

Assessment of lifestyle and eating habits among undergraduate students in northern Italy

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Abstract

Aim and methodology. Dietary habits of university students were analyzed in order to investigate any differences between students living at and away from home. Two hundred and fifty-eight undergraduate students attending University of Ferrara completed a self-administered questionnaire on demographic characteristics, food frequency consumption habits and body weight perception.

Results. Students living at home practiced more sport and consumed more frequently raw and cooked vegetables, fish, meat and poultry, fresh fruit, eggs, bread/cereals. Conversely, students living away from home consumed more often packaged/ready food, beer and spirits, milk and chips. The majority of students living alone reported a modification of dietary habits since leaving family. Furthermore they perceived to have a weight condition different from normal in a greater extent than students living with family.

Discussion. Students living alone encountered more difficulties in adopting a healthy diet so it would be desirable to adopt nutritional educational interventions on university students, usually neglected by these measures.

Key words

- dietary habits
- university students
- food frequency questionnaire

INTRODUCTION

Chronic diseases are major causes of morbidity and mortality in all industrialized countries, even in the younger age groups. Consequently the World Health Organization (WHO) recognizes the vital role of a healthy diet for prevention. In addition, unsuitable dietary habits coupled with inadequate physical activity are associated with an increased prevalence of obesity and osteoporosis [1, 2].

Young adults, in consideration of important lifestyle changes, are arranged to negatively modify their way of eating in terms of the variety, the consumption of fruit and vegetables, and the frequency and timing of intake [3, 4]. The years spent at the university represent a critical period that is able to influence both the quality of lifestyle and eating habits of the subsequent adulthood [5] and, also, on long-term, the health of the individuals [6]. Specifically, the university population is divided into two categories, those who continue to live with their parents and those that are attending universities far from their usual residence that are forced to live away from home. For both, the beginning of the university matches with more freedom and independence

and is often the first time that young people assume the responsibility to choose and prepare foods [7]. It has long been known how much college students have difficulties in following healthy dietary habits [8]. Taking in consideration this background, special attention should be paid to university students as a group particularly prone to poor dietary habits [9].

The aim of the present work was to analyze the lifestyle of a group of undergraduate students attending university in a city of northern Italy (Ferrara). In particular, frequency of participation in recreational activities, eating habits and nutritional status were considered.

MATERIALS AND METHODS

The students attending a university located in a city in the Emilia-Romagna Region (North-East Italy) enrolled in different degree courses (midwifery, nursing and biology) have been invited to participate in a study about their food habits during the period March-April 2011.

The participants were required to be free of diet-related problems and to be consuming their usual mixed diet. The undergraduate students who met the study

criteria were asked to complete a self-administered questionnaire. The enrolment was voluntary and anonymous. Preliminary information was provided about the purpose, the protocol and the method of the study, including the guarantee of anonymity (according to Legislative Decree no. 196/2003 "Code concerning the protection of personal data").

The research was carried on in accordance with the World Medical Association Declaration of Helsinki. It does not report any experiment on human or biological human samples, nor research on identifiable human material and data because it is an observational survey conducted by an anonymous questionnaire among university students. Indeed, in order to protect the privacy of subjects and confidentiality of their personal information and to minimize the impact of the study on their physical, mental and social integrity (stated in the article n. 23 of the above mentioned Helsinki declaration) the research was wholly conducted anonymously; thus no identifiable personal data are reported. Verbal informed consent was obtained from all subjects.

Characteristics of the questionnaire

The questionnaire (Supplementary data, available online at www.iss.it/anna) was used to obtain information on demographic, social and leisure activities, as well as dietary habits, health status and weight. The first part was dedicated to the demographic aspects. The second section considered the socio-cultural aspects in order to understand where the students were living during the term-time (if at home with the family or not) and the frequency of the most common recreational activities (pub, cultural activities, disco, sports). The third part was about the eating habits and, in particular, where meals were prepared and included the Food Frequency Questionnaire (FFQ), a questionnaire developed on the model of that used by Papadaki and Scott [10], and already adopted for a survey on the same aspects of the lifestyle of university students [11].

The food frequency list contained fresh fruit; cooked vegetables; raw vegetables; potatoes, rice and pasta; chips; pulses; meat products (ham, sausages, burgers, etc.); fish; snacks (crisps, nuts, etc.); sauces (mayonnaise, ketchup, etc.); meat and poultry; bread and cereals; dairy (including cheese and yoghurt); cakes (including sweets, sugar, chocolates, biscuits, ice cream, cakes, scones and pastries); eggs; and pizza. Concerning beverages, the categories were: fresh fruit juice; milk; soft-fizzy drinks; wine; beer; spirits; and coffee/tea. Consumption frequency for each food item was measured as "never", "1-3 times per month", "1-2 times per week", "3-4 times per week", "5-6 times per week", "once per day", "twice per day", "3 times per day" and "4 times per day".

The section on food habits also included questions about place and frequency of consumption of main meals of the day. The participants were also asked whether they perceived that their eating habits had changed since starting university. The last section of the questionnaire focused on the health of students enrolled, who were asked how they perceived their nutritional status (normal weight, underweight or overweight).

Statistical analysis

The answers provided in the questionnaire have been collected in a database using Microsoft Excel 2007. Data for individual food items in the food frequency questionnaire were transformed to servings per week (servings/week). As in the study by Papadaki and Scott [10], it was assumed that "times" could be equated to "portions". Therefore, the frequency of consumption of each food and beverage category was transformed as follows: the frequency value "never" was transformed to "0 times per week", "1-3 times per month" was transformed to "0.5 times per week", "1-2 times per week" was transformed to "1.5 times per week", "3-4 times per week" became "3.5 times per week", "5-6 times per week" became "5.5 times per week", "once per day" became "7 times per week" and "2 times per day" became "14 times per week", "3 times per day" became "21 times per week" and "4 times per day" was transformed to "28 times per week".

The per capita weekly consumption of each food or beverage was then calculated by taking the sum of the values for all students in the population of reference and dividing the result by the total number of individuals. The obtained data were analyzed by StatView® 5.0.1 software (Abacus Concepts, Berkeley, CA, USA). The chi-square test was used to detect differences in the place where meals are prepared and consumed between students living at or away from home. The Mann-Whitney test was used to detect changes in food intake for students living at and away from home. A p -value < 0.05 was considered statistically significant.

RESULTS

Two hundred and fifty-eight students agreed to answer to the questionnaire, of whom 118 (45.7%) still lived at home with parents during their studies and 140 (54.3%) lived away from family. The age of students is placed in a range varying from 19 to 42 years (mean age 23.3 ± 4.6 years), and most of them were females (68.6%).

Among the leisure activities (*Figure 1*), sport was found to be the most performed (1.4 times per week), followed by going to pub or sandwich bars about once per week (0.98 times per week), while the participation to cultural activities (0.6 times per week) and the discos (0.5 times per week) were less frequently cited. The sport was significantly ($p = 0.0002$) more practiced by males (2.03 times per week) than females (1.14 times per week).

The students who still lived at home showed, overall, an increased tendency to engage in leisure activities than those who lived far from home, and the difference between the two groups was statistically significant for the sport (1.69 times per week for students living at home versus 1.19 times per week for students living away from home; $p = 0.0044$) and for participation in cultural activities (0.61 times per week for students living at home versus 0.50 times per week for students living away from home; $p = 0.0052$).

With regard to the main meals, the majority of students (84.9%) stated they have breakfast at home; only a small group (8%) said they skip it, with the remainder having breakfast at the bar. The 77.5% of respondents

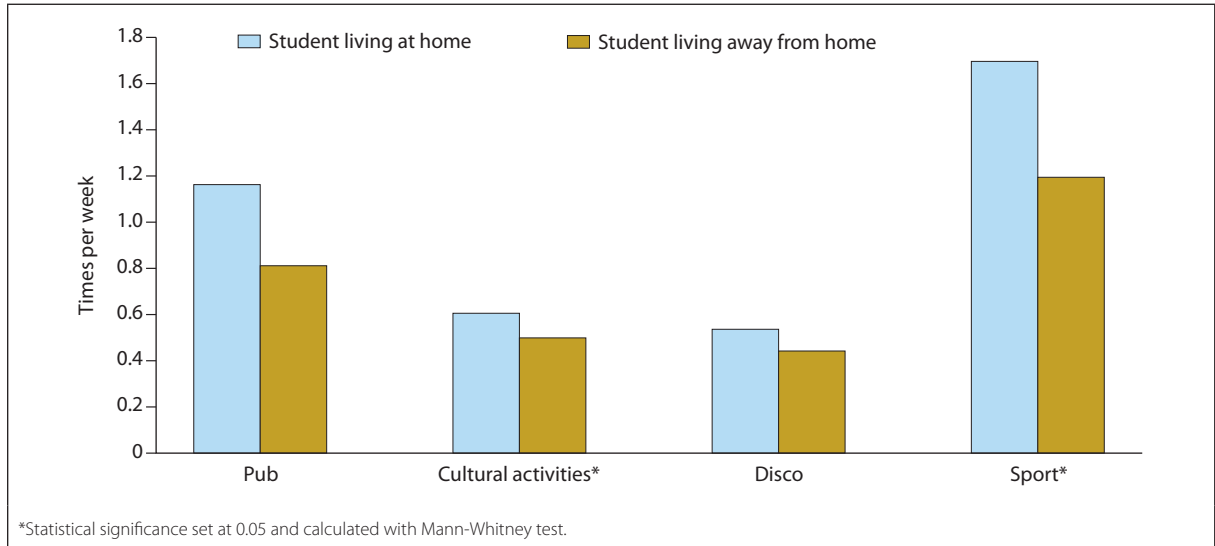


Figure 1
Leisure activities students according to living arrangement.

declared to have lunch at home or to eat food prepared at home; such behavior mainly concerned non-resident students (79.3%) compared to those who still lived at home (75.4%). The percentage of respondents who have lunch in the canteen was similar in both groups of students (about 8%). A proportion of students (14.3%) claimed to choose other solutions outside home (bars, takeaways, etc.), especially among those living in the

household (16.9%) compared to those living alone in their apartment (12.1%). The dinner was the meal that almost all of the students consumed at home.

As shown in the *Figure 2*, the most consumed foods were meat (5.73 servings/week), pasta/rice (5.20 servings/week), bread/cereals (5.1 servings/week), cakes (5.14 servings/week), raw vegetables/salads (4.69 servings/week), fresh fruit (4.64 servings/week), dairy prod-

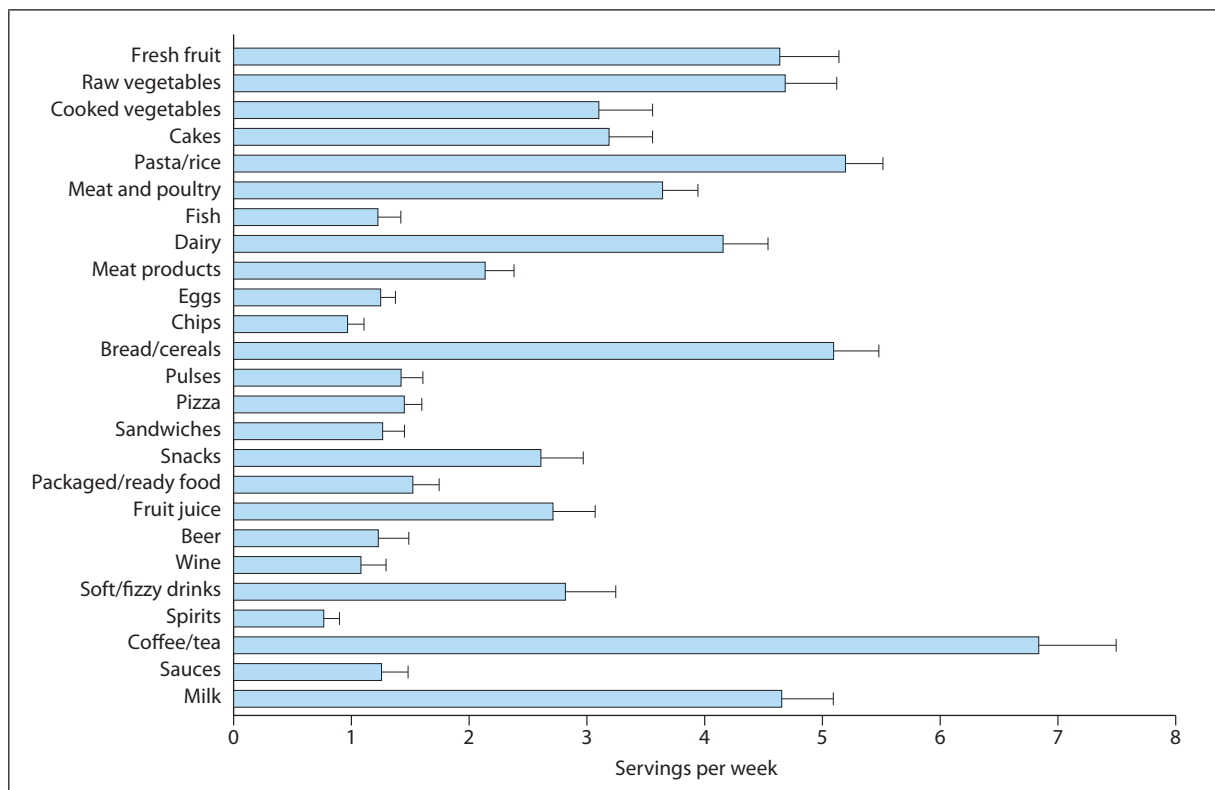


Figure 2
Mean weekly consumption of foods and beverages for undergraduate students. The error bars represent the confidence intervals at 95%.

ucts (4.16 servings/week), and the most consumed drinks were coffee/tea (6.84 servings/week) and milk (4.66 servings/week). The food products with an average consumption were: cooked vegetables (3.10 servings/week), snacks (2.61 servings/week), sausages (2.14 servings/week), while for drinks, non-alcoholic beverages (2.83 servings/week) and fruit juices (2.72 servings/week). The students reported a lower consumption of: packaged foods (1.52 servings/week), pizza (1.45 servings/week), pulses (1.43 servings/week), sandwiches (1.26 servings/week), eggs (1.25 servings/week), fish (1.24 servings/week), fries (0.97 servings/week), beer (1.24 servings/week), wine (1.08 servings/week), spirits (0.77 servings/week).

The gender appeared to influence the frequency of consumption of many foods (Table 1). Women demonstrated to consume, with a significant difference, greater amount of raw vegetables (5.25 servings/week, $p = 0.0002$) and fresh fruit (5.21 servings/week, $p = 0.0142$) and a highly significant difference in consuming more cooked vegetables (3.63 servings/week, $p < 0.0001$) and non-alcoholic beverages (2.38 servings/week, p

< 0.0001). In contrast, males consumed significantly more pasta (5.91 servings/week, $p = 0.0088$), prepared foods (1.96 servings/week, $p = 0.0016$), sauces (1.73 servings/week, $p = 0.0080$), pizza (1.55 servings/week, $p = 0.0025$), wine (1.34 servings/week, $p = 0.0011$) and spirits (1.22 servings/week, $p = 0.0008$) and in a highly significant way more sandwiches (1.66 servings/week, $p < 0.0001$) and beer (2.28 servings/week, $p < 0.0001$) than females.

The frequencies of consumption were also influenced by the place of residence (Table 2). The students that lived at home reported a larger (even not statistically significant) consumption of sweets, vegetables and sandwiches than student living away from family. A significant difference was found instead for fresh fruits (5.43 servings/week, $p = 0.0089$), meat (4.12 servings/week, $p = 0.0030$), sausages (2.56 servings/week, $p = 0.0137$), and coffee/tea (7.56 servings/week, $p = 0.0279$). In this group of students, an increased consumption was also noted for raw (5.78 servings/week) and cooked vegetables (3.91 servings/week), fish (1.60 servings/week) with a highly significant difference ($p < 0.0001$).

Table 1

Mean weekly consumption (servings/week) of selected food and beverages of students according to gender

Food items	Men (n = 81)		Women (n = 177)		Difference (%)	p*
	Mean	s.d.	Mean	s.d.		
Fresh fruit	3.39	2.93	5.21	4.61	-34.9	0.0142
Raw vegetables	3.46	2.87	5.25	3.81	-34.0	0.0002
Cooked vegetables	1.92	2.45	3.63	4.10	-46.9	< 0.0001
Cakes	2.62	2.43	3.45	3.20	-23.9	0.0832
Pasta/rice	5.91	2.66	4.90	2.42	20.6	0.0088
Meat and poultry	4.03	2.64	3.47	2.35	16.3	0.1132
Fish	1.14	1.17	1.28	1.60	-10.3	0.9328
Dairy	4.00	3.23	4.24	2.94	-5.7	0.3021
Meat products	2.37	2.08	2.04	1.95	16.3	0.1122
Eggs	1.40	1.12	1.18	1.02	18.6	0.1362
Chips	1.17	1.03	0.89	1.17	31.5	0.0024
Bread/cereals	5.28	3.25	5.01	3.04	5.3	0.0826
Pulses	1.48	1.56	1.40	1.46	5.9	0.6936
Pizza	1.55	1.34	1.27	1.09	44.0	0.0025
Sandwiches	1.66	1.62	1.08	1.44	53.7	< 0.0001
Snacks	2.58	2.95	2.62	3.04	-1.5	0.8460
Packaged/ ready food	1.96	1.98	1.32	1.81	48.5	0.0016
Fruit juice	2.86	2.91	2.65	2.94	7.9	0.3662
Beer	2.28	2.94	0.76	1.17	200.3	< 0.0001
Wine	1.34	1.61	0.96	1.81	40.0	0.0011
Soft/ fizzy drinks	3.79	3.71	2.38	3.25	59.0	< 0.0001
Spirits	1.02	1.22	0.65	1.01	57.0	0.0008
Coffee/tea	6.58	5.04	6.96	5.55	-5.5	0.8062
Sauces	1.73	2.38	1.04	1.54	66.6	0.0080
Milk	4.23	3.23	4.86	3.61	-13.0	0.2344

(s.d. = standard deviation)

*Statistical significance set at 0.05 and calculated with Mann-Whitney test.

Table 2
Mean weekly consumption (servings/week) of selected food and beverages of students according to living arrangement

Food items	Students living at home (n = 118)		Students living away from home (n = 140)		Difference (%)	p*
	Mean	s.d.	Mean	s.d.		
Fresh fruit	5.43	4.54	3.97	3.84	-26.9	0.0089
Raw vegetables	5.78	3.94	3.76	3.08	-34.9	< 0.0001
Cooked vegetables	3.91	3.34	2.40	3.95	-38.5	< 0.0001
Cakes	3.47	3.13	2.95	2.87	-15.0	0.1189
Pasta/rice	5.14	2.51	5.24	2.56	2.0	0.8139
Meat and poultry	4.12	2.58	3.23	2.26	-21.5	0.0030
Fish	1.60	1.67	0.91	1.21	-43.0	< 0.0001
Dairy	4.39	2.93	3.98	3.11	-9.3	0.1433
Meat products	2.56	2.41	1.79	1.49	-29.8	0.0137
Eggs	1.35	1.21	1.17	0.90	-13.4	0.5208
Chips	0.91	1.07	1.03	1.18	13.0	0.7298
Bread/cereals	5.44	3.04	4.81	3.25	-11.5	0.0826
Pulses	1.60	1.76	1.28	1.21	-20.4	0.8049
Pizza	1.41	1.19	1.00	1.34	5.7	0.8841
Sandwiches	1.39	1.60	1.16	1.45	-16.4	0.1339
Snacks	2.64	2.61	2.58	3.32	-2.2	0.1848
Packaged/ ready food	1.38	1.63	1.64	2.07	19.2	0.9939
Fruit juice	2.78	3.11	2.66	2.78	-4.4	0.8828
Beer	1.03	1.82	1.41	2.19	36.1	0.1904
Wine	1.03	1.56	1.12	1.91	8.9	0.6557
Soft/fizzy drinks	3.03	3.65	2.65	3.28	-12.4	0.5325
Spirits	0.72	1.10	0.80	1.08	11.1	0.3150
Coffee/tea	7.56	5.08	6.24	5.58	-17.5	0.0279
Sauces	1.22	1.80	1.28	1.94	4.7	0.6784
Milk	4.11	3.62	5.13	3.24	24.8	0.0343

(s.d. = standard deviation)

*Statistical significance set at 0.05 and calculated with Mann-Whitney test.

In contrast, the students living away from home consumed significantly more milk (5.13 servings/week, $p = 0.0343$) and packaged food, fries, beer and spirits. The frequency of consumption of pasta, snacks, fruit juices, sauces and pizza were similar in the two groups of students.

In addition, female students who still live in their family home, compared to those living away from home, consumed significantly greater amounts of fruit ($p = 0.0295$), raw ($p = 0.0018$) and cooked vegetables ($p = 0.0002$), fish ($p = 0.0007$), sandwiches ($p = 0.0419$), but showed a tendency to drink significantly ($p = 0.0239$) less milk. The men who live with family showed a significantly higher frequency of consumption of raw ($p = 0.0114$) and cooked vegetables ($p = 0.0114$), meat ($p = 0.0013$) and sausages ($p = 0.0089$) and a highly significant difference for fish consumption ($p < 0.0001$) than those living away from home.

Referring to dietary habits, on the whole the 84.5% of students noted some modification since studying at the university; no significant difference between males

and females was found. The modification in dietary habits affected mainly students living away from home (92.14%) compared to those living with family (75.42%) with a statistically significant difference ($p = 0.0002$).

The analysis of responses concerning the nutritional status as perceived by themselves (Figure 3) showed that most of students believed to be of normal weight (59.3%); this condition was most felt by students living at home (62.7%) compared to those who live away (56.4%). A minority of students reported to be underweight (3.9%). With regard to the excess of weight, the 8.9% of the respondents considered themselves overweight and 27.9% were slightly overweight. Overall, students who live away from home have perceived a condition different from normal weight to a greater extent than those who remained in the family, both the overweight (10.7% versus 6.8%), also moderate overweight (28.6% versus 27.1%), and the underweight (4.3% versus 3.4%). No significant difference between males and females in belonging to weight categories was found.

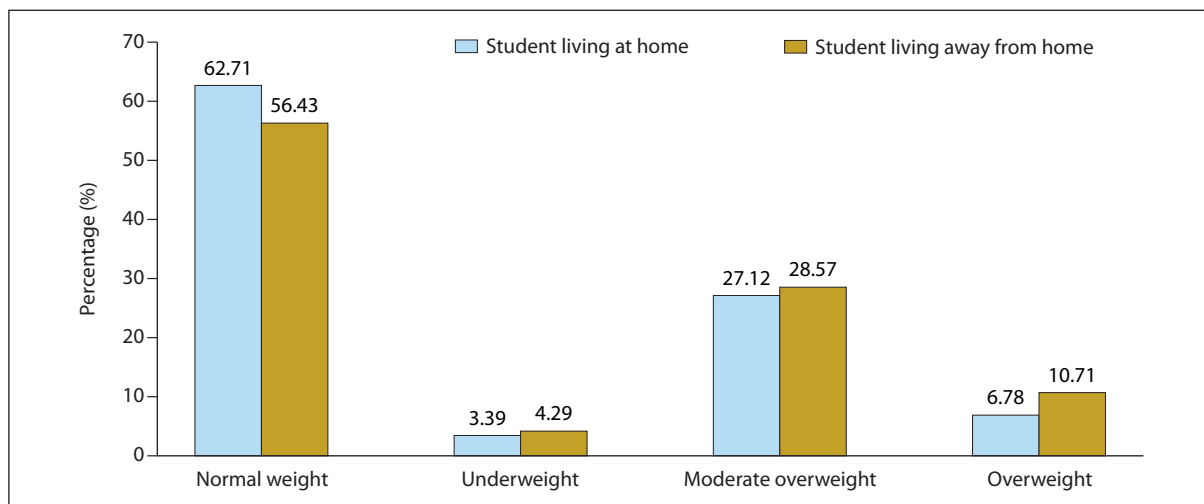


Figure 3
Perception of body weight as reported by undergraduate students (expressed as a percentage).

DISCUSSION

The study takes into account a non-probabilistic sample represented by university students attending degree courses in nursing, midwifery and biology at the University of Ferrara who agreed, on a voluntary basis, to complete the questionnaire on eating habits. The study showed the young interviewed students of Ferrara met considerable difficulties in conducting a healthy lifestyle, doing little sporting activity and acquiring unfavorable dietary habits. These conditions bring to difficulties in maintaining a correct nutritional condition, since only slightly more than half of the students recognized that they have a normal weight. It is known that health preserving requires a mixed and balanced diet in respect of the portions, associated with a more active lifestyle, consisting in sports for about an hour for 2-4 times a week [12]. The New Food Pyramid of the Modern Mediterranean Diet, developed by the National Research Institute for Food and Nutrition (IN-RAN), highlights the importance of physical activity, drinking water and eating local products on a seasonal basis. Servings should be moderate as well as wine and spirits consumption, in accordance with the social and religious traditions [13].

Similarly to other studies describing a lack of regular sporting activities [14] and a decrease in all forms of physical activity in correspondence with the beginning of university [15], sport was the recreational activity most carried out by students, albeit with a frequency lower than the weekly average recognized as suitable for the maintenance of good health. Students living alone dedicated less time to sport, in accordance with a recent survey that took place in Southern Italy [11], as well as for all the leisure activities in general.

From the nutritional perspective the majority of respondents, especially the students living away from home, recognized to have changed their eating habits while attending university. It was already noted in other contexts how students find difficult to follow healthy eating habits [16]. The reasons that influence the food choices are different: the change of lifestyle, the comfort

and convenience of fast food, the taste, the physical and social environment surrounding them, the gender, the attention to the weight and the beliefs [17]. The results of this study are in agreement with others reporting the adoption of unhealthy food habits among college students, especially with regard to the low consumption of fruit and vegetables [18, 19], milk and dairy products [20], fish [21], eggs, pulses [22] and the excessive consumption of meat [23], sausages and sweets [24]. The difficulty to adopt a diet complying with the Guidelines is a global problem that affects college students from several origins and with different dietary habits [19, 24-27]. Despite these premises, we found a consumption of cereal derivatives that complies with the Guidelines. The women, in agreement with previous studies [28-29], have been shown to consume significantly more fruits and vegetables, less ready meals and alcoholic beverages; this is probably because they are better informed about the nutritional value of foods [7, 30], or simply because they are more attentive to weight control [31].

Although the change in dietary habits has involved a significant amount of students, the phenomenon has mainly affected those who lived away from family. The university students who lived with their parents eat a lot more fruits, vegetables, pulses, and fish and this may be related to the fact that they are not directly engaged in the shopping and preparation of meals, while the family provides ongoing support towards healthy food choices [7]. The departure from the ideal model of the Mediterranean diet appeared more pronounced among students who leave the family that, in agreement with other studies [23, 32] showed a significant lower consumption of fruits, vegetables, pulses and fish, and a higher consumption of ready foods and fries. These eating choices may be attributable to the fact that these young people are, for the first time, totally independent [3, 33-34], to the inexperience in preparing and planning meals, to the lack of time [35] or to the limitation of money which forces them to spend less for food [7]. In agreement with the findings by other authors [36,

37], the weekly consumption of alcoholic beverages is higher among students living away from family than those who live at home.

Regarding the weight condition, only slightly more than half of the respondents said they perceived their weight as normal, and, not surprisingly, they showed a consumption of foods closer to the Mediterranean diet with a higher intake of cereals, vegetables, pulses, and lower consumption of meat than the average of the respondents, as opposed to those who, defining themselves overweight, reported to eat more sausages, pizza and focaccia products and to drink more alcoholic beverages. Many studies have shown that the students tend to increase their weight during their time at the university, with a weight loss after the first year [27], probably for the neglecting of the traditional Mediterranean diet [29], the change in lifestyle, the transition to a more sedentary lifestyle, more opportunities to eat and drink with friends, the attendance to cafés and fast-food restaurants and hormonal disorders related to the reduction of sleep [38-42]. As previously shown, the students who live away from home leave the model of healthy and balanced diet and perform less physical activity than those living with the family and this conditions were also reflected on the weight that students living alone perceived as different from the normal in greater extent, both as regards the underweight that overweight.

Although the present study was lacking of randomization, it indicated that, in agreement with previous literature data, interviewed undergraduate students adapted their lifestyle and eating habits, adopting a poorly mixed diet, moving away from the Mediterranean model and practicing limited physical activity. The strength of the study is mainly represented by the focus on a population usually neglected in surveys on lifestyles that may represent risk factors, as dietary habits. Moreover university students are not covered by specific interventions of prevention. Comparing the weekly consumption of foods and drinks, a greater tendency to consume less fruit and vegetables and more meat and alcohol was detected in students living away from the family. Furthermore in this category of students the perception of having a body weight different from the normal was stronger. It would not be disregarded that, particularly in young and female people, the dissatisfaction against

body weight could lead to anorexia and bulimia nervosa albeit not all individuals who experience this condition will afterward develop an eating disorder [43].

These aspects seem to suggest that attending university, especially away from the family, may play a role in the onset of unhealthy lifestyle, though further studies taking in account also gender differences as well as living arrangements are required in order to assess if they can represent risk factors.

CONCLUSIONS

In conclusion, this study showed the difficulties that university students encounter, especially when they are away from the family, in following a healthy lifestyle and taking care of themselves from the nutritional point of view.

Despite a lot of attention is given to the promotion of a healthy lifestyle based on balanced and varied diet and adequate exercise, no intervention is targeted directly at young adults. For example, there are specific systems for monitoring dietary habits both in children (OKkio alla SALUTE www.epicentro.iss.it/okkioallasalute/) and adolescents (Health Behaviour in School-aged Children, HBSC) and guidelines dedicated to school meals that are associated with dietary education interventions integrated with the subjects studied in school. No specific health promotion intervention in nutrition field is provided to young people, like college students, although eating habits are essential for effective primary prevention of many chronic degenerative diseases. As food choices can have negative fallout on health in the future, it appears desirable to adopt specific nutritional educational interventions on university students usually neglected by these measures, as well as it would be appropriate to increase the programs of health education among all young adults.

Conflict of interest statement

There are no potential conflicts of interest or any financial or personal relationship with other people or organizations that could inappropriately bias conduct and findings of this study.

Received on 17 July 2014.

Accepted on 21 April 2015.

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