < 0.001) were observed among boys of Christian and Muslim faith, with significantly higher intakes in Christians. In contrast, a higher cholesterol intake (p = 0.038) was observed in Muslim girls compared to Christians. Regarding alcohol intake, its consumption being much higher among students of Christian faith. Likewise, there were no significant differences in the quality of the diet as assessed by HEI, this being of poor, together with a low adherence to the Mediterranean diet in both groups. Muslim university students have a lower risk of drinking alcohol (OR = 7.88, 95% CI = 4.27, 14.54). Few differences were found between girls and boys in both religions although the Mediterranean Diet Score was lower for girls. In conclusion, Melilla university students eat low quality foods and have little adherence to the Mediterranean diet regardless of the religion professed or gender, although Christians tend to drink more alcohol and to smoke more cigarettes and Muslims skip some meals.

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1. Introduction

There is increasing literature suggesting that the university students may be a population at biological and social risk, often with inadequate health behaviors and life habits (Azadbakht & Esmaillzadeh, 2012; Senekal, Lasker, Van Velden, Laubscher, & Temple, 2016; Turhan et al., 2016). In addition, studies on the university population indicate that these individuals are distancing from the traditional Mediterranean food pattern (García and

Martínez-Monzó, 2002; Durá & Castroviejo, 2011). This diet is characterized by a high consumption of fruits, vegetables, and olive oil, as well as a reduced consumption of meat and dairy projects. Accordingly, the Mediterranean diet has low levels of saturated fatty acids, and high levels of monounsaturated fatty acids, complex carbohydrates, and fiber. Due to its particular features, this dietary pattern is closely linked to a lower risk of chronic illnesses such as type 2 diabetes mellitus, cardiovascular disease (Serra-Majem, Roman, & Estruch, 2006), and overall a longer life span (Estruch et al., 2013).

New responsibilities such as buying food, choosing a daily menu, and preparing meals are factors that could contribute to conditioning their eating habits (Rakicioglu & Yildiz, 2011). Furthermore, recent studies point out to a rapid adoption of risky nutritional practices, such as rapid weight loss diets, irregular



^{*} Corresponding author.

E-mail addresses: silnado@ugr.es (S. Navarro-Prado), emigoji@ugr.es (E. González-Jiménez), perona@ig.csic.es (J.S. Perona), mmontero@ugr.es (M.A. Montero-Alonso), martalopez@ugr.es (M. López-Bueno), jschmidt@ugr.es (J. Schmidt-RioValle).

meals, skipping breakfast, consumption of nutrient-poor food and the excessive intake of alcohol (Cortés, Giménez, Motos, & Cadaveira, 2014) as well as other toxic substances (Patiño-Masó, Gras-Pérez, Font-Mayolas, & Baltasar-Bagué, 2013). This can lead to deficiencies in micronutrients and in other essential components found in the traditional Mediterranean diet, which are indispensable to achieve an adequate nutritional health (Baldini, Pasqui, Bordoni, & Maranesi, 2009; Estruch et al., 2013; Santomauro et al., 2014; Trichopoulou et al., 2014).

It has been reported that religion can act as a protective factor among the university population against health and nutritional behaviors and habits, (Ruiz, González, Vera, & Azancot, 2011). Studies such as the published by Van der Meer Sanchez, De Oliveira, Nappo (2008) and Gomes, de Andrade, Izbicki, Moreira Almeida, and Oliveira (2013), in a Brazilian university population, suggest that culture and religion can positively influence the adoption of healthy living habits and act as a protective factor against drug use in this group. Similar results have been described in other countries with a university population of different religious denominations (El Ansari, Sebena, & Stock, 2014; Neighbors, Brown, Dibello, Rodriguez, & Foster, 2013); However, it has not been shown whether religion is associated with healthy or unhealthy eating habits (Tanton, Dodd, Woodfield, & Mabhala, 2015). In this regard, Melilla, a Spanish university city located in North Africa with a large Christian and Muslim university population, represents the ideal setting for assessing whether or not this cultural and religious plurality is advantageous over the lifestyles and nutritional habits of university students (Navarro-Prado, González-Jiménez, Montero-Alonso, López-Bueno, & Schmidt-RioValle, 2015). Therefore, the aims of this study were to characterize the eating habits and healthy habits of students at the Melilla campus of the University of Granada, to evaluate the quality of their diet and to assess their level of adherence to the Mediterranean diet, as well as to determine the influence of religion in the practice of healthy living habits.

2. Material and methods

2.1. Study design and sampling

A cross-sectional study was performed during the 2013–2014 academic year. It monitored the life style and eating habits of a group of students from the campus of the University of Granada in the Spanish city of Melilla on the North African coast, a city with an large university population of Christina and Muslim confessions. The sample consisted of 257 students, 141 Christian and 116 Muslim, 22.4 \pm 4.76 years of age, selected by random sampling among the total university population of the Melilla campus (n = 1188 students).

2.2. Data collection

To participate in the study it was necessary to be enrolled in one of the Degree studies offered by one of the three Faculties of the Melilla campus. Another criterion for inclusion was the acceptance and written signature of informed consent. The exclusion criteria considered were the existence of endocrine and metabolic pathologies and the refusal to participate in the study. The flow diagram (Fig. 1) summarizes the process of selecting participants.

In September 2013 a series of meetings were scheduled, which were attended by all of the students on the campus. Attending students were informed about the different evaluations that should be done, as well as the questionnaires that they had to complete, if they finally decided to participate in the study. The complete evaluation of the subjects participants took place in October 2013. This included an anthropometric assessment and analysis of body composition. In addition, two instruments were used, a questionnaire focused on the subject's life style and eating habits and a 72-h food record.

The study was approved by Consejería de Educación y Juventud del Gobierno de Melilla. All participants gave written, informed consent and data were coded to ensure confidentiality. This research was performed in strict compliance with the international code of medical ethics established by the World Medical Association and the Declaration of Helsinki.

2.3. Anthropometric evaluation and body composition analysis

Anthropometric variables were measured in accordance with the International Society for the Advancement of Kinanthropometry guidelines (Marfell-Jones, Olds, & Stewart, 2006). Variables were collected at the same time in the morning, between 7:00 and 10:00 a.m., following an overnight fast. Body weight was measured in the subjects' underwear and with no shoes, using electronic scales (Tanita BC-418MA[®], Hamburg, Germany) with a low technical error of measurement (TEM = 0.510%). Height was measured using a mechanical stadiometer platform (Seca[®] 274, Hamburg, Germany; TEM = 0.01%). The BMI (kg/m^2) categorization of the subjects was performed according to the categories established by the World Health Organization (WHO, 1998). The calculation of body composition was performed with a Body Composition Analyser (Tanita BC-418MA[®], Hamburg, Germany). The same trained research assistant performed all the measurements.

2.4. General data and food consumption assessment

All of the participants were asked to fill out a questionnaire that focused on their life style and eating habits. This instrument was an adapted version of a questionnaire (demographic data, eating habits, and food consumption) that was elaborated and previously validated by González et al. (2012).

Furthermore, the subjects were asked to fill out a 72-h food record (i.e. Thursday, Friday, and Saturday). The nutritional information was analyzed with the nutritional computer application, Diet Source[®] version 3.0.

The degree of the subjects' adherence to the Mediterranean diet was evaluated with the Mediterranean Diet Score (MDS), created and subsequently modified by Trichopoulou, Costacou, Bamia, and Trichopoulos (2003). It focuses on the core components of the Mediterranean diet, which can be assigned a value of 0 or 1. These components are summarized in nine variables: (i) vegetables and potatoes; (ii) legumes; (iii) fruits; (iv) cereals and their byproducts; (v) fish; (vi) meat; (vii) dairy products; (viii) alcohol; (ix) the ratio of monounsaturated fatty acids to saturated fatty acids (MUFAs/SFAs).

The median of the values specific of each sex was used as a cutoff point for each food group. When the consumption of food groups in the Mediterranean diet and the MUFAs/SFAs ratio were lower than the median of the sample, the score was 0. In contrast, if consumption was higher than the median, the score was 1. Furthermore, foods not characteristic of the Mediterranean diet (i.e. meat and dairy products) had a score of 0 when they were consumed over the median, and 1 when their consumption was lower than the median. Alcohol had a score of 1 when it was consumed in quantities of 10–50 g/day for male subjects and 5–25 g/day for female subjects. Other values had a score of 0. Therefore, the values of this index ranged from 0 to 9 points. Scores of 4 or more were associated with a satisfactory adherence to the Mediterranean diet whereas scores lower than 4 reflected an



Fig. 1. Flow diagram of the recruitment progress.

unsatisfactory adherence.

The Healthy Eating Index (HEI-2005) was used to calculate the quality of the subjects' diet (Kennedy, Ohls, Carlson, & Fleming, 1995). This is a unique and brief measure of the quality of the diet of great utility to monitor changes in consumption patterns. Of the ten diet components evaluated by this index, five correspond to the main food groups (milk, grains, meat, fruits, and vegetables) and four correspond to total fat, saturated fat, cholesterol, and so-dium. The tenth component is the variety of the diet. The values of this index can range from 0 to 10 points. Scores higher than 80 corresponded to a well-balanced diet; scores of 51–80 signified that the subject's diet was in need of improvement; and scores lower than 51 indicated a low-quality diet.

2.5. Statistical analysis

The statistical analysis was performed with the application IBM SPSS 20 (SPSS Inc., Chicago, IL, USA). Means and standard deviations were the descriptive statistics for the quantitative variables. Qualitative variables were described in terms of proportions. The two means were compared using *t*-test two samples of Student (as modified by Levene's test for equality of variances) for normally distributed variables and the Wilcoxon test for non-normal. In addition, The Chi-square test was employed for comparison between categorical variables. The normality of the distributions was verified by the Kolmogorov–Smirnov test. The level of significance was P < 0.05.

3. Results

3.1. Sociodemographic characteristics and life style

The population sample was composed of 88 boys, 36.2% Christian and 31.9% Muslim and 169 girls, 63.8% Christian and 68.1% Muslim. In relation to the type of residence, there were significant

differences (p < 0.003) among Christian and Muslim male students, with more Muslims living in the family home (97.3%). Significant differences (p < 0.001) were also observed among girls, with the percentage of female Muslims (86.1%) living in the family home being equal to Muslim males. Living in rental flats was a more frequent option among Christian students, and in particular among Christian girls (Table 1). As for daily menu, there were significant

Table 1

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Socio-demographic and life style characteristics in Christian and Muslim boys and girls participating in the study.

Variable	Male		Female			
	Christian $(n = 51)$	Muslim(n=37)	P-value	Christian ($n = 90$)	Muslim (n=79)	P-value
Population	36.2%	31.9%		63.8%	68.1%	
Age	22.59 ± 4.323	21.00 ± 2.392	0.031**	23.61 ± 5.983	21.65 ± 3.978	0.012**
Academic studies	27 (52.0%)	F (12 F%)	0.001*	CO (CC 7%)	24 (42 0%)	0.001*
Nursing Education and Humanities	27 (52.9%)	5 (13.5%) 6 (16.2%)	<0.001*	60 (66.7%) 22 (25.6%)	34 (43.0%) 14 (17.7%)	<0.001*
Social Sciences	11 (21.0%)	26(70.2%)		25 (25.0%) 7 (7.8%)	14 (17.7%) 31 (39.2%)	
University level	15 (25.5%)	20 (70.5%)		7 (7.0%)	51 (55.2%)	
First year	8 (15.7%)	12 (32.4%)	0.055*	19 (21.1%)	22 (27.8%)	0.163*
Second year	19 (37.3%)	12 (32.4%)		19 (21.1%)	23 (29.1%)	
Third year	16 (31.4%)	4 (10.8%)		22 (24.4%)	19 (24.1%)	
Fourth year	8 (15.7%)	9 (24.3%)		30 (33.3%)	15 (19.0%)	
Type of Housing	25 (62 69)	26 (07 20)	0.000*	11 (15 600)	60 (06 10)	0.001*
Family home	35 (68.6%)	36 (97.3%)	<0.003*	41 (45.6%)	68 (86.1%)	<0.001*
Diliversity residence fidit	5 (9.8%) 11 (21.6%)	0(0%) 1(2.7%)		10(11.1%)	3 (3.8%) 8 (10.1%)	
Person in charge of daily menu	11 (21.0%)	1 (2.7%)		59 (45.5%)	8 (10.1%)	
Mother	22 (43.1%)	35 (94.6%)	< 0.001*	33 (36.7%)	57 (72.2%)	< 0.001*
Father	2 (3.9%)	0 (0%)		1 (1.1%)	0 (0%)	
Yourself	22 (43.1%)	1 (2.7%)		44 (48.9%)	18 (22.8%)	
Other	5 (9.8%)	1 (2.7%)		12 (13.3%)	4 (5.1%)	
Use of "miracle" slimming diets (Yes)	7 (13.7%)	3 (8.1%)	0.412*	21 (23.3%)	13 (16.5%)	0.266*
Consumption of weight loss products (Yes)	12 (23.5%)	4 (10.8%)	0.127*	26 (28.9%)	7 (8.9%)	0.001*
Regular daily meals	20 (76 5%)	21 (56.0%)	0.050*	75 (00 20)	50 (62 2%)	0.002*
Breakfast (Yes) Mid. morning spack (Yes)	39 (76.5%)	21 (56.8%) 14 (27.8%)	0.050	75 (83.3%) 27 (20.0%)	50 (63.3%) 22 (20.1%)	0.003
Lunch (Yes)	20 (39.2%)	14 (57.8%) 34 (91.9%)	0.890	27 (30.0%) 90 (100%)	23 (29.1%) 77 (97.5%)	0.900
Mid-afternoon snack (Yes)	30 (58.8%)	18 (48.6%)	0.344*	38 (42.2%)	33 (41.8%)	0.953*
Dinner (Yes)	46 (90.2%)	30 (81.1%)	0.219*	84 (93.3%)	49 (62.0%)	< 0.001*
Nibbling between meals (Yes)	25 (49.0%)	23 (62.2%)	0.222*	49 (54.4%)	52 (65.8%)	0.132*
Fear of weight gain						
Never	26 (51.0%)	14 (37.8%)	0.669*	42 (46.7%)	27 (34.2%)	0.216*
Sometimes	10 (19.6%)	10 (27.0%)		23 (25.6%)	20 (25.3%)	
Always Weath nighten and	8 (15.7%)	7 (18.9%)		14 (15.6%)	14 (17.7%)	
Consumption of alcoholic beverages	7 (13.7%)	6 (16.2%)		11 (12.2%)	18 (22.8%)	
Never	8 (15 7%)	27 (73 0%)	<0.001*	21 (23 3%)	56 (70.9%)	<0.001*
Weekends	19 (37.3%)	6 (16.2%)	0.001	19 (21.1%)	7 (8.9%)	0.001
Every day	0 (0%)	1 (2.7%)		0 (0%)	0 (0%)	
Occasionally	24 (47.1%)	3 (8.1%)		50 (55.6%)	16 (20.3%)	
Average age of drinking initiation	16.22 ± 1.412	15.60 ± 2.675	0.491**	16.77 ± 2.880	16.41 ± 1.228	0.621**
Cigarette consumption				/		
Never	37 (72.5%)	30 (81.1%)	0.798*	65 (72.2%)	68 (86.1%)	0.143*
Weekends	3 (5.9%)	2 (5.4%)		/ (/.8%) 10 (11 1%)	2(2.5%)	
Occasionally	5(9.6%) 6(11.8%)	2 (3.4%)		8 (8 0%)	0 (7.0%) 3 (3.8%)	
Average age of smoking initiation	17.00 + 1.359	15.71 + 1.890	0.088**	16.72 + 1.926	16.36 + 1.120	0.573**
Use of illegal drugs (Yes)	3 (5.9%)	7 (18.9%)	0.057*	4 (4.4%)	5 (6.3%)	0.586*
Frequency of illegal drug use					· · ·	
Daily	0 (0%)	2 (20.0%)	0.505*	0 (0%)	2 (28.6%)	0.248*
Weekly	1 (25.0%)	3 (30.0%)		1 (20.0%)	3 (42.8%)	
Monthly	3 (75.0%)	5 (50.0%)		4 (80.0%)	2 (28.6%)	
Is physical exercise important?	1 (2.0%)	0 (0%)	0 227*	1 (1 10/)	4 (5 09()	0 121*
NOL IMPORTANT	I (2.0%) 2 (5.0%)	U (U%) 5 (12 5%)	0.337*	I (I.I%) 15 (16 7%)	4 (5.0%) 10 (24.1%)	0.131*
Yan y mportant	3 (3.9%) 47 (92 2%)	3 (13.3%) 32 (86.5%)		1J (10.7%) 74 (82.2%)	13 (24.1%) 56 (70.9%)	
Do you practice a sport? (Yes)	41 (80.4%)	27 (73 0%)	0 412*	35 (38.9%)	28 (35 4%)	0 644*
Is your free time spent on sedentary leisure? (Yes)	40 (78.4%)	31 (83.8%)	0.170*	72 (80.0%)	63 (79.7%)	0.745*
Average time spent on sedentary leisure (hours)	2.20 ± 1.649	3.27 ± 2.143	0.013**	2.67 ± 1.989	2.75 ± 2.009	0.795**
Daily use of transportation to reach the campus (Yes)	28 (54.9%)	22 (59.5%)	0.670*	44 (48.9%)	40 (50.6%)	0.821*

Data are mean values \pm SD and percentage.

*Chi-square test.

**Student's t-test.

differences (p < 0.001) between boys and girls. Among Muslims, it was the mother who, in a greater proportion of cases, was in charge of the daily menu in the family household. Christian boys and girls were in a greater percentage of cases responsible for deciding their menu on a daily basis. In regard to the consumption of weight-loss products, statistically significant differences (p = 0.001) were observed only among Christian and Muslim girls, with a higher percentage of consumption (28.9%) among Christians. In regard to regular daily meals, there were significant differences due to religion in boys (p = 0.050) and girls (p = 0.003). Also, for both sexes, Christian students ate breakfast in a greater percentage of cases (76.5% of boys and 83.3% of girls) compared to Muslims. As for the dinner, significant differences were found only among girls. A greater proportion (93.3%) of Christian girls had dinner. In regard to the consumption of alcoholic beverages, there were statistically significant differences between Christian and Muslim boys and girls. 73.0% of Muslims boys and 70.9% of Muslim girls stated that they never consume alcohol. In contrast, weekend and occasional alcohol consumption was higher among Christian boys and girls. The self-reported age of drinking initiation (Baldini et al., 2009) was similar in both sexes, although slightly lower among Muslim boys. In regard to cigarette and illegal drug consumption, no significant differences were observed between Christian and Muslim boys and girls. However, a largest proportion of Muslim boys claimed to consume illegal drugs. Regarding the importance given to physical exercise, there were no statistically significant differences, although a higher proportion of Christian boys (92.2%) and girls (82.2%) considered it to be very important. In contrast, significant differences (p = 0.013) were found in the average time devoted to sedentary leisure activities among Christian and Muslim boys, being Muslims who spent more time (3.27 h) on these activities.

3.2. Anthropometric characteristics and body composition

Anthropometric measures showed in Table 2 reveal significant differences (p = 0.048) in BMI between Christian and Muslim boys, being their mean values higher among Christians. Height also showed statistically significant differences (p = 0.037) between Christian and Muslim girls, with higher mean values among the latter. In addition, the results show a higher prevalence of overweight in Christian boys and girls compared to Muslims, although no significant differences were found (p = 0.618 and p = 0.579, for boys and girls, respectively). Likewise, significant differences (p = 0.041) were observed between Christian and Muslim boys for

the visceral fat indicator. No statistically significant differences were found for sex or religion for the remaining anthropometric variables analyzed.

3.3. Daily intake of energy, macronutrients, and micronutrients

The results show a higher carbohydrate intake (p = 0.018) among Muslim girls compared to Christians (Table 3). In regard to micronutrients, significant differences in sodium intake (p < 0.001) were observed among boys of Christian and Muslim faith, with significantly higher intakes in Christians. No statistically significant differences were observed between Christian and Muslim students for the intake of vitamins, fatty acids or fiber. In contrast, a higher cholesterol intake (p = 0.038) was observed in Muslim girls compared to Christians. Regarding alcohol intake, there were significant differences between Christian and Muslim boys (p = 0.007) and Christian and Muslim girls (p = 0.002), its consumption being much higher among students of Christian faith.

3.4. Quality of diet as measured by the Healthy Eating Index (HEI) and Mediterranean diet score (MDS)

In regard to diet quality (Table 4), the Healthy Eating Index (HEI) showed that the percentage of students on a daily low-quality diet was higher among boys and girls of Christian faith (7.7%) and (3.4%), respectively. Likewise, the percentage of students whose daily diet needs improvement was higher among both Christian (88.5%) and Muslim (89.5%) boys compared to girls. However, the percentage of students who maintained a balanced diet was higher among Christian and Muslim girls (16.9% and 10.3% respectively), although no statistically significant differences were found compared to boys (p = 0.530 and p = 0.070, respectively).

Regarding adherence to the Mediterranean diet (Table 5), the Mediterranean diet score (MDS) indicated a poor-quality eating pattern with low adherence to the Mediterranean diet. The results of the study showed that 47.2% Christian and 41.8% of Muslim girls had a score of 1 point, which signified that they had the lowest adherence, to the diet. In addition, there were statistically significant differences (p = 0.005) in the degree of adherence to DM among Christian and Muslim girls. Among the boys, the results showed that 39.2% of students of Christian faith had a score of 1 point, i.e. a low adherence to the DM, although differences relative to sex were not significant (p = 0.682).

Table 2

Anthropometric characteristics and body composition in Christian and Muslim boys and girls participating in the study.

Variable	Male			Female			
	Christian ($n = 51$)	Muslim(n=37)	P-value	Christian (n = 90)	$Muslim \ (n=79)$	P-value	
Weight (Kg)	80.32 ± 12.521	75.35 ± 12.042	0.065**	60.46 ± 9.852	62.10 ± 10.503	0.297**	
Height (cm)	178.50 ± 7.127	178.24 ± 7.153	0.867**	163.77 ± 5.740	165.67 ± 6.041	0.037**	
BMI (kg/m2)	25.19 ± 3.562	23.70 ± 3.281	0.048**	22.54 ± 3.452	22.60 ± 3.539	0.908**	
Weight Class			0.618*			0.579*	
Normal weight	29 (56.9%)	23 (62.2%)		71 (78.9%)	65 (82.3%)		
Overweight	22 (43.1%)	14 (37.8%)		19 (21.1%)	14 (17.7%)		
Fat-free mass (%)	19.17 ± 9.827	16.72 ± 6.779	0.195**	25.96 ± 7.448	26.47 ± 7.317	0.656**	
Fat (%)	64.57 ± 7.612	62.65 ± 8.183	0.260**	44.17 ± 3.853	44.84 ± 2.254	0.284**	
Visceral fat indicator	3.75 ± 2.820	2.73 ± 1.758	0.041**	2.15 ± 2.020	2.04 ± 1.680	0.702**	
Total body water (%)	57.00 ± 5.199	58.28 ± 5.111	0.254**	51.98 ± 4.437	51.64 ± 5.055	0.647**	
Metabolic age (year)	21.67 ± 10.041	20.27 ± 8.843	0.501**	22.31 ± 12.759	21.59 ± 9.990	0.683**	
Basal metabolism	1931.86 ± 244.926	1837.14 ± 311.665	0.114**	1380.09 ± 111.950	1403.05 ± 136.743	0.232**	

Data are mean values ± SD and percentage.

**Student's *t*-test.

^{*}χ² Chi-square test.

Table 3

Daily intake of energy, macronutrients, and micronutrients in Christian and Muslim boys and girls participating in the study.

Variable	Male			Female			
	Christian ($n = 51$)	Muslim (n=37)	P-value	Christian (n = 90)	Muslim (n=79)	P-value	
Energy (Kcal)	2294.38 ± 665.251	2217.37 ± 699.469	0.601**	1920.36 ± 545.215	2008.67 ± 690.792	0.362**	
Carbohydrates (g)	250.61 ± 93.877	265.22 ± 91.489	0.468**	211.93 ± 67.431	242.83 ± 95.940	0.018**	
Lipids (g)	92.80 ± 31.434	87.73 ± 31.793	0.459**	81.38 ± 28.127	81.90 ± 31.452	0.911**	
Proteins (g)	105.77 ± 37.621	91.30 ± 33.737	0.067**	79.45 ± 18.817	74.30 ± 22.704	0.109**	
Calcium (mg)	957.98 ± 401.209	866.35 ± 339.902	0.263**	789.87 ± 250.124	799.72 ± 331.669	0.830**	
Potassium (mg)	2838.09 ± 1057.496	2641.40 ± 1005.224	0.382**	2378.20 ± 796.826	2425.72 ± 897.548	0.716**	
Magnesium (mg)	274.15 ± 109.223	251.41 ± 99.672	0.320**	215.90 ± 62.477	216.47 ± 69.835	0.955**	
Iron (mg)	14.83 ± 6.270	13.15 ± 4.205	0.137**	11.53 ± 3.560	12.17 ± 3.618	0.249**	
Sodium (mg)	2423.41 ± 991.934	1760.35 ± 647.447	< 0.001**	1927.49 ± 698.918	1746.05 ± 753.455	0.106**	
Phosphorous (mg)	1438.33 ± 516.078	1235.28 ± 493.507	0.067**	1167.55 ± 318.259	1129.95 ± 410.084	0.504**	
lodine (μg)	49.32 ± 37.200	54.97 ± 28.009	0.439**	51.55 ± 38.342	55.52 ± 46.442	0.544**	
Vitamin C (mg)	148.26 ± 85.827	153.96 ± 65.609	0.736**	136.54 ± 78.272	155.17 ± 81.407	0.132**	
Vitamin D (µg)	9.58 ± 8.568	10.30 ± 9.931	0.718**	6.88 ± 8.575	7.64 ± 5.911	0.511**	
Vitamin E (mg)	9.24 ± 8.798	6.61 ± 4.596	0.073**	6.16 ± 2.782	6.35 ± 3.830	0.712**	
Vitamin B ₆ (mg)	2.39 ± 1.343	2.10 ± 0.951	0.254**	1.88 ± 2.231	1.76 ± 0.740	0.661**	
Vitamin B ₁₂ (µg)	6.97 ± 5.342	6.02 ± 5.184	0.404**	5.10 ± 5.287	6.81 ± 9.676	0.165**	
SFAs (g/día)	27.54 ± 11.768	26.84 ± 11.550	0.783**	25.12 ± 9.892	25.66 ± 11.164	0.740**	
MUFAs (g/day)	33.04 ± 11.206	31.24 ± 12.888	0.487**	30.53 ± 12.015	29.48 ± 12.366	0.574**	
PUFAs (g/day)	9.86 ± 5.741	8.88 ± 4.947	0.404**	7.61 ± 3.504	7.50 ± 3.780	0.846**	
Total cholesterol (mg/day)	466.75 ± 200.825	434.92 ± 188.840	0.454**	367.69 ± 148.220	422.07 ± 188.737	0.038**	
Fiber (g/day)	13.41 ± 6.046	14.77 ± 6.955	0.332**	12.96 ± 5.362	13.45 ± 5.785	0.568**	
Alcohol (g/day)	4.81 ± 11.433	0.29 ± 1.269	0.007**	3.13 ± 7.946	0.44 ± 1.895	0.002**	

Data are mean values \pm SD and percentage.

** Student's t-test.

Table 4

Quality of diet based on the Healthy Eating Index (HEI) in Christian and Muslim boys and girls participating in the study.

Variable	Male		Female		
	Christian $(n = 51)$ Muslim $(n = 37)$		Christian (n = 90)	Muslim (n = 79)	
HEI (Total sample)					
Mean ± SD	66.75 ± 9.903	68.03 ± 8.903	70.51 ± 9.632	67.83 ± 9.256	
HEI 0-50					
% subjects	4 (7.7%)	1 (2.6%)	3 (3.4%)	2 (2.6%)	
mean ± SD	47.25 ± 2.062	47.00 ± 0	49.00 ± 1.732	50.00 ± 0	
HEI 51-80					
% subjects	45 (88.5%)	33 (89.5%)	72 (79.8%)	69 (87.2%)	
mean ± SD	67.72 ± 7.960	67.38 ± 7.491	68.46 ± 6.697	66.49 ± 7.428	
HEI > 80					
% subjects	2 (3.8%)	3 (7.9%)	15 (16.9%)	8 (10.3%)	
mean \pm SD	83.50 ± 3.536	82.33 ± 2.309	84.47 ± 3.314	83.75 ± 4.027	

Data are mean values \pm SD and percentage.

3.5. Practice of healthy habits of life according to religious group

There was no association between belonging to a Christian or Muslim confession and maintaining an adequate nutritional status (normal-weight), not using drugs and practicing sports (see Table 6). Crude data show that Muslim students have a lower risk of smoking (OR = 2.08, 95% CI = 1.15, 3.88). On the other hand, both crude and adjusted data by academic studies, sex and type of residence show that Muslim students are less likely to consume alcohol (OR = 7.88, 95% CI = 4.27, 14.54).

4. Discussion

The results obtained in this study show differences in healthy and eating habits among Christian and Muslim girls and boys in the city of Melilla. It was noteworthy that 97.3% of Muslim male students lived at home followed by a 86.1% of Muslims girls, a factor that possibly conditioned their diet. In this sense, our results contrast with those of Seubsman et al. (2010), who observed a wide variety of housing modes in a university population of Thai students. Accordingly, our study found that it was the mother of the Muslim boys and girls who actually was in charge of the daily menu. However, this was not the case in studies of Thai and German university students where the parents rarely were responsible for feeding their children during their university studies (Schwarzer et al., 2010).

In regard to the consumption of weight-loss products, significant differences were observed only among Christian and Muslim girls, with a higher percentage of consumption (28.9%) among Christians. This was a more frequent practice among the Christian girls, which coincides with previous studies of Belgian and American university students (Deliens et al., 2013; Pullman et al., 2009). A high number of students of both genders and mainly Muslims, did not have breakfast before going to class. This agrees with the results of Papadaki, Hondros, Scott, and Kapsokefalou (2007), for Greek university students and with those of Rakicioglu and Yildiz (2011), for Turkish students. Regarding the fear of weight gain, no significant differences were found between Christian and Muslim boys and girls. However, Muslim students of both genders showed a slightly greater fear of gaining weight compared to Christians (about 18% and 16%, respectively). This result differed somewhat from Kapka-Skrzypczak et al. (2012), who found that 9.9% of a

Table 5

Adherence to Mediterranean diet based on the Mediterranean Diet Score (MDS) in Christian and Muslim boys and girls participating in the study.

Variable	Male		Female		
	Christian (n = 51)	Muslim (n = 37)	Christian (n = 90)	Muslim $(n = 79)$	
MDS (Total sample)					
mean ± SD	0.96 ± 0.894	0.95 ± 1.053	0.77 ± 0.780	1.20 ± 0.925	
0	18 (35.3%)	15 (43.2%)	36 (40.0%)	19 (24.1%)	
1	20 (39.2%)	11 (29.7%)	42 (46.7%)	33 (41.8%)	
2	10 (19.6%)	7 (18.9%)	10 (11.1%)	19 (24.1%)	
3	3 (5.9%)	2 (5.4%)	1 (1.1%)	8 (10.1%)	
4	0 (0%)	1 (2.7%)	1 (1.1%)	0 (0%)	
MDS < 4					
% subjects	51 (100.0%)	36 (97.3%)	89 (%)	79 (%)	
mean \pm SD	0.96 ± 0.894	0.86 ± 0.931	0.73 ± 0.703	1.20 ± 0.925	
0	18 (35.3%)	16 (44.4%)	36 (40.4%)	19 (24.1%)	
1	20 (39.2%)	11 (30.6%)	42 (47.2%)	39 (41.8%)	
2	10 (19.6%)	7 (19.4%)	10 (11.2%)	19 (24.1%)	
3	3 (5.9%)	2 (5.6%)	1 (1.1%)	8 (10.1%)	
MDS 4–6					
% subjects	0 (0%)	1 (2.7%)	1 (1.12%)	0 (0%)	
Mean \pm SD	0	4 ± 0	4 ± 0	0	
4	0 (0%)	1 (100.0%)	1 (100.0%)	0 (0%)	
MDS > 6		· · ·			
% subjects	0	0	0	0	

Data are mean values \pm SD and percentage.

Table 6

Influence of belonging to Christian or Muslim confession in the practice of healthy life habits.

Variable	n	%	OR	95%CI	OR ^a	95%CI		
Normal w	Normal weight							
Yes	100	53.2	1					
No	41	59.4	1.29	0.74; 2.25	1.39	0.74; 2.61		
Cigarette o	onsump	tion						
Yes	39	68.4	1					
No	102	51.0	2.08*	1.15; 3.88	1.93	0.98; 3.82		
Consumpt	Consumption of alcoholic beverages							
Yes	112	77.2	1					
No	29	25.9	9.71**	5.47; 17.24	7.88**	4.27; 14.54		
Illegal dru	g							
Yes	7	36.8	1					
No	134	56.3	0.45	0.17; 1.19	0.44	0.15; 1.30		
Practice a sport								
Yes	76	58.0	1					
No	65	516	1 30	$0.79 \cdot 2.12$	112	0.63 2.02		

Christians were taken as reference.

Data are presented as odds ratio (OR) with 95% confidence intervals (CI) using logistic regression model.

OR^a adjusted for academic studies, sex and type of housing.

 $^{*}p < 0.05; \ ^{**}p < 0.001.$

population of 4.428 Polish university students of Christian confession had a morbid fear of becoming fat.

In regard to the consumption of alcoholic beverages, there were statistically significant differences between Christian and Muslim boys and girls, being their consumption both occasional and on weekends much higher among Christian boys and girls. In spite of this, our results differ with those of Donath et al. (2011), who report that 89.1% of a population of young Russians and German in an urban environment consumed alcohol on a daily basis. The average age of drinking initiation for our sample was similar in both sexes, although slightly lower among Muslim boys (15.6). This contrasts with the average age of 13-14 for university students in other regions of Spain, such as Valencia (Cortés, Espejo, & Giménez, 2007). A possible reason for this is that alcohol consumption might be modulated by the need of the need for coexistence among persons of different religions, in some of which, such as Islam, there is a explicit prohibition of consuming alcohol. This prohibition could be acting as a stimulating factor of its consumption among young Muslims. In addition, in Melilla there is a minority group of Jews who also do not drink alcohol. The results for the age of smoking initiation among university students in Melilla were similar to those for drinking alcohol. However, even though there were no significant differences in tobacco consumption among Christian and Muslim boys and girls, Christian female students showed the highest smoking frequency. This differs from Bhojani, Chander, and Devadasan (2009), who found that 15.7% of a population of Indian students smoked daily, and that the average age of smoking initiation was 14.7. In relation to illegal drug use, 18.9% of Muslim boys stated that they had consumed drugs during the academic year. In addition, daily consumption of illegal drugs was overall higher among Muslims girls and boys. This finding contrasts with that observed by Ruíz Laso (2015), among young Christians and Muslims in the city of Ceuta, where Christian students are the most frequent (72.2%) who use illegal drugs against Muslims (27.6%). On the other hand, Jiménez-Muro, Beamonte, Marqueta, Gargallo, and Nerín (2009), in their study with Spanish university students in Zaragoza, found that 16.5% had used illegal drugs. Despite the fact that the university students in Melilla had lower levels of drug use than other national studies, the results obtained highlight the fact that the years at university are a period of susceptibility to the consumption of toxic substances.

Almost all of the students regard physical exercise as very important. Nevertheless, despite this affirmation, Muslim girls were the ones who practiced less sport. These results coincide with the interests, habits, and sports activities reported by Pavón and Moreno (2008), for a population of 1512 university students in the Spanish province of Murcia. They also are in consonance with other international studies (Okazaki et al., 2014; Rao, Darshan, Das, Rajan, & Bhogun, 2012; Vázquez, 2001). On the other hand, the time dedication to sedentary activities was higher among Muslim boys and girls compared to Christians. Particularly among Muslim boys were the ones spending more time on sedentary leisure activities (3.27 h). Similar results in hourly dedication to sedentary leisure were reported among Spanish university students in Cuenca (Arias-Palencia et al., 2015) and Portuguese university students (Clemente, Nikolaidis, Martins, & Mendes, 2016).

In our study about 43.1% of Christian boys and 21.1% of Christian girls were overweight. These results are in contrast to what it was

reported by Cutillas, Herrero, de San Eustaquio, Zamora, and Pérez-Llamas (2013), who in a sample of 223 students at the University of Murcia (Spain), found that 9.3% of the females and 24.2% of the males were overweight.

According to Kant (2004), and Trichopoulou et al. (2003), the adoption of the Mediterranean diet as a regular eating pattern is the best alternative for staying healthy. This is even truer in the case of young people (Grosso et al., 2013). However, recent research has observed a growing distance between the traditional eating pattern characteristic of the Mediterranean diet and the current eating habits of the Spanish university population (Institute of Medicine, 1989; Cervera, Serrano, Daouas, Delicado, & García, 2014; Navarro-González et al., 2014).

This unsatisfactory nutritional situation could stem from the change in life style that occurs when students enter the university, namely, the transition to a more or less independent life, in some cases, far from the family home and parental protection. This is a stressful situation for many young people, which contributes to an alteration of their eating patterns (Ansari, Stock, & Mikolajczk, 2012; Sharma, Harker, Harker, & Reinhard, 2010). These changes even occurred in the case of those subjects who were living at home.

The Healthy Eating Index showed that the percentage of students with a low-quality daily diet was higher among boys and girls of Christian faith. On the other hand, these results show that Christian and Muslim boys need a greater improvement of their daily diet. In any case, all participants have the need to improve their diet, a situation also observed by Ansari et al. (2012), in universities in Poland, Bulgaria, and Germany, The Mediterranean Diet Score of the subjects also indicate poor-quality food pattern with a low adherence to the Mediterranean diet. 47.2% Christian girls and 41.8% of Muslim girls had the lowest adherence, to the diet, showing significant differences in the degree of adherence to DM among Christian and Muslim girls. The university students of Melilla do not consume a large majority of the foods that form the basis of the Mediterranean diet in the recommended amounts. Even so, the students in Melilla adhered to the Mediterranean more strictly than other university populations in Mediterranean countries such as Greece (Chourdakis et al., 2011) and Turkey (Rakicioglu & Yildiz, 2011).

Likewise, there was no influence between belonging to a Christian or Muslim group and maintaining an adequate nutritional status (normal-weight), not to consume drugs and to practice sport. According to Ruíz Laso (2015), this circumstance could be explained by the effect of the fashions and customs peculiar to the social environment of these young people and that could be acting in a determinant way. However, as would be expected from both raw data and adjusting for academic studies, sex and type of residence, it is observed that Muslim students are less likely to consume alcohol, a circumstance that could be explained by the effect of the existing prohibition in Islam in terms of the consumption of alcoholic beverages (Contreras, 2007). With regard to tobacco consumption, raw data show that Muslims have a lower risk of smoking, however, the adjusted data do not show differences between the two groups. This could be explained by the fact that the proportion of students who live in their family household is higher among Muslims. In addition, this effect could be explained by the fact that Christian students are mostly enrolled in Nursing, which was considered as a confounding factor in the adjustment, perhaps being more aware of healthy habits (Navarro-Prado, 2016).

The present study has some strengths and limitations. Among the strengths is the representative sample, selected by random sampling among the total university population of the Melilla campus, which contributes to obtaining solid results that will be useful and will improve comparability in future studies. Among the limitations of the study, we must include its cross-sectional nature.

5. Conclusions

Nutritional and health habits of Melilla university students should be improved since both Muslim and Christian boys and girls eat foods of low nutritional quality and have little adherence to the Mediterranean diet. There is no influence between belonging to a Christian or Muslim group and maintaining a proper nutritional status, not using drugs, not smoking and practicing sports, although Muslim students have a lower risk of consuming alcohol. This justifies the need to gain more in-depth knowledge of the factors that condition the life style and eating habits of university students in order to prevent future health problems. It would be useful to implement an intervention program in order to expand knowledge about healthy eating habits and lifestyles and promote self-care.

Conflict of interest

The author(s) declare(s) that there is no conflict of interests regarding the publication of this paper.

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