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Homemade food, alcohol, and body weight: Change in eating habits in young individuals at the time of COVID-19 Lockdown

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Abstract:

BACKGROUND: The 2019 coronavirus disease (COVID-19) lockdown has caused significant changes in everyday life. This study evaluated the effect of the COVID-19 quarantine on dietary and alcohol consumption habits and body weight of Italian university students.

MATERIALS AND METHODS: An online cross-sectional survey was carried out among university students than 18 years in July 2020. The online self-administered questionnaire included demographic and anthropometric data (reported weight and height), weight, and dietary habits changes during of the COVID-19 lockdown.

RESULTS: A total of 520 respondents have been included in the study. A total of 393 (~76%) were female, 3.8% was obese, and the mean age was 23 ± 4 years. Numerous students reported a change in their eating habits during the lockdown with an increase in consumption of chocolate (40%), ice cream, and desserts (34%), but most of all an increase of homemade bread and pasta (60%), pizza (47%), and homemade sweets (55%). The students also reported an increase of vegetables, fresh fruit, legumes, eggs, and coffee, but also of processed meat, fried foods, cheeses, butter, and sweet beverage, and a reduction in alcohol intake. The weight gain was observed in 43.8%, and males have greater weight gain than females (57% vs. 46%, respectively; $P = 0.04$). A greater increase in body weight was observed in obese as compared to those with normal weight (77% vs. 44%, respectively; $P < 0.001$).

CONCLUSIONS: Our data highlighted the need for dietary guidelines to prevent weight gain during the period of self-isolation, especially targeting those with overweight and obesity.

Keywords:

2019 coronavirus disease, coronavirus, eating habits, lockdown, quarantine, weight change

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Introduction

The 2019 coronavirus disease (COVID-19) is a novel severe acute respiratory syndrome caused by SARS coronavirus 2.^[1] Due to the rising rate of COVID-19 cases, the World Health Organization declared a global health emergency on January 30, 2020.^[2] Italy was the second most affected country in the World by the COVID-19 pandemic.^[3] In order to contain and combat the spread of

the new COVID-19, the Italian government decided on stringent containment measures: the ban on mass gatherings and events and the ban on meeting without urgent reasons were issued the entire national territory, and it was strongly recommended to limit the movement of individuals except in strictly necessary cases.^[4] In Universities and other educational Institutions, didactic or curricular activities were carried out with remote modalities.^[4] Sporting events

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and competitions of any order and discipline were suspended, in public or private places.

Due to the “Stay-at-Home” decree,^[5] there has been a change in the lifestyles and habits of the Italian population during the lockdown. Physical distance and isolation have had a heavy impact on young citizens lives, particularly influencing their daily behavior. In this situation, it is plausible that a change in eating behaviors or dietary habits occurred due to a continuous accessibility to foods at home, as well as in body weight due to reduced physical activities.^[6]

Recent studies indicate that nutrition is a key aspect influencing the outcomes in COVID-19 infection.^[7,8] However, studies already carried out with the aim to describe the effect of lockdown on eating behaviors/ dietary habits are discordant.^[9-11]

In addition, several studies highlight that, in the last years, Southern Italian young adults have abandoning the Mediterranean dietary pattern.^[12,13] Therefore, the aim of our study was to evaluate the changes in the eating habits of Italian young adults, represented by a sample of university students, during the COVID-19 lockdown, using a survey method to reach them everywhere.

Materials and Methods

Study design and setting

This was a prospective, cross-sectional study conducted to explore the effects of lockdown on the changes eating habits in young adults from Southern Italy with an anonymous, online survey based on a structured questionnaire that we extracted from CREA-Council for Agricultural Research and Economics (crea.gov.it) was conducted (in Italian, retrievable at https://docs.google.com/forms/d/18lydVFUhlJYqxtsfy9CYsgRGnmYDG0XVpo3PkIEi_VM/prefill). As reported in other article,^[14] we performed a construct validity of the questionnaire by a factor analysis via Horns parallel analysis for principal components on the questionnaire, using varimax rotation. An Eigen value of 1 was used as a cutoff for determining the number of factors. Overall, the total percentage of variance was 54.2%. The questionnaire had good internal consistency, with Cronbach’s α as 0.84. Such online research is a recommended approach to quickly reach a specific group of subjects, guaranteeing their safety under pandemic.^[15,16] The questionnaire was made available through online social media for a period between July 21, 2020, and September 30, 2020.

Study participants and sampling

The inclusion criteria for the study were participants residing in Calabria (Southern Italy) enrolled in university courses, age ≥ 18 years of both genders.

These criteria were verified by answers given to the corresponding survey questions. Upon entering the survey link, directly connected to the Google platform, those who agreed in participating provided consent to participate and received detailed instructions. The survey was completed by 550 students.

Data collection tool and technique

The used questionnaire aimed to assess whether in the lockdown period resulted in increased or reduction food consumption, in the frequency of consumption of selected food products, as well as alcohol consumption and observed weight change during the COVID-19 lockdown. In particular, the study comprised a structured request packet that inquired demographic information (age, gender, and place of residence during the lockdown), anthropometric data (reported height and body weight), body mass index (BMI) for each participant was calculated from self-reported height and body weight, and dietary habits information (daily and weekly intake of certain foods, foods frequency, before and during the lockdown). After closing the survey and stopped collecting data, the final database was downloaded as a Microsoft Excel sheet, and we analyzed the data immediately thereafter.

Data are reported as the number and percentage for the categorical variables or by the mean \pm standard deviation for continuous variables. A Chi-square test was performed to analyze the prevalence of weight gain between gender, age groups, and BMI categories.

The Chi-square test was also used to assess food consumptions between students who keep their body weight stable and who gains. Significant differences were assumed to be present at $P < 0.05$ (two-tailed). All comparisons were performed using the SPSS software 22.0 for Windows (IBM Corporation, New York, NY, United States).

Ethical consideration

Anonymity of the participants was guaranteed by the platform. Participation in the survey was voluntary, and no recompense was provided. The present study was approved by the Local Ethical Committee at the Calabria Region-Central Area (127/2020/CE approved April 16, 2020). Online informed consent was obtained from all participants. The investigation conforms to the principles outlined in the declaration of Helsinki.

Results

Demographic characteristics

The survey was completed by 550 students, of which 30 of them were excluded from the statistical analysis due to the duplicates and discrepancies within the responses related to age, body weight or height. The main

characteristics of the study population are presented in Table 1. Considering the total of the sample of 520 participants, the female respondents represent 75.6% of the population. The average age of the sample was 23 ± 4 years; the majority of the participants were 21–25 years old and attended a university degree program. A sample of 492 participants (95%) spent the lockdown with their family, the remaining 28 participants (5%) spent the quarantine alone, at home with friends or a university residence [Supplemental Figure 1].

Body mass index and reported change of body weight

The BMI of the participants was 22.2 ± 4 kg/m²; most of the participants (81.9%) were of normal weight, whereas the prevalence of overweight was 14.2% and obesity 3.8% [Table 1]. Concerning body weight, 240 (46.2%) of responders did not substantially change their body weight during the COVID-19 lockdown; however, 228 (43.8%) of them reported gained weight [Figure 1]. In particular, 117 participants (22%) increased their body weight by 1–2 kg and 111 (21.5%) participants increased their body weight by 3–5 kg or more. Furthermore, males have greater weight gain than females (57% vs. 46%, respectively; $P = 0.041$). There were no statistically significant differences in body weight gain in the population according to age groups ($P = 0.19$). Diet of those who gained weight changed in a most negative direction compared to those who reported no changes the increase in body weight. Figure 2 shows the percentage of participants who reported an increase in body weight according to BMI categories. Those with higher BMI

Table 1: Characteristics of the study population (percentage)

Characteristics	n (%)
Gender	
Male	127 (24.4)
Female	393 (75.6)
Age groups (years)	
18-20	163 (21.3)
21-25	257 (49.4)
≥26	100 (19.2)
Education	
University degree course	514 (98.8)
Graduate school, PhD	6 (1.2)
Place during the quarantine	
Family	492 (94.6)
Other	28 (5.4)
BMI (kg/m ²)	
<25	426 (81.9)
25-29	74 (14.2)
≥30	20 (3.8)
Weight changes during the quarantine	
Gained	228 (43.8)
No changes/didn't know	292 (56.2)

BMI: Body mass index

gained more weight than those having normal BMI (77% vs. 44%, respectively; $P < 0.001$) [Figure 2]. Table 2 shows the changes in eating behaviors differed according to changes in body weight.

Dietary patterns

Dietary habits during the lockdown reported by all participants are presented in Figure 3 and Supplemental Table 1. A significant number of participants reported that they changed their eating habits during the lockdown [Figure 3].

Comfort food

In particular, data show an increase in “comfort food” consumption, notably chocolate (40%), ice cream and desserts (34.4%), sugar (30%), but most of all an increase of homemade bread and pasta (60.4%), pizza (47%), and homemade sweets (55.4%). More weight-gaining respondents significantly increased comfort food such as sugar, sugary drinks, homemade foods, bread, pasta, and breakfast cereals as well as sweet beverage and coffee [Table 2].

Vegetable, cereals, and fruits

Interestingly, 25% of responders increased their consumption of vegetables and fresh fruit. Data show a greater increase of legumes, bread, pasta, and breakfast cereals. Regarding the consumption of nuts, it was reduced during the lockdown, as well as fruit jam.

Meat products

Data show a greater increase eggs, meat, but also of fried foods and processed meat. However, we report a small decrease of fish. Purchases of ready-made meals were reduced by nearly 23%.

Milk, dairy, and fats

Consumption of milk and yogurt is increased during the lockdown. Data show also a greater increase cheeses and butter, but also olive and seed oils. Weight-gaining respondents' participants also increased the consumption of eggs, cheese, fried food, and dressing fats [Table 2].

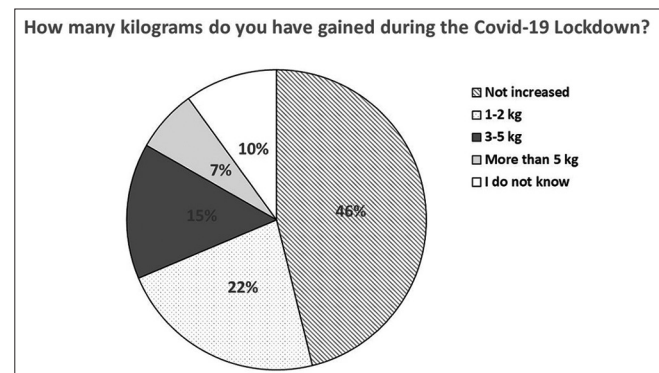
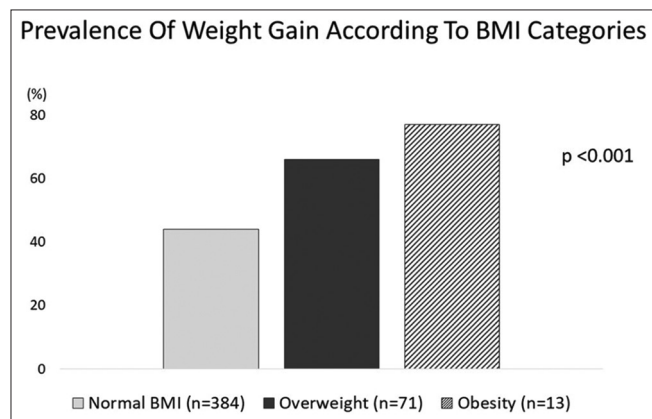


Figure 1: Overall reported weight change during the lockdown

Table 2: The proportion of participants who reported changes in eating behaviors by changes in body weight (percentage)

Food intake	No changes (n=292)	Gained (n=228)	P
Breakfast cereals	9.6	17.1	0.03
Sugar	13.3	44.6	<0.001
Pasta and rice	13.8	50	<0.001
Bread	17.1	53.5	<0.001
Pizza	31.7	61.8	<0.001
Flour for homemade (pizza, fresh pasta, bread, cakes, and biscuits)	45.8	75	<0.001
Homemade cookies and sweets	40.8	71.1	<0.001
Ice cream and desserts	19.2	50	<0.001
Chocolate	23.8	56.1	<0.001
Sweet beverages	11.3	26.3	0.001
Coffee	15.4	28.9	0.01
Eggs	13.8	28.5	0.04
EVOO	5.4	23.7	<0.001
Processed meat	13.3	35.1	<0.001
Cheeses	10.8	27.6	<0.001
Butter	8.8	27.6	<0.001
Margarine	4.6	13.2	0.05
Seed oil	6.7	17.1	<0.001
Fried food	14.6	40.4	<0.001

EVOO=Extravirgin olive oil

**Figure 2:** Prevalence of weight gain according to body mass index categories

Alcohol consumption

Regarding the consumption of alcohol during the COVID-19 lockdown, 30% of university students reported a decrease in alcohol intake. Only 11% of responders report an increase in consumption of this beverage. Fifty-nine percent of participants did not change the consumption of alcoholic beverages during the quarantine.

Discussion

To our knowledge, this study was among one of the first to investigate the impact of the COVID-19 lockdown on eating habits among university students from Southern Italy, where Mediterranean diet was born. The lockdown experience has caused considerable distress for many young people in the numerous aspects of their lives, including the interruption of their university training.

We investigated their eating habits change during the lockdown. Recent studies carry out during the COVID-19 pandemic told more frequent and increased consumption of cakes and sweets, decreased intake of vegetables and fruits, and increased consumption of canned foods.^[17-19] In other studies, positive changes such as decreased consumption of sugary drinks, processed meat, and increased consumption of fresh fruits and vegetables legumes were identified.^[20,21] Our data support previous findings. During the lockdown, we observed positive and negative changes in eating habits. Overall, we found that increases were much more frequent than decreases for all the foods explored. The impact of the COVID-19 outbreak and the related lockdown thus appear to be associated with substantial increases in the intake of caloric food, as well as body weight gain among the university student population surveyed. The lockdown provided more time to the kitchen, this provided the opportunity to eat healthier and enjoy food without haste even in young people. On the one hand, social isolation has been associated with a negative impact on nutrition habits, physical activity, poor physical and mental health, and obesity. Unfortunately, a large proportion of the participants increased their consumption of “comfort foods,” sweet or salty, the consumption of homemade pizza, bread, and desserts, has increased. This is still a matter of discussion, but there is a clear relation between anxiety levels and craving hunger.^[22]

It is well-known that obesity is a condition characterized by chronic low-grade inflammation dependent on the adipocytokines secretion of the adipose tissue with immunomodulatory effects.^[23] These, due to the

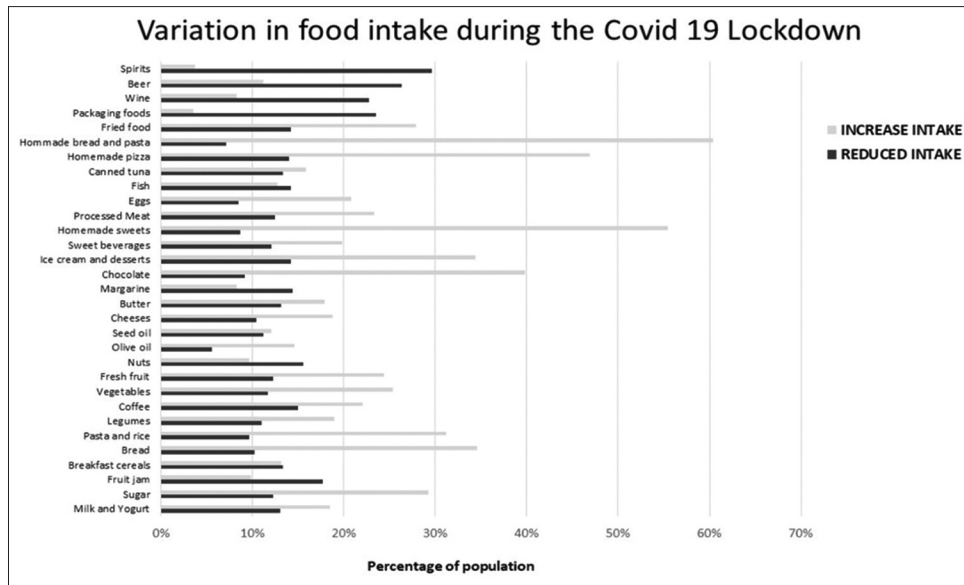


Figure 3: Variation in food intake during the COVID-19 lockdown

dysregulation of immune responses, make the immune system more vulnerable to infections, which leads the patients being less responsive to vaccination and antiviral drugs.^[24] For this reason, the relationship between viral diseases and obesity has been studied for some years. During the H1N1 epidemic, some authors have described that obese patients had a higher risk of developing the disease, longer intensive care stay, and greater mortality.^[25] Regarding COVID-19, it was found that obesity is independent risk factor, and the risk of requiring invasive mechanical ventilation is 7.36 times higher when patients with a BMI >35 kg/m² were compared to those with BMI <25 kg/m².^[26] Other authors showed that obesity predisposes to high mortality due to COVID-19 even in very young patients of age ≥14 years,^[27] and it is considered that the high prevalence of obesity in these patients that can move the age curve of mortality in this people group.^[28]

Current data on alcohol use in lockdown are controversial. Our data show a reduction in alcohol consumption in the 30% analyzed young student population. These data are consistent with a recent study^[29] showed that decrease in drinking were primarily driven by drinkers aged 18–25 years, particularly women, during the COVID-19 lockdown. Therefore, it appears that the reduction of opportunities for drinking with people outside household, particularly in young people, has outweighed increases attributable to lockdown stress, in the period of social isolate.^[29] However, a small group of students have increased their alcohol consumption during this lockdown period.

Our data showed also that the participants with higher BMI at the beginning of lockdown gained weight

compare to those having a normal weight. Italian study has reported weight gain during the COVID-19 lockdown,^[21] other authors have shown that the participants following an unhealthy diet had 4.5 times higher odds of weight increase,^[25] our data support these findings. These results are worrying why latest studies report that patients with obesity are at increased risk of complications and mortality of COVID-19 infection.^[26,30]

The strengths of our study include the online survey, which allowed us quickly to reach a sufficiently large sample of the Southern Italian university students.

Limitations and recommendations

Several limitations of our study must be mentioned: first, we used self-reported online survey data which may be less reliable, such as weight and height, which could lead to underestimation of overweight and obesity; however, our survey was similar to others that have been frequently employed.^[21] Furthermore, the majority of respondents were women, however, the higher participation of women was also reported by other researchers.^[17,20,31] Finally, a question about weight loss was not included in the survey. Finally, we did not collect the data on physical activity and stress during the lockdown. However, the results of our study they are important, because suggest that eating habits should be monitored in order to avoid the negative effects of COVID-19, due to body weight gain, even in young people, whereas the COVID-19 pandemic is still ongoing. In our opinion, it is necessary to remark young people of the most important principles of healthy nutrition during the COVID-19 pandemic, to prevent other risk factors in this population.

Conclusions

In this study, we have provided for the first-time data on the Southern Italian university students eating habits during the COVID-19 lockdown. The young people are currently considered to be at low risk of fall ill COVID-19, but this situation may change as obesity increases in this population. Positive is the reduction in alcohol consumption in the Italian university students during the lockdown, as well as the increase in some healthful food intake, but COVID-19 lockdown caused also negative changes in nutrition habits in this population. Weight gain was associated with dietary changes, especially increased “comfort food,” above all where BMI values were greater. Increased overweight and obesity in young people can worsen COVID-19 outcomes and promote the increase in cardio-metabolic risk factors.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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Supplemental Table 1: Changes in eating behaviors during the lockdown (%)

Food intake	Decreased	Remains as usual	Increased
Milk and/or yogurt	13.1	68.5	18.5
Chees	10.4	70.8	18.8
Breakfast cereals	13.3	73.7	13.1
Sugar	12.3	58.5	29.2
Marmalade	17.7	72.5	9.8
Pasta and rice	9.6	59.2	31.2
Bread	10.2	55.2	34.6
Pizza	14.0	39.0	46.9
Flour for homemade (pizza, fresh pasta, bread, cakes, and biscuits)	7.1	32.5	60.4
Homemade cookies and sweets	8.7	36.0	55.4
Ice cream and desserts	14.2	51.3	34.4
Chocolate	9.2	51.0	39.8
Packaging foods	23.5	73.1	3.5
Legumes	11.0	70.0	19.0
Vegetables	11.7	62.9	25.4
Fruits	12.3	63.3	24.4
Nuts	15.6	74.8	9.6
Eggs	8.5	70.8	20.8
Processed meat	12.5	64.2	23.3
Fresh Fish	14.2	73.1	12.7
Canned tuna	13.3	71.0	15.8
Butter	13.1	69.0	17.9
Margarine	14.4	77.3	8.3
EVOO	5.6	79.8	14.6
Seed oil	11.2	76.7	12.1
Fried foods	14.2	57.9	27.9
Coffee	15.0	62.9	22.1
Sweet beverages	12.1	68.1	19.8
Wine	22.7	69.0	8.3
Beer	26.3	62.5	11.2
Spirits	29.6	66.7	3.7
Alcoholic aperitif	28.7	68.1	3.3
Bitters and digestives	24.4	70.8	4.8

EVOO=Extra virgin olive oil

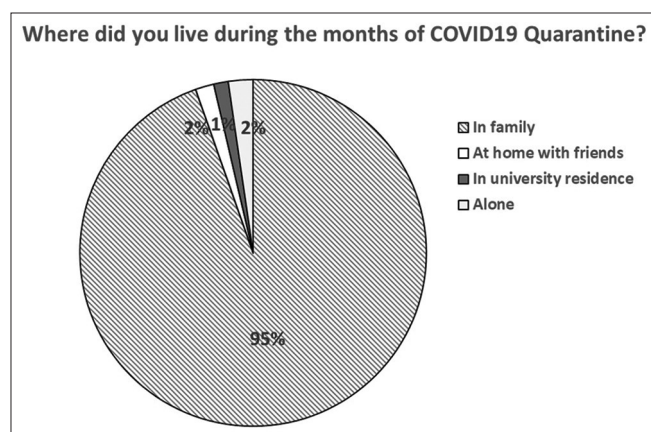


Figure S1: Overall reported life during the lockdown