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HIGH COOKING SKILLS DO NOT LEAD TO HEALTHY MEDITERRANEAN EATING HABITS. FOCUS ON CATERING STUDENTS

Running title: High cooking skills and adherence to the Mediterranean Diet

Original Research

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ABSTRACT

The lack of human nutrition and dietetics knowledge may have a detrimental effect on the eating habits of catering students. The purpose of the study was to assess the adherence to the Mediterranean Diet of catering students. A cross-sectional descriptive study was carried out. 108 catering students completed the KIDMED questionnaire. The mean score and the confidence intervals were calculated. A Student's t-test was used to evaluate the differences for sex and year of study. For each answer, the odds ratio by logistic regression adjusting for sex and year of study were calculated. The students had inadequate fruit and vegetables intake. Despite the catering students had high cooking skills, findings revealed a moderate adherence to the Mediterranean Diet. Results and claims suggest that catering students would benefit from studying nutrition and dietetics subject. The cooking skills are probably a tiny part of the tools and knowledge necessary to have a good adherence to the Mediterranean Diet. This work recommends the incorporation of nutrition and dietetics subject in catering degrees.

Keywords: culinary, nutrition education, restaurants, KIDMED, adherence, cooking skills

Abbreviations: MD: Mediterranean Diet

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1. INTRODUCTION

A widely discussed topic for the last three decades has been potential benefits of the Mediterranean diet (MD). Close adherence to the ~~Mediterranean Diet~~ MD is positively associated with longevity, prevention of cardiovascular disease (Martinez-Gonzalez & Martin-Calvo, 2016) and protection of major chronic degenerative diseases (Franquesa et al., 2019; Wu & Sun, 2017) Unfortunately, we can observe a progressive trend to leave the Mediterranean dietary pattern (Cabrera et al., 2015; da Silva et al., 2009). The new generations have an unhealthy eating behaviour with high calory intake, high consumption of soft drinks (Singh et al., 2015), fruit juice (Wojcicki & Heyman, 2012), energy drinks (Committee on Nutrition and the Council on Sports Medicine and Fitness, 2011), snacks, sweets, bakery products and other refined or ultra-processed foods (Latasa et al., 2017). The western high-density calories diet has replaced the traditional MD. The western diet has displaced the abundance of plant foods “typical” of the MD causing detrimental effects. Italy, Greece and Spain are at the top of European childhood obesity. In the last few decades, European children and adolescents have been showing a worrying increase in overweight and obesity (OECD Directorate for Employment & Labour and Social Affair, 2014).

Eating out has become a regular part of the diet in western society. Therefore, eating out has become an important part of daily caloric intake (Vandevijvere et al., 2009), and this trend seems to be irrevocable. Restaurants, caterings, canteens and their workers will acquire more and more importance in human nutrition in the next years. There is a decreasing transference of essential cooking skills from parents to youths. The students spend up to 7-8 hours per day, 5 times per week, in the education system from elementary school until University. During

this period they usually eat in the school or University's canteen. Unfortunately, eating out may lead to less healthy eating habits (Bagordo et al., 2013).

There is a growing number of studies linking cooking skills with healthy eating habits and dietary patterns (Bernardo et al., 2018; Wolfson & Bleich, 2015; Wolfson et al., 2016). Some research has shown that cooking classes may have a positive impact on MD and future food choice (da Rocha Leal et al., 2011; Jacob et al.,2016). Poor cooking skills are associated with low consumption of fruit and vegetables (Hartmann et al., 2013).

There is little data on catering workers (chefs, maîtres, waiters etc.) and their eating habits. Some studies have researched the nutritional knowledge of food handlers (Lessa et al., 2017), while other studies have researched chefs and students chef attitude to a healthy diet (Obbagy et al., 2011; Reichler & Dalton, 1998). Cooking studies lead to know how to manage the restaurant or canteen and to execute the activities of pre-elaboration, preparation, conservation, presentation and service of all kinds of culinary making. Cooking students spend many hours in theoretical classes studying all kind of food and spend all their practical classes between food, tables, and cookers. The research suggests that cooking skills could lead to having a good food pattern adjusted to the MD or similar healthy eating patterns.

Nutrition and Dietetics is only included in the study programmes for dieticians, health workers, food technology while there is no study programme for professionals in catering and cooking studies. We propose that the lack of human nutrition and dietetics knowledge may have a detrimental effect on the eating habits of the catering students. Furthermore, this lack of nutrition education could not allow the students to link their cuisine to the health of their future customers. Despite many studies on cooking skills, surprisingly there are no studies that have investigated the eating habits of the Mediterranean catering students. Spanish catering students have definitively high Mediterranean cooking skills. We are interested in the

investigation on the Mediterranean eating habits of the Spanish catering students. Thus, the aim of the study was to assess the adherence to the MD of catering students.

2. MATERIAL AND METHODS

2.1 Participants

A cross-sectional descriptive study was carried out. One hundred and eight catering students between 17 and 24 years old were selected. There were 9 students who were more than 24 years old. The participants study catering management and service as well as cooking and gastronomy in the degrees of the Spanish public education system. There are three different grades of degrees in the Spanish education system. In our study, 18 students come from the basic professional degree, 64 students come from the medium professional degree, and 26 students come from the high professional degree. ~~We considered that these students are representative of the catering students at least in Spain~~. All students come from a high school in Santa Pola, Alicante, Spain. All the students participated voluntarily in the study and if required their legal guardian signed a written informed consent. The ethics committee of the University of Alicante granted ethical approval, according to the Declaration of Helsinki.

2.2 Procedures

Adherence to the MD is assessed with the short frequency questionnaire "KIDMED" (Serra-Majem et al., 2004). Also, it was used to evaluate the differences between sexes and between first and second years of cooking studies. The results of the KIDMED questionnaire were classified, according to the authors, into three levels: 8-12 (high) optimal Mediterranean diet; 4–7 (medium) improvement needed to adjust intake to Mediterranean patterns; 0-3 (poor) very low diet quality. The questionnaire was distributed to the students at the beginning of the cooking class and collected approximately 15 minutes after distribution. The guidelines were explained by a human nutritionist to all participants to ensure that the questionnaires were completed appropriately. The study was carried out in March 2018. We checked the Spanish

catering degrees~~, programme~~ and we found out there is no subject in human nutrition and dietetics. Moreover, the catering students have less than 0.8% of the lessons dedicated to supplying some generic information about human nutrition and dietetics. Furthermore, fewer than 0.1% of the lessons are dedicated to the MD, a staple dietary pattern in South Europe.

2.3 Statistical Analysis

In order to assess the adherence to the MD, the mean score and the confidence intervals (CI 95%) were calculated on a base of sex (males = 64, females = 44) and year of cooking study (1^{st} year = 77, 2^{nd} year = 31). A Student's t-test was used to evaluate the differences between sexes and between first and second year of cooking studies. It was calculated the percentage of each answer and the confidence interval (95%). Moreover, for each answer, the odds ratio based on ~~logistic regression adjusting on a base of~~ sex and year of cooking study were calculated. Statistical analyses were performed using Statistical Package for the Social Sciences 18.0 software for Window (IBM SPSS Software, Armonk, NY, USA) with statistical significance set at $p \leq 0.05$.

3. RESULTS

The results of the KIDMED score are shown in Table 1. The participants showed medium adherence to the MD. More than 14% of students showed a poor index score (Index score ≤ 3), 59% of students showed medium adherence to the MD (Index score 4-7) and approximately 26% of students showed high adherence to the MD (Index score ≥ 8). Male and female catering students showed a similar KIDMED index score. Regardless of the catering degrees studied, the students showed a similar KIDMED index score. When the statistical analysis was performed based on the year of the study, there was no difference in the KIDMED index score. The overall results of the questions of the KIDMED questionnaire are shown in Table 2.

Only half of the students consume a piece of fruit or fruit juice every day. It was revealed that the majority of the students did not consume the second fruit daily. More than 60% of the students did not eat vegetables 2 times per day.

More than a third of the students usually go once or more than once a week to a fast-food (hamburger) restaurant. The female students consume more cereals or grain for breakfast than males ($P \leq .01$).

Table 1: OVERALL RESULTS OF THE KIDMED SCORE OF THE CATERING STUDENTS (n = 108)

	KIDMED Score		
	Mean	**95% CI**	**Sig.**
Total	5.91	(5.46;6.35)	
Sex			
Male (n = 64)	5.81	(5.25;6.37)	.613
Female (n = 44)	6.05	(5.29;6.80)	
Year of the study			
1st (n = 77)	5.90	(5.42;6.37)	.945
2nd (n = 31)	5.94	(4.88;6.99)	

Score Frequency

	Poor Adherence				**Medium Adherence**				**High Adherence**				
Score	0	1	2	3	4	5	6	7	8	9	10	11	12
Frequency	1	1	6	8	12	23	16	13	11	9	6	2	0
Total	16				64				28				

Notes: Sig.: Signification, CI: confident interval. Table 1 shows the total mean score and the mean score on a base of sex and year of study. Moreover, the table shows the score frequency and the KIDMED index among the catering students. Poor adherence to the MD (Index score ≤ 3) means a very low-quality diet. Medium adherence to the MD means that the students need to improve the Mediterranean food pattern. High adherence to the MD indicates an optimal MD.

The catering students of the second year of the study consume more fish than the ones of the first year of the study ($P \leq .05$). However, they consume less dairy product for breakfast than the ones of the first year of the study ($P \leq .05$).

4. DISCUSSION

This is the first time that the KIDMED questionnaire has been answered by catering students. The present study shows that catering students have a moderate adherence to the MD. The moderate adherence to the MD could limit the beneficial effect of this diet. ~~In accordance with our results,~~ It is not the first time that moderate or poor adherence to the MD has been reported in children and adolescents in Southern Europe (Grosso & Galvano, 2016). Low or moderate scores of the adherence to the MD could negatively contribute to the several different health outcomes (Sofi et al., 2014), cognitive and academic performance (Chacón-Cuberos et al., 2018). Moreover, moderate adherence to the MD is associated with low physical activity in young people (Chacón-Cuberos et al., 2018; Zurita-Ortega et al., 2018). The catering students did not seem to have good eating habits as expected from people that live and work in gastronomy field. The students showed low fruit and vegetables intake. They consume an insufficient amount of fruit and vegetables as do the majority of young people (Nour et al., 2017).

The current dietary guidelines have been advocating an increase in fruit and vegetables intake (Harvard T.H. Chan School of Public Health, 2011; The French National Nutrition and Health Program's dietary guidelines, 2011). Nevertheless, the percentage of intake of a second piece of fruit or a second serving of vegetables in the second and fourth answer was lower than the percentage recorded for the first and third one (see Table 2). Therefore, it is very probable that the catering students eat fewer than 5 servings of fruit and vegetables per day. The recommendation is 5 to 10 servings per day. However, bad health outcomes such as premature deaths and cardiovascular diseases may be attributable to a fruit and vegetable intake below 500 and 800 g/day, respectively (Aune et al., 2017). The young people often substitute fruit, vegetables and other healthy food with snacks of low nutritional value (Jackson et al., 2017; Serra-Majem et al., 2004) and ultra-processed foods (Martínez Steele et al., 2016). In a study, it was found that cooking classes increase fruit and vegetables intake in

youth (Brown & Hermann, 2005). On the contrary, in our study, the catering students that have daily cooking classes showed an insufficient fruit and vegetables consumption. An explanation could be that the cooking class, like any other activities such as educational guided supermarket tours, how to read the nutritional labels, nutrition assessment by a dietician has a positive impact. In fact, going to the dietician for nutritional assessment improves your diet quality, interactive nutrition education improves adherence to the MD (Philippou et al. 2017), educational supermarket tours could improve the purchase of some healthy foods (Escaron et al., 2013). In our opinion, there are many levels of act. Cooking classes are one of the beneficial recommendations for people who have difficulties adhering to a healthy diet. We think that the catering students may need to know some essential nutrition concepts and to be nutritionally aware of their food choices for the menus.

Surprisingly the results reveal that the catering students usually go to fast food restaurants. It is probable that the quickness of serving, the taste and the cheap price fulfil their needs (Untaru, 2014). An alternative explanation may be that the lack of nutrition education allows enjoying junk food without any regret. The ages considered in the present study are at a crucial step for intellectual and physical development. Nowadays the youth spend a lot of time on social networks. The social networks as Instagram, Facebook, Youtube, Twitter, etc. maybe are the major source of education and inspiration for young people. However, they can also become a concern, especially in eating habits (Sidani, Shensa, Hoffman, Hanmer, & Primack, 2016).

Poor diet in these ages could lead to health impairments and promote bad eating habits (Lytle, 2002). Several studies have identified the importance of promoting a healthy diet in early life stages (Iaccarino Idelson et al., 2017). Failure to form healthy eating habits during this period probably makes the future adults unprotected against poor diet and increasing the risk to suffer some chronic diseases later on (Nelson et al., 2008). Even with media attention and

campaigns promoted by the public health system on the benefits of MD, young people have been failing to adhere to MD and similar healthy eating patterns (Cabrera et al., 2015; Grosso & Galvano, 2016; Iaccarino Idelson et al., 2017). Based on the results of the main report on European young people (OECD Directorate for Employment & Labour and Social Affair, 2014), if we do not reverse the trend, we expect new generations with a higher percentage of overweight and obesity than the previous ones.

Taking into account that catering students will have an important role to play in the population´s dietary intake, we should focus on them. We do not know if the chefs and catering workers are aware of their role in the dietary intake of their customers. They play a huge role especially at University, school canteens and restaurants for workers where people usually eat at least 5 times per week. The older generation of chefs such as Paul Bocuse did not appear interested in the bad eating habits of their customers when he declared "A chef is not a doctor". It is possible that this new scientific approach that links culinary art with nutrition and dietetics is not strong enough to convince its opponents. Rather, they die off and a new generation which is familiarized with the new knowledge and new responsibilities arises. Current examples of culinary nutritionists are the pairing of chefs with nutrition educators or vice-versa, most often seen in outreach programs on television, web and social networks. It is time to merge culinary art and nutrition education. There are some pioneers such as Jamie Oliver in the UK (https://www.jamieoliver.com/), Stefano Vendrame in Italy (https://www.spaziosfera.com/) or Aitor Sanchez, Juan Llorca and Lucia Martínez in Spain (https://www.midietacojea.com/, http://juanllorca.com/ and https://www.dimequecomes.com/) that outreach the strong link between cooking and nutrition education.

The lack of nutrition and dietetics subject in catering degrees could explain the unsatisfactory adherence to the MD of the catering students. The moderate adherence to the MD found in

our study, with the lack of nutritional education in the catering degrees could reveal a weak point in education and public health.

Table 2: OVERALL RESULTS OF THE KIDMED QUESTIONNAIRE OF THE CATERING STUDENTS (n = 108)

KIDMED questionnaire	No (%)	Yes (%)	OR Sex	OR Year
1.Takes a fruit or fruit juice every day	54 (50%)	54 (50%)	1.00	0.91
2. Has a second fruit every day	81 (75%)	27 (25%)	1.23	1.06
3. Has fresh or cooked vegetables regularly once a day	29 (26.9%)	79 (73.1%)	0.66	1.08
4. Has fresh or cooked vegetables more than once a day	66 (61.1%)	42 (38.9%)	1.87	1.00
5. Consumes fish regularly (at least 2–3 times per week)	48 (44.4%)	60 (55.6%)	0.80	2.05*
6. Goes more than once a week to a fast-food (hamburger) restaurant	69 (63.9%)	39 (36.1%)	1.16	1.30
7. Likes pulses and eats them more than once a week	38 (35.2%)	70 (64.8%)	0.92	1.20
8. Consumes pasta or rice almost every day (5 or more times per week)	54 (50%)	54 (50%)	1.00	0.76
9. Has cereals or grains (bread, etc.) for breakfast	48 (44.4%)	60 (56.6%)	4.11**	1.15
10. Consumes nuts regularly (at least 2–3 times per week)	42 (38.9%)	66 (41.1%)	1.02	0.69
11. Uses olive oil at home	2 (1.9%)	106 (98.1%)	0.68	---
12. Skips breakfast	90 (83.3%)	18 (16.7%)	2.00	1.06
13. Has a dairy product for breakfast (yoghurt, milk, etc.)	38 (35.2%)	70 (64.8%)	0.78	0.38*
14.Has commercially baked goods or pastries for breakfast	83 (76.9%)	25 (23.1%)	1.04	1.37
15. Takes two yoghurts and/or some cheese (40 g) daily	58 (53.7%)	50 (46.3%)	0.81	0.78
16. Takes sweets and candy several times every day	90 (83.3%)	18 (16.7%)	0.37	1.50

Notes: OR Sex: Odds Ratio on a base of Sex, OR Year: Odds Ratio on a base of the year of the study. Baseline: Males 1st year of study; * $P \leq .05$, $P \leq .01$. ---: There are not enough data; we did not calculate the OR Year.

Scientific literature assumes that a decline in cooking skills is associated with low diet quality and could contribute to overweight and obesity (Bernardo et al., 2018; Engler-Stringer, 2010). Cooking skills have been included among the strategies to prevent and reduce obesity and chronic diet-related diseases. Several studies have shown that cooking skills are related to a healthier diet (Hartmann et al., 2013; Wolfson & Bleich, 2015; Wolfson et al., 2016). Cooking skills are linked with an improvement in eating habits and dietary quality (Fordyce-Voorham, 2011; Lavelle et al., 2016; McGowan et al., 2017). Based on the studies mentioned above, we reasonably expected high adherence to the MD from Mediterranean catering students. The present study shows worrying results in adherence to the MD of the future catering workers. Despite the catering students having high cooking skills, their adherence to the MD was moderate and there were more than 14% of the students with very low-quality diet (see Table 1).

There are many studies that promote cooking classes to improve eating habits towards a healthy diet (Bernardo et al., 2018; Brown & Hermann, 2005; Reicks et al., 2018). Cooking skills can help to prevent overweight and obesity in childhood and adolescence (Condrasky & Hegler, 2010; Nelson et al., 2013; White House Task Force on Childhood Obesity, 2010). It has been speculated that a decline in cooking skills teaching could contribute to nutrition-related problems (Caraher et al., 1999; Short, 2003). Some studies call for practical cooking skills education in early ages (Condrasky & Hegler, 2009; Condrasky & Hegler, 2010; Lavelle et al., 2016). Furthermore, some studies have shown that taking part in cooking classes improve the adherence to the MD (da Rocha Leal et al., 2011; Monlezun et al., 2015). Our results highlight that, probably, the cooking skills are a minimum part of the tools necessary to have a good adherence to the MD. However, regardless of the type of intervention, nutrition education is a common positive factor in the study analysed (Bernardo et al., 2018; Fordyce-Voorham, 2011; Heydenreich et al., 2014; Miller & Cassady, 2015). We

believe that this may be the key factor to improve the adherence to the MD of the catering students (Philippou et al., 2017). Some studies have incorporated intervention in nutrition education with good outcomes (Ha & Caine-Bish, 2009; White et al., 2009). Other studies suggest that people with a greater knowledge of nutrition have better eating habits than people with less nutrition education (Guthrie et al, 2005; Lanigan & Power, 2008). Consistent with our hypothesis, the students of the second years of the course did not increase the adherence to the MD compared to the first year course ones. Our study has shown that the catering students have similar adherence to the MD reported in previous studies (Cabrera et al., 2015; Grosso & Galvano, 2016), thus they are not the exception to a general trend to drift away from the MD (da Silva et al., 2009). MD could potentially benefit the people if they recover the culture, history, identity and heritage of the traditional Mediterranean food (Renna et al., 2015).

This was a descriptive study and it has some limitations. The work is a “status study” and the results are a picture indicating what is being done. Moreover, the sample size could not seem representative because the number of participants was not high. However, all catering Spanish students have similar programmes in the degrees of the Spanish public education system, so the possible bias is minimized.

There were no previous data that involved catering students and their diet, so knowledge regarding adherence to the MD and high cooking skills were needed to improve. We feel that making nutrition education accessible for catering students during their studies should be considered a priority to make healthy cooking skills applicable. Acknowledge the possibility to study human nutrition and dietetics in catering studies could be the most enlightened practice. Catering students have school programmes with a lot of hours of cooking skills to reach a tasty cuisine, to obtain skills in restaurant management etc., but they haven´t studied nutrition and dietetics. Thus, they will not be able to link their cuisine to the health of their

customers. Combining cooking skills experience with human nutrition concepts would provide a basis for enhanced confidence for nutrition dietetics healthcare. To be positive players in dietary patterns and public health, catering students should have essential skills in nutrition and dietetics to promote healthy menus and make it easy to follow a healthy diet eating out. The essential skills of nutrition education refer to knowledge of concepts and processes related to nutrition and health, diet and diseases, food preparation and nutrients etc.

5. CONCLUSIONS

High cooking skills are not linked with high adherence to the MD. Lack of nutrition education may be the cause of moderate adherence to the MD in catering students. Although the literature linking cooking skills and healthy diet is extended, results from our study and claims suggest that catering students would benefit from studying nutrition and dietetics subject. The cooking skills probably are just a part of the tools and knowledge essential to have a good adherence to the MD. This work recommends the incorporation of nutrition and dietetics subject in catering degrees.

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Authorship

Cesare Altavilla, Pablo Caballero Pérez and Jose Tuells are authors of this paper. They argued the discussed issues, designed the study and written the manuscript.

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Conflict of interest

None of the authors has any conflicts of interest or financial ties to disclose.

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