

DIETARY BEHAVIOURS AND AWARENESS OF SEASONAL FOOD AMONG COLLEGE STUDENTS IN CENTRAL ITALY

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ABSTRACT

In this study, eating behaviours and knowledge of food seasonality among college students who will become teachers were investigated. A questionnaire was administered to students to collect data on dietary habits, physical activity, and awareness of food season. Two-hundred eighty students participated (95.4% female, 26±6 years old); 14% was overweight/obese, but 68% never practiced physical activity. Almost 76% were aware of differences between consumption of fruit in and out of season, but a poor knowledge of foodstuffs seasonality emerged. These findings underline the need of improving awareness on proper diet and food seasonality because of the societal role of these students.

Keywords: university students, future teachers, Mediterranean Diet, eating habits, seasonal food

1. INTRODUCTION

The Mediterranean Diet (MedDiet) has been identified one of the best models for health prevention as part of a “Mediterranean-lifestyle” that include both physical and social activity (DEL BALZO *et al.*, 2012). This diet has beneficial effects due to the synergistic and interactive nutrients combination (DEL CHIERICO *et al.*, 2014), mitigates against overweight and obesity (EGUARAS *et al.*, 2015), and provides dose-dependent protection against chronic diseases, such as cancers and cardiovascular diseases (GROSSO *et al.*, 2014; DAVIS *et al.*, 2015). However, since economic, social and demographic changes have taken place, Southern European countries, including Italy, have deviated from this pattern toward food choices typical of a “Western” diet, rich in animal-derived saturated fats, processed meat, eggs, sugars, and poor in legumes, whole cereals, fruit and vegetables (BLOOMFIELD *et al.*, 2015; MORENO *et al.*, 2002). Therefore, overweight and obesity have increased in young adults and in the areas commonly characterized by healthy diet patterns (MORENO *et al.*, 2002; DE PIERO *et al.*, 2015).

An additional advantage of MedDiet is the consumption of locally produced foodstuffs, as well as their availability during harvest season, the nutritional variety, the sustainability and environmental impact because of reduced “food miles” (EDWARDS-JONES *et al.*, 2008; EDWARDS-JONES, 2010). The food seasonality is referred as the time-period when the harvest or flavour of a food is at its peak, usually corresponding when a food item is cheapest and freshest on the market. The best consequence of eating seasonally is that food has the best tasting carrying benefits to health, and while the costs fall down, the whole quality drives up.

Since food choices have been identified as key elements in diseases pathogenesis and prevention (DAVIS *et al.*, 2015), as well as for public health promotion (SAMMARCO *et al.*, 1997), the assessment of eating habits can support the design and improvement of measures for reducing the negative effects of unhealthy food patterns (DE PIERO *et al.*, 2015).

The start of adult life is a critical period because of multiple physiological and psychological changes determining health-related habits in later adulthood. The college students can be considered as an index group reflecting general changes in lifestyles, because most at risk of poor nutrition and unsuitable dietary habits (RIPABELLI *et al.*, 2001), due to a reduced food variety and scarce consumption of fruit or vegetables (RODRÍGUEZ *et al.*, 2013; SHIVE and MORRIS, 2006). For students, the years spent at the university represent a critical period influencing the quality of lifestyle, being characterized by freedom and independence, and referred to the first time for assuming responsibilities for food choices and preparation (TELEMAN *et al.*, 2015).

To date, studies on dietary patterns amongst Italian college students with respect of MedDiet recommendations are still scarce, and previous investigations were only conducted in some metropolitan areas (STEPTOE *et al.*, 2002; BALDINI *et al.*, 2009; LUPI *et al.*, 2015; TELEMAN *et al.*, 2015). Furthermore, no researches were performed to investigate knowledge on harvest season of locally produced food among college students who are studying to become teachers, and would be responsible for teaching healthy lifestyles in children attending the primary school (EGEDA *et al.*, 2014).

Indeed, the aims of this study were to assess food choices and eating-related behaviours among college students attending the Faculty of Primary Education Sciences at University of Molise, Central Italy, and to evaluate their awareness and knowledge on harvest season of locally produced food.

2. METHODS

2.1. Study design

This survey was conducted enrolling college students at University of Molise that represents the only public higher education institution in Molise Region. The University counting 7,304 students during 2013-2014 academic year (<http://statistica.miur.it/scripts/IU/vIU1.asp>) is mostly characterized by students from Molise Region (more than 50%) and from the neighbouring Southern Regions of Puglia and Campania.

2.2. Participants and recruitment

All the students attending the degree course of Primary Education Sciences during 2013-2014 academic year were recruited by sending an invitation at their institutional email address. At time of the study, 304 students were attending this academic course, and were mostly females (n=281, 92.4%) (internal data referred to 2013-2014 academic year for the degree course of Primary Education Sciences provided by University administrative offices). The enrolment was voluntary and anonymous. An informed signed consent was obtained from each student who agreed to participate to the survey, receiving verbal information by a trained interviewer.

2.3. Data collection and procedures

Participants completed a newly developed questionnaire, which was validated in a pilot study on a small sample of randomly selected students (unpublished data). Particularly, the questionnaire included 48 items ordered in four sections: a) socio-demographic characteristics; b) lifestyles, food habits and dietary intake assessment; c) knowledge and understanding of harvest season with respect to Italian food production, focusing on seasonality and freshness of some fruit and seafood; d) sources of information on food quality. Self-reported weight and height were used to calculate Body Mass Index (BMI) for each student (DE WAURE *et al.*, 2015). A dietary index of the nutrition status was also identified, based on the MedDietScore (MDS) as previously described (PANAGIOTAKOS *et al.*, 2007; PANAGIOTAKOS *et al.*, 2009), with some modifications in the list of food, which included: non-refined cereals; fruit; vegetables; legumes; potatoes; fish and seafood; red meat and derived products; white meat; milk and dairy products; and olive oil. Based on the reported intake, rates between 0 and 5 were used to score the food frequency for each student. For food suggested on a daily basis or more than three portions per week, the score 0 was assigned when no consumption was reported, while the scores from 1 to 5 were applied to proportional consumption rate. For food consumption deviating from MedDiet pattern, a reverse scale was applied, with the score of 5 for rare or no consumption, and the score 0 for daily consumption.

2.4. Statistical analysis

Questionnaire data were analyzed using the Statistical Package for Social Sciences software (IBM SPSS Statistics for Windows, Armonk, NY: IBM Corp) version 22.0. Qualitative variables were reported as absolute frequencies and percentages, whilst quantitative variables expressed as means \pm standard deviation (SD), median and range. Differences among categorical variables were analyzed by Chi-square test. P-values were calculated based on a two-tailed test, and compared to 0.05 significance level.

3. RESULTS

3.1. Socio-demographic and anthropometric characteristics of enrolled students

Two-hundred and eighty out of 304 students agreed to participate to the study (response rate 92.1%). The sample had mean age of 25.9±6.2 years (median 23 years, range 19-50 years) and was mostly characterized by female students (n=267, 95.4%). The 77.8% (n=218) was single, and 11.8% (n=33) had children. At time of study, 32% (n=89) was already graduated, and the remaining has attended secondary high school. The 44.3% (n=124) of students lived away from parental home. Particularly, 57.1% were residents in Molise Region, and an important proportion was from the neighbouring Regions, such as Puglia (19.6%), Campania (16.8%), Abruzzo and Lazio (both 3.2%). The 57.8% (n=162) of students stated to have a paid employment, but none was food handler. Familial history of diseases was as follows: hypertension (36.4%), diabetes (23.6%), high cholesterol (21.1%), cardiovascular diseases (15.4%), obesity (3.2%), and thyroid disorder (2.5%).

According to BMI (mean 21.4±3.0, min 15.4, max 30.1), 71.1% (n=199) was classified within the normal range, followed by 15.0% (n=42) as underweight, and 13.9% (n=39) as overweight/obese. Physical activity was only practiced by 32.1% (n=90) with a frequency of three-four times per week, mainly going to the gym, running, walking, cycling and swimming. Significant differences between overweight/obese students and normal/underweight ones were found for education level (secondary school *vs* degree $p=0.001$). A greater proportion of underweight (11.1% *vs* 3.9%) and overweight/obese (12.9% *vs* 1.1%) students have attended secondary school compared to graduation. Conversely, no significant differences between normal weight and overweight/obese or underweight students were observed in relation to gender, living away from home, practicing sport, and familial diseases history.

3.2. Dietary patterns and behaviours

Concerning questionnaire items on food-related behaviours and habits, the possible answers were reported as never; sometimes or 1-4 times/week; often or 5-8 times/week; very often or 8-10 times/week; always or daily; the results are shown in Table 1.

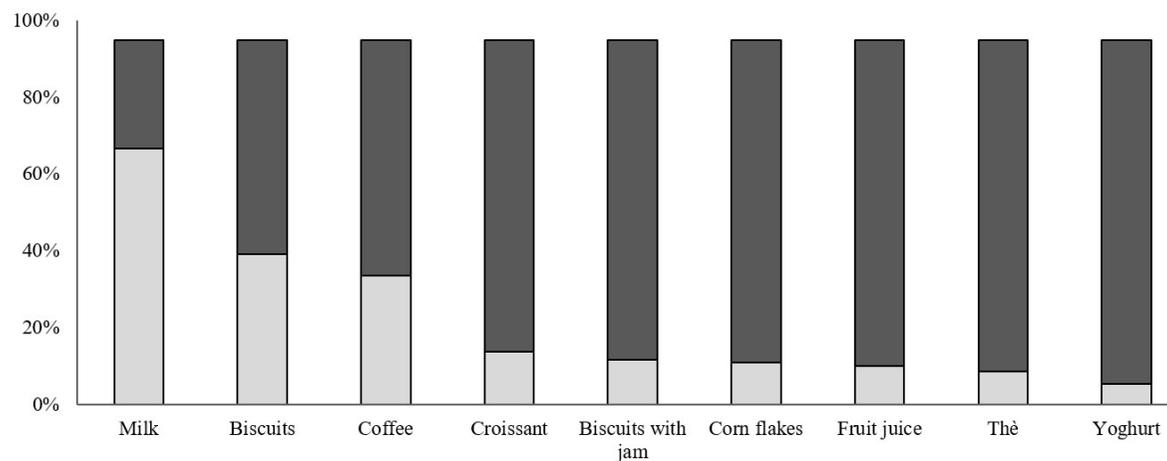
The analysis of eating habits and behaviours revealed that 61.8% students eat sometimes outside home (i.e. bars, take-away, restaurants, etc.), and 84.0% and 46.0% have both a daily breakfast and a snack before lunch or in the afternoon, respectively (Table 1). Among students having breakfast daily or 1-4 times/week, the consumption of milk, biscuits and coffee was highly reported (Fig. 1), while fruit, confectionery products/biscuits and fruit juice were the food items mostly consumed for snack before lunch or in the afternoon (Fig. 2).

About 50.0% (n=146) of students stated drinking at least 8 glasses (about 1.5-2L) of water per day, as recommended (EFSA Publication 2010). Only 9.3% (n=26) indicated to drink wine during meals, with an average of 125 ml (min 50 ml, max 750 ml). For food preparation and cooking, about 60.0% of students reported to use always extra virgin olive oil, followed by 17.9% who used it often and 16.8% very often (Table 1); however, 53.2% reported to use butter sometimes. Salty (i.e. pretzels, chips, popcorn, fast food burgers, sandwiches, mixed nuts, etc.) and whole foodstuffs (i.e. whole-wheat and grains) were mainly consumed sometimes (38.0% and 35.0%, respectively) and half of the students do not eat these food.

Table 1. Eating habits and behaviours.

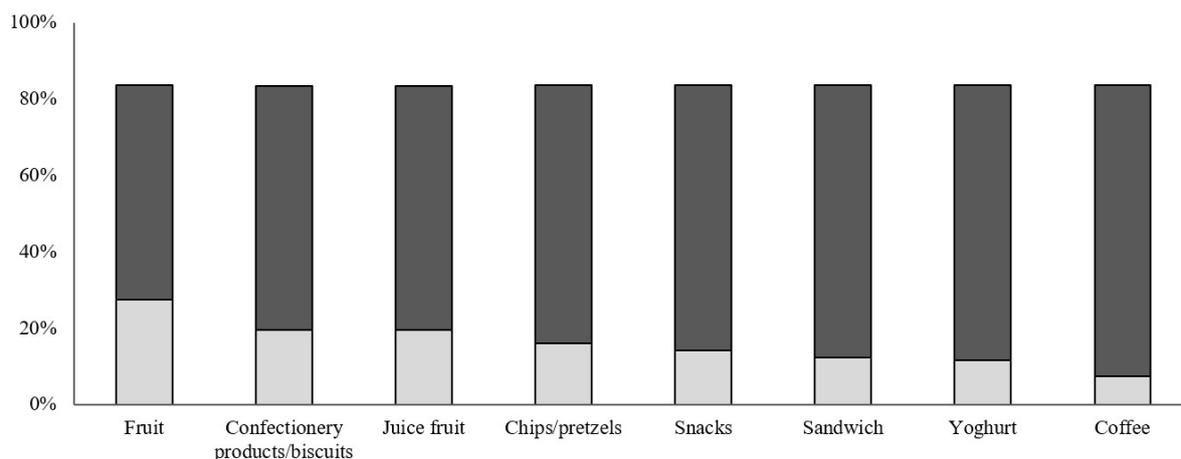
	Frequency per week				
	Never n (%)	Sometimes (1-4 times/week) n (%)	Often (5-8 times/week) n (%)	Very often (8-10 times/week) n (%)	Always or Daily n (%)
Eating outside home	2 (0.7)	173 (61.8)	60 (21.4)	35 (12.5)	10 (3.6)
Breakfast	14 (5.0)	32 (11.4)			234 (83.6)
Snack	46 (16.4)	105 (37.5)			129 (46.0)
Use of extra virgin olive oil	2 (0.7)	14 (5.0)	50 (17.9)	47 (16.8)	167 (59.6)
Use of butter	115 (41.1)	149 (53.2)	10 (3.6)	4 (1.4)	2 (0.7)
Salty food consumption	141 (50.4)	106 (37.9)			33 (11.8)
Whole food consumption	138 (49.3)	99 (35.4)	33 (11.8)	9 (3.2)	1 (0.4)
Fried food consumption	52 (18.6)	186 (66.0)	33 (11.8)	7 (2.5)	2 (0.7)
Watching television during meals	29 (10.4)	55 (19.6)			196 (70.0)

Fig. 1. Food items consumed at breakfast by the students.



The grey bar corresponds to the percentage of students consuming daily or sometimes specific food at breakfast; the black bar indicates the proportion of students who did not consume these foods at breakfast.

Fig. 2. Food items consumed as snacks by the students.



The grey bar corresponds to the percentage of students consuming daily or sometimes specific food at snack time; the black bar indicates the proportion of students who did not consume these food at snack time.

Approximately 70% of students reported to eat fried food (i.e. chips, fish, chicken) sometimes and to watch television during meals (Table 1). No significant differences between normal weight and overweight/obese or underweight students were found for water consumption, extra virgin olive oil and butter use, consumption of whole and fried food, and watching television, while differences were significant for salty food consumption ($p=0.04$). Particularly, 36.8% of normal weight students did not consume salty food compared to 3.2% and 7.9% in the underweight and overweight/obese categories, respectively. Furthermore, students declared to achieve most of the information on food quality from food labels ($n=173$, 62.0%), television programs on health topics (47.1%) and food preparation/cooking (35.4%), farmers and/or shopkeeper (19.6%).

3.3. Food intake assessment

The consumption frequency of selected food in terms of servings per week is reported in Table 2.

Briefly, the consumption of both red meat and salami reported by students was very high; 60.0% and 36.0% reported 2-3 servings/week for red meat and salami, respectively; furthermore, 13.6% and 29.6% stated 4-5 servings/week for the same food. The frequency of white meat was commonly reported as 2-3 servings/week (64.3%) and less than 1 serving/week (19.6%). Moreover, dairy products and cheese were largely consumed by 48.9% and 43.6% as 2-3 servings/week, respectively, and 25.7% and 21.4% as 4-5 servings/week, while milk was never consumed by 16.0% of the students. Pasta and bread consumption was generally reported on daily frequency (43.2% and 62.9%, respectively), compared with rice mainly consumed as less than 1 serving/week. Students reported a highly different consumption of vegetables, and a similar proportion (30.0%) was reported for 2-3 and 4-5 servings/week, whilst only 24.6% consumed daily these food items. A poor intake of legumes was also observed, as most (48.2%) students reported 1-2 servings/week, as well as for fish/shellfish, which were mostly reported as 1-2 servings/week (49.3%) and less than 1 serving/week (39.3%).

Fruit consumption was properly reported as 16-21 servings/week only by 42.5% of students, while about 4.0% do never consume them and 9.0% less than 1 serving/week (Table 2).

Table 2. Frequency of weekly consumption in terms of servings per week of certain food reported by students.

Food	Frequency of consumption reported by students				
	Never	≤1 serving/week n (%)	2-3 servings/week n (%)	4-5 servings/week n (%)	6-7 servings/week n (%)
White meat	10 (3.6)	55 (19.6)	180 (64.3)	35 (12.5)	
Red meat	11 (3.9)	62 (22.1)	169 (60.4)	38 (13.6)	
Salami	15 (5.4)	74 (26.4)	101 (36.1)	83 (29.6)	7 (2.5)
Eggs	12 (4.3)	126 (45.0)	119 (42.5)	19 (6.8)	4 (1.4)
Milk	46 (16.4)	27 (9.6)	33 (11.8)	37 (13.2)	137 (48.9)
Dairy products	11 (3.9)	37 (13.2)	137 (48.9)	72 (25.7)	23 (8.2)
Cheese	26 (9.3)	55 (19.6)	122 (43.6)	60 (21.4)	17 (6.1)
Bread	2 (0.7)	23 (8.2)	20 (7.1)	59 (21.1)	176 (62.9)
Rice	12 (4.3)	141 (50.4)	86 (30.7)	33 (11.8)	8 (2.9)
Pasta	8 (2.9)	20 (7.1)	40 (14.3)	91 (32.5)	121 (43.2)
Pizza	2 (0.7)	104 (37.1)	138 (49.3)	29 (10.4)	7 (2.5)
Vegetables	11 (3.9)	32 (11.4)	83 (29.6)	85 (30.4)	69 (24.6)
Confectionery products	11 (3.9)	54 (19.3)	95 (33.9)	65 (23.2)	55 (19.6)
Chocolate	22 (7.9)	86 (30.7)	74 (26.4)	57 (20.4)	41 (14.6)
Coffee	54 (19.3)	20 (7.1)	25 (8.9)	21 (7.5)	160 (57.1)
Fruit juice	38 (13.6)	86 (30.7)	75 (26.8)	53 (18.9)	28 (10.0)
Sparkling processed beverages	83 (29.6)	89 (31.8)	64 (22.9)	27 (9.6)	17 (6.1)
	Never	<1	1-2	3-4	5-6
Fish/shellfish	16 (5.7)	110 (39.3)	138 (49.3)	16 (5.7)	
Legumes	14 (5.0)	78 (27.9)	135 (48.2)	45 (16.1)	8 (2.9)
	Never	1-4	5-8	9-12	13-18
Potatoes	3 (1.1)	89 (31.8)	150 (53.6)	34 (12.1)	4 (1.4)
	Never	1-4	5-8	9-15	16-21
Fruit	11 (3.9)	26 (9.3)	51 (18.2)	73 (26.1)	119 (42.5)

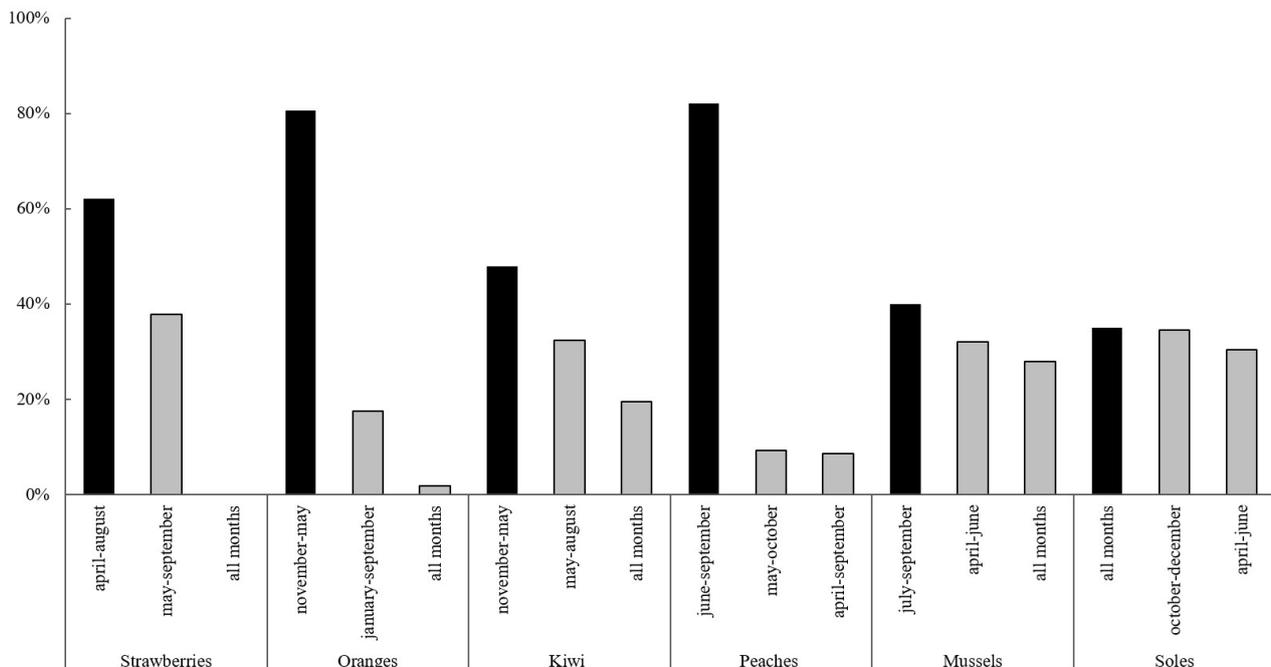
The calculated MDS was on average 29.4 ± 3.9 (median 30, ranging between 18 and 38) compared to 50 maximum score. Four MDS categories were identified: score 18-22 related to the lowest adherence (5% of study population), score 23-27 to low adherence (25.7%), score 28-32 to intermediate adherence (47.1%), score 33-38 to moderate/acceptable compliance (22.1%). The majority (49.2%) of normal weight students had intermediate-moderate score compared to underweight (10.7%) and overweight/obese (9.3%) students, but differences were not significant.

3.4. Awareness and knowledge on seasonality of local food

Almost 44.0% (n=124) of students reported that both consumption and transportation of food out of season could produce high impact on the ecosystem, followed by an intermediate and low impact for 48.6% and 7.1%, respectively. Most of students (n=214, 76.4%) stated that there are remarkable differences between consumption of fruit in season and out of the harvest period, while 16.4% (n=46) did not recognize any differences. The main reasons reported by students for choosing fruit in season were limited treatment with pesticides (49.1%), great freshness (45.8%), low cost (42.5%), enhanced nutritional intake (39.2%), high quality in terms of nutritional properties (33.2%), guarantee of safety of origin and cultivation/production practice (32.7%), reduced impact on environment (29.4%), and scarce additive/preservative content (23.3%).

Knowledge on seasonality of selected fruit was inadequate. Only 62.0% (n=174) and 48.0% (n=134) could correctly identify the seasonal period of strawberries (April-August - as its best) and kiwi fruit (November-May), and differences between students who correctly and inaccurately identified these periods were significant ($p < 0.001$). Conversely, awareness of the harvest period of oranges (November-May) and peaches (June-September) resulted more satisfactory, being correctly identified by 80.7% and 82.1% (Fig. 3), but differences were not significant.

Fig. 3. Proportion of students aware of harvest period of selected food.



The black bar indicates the correct answer on the natural harvest season of local food.

More than half students (n=154, 55.0%) reported to have knowledge of seasonal freshness of fish and seafood, which is closely related to their reproductive period, whereas 34.3% (n=96) did not know it, and 10.7% (n=30) said that there is no a specific period. The main reasons reported by students to prefer the consumption of fish and seafood at the natural reproductive period were great freshness (65.0%), enhanced nutritional intake (41.8%), healthy nutrition (26.4%), low cost (11.8%), and adequate size of products (10.0%). However, only 40.0% (n=112) and 35.0% (n=98) could recognize the natural period of mussels and sole, respectively (Fig. 3), and differences between students who properly and incorrectly identified these periods were significant ($p < 0.05$).

4. DISCUSSION

This study aimed to evaluate eating habits and adherence to MedDiet model, as well as to investigate knowledge on the seasonal period of locally produced food among college students who were studying to become teachers. The survey revealed that the majority of study population had BMI within the normal range, and only 14% was classified as overweight/obese, in agreement to a recent study conducted amongst Italian university students (TELEMAN *et al.*, 2015). Our findings differed from other studies conducted in Europe and Italy, in which different percentages of overweight/obese have been reported (PELTZER and PENGPID, 2015; ORGANIZATION FOR ECONOMIC COOPERATION AND DEVELOPMENT, 2014; OSSERVATORIO NAZIONALE SULLA SALUTE NELLE REGIONI ITALIANE, 2014; EPICENTRO, 2013); however, data are difficult to compare because of the different target population, and because the percentages were pooled and stratified by specific age groups.

In our study, 68% of students reported to never practice physical activity, which is consistent with other results (RODRÍGUEZ *et al.*, 2013; OSSERVATORIO NAZIONALE SULLA SALUTE NELLE REGIONI ITALIANE, 2014), indicating high prevalence of inactivity in females who represented more than 95% of whole sample. Prevalence of physical inactivity was estimated of 21% in individuals aged ≥ 15 years from 76 countries (DUMITH *et al.*, 2011) worldwide, whereas in Italy percentages were of 27.2%, 27.8% and 34.8% among 18-19, 20-24 and 25-34 years old individuals, respectively (OSSERVATORIO NAZIONALE SULLA SALUTE NELLE REGIONI ITALIANE, 2014), and a similar trend was reported in individuals aged 18-34 years (EPICENTRO, 2013). These findings are of serious concerns since the World Health Organization recommends that adults should practice at least 150 minutes of moderate-intensity physical activity or 75 minutes of vigorous-intensity through the week. It is also well known that physical activity is associated to better anthropometric measures (ZACCAGNI *et al.*, 2014), whilst the inactivity is related to several health risk factors, such as smoking, unhealthy diet, and chronic diseases (MORENO-GÓMEZ *et al.*, 2012). Hence, because of great benefits regardless of changes in anthropometric outcomes, especially in preventing weight gain (CONN *et al.*, 2014), college education should focus on health promotion encouraging students in regular physical activity (STANFORD *et al.*, 2014). Our study also revealed that 16% of students never or not every day have breakfast, which could affect performance during the rest of the day, causing fatigue and poor attention among students, as previously reported (ACKUAKU-DOGBE and ABAIDOO, 2014). Breakfast consumption is associated with a better nutritional profile and a lower risk of overweight/obesity (COOPER *et al.*, 2011). Indeed, irregular breakfast habits are associated with poor nutrition, and skipping this meal could be an indicator of unhealthy eating habits in a population, being also linked with low vegetable intake (LAZZERI *et al.*, 2013). Most college students further did not meet dietary and physical activity guidelines, suggesting the need of preventive interventions and increased understanding on overweight-

related risk, in agreement with previous reports (HUANG *et al.*, 2003; SÁNCHEZ SOCARRÁS and AGUILAR MARTÍNEZ, 2014). Hence, specific strategies involving a combination of physical activity, nutritional, and educational interventions instead of single component-based programs (SHIRLEY *et al.*, 2015) should be improved to yield better obesity-related outcomes.

In our target population, the main nutritional deviations were related to low intake of vegetables, fruit and legumes, which represent the main components of a balanced diet together with cereal grains and derived products (GARCÍA-MESEGUER *et al.*, 2014). A prevalent consumption of red meat and products compared to white meat was found, in agreement with other European countries (DE PIERO *et al.*, 2015). The low consumption of fruit and vegetables was reported in other studies conducted in Western countries and USA (KING *et al.*, 2007; KELLER *et al.*, 2008; DODD *et al.*, 2010), showing that university students did not follow the recommended consumption because of their taste and price, which represent the most critical barriers (SHIVE and NEYMAN, 2003). Conversely, studies conducted in South East Asia reported a consumption of fruit and vegetables of five servings per day among female university students (SAKAMAKI *et al.*, 2005; YAHIA *et al.*, 2008; PERERA and MADHUJITH, 2012).

Significant dietary changes can occur since starting university, and students living away from home are more likely to develop unfavourable eating habits by decreasing weekly consumption of fruit, vegetables, seafood, olive oil, and increasing sugar, alcohol and fast food intake (FIORE *et al.*, 2015). In our survey, the majority of students were unmarried, and 44% were living outside from family home, suggesting that the unsatisfactory food intake could be probably related to poor education on proper food choices, limited budget and/or to lack of skills to prepare a basic healthy meal.

The MDS revealed a poor adherence to MedDiet, in agreement with other studies among university population (CERVERA BURRIEL *et al.*, 2014; GARCÍA-MESEGUER *et al.*, 2014). The unsatisfactory adherence to MedDiet was mostly associated with low consumption of food groups suggested on a daily basis or more than three portions per week, and with high intake of food suggested on rare consumption.

Our survey also investigated awareness on seasonal period of local food. Students showed a lack of knowledge on the harvest period of many locally produced foodstuffs, indicating misperception and significant understanding gaps, as previously reported among university students and consumers (WILKINS *et al.*, 2002; BROOKS *et al.*, 2011). Most students associated the quality of seasonal food to inappropriate attributes, by referring their preference due to limited chemical treatment or content, guarantee of origin production and for environmental reasons. Fruit have proper nutritional and sensory quality at natural harvest season, providing a good source of health-promoting compounds (VOĆA *et al.*, 2014). For example, in addition to beneficial compounds, the attributes of sweetness, acidity, colour and flavour are the most important characteristics of strawberries, affecting either quality, marketability, or choice of consumers. Indeed, the ripening process and maturity strongly affect their nutritional composition and contribute to typical taste, indicating that strawberries should be consumed at stage of full maturity (VOĆA *et al.*, 2014). Similar findings can be associated with seafood since - in the context of human health - the season could influence their compositions of both amino acids and fatty acids (ÇAĞLAK and KARSL, 2017). Moreover, sensory properties and nutritional value are two sets of characteristics that, together with freshness, are accountable for fish quality, and are affected by many factors including seasonal changes (PETROVIĆ *et al.*, 2015).

The debate on MedDiet with emphasis on plant-based foodstuffs consumption and recommendations for seasonal local food consumption are key topics of global framework of sustainable eating (FORLEO *et al.*, 2015). Nevertheless, sustainability of seasonal food in term of environmental performance may be controversial and depends on the definition of

seasonal characteristics and environmental impact. Some studies have assessed that seasonality is unlikely to deliver large environmental benefits, except for water footprint (FOSTER *et al.*, 2014). Reduction in greenhouse gas emissions from eating seasonal vegetables is also limited, representing a minor proportion of the total emissions from food consumption (RÖÖS and KARLSSON, 2013). Indeed, the multifaceted concept of seasonality should be considered under a nutritional-health perspective and a global approach, including environmental, socio-cultural and economic pillars of sustainability (AKHATOU and FERNÁNDEZ-RECAMALES, 2014).

The study has some limitations: sample size might not be representative of the whole university population of Central Italy; being the sample represented mostly by females, the results could not be directly generalizable to male subjects; anthropometric measurements, as well as dietary intake were self-reported and assessed by short questions with possible under or over estimation; there were no opportunities for follow-up and verification. Despite this, our survey was performed in a short data collection time and involved a priority young-adult population that could be targeted for strengthening public health strategies for eating behaviours improvement. Our findings have important implications for research and practice, and provide hitherto invaluable information on a sample of Italian college students recruited in a non-metropolitan area never investigated before, and could be useful in systematic reviews and meta-analysis studies.

5. CONCLUSIONS

The survey highlights the need to extend policies among college students, providing a proper nutritional education because of their future societal role as educators, as well as for their own health.

Education should focus on specific strategies aimed at improving awareness on quality and regularity of breakfast, physical activity, and on the importance of fruit, vegetables and legumes intake, as well as on the consumption of seasonal food.

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