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Effect of COVID-19 Lockdown on Adherence to the Mediterranean Diet Among Participants in a Health-Promotion Program

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Abstract. Mediterranean diet, characterized by being abundant in plant-based foods, rich in olive oil, and lower in saturated fat, meats, and dairy products has been associated with several health benefits such as reduced mortality and incidence of cardiovascular disease. Despite this evidence, adult population does not seem to display a high adherence to the dietary patterns proposed by this diet. On the other hand, the COVID-19 pandemic has forced most of the population to shift to working from home when possible and this might have well affected their dietary patterns. The aim of the present work is to analyze how adherence to the Mediterranean diet among employees participating in a health-promotion program have been affected during lockdown due to the COVID-19 pandemic. Around 300 adults fulfilled validated questionnaires to measure their adherence to Mediterranean Diet both in October 2019 and May 2020. A series of $\chi 2$ tests were performed to test for any potential effects of the pandemic on Mediterranean diet-related variables. Results showed that working from home might have had a positive effect on Spanish employees' adherence to the Mediterranean Diet. More specifically, it seems that adults have been likely to increase their vegetables, fruit and legumes intake. Results are discussed in terms of working-from-home effects on healthy habits. The relevance of implementing programs to promote healthy behaviours is also discussed.

Keywords: Dietary patterns · Healthy habits · Working from home

1 Introduction

Diet habits have increasingly gained attention from the scientific community because of their potential consequences for health [1]. In this line, the Mediterranean diet has been linked to a number of health benefits, including reduced mortality and incidence of cardiovascular disease [2] as well as a relatively high level of self-rated health [3]. This diet is abundant in minimally processed plant-based foods, is rich in monounsaturated fat from olive oil, and is lower in saturated fat, meats, and dairy products. With the literature addressing the assessment of adherence to Mediterranean diet among office workers

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being scarce, it has been suggested that workers of large companies show moderate adherence to this dietary pattern [4]. In 2020, the world experienced such exceptional circumstances that the usual health determinants were affected at all levels. The spread of the SARS-CoV2 (severe acute respiratory syndrome coronavirus 2), which gave rise to the disease known as COVID-19, led the WHO to declare a global pandemic inMarch 2020 [5]. Spain has been one of the hardest hit and earliest inflicted countries. In an attempt to fight the spread of the virus, the Spanish government approved a period of strict home confinement from 15 March to 2 May 2020. The confinement measures were then gradually relaxed working up until the summer months, but many companies maintained working-from-home (WFH) measures. Some of the immediate consequences of the confinement period were that people had to stay at home more than usual, interrupting their usual activities, and had to change their lifestyle habits [6].

Prolonged quarantine measures have forced businesses to adapt to their workforces being confined at home and no longer able to come into the office. Since the start of mandatory quarantine measures, there has been a significant rise in both public and private sector WFH participation, as well as WFH employee production and working hours [7].

A comparison between Spanish data in 2019 and 2020 revealed that remote work rose from less than 5% to 34% during the quarantine [8]. This shift from office to home working may well have affected healthy habits among workers. Thus, assessing how health risks and benefits of WFH are affected by its sudden, large-scale uptake in the context of COVID-19 is key to best preserving occupational health. This explains the emergence of studies aiming to understand health-related behavioral changes during quarantine [9, 10].

There is existing evidence of the benefits of health promotion by companies among their employees [e.g., 11]. This fact explains the interest of companies to introduce corporate health programs. To the best of our knowledge, no previous studies have analyzed how dietary patterns reported before and during confinement have changed among workers from companies participating in a health promotion program. Given the possibility of new virus outbreaks and thus the continuation of WFH for many people, the spread of WFH to new people seems to be a more than likely future situation. Considering this possibility, it might be of great value to companies to understand the health-related impacts of WFH. This knowledge might be helpful to design their own programs to proactively address the occupational health of their staff in these types of situations in the future.

The main aim of the present work is to analyze how adherence to the Mediterranean diet among workers participating in the Healthy Cities program have been affected during confinement, i.e., WFH due to the COVID-19 pandemic.

2 Methods

2.1 Participants

The sample was composed of Spanish office employees participating in the Healthy Cities scheme developed by Sanitas (https://corporativo.sanitas.es/sobre-nosotros/sostenibilidad/healthy-cities/ accessed on 3 March 2021). There were 2491 employees who completed an online survey containing the questionnaires used in the present study

before the pandemic. These participants were contacted via e-mail again in May 2020. This time, the questionnaires were answered by 297 subjects, who, therefore, constitute the research sample (148 women and 149 men). The average age of the participants was 42.76 years (SD = 7.79) ranging from 24 to 63.

2.2 Instruments

Information about the participants' demographic variables, such as gender, age, and the company they belonged to, was gathered in the first data collection. For the second data collection, the participants were also asked whether they had suffered from COVID- 19. On the other hand, the PREDIMED (Prevención con dieta mediterránea) questionnaire was used [12] to measure the adherence to a Mediterranean diet (Table 1). This instrument consists of 14 items in which participants are asked about their diet habits (e.g., "Do you mainly use olive oil to cook?"). Depending on their answers, participants could score 0 or 1 points for each question. Those who reached nine points in the questionnaire were deemed as Mediterranean diet followers.

Table 1. PREDIMED items and analysis criteria

Questions	Criteria for 1 point
1. Do you use olive oil as main culinary fat?	Yes
2. How much olive oil do you consume in a given day (including oil used for frying, salads, out-of-house meals, etc.)?	$\geq$ 4 table spoons
3. How many vegetable servings do you consume per day? (1 serving: 200 g [consider side dishes as half a serving])	$\geq$ 2 ($\geq$1 portion raw or as a salad)
4. How many fruit units (including natural fruit juices) do you consume per day?	$\geq$ 3
5. How many servings of red meat, hamburger, or meat products (ham, sausage, etc.) do you consume per day? (1 serving: 100–150 g)	$<$ 1
6. How many servings of butter, margarine, or cream do you consume per day? (1 serving: 12 g)	$<$ 1
7. How many sweet or carbonated beverages do you drink per day?	$<$ 1
8. How much wine do you drink per week?	$\geq$ 7 glasses
9. How many servings of legumes do you consume per week? (1 serving: 150 g)	$\geq$ 3

(*continued*)

Table 1. (*continued*)

Questions	Criteria for 1 point
10. How many servings of fish or shellfish do you consume per week? (1 serving 100–150 g of fish or 4–5 units or 200 g of shellfish)	≥ 3
11. How many times per week do you consume commercial sweets or pastries (not homemade), such as cakes, cookies, biscuits, or custard?	< 3
12. How many servings of nuts (including peanuts) do you consume per week? (1 serving 30 g)	≥ 3
13. Do you preferentially consume chicken, turkey, or rabbit meat instead of veal, pork, hamburger, or sausage?	Yes
14. How many times per week do you consume vegetables, pasta, rice, or other dishes seasoned with sofrito (sauce made with tomatoand onion, leek, or garlic and simmered with olive oil)?	≥ 2

2.3 Procedure

Sanitas, a leading Spanish health company, developed the Healthy Cities Challenge which was carried out from September 2019 to September 2020 aiming (1) to promote healthy lifestyle habits among the employees belonging to the big Spanish companies who participated in the programme and (2) to generate a financial donation by Sanitas to an urban regeneration project, in a Spanish city, as a vehicle to develop more areas where people can go to carry out PA. As for the first aim, workers belonging to the participant companies were invited to participate in some health-related offline events and online workshops.

An online platform was used to create and distribute the questionnaire. The initial questionnaire was administered in October 2019 and the second questionnaire was administered in May 2020. In both cases, the questionnaire was disseminated through platforms available for the staff of companies participating in the Healthy Cities Project.

The time required to answer the questionnaire was approximately 10 min. The participants were able to answer the questionnaire at different times. The responses to the questionnaires were stored in an online database to which the authors had access. All of the participants were treated in agreement with the ethical guidelines of the American Psychological Association [13].

2.4 Data Analysis

A series of $\chi 2$ tests were performed to test for any potential effects of the pandemic on Mediterranean diet-related variables.

3 Results

Table 2 shows the distribution of participants in terms of every item in the PREDIMED questionnaire both before and during the pandemic. Pearson $\chi 2$ tests, together with the analysis of the adjusted residuals, revealed that in all of the items the participants displayed a pattern closer to the Mediterranean diet features during pandemic than before. More specifically, there was an increase in the number of participants reporting that the olive oil was the main culinary lipid used, as well as an increase in the intake of olive oil, vegetables, fruit, red meat, wine, legumes, fish and seafood, tree nuts and sofrito sauce. On the other hand, participants intake of butter, cream and margarine, or commercial sweets decreased during the pandemic. Overall, the adherence to the Mediterranean diet was higher during the pandemic than before.

Table 2. Distribution of the participants in the different items of PREDIMED before and during the Pandemic

	Before Pandemic	During Pandemic	(d.f.) Pearson $\chi 2$
Use of olive oil as main culinary lipid			
No	7	3	(1) 9.03 ***
Yes	290	294	
Olive oil			
0–3 tablespoons	59	36	(3) 65.03 **
More than 3 tablespoons	238	261	
Vegetables			
1–2 servings	107	190	(3) 37.07 ***
More than 2 servings	98	199	
Fruits			
0–3 servings	204	197	(3) 39.68***
More than 3 servings	93	100	
Red/processed meats			
None	106	97	(1) 27.71***
At least one	191	200	
Butter, cream, margarine			
None	250	225	(1)29.36***
At least one	47	72	
Soda drinks			
None	225	204	69.02***

(*continued*)

Table 2. (*continued*)

	Before Pandemic	During Pandemic	(d.f.) Pearson χ2
At least one	72	93	
Wine glasses			
None	251	233	61.69***
One or more	46	64	
Legumes			
None	226	203	30.88***
At least one	71	94	
Fish/seafood			
0- 2 servings per week	186	180	41.43***
At least 3 servings per week	111	117	
Commercial sweets and confectionary			
Less than 2 servings per week	68	86	(4)46.54***
At least 2 servings per week	229	211	
Tree nuts			
Less than 3 servings per week	40	33	(4)18.61**
At least 3 servings per week	257	264	
Poultry more than red meats			
No	20	18	(4)43.62***
Yes	277	279	
Use of sofrito sauce			
Less than twice per week	93	77	(3)13.82**
At least twice per week	204	220	
Adherence to the Mediterranean Diet			
No	135	70	(1)22.26***
Yes	162	227	

Note. When it is not specified, the table indicates the number of servings per day *0.05, **0.01; ***0.001

4 Discussion

The main aim of the present work is to analyze how adherence to the Mediterranean diet among workers participating in the Healthy Cities program have beenaffected during confinement, i.e., WFH due to the COVID-19 pandemic. As has been previously pointed out, it could have been expected that during the pandemic, our diet would have taken a step back from being a healthy diet rich in fresh food to one containing foods with a long shelf life [14]. The reasons supporting this belief are both the threat of a potential food shortage

and that a typical response to chronic stressful situations is the consumption of energy-dense foods [15]. However, our results show that the adherence to a Mediterranean diet was higher during the pandemic than before. This fact is not surprising in light of recent studies addressing both dietary and cooking habits. In this vein, Rodríguez-Pérez et al. [16] suggested that COVID-19 confinement in Spain has led to the adoption of healthier dietary habits reflected in a higher adherence to a Mediterranean diet. As was pointed out, devoting more time to both cooking and eating when WFH compared to when working at the office might explain why people have been more likely to engage in healthier diet behaviors [17].

The analysis of benefits and disadvantages of WFH has gained much attention during the pandemic we are going through. Recent research has pointed out that WFH might lead to positive outcomes such an improvement in work-life balance, work efficience, and work control [18]. However, there are several aspects of WFH which could negatively affect to the employees wellbeing such as the existence of home office constraints, work uncertainties and inadequate tools [18]. A study carried out among researchers found that the effect of WFH did improve the efficiency for some people, while acted as a barrier for eficiency in others [19]. This fact makes us think that there must be personal and/or contextual factors affecting WFH experiences. However, it seems that workers might be unaware about what WFH entails and lack resources required for this change, like software, access to official documents and proper working space [20]. This all sugests that, while companies trends in terms of WFH are likely to change once the pandemic is over, proper training will be required if this practice is to be a feasible option or the new normal. Possibly the working balance will be visible post-pandemic when WFH is not a forced mandate, rather a flexible option.

The findings of the present study, suggesting that employees are more likely to follow a healthy diet (Mediterranean one) when working from home, could be taking into consideration for companies when it comes to make a decision about the future scenario. The practical implications of the present findings are twofold. On the one hand, companies could facilitate WFH on the basis that it might positively affect their employees' health. On the other hand, it would be interesting to explore which barriers employees find to follow a healthy dietary pattern when working from the office and tackle them accordingly. Health-promotion programs could thus implement training about dietary patterns and specially, encouraging actions such the provision of comfortable spaces for employees to have their home-made lunch, the provision of fruits during the breaks, or the existence of an affordable and healthy offer for lunch.

The main strength of the present study is having data gathering just before the pandemic, when it was not possible to foresee that situation. This allowed us to compare the study variables before and after the pandemic. Furthermore, it is focused on a specific population (Spanish employees attending a health promotion program) which contributes to the sample homogeneity, As stated below, this could be both a strength and a limitation. This study has some limitations that must be mentioned. While this is one of the very few studies assessing the impact of the pandemic with data gathered both before and during the pandemic, only 297 participants out of the initial 2491 completed the second wave of questionnaires. Second, our sample represents a specific population group, i.e., employees participating in a health promotion program, and the findings cannot be

extended to the whole population. The health promotion program that the participants were taking part of could have partially explained the changes observed. It would be interesting for future studies to explore the effects of such programs when under different sanitary conditions.

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