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Assessment of Eating Behavior During the COVID-19 Pandemic Period. A Pilot Study

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ABSTRACT

Background: In order to counter and control the spread of the new COVID-19 pandemic, at the beginning of March 2020, the Romanian government decided to apply strict isolation and quarantine measures. **Objective:** In the present study, we aimed to analyze the impact of the COVID-19 pandemic and isolation/quarantine at home on lifestyle and daily diet, and to identify changes caused by the pandemic related to the nutritional status and food preferences of the Romanian population. **Material and Method:** We conducted a prospective observational study based on a structured questionnaire that included 30 items for investigating multiple aspects regarding the dietary habits in the context of the pandemic, quarantine and social isolation imposed by the new SARS-CoV-2 coronavirus. The questionnaire was disseminated on various online platforms accessible from any device with an internet connection in Romania, on social media groups between January and March 2021. The questionnaire was made online, using the Google Forms platform, this method being very useful for carrying out the proposed evaluation, as it facilitated the national dissemination of the evaluation questionnaire. The final study group consisted of 620 respondents from 35 counties of Romania. **Results:** Regarding weight status, we found that the respondents showed significantly more frequent weight fluctuations during the pandemic than before ($p < 0.0001$). The results showed an increase in the mean weight of the respondents during the pandemic vs. their mean weight before ($p = 0.04$). In contrast, there were no statistically significant differences between the BMI calculated before and during the pandemic ($p = 0.3$). Respondents, who had a chaotic diet (40.64%) before the pandemic, became significantly more organized in this regard during the pandemic (35.96%) ($p = 0.008$). **Conclusions:** We can state that the pandemic period and isolation at home analyzed in terms of eating habits had positive consequences for about half of the study participants which adopted an organized, diversified eating behavior and balanced lifestyle.

Keywords: COVID-19, isolation, lifestyle, nutrition, diet

INTRODUCTION

COVID-19 is a severe acute respiratory syndrome caused by SARS coronavirus 2 (SARS-CoV-2). At the end of 2019, SARS-CoV-2 spread rapidly from Wuhan City in Hubei, China, to the rest of the world's population.[1,2] Due to the increase of reported cases in Chinese and international locations, on January 30, 2020, the Emergency Committee of the World Health Organization (WHO) declared COVID-19 a global emergency, and on March 12, 2020, COVID-19 was declared a pandemic.[3,4] To counter and control the spread of COVID-19, in early March 2020, the Romanian government decided on stricter isolation measures, including banning mass assemblies and events, and declared a state of national emergency. Due to the stay at home order, there was an abrupt modification in the lifestyle practices of the population, with a radical decrease in any form of socialization of physical nature. Physical distancing and self-isolation had deeply affected the lives of people and also influenced their eating habits and daily behaviors. Due to the radical change, daily activities and important habits: work activities, children's games, as well as any type of activity with the family, from dining to physical exercise, took place only at home (inside the house, or in the private yard).

In this situation, citizens were permitted to leave their house only to buy essential products from supermarkets and pharmacies, to go to work in those cases where physical presence at work was indispensable (pharmacies, health care, supermarkets etc.), with the mention to keep the social distance.

This measure instigated fear in the first place, and people began to stock up; this measure also led to the interruption of food supply, leading to a lack of basic food in most shops and grocery stores. However, after the initial few days, the majority of enterprises ensured enough food for this time of emergency. Despite the fact that the situation appeared to be normalizing, not all food and groceries were readily accessible in markets, making people on special diets and the elderly even more vulnerable.

Educational institutions have started working remotely. Any other type of stores except grocery stores and pharmacies were closed. Restaurants and bars have been locked, leaving only the alternative of catering. This condition compelled many to undertake home cooking. Social isolation interrupted the daily routine. Enhanced sedentary lifestyle and longer screen time, as well as constrained food disposal and choices, led to modifications in nutritional patterns and weight increase.[5]

Confinement has led to several financial, social and healthcare-related issues. Some employees were forced to take unpaid leave and many lost their jobs. They lost their income and felt insecure and stressed. Anxiety is linked to increased energy intake, increased appetite, unhealthy diets high in fat and sugar and higher alcohol consumption, which can lead to weight gain and risk of obesity.[6,7] Lack of exercise can also lead to weight gain and body fat accumulation, causing various cardio-metabolic illnesses.[8] Recent data have shown that obesity is linked to a higher rate of COVID-19 infections, and also to more severe outcomes once the infection was contracted.[9,10] Current studies indicate that unhealthy eating habits can cause chronic inflammation and weakened immune defense against viruses.[11]

WHO professionals have created specialized recommendations on nutrition and physical activity for the duration of quarantine.[12] However, during this unparalleled time, associated with several economic, social and psychological issues, it may be difficult to respect such indications.

In the present study, we aimed to analyze the impact of the COVID-19 pandemic, as well as isolation/quarantine at home on lifestyle and daily diet, and to identify changes caused by the pandemic in relation to the nutritional status and food preferences of the population.

For this assessment we started from the assumptions that during the pandemic, the population:

1. had reduced the level of physical activity;
2. had increased the amount of food purchases and made food stocks;
3. had gained weight/BMI;
4. had increased the frequency of home cooking;
5. had used the grocery shopping list more often.

MATERIAL AND METHODS

We conducted a prospective observational study based on a structured questionnaire that included 30 items investigating multiple aspects of the population's diet in the context of quarantine and social isolation imposed by the emergence of the new SARS-CoV-2 pandemic.

The questionnaire was disseminated on various online platforms accessible from any device with an internet connection in Romania, for social media groups between January and March 2021. The questionnaire was developed online using the Google Forms platform, this method being very useful for carrying out the proposed evaluation, as it facilitated the dissemination of the evaluation questionnaire at a national level.

The questionnaire included three main sections with questions about:

- socio-demographic information;
- information on eating behavior before and during the pandemic;
- the frequency of practice and the location of physical activity before and during the pandemic;
- information on anthropometric indicators before and during the pandemic.

The criteria for participation in the study was age over 18 years. The respondents were informed about the participation criterion, completion and participation were voluntary, and the information provided in the questionnaire was anonymous.

All study participants signed an informed consent prior to their inclusion, and the study was conducted in accordance with the principles set forth in the Declaration of Helsinki. Also, the study was approved by the ethics committee of the "George Emil Palade" University of Medicine, Pharmacy, Science and Technology from Târgu Mureș.

The final study group consisted of 620 respondents from 35 counties of Romania. A total of 14 respondents were excluded because they returned the questionnaire without one or more answers.

Statistical processing

Statistical processing was performed using GraphPad Prism version 6.01 statistical software for Windows and the SPSS version 20.0 package (IBM Corp, Armonk, NY). The statistical analysis involved the application of tests for paired data (dependent), the final study group consisting of 620 respondents. The calculated descriptive statistical indicators included asymmetry and vaulting coefficient of the distribution curve, minimum value, maximum value, standard deviation, mean, standard error, modulus, median and variance. Continuous variables are expressed as mean ± standard deviation (SD), categorical variables are presented as number and percentage.

To test the normality of continuous quantitative data we used the Kolmogorov-Smirnov (KS) test. When the result of the KS test indicated a parametric distribution, Student's t test for paired data was used for comparative analysis, and if the KS test indicated a non-gaussian distribution, the Wilcoxon test was applied. To analyze the categorical data, we compiled 2 × 2 contingency tables and used the significance test for Chi-square quantum effects (for values greater than 5) or the Fischer test (for values less than 5). To identify the degree of relationship between age and weight/BMI we used the Pearson correlation test. The chosen significance threshold was alpha = 0.05.

RESULTS

From the total of 620 respondents, the majority were female (80.8%), and 68.1% of them were living in urban areas (66.3%). The mean age of the whole study population was 27.24 years (range 18–59 years). The general characteristics of the study population related to gender, area of living, income, and social status are listed in Table 1.

Regarding the weight status of the respondents before and during the pandemic, Table 2 shows a significant difference in weight between the two periods. The respondents showed weight fluctuations more frequently during the pandemic than before ($p < 0.0001$). There was also a sig-

TABLE 1. General characteristics of the study population

Characteristics		n (620)	%
Age	Mean ± SD	27.24 ± 9.42	N/A
Gender	Male	119	19.2
	Female	501	80.8
Marital status	Married	193	31.1
	Single	411	66.3
	I would rather not say	16	2.6
Living area	Rural area	198	31.9
	Urban area	422	68.1
Monthly income (family)	<1500 RON	106	17.1
	1500–2000 RON	68	11.0
	2000–3000 RON	55	8.9
	3000–4000 RON	41	6.6
	>4000 RON	125	20.2
	I am not working	225	36.3

TABLE 2. Comparison between anthropometric indicators and various aspects of nutrition before and during the pandemic period

Characteristics		Before the pandemic	During the pandemic	p value
Weight (kg)		64.14 ± 15.15	64.25 ± 15.65	0.04
BMI		22.89 ± 4.39	22.93 ± 4.38	0.3
Weight fluctuations	I lost weight	22.10%	35.60%	<0.0001
	I gained weight	18.50%	27.10%	
	No change	59.40%	37.30%	
Eating pattern type	Vegan	1.10%	0.50%	0.4
	Vegetarian	6.10%	6.80%	
	Traditional	92.70%	92.70%	
Meal frequency/day	Without a rule (with many snacks)	40.64%	35.96%	0.008
	3 meals, without snacks	19.35%	18.22%	
	3 meals and 1–2 snacks	27.41%	36.12%	
	Other	12.58%	9.67%	
The habit of grocery shopping according to a written grocery list	Yes	94.93%	75%	<0.0001
	Sometimes	3.37%	9.21%	
	No	1.68%	15.78%	
Where did you work from?	Not working	42.58%	50.48%	<0.0001
	From home	9.35%	33.38%	
	On the go	8.54%	1.61%	
	From a workplace	36.61%	13.06%	
	Other	2.90%	1.45%	
Place of practice for physical activity	At home	20.48%	20.64%	<0.0001
	At the gym	14.51%	9.51%	
	Outdoor	10.48%	3.70%	
	I did not practice	54.51%	66.12%	

nificant increase in weight during the pandemic (p = 0.04). In contrast, there was no significant difference in BMI before and during the pandemic (p = 0.3). Most subjects stated that they followed a traditional eating pattern both before and during the pandemic (92.7%), 1.1% were vegans before, while during the pandemic 0.60% of them gave up veganism to the detriment of vegetarianism (6.1%), the differences being statistically insignificant (p = 0.4).

Regarding the organization of meals before and during quarantine, we found that respondents who had a disorganized diet (40.64%) before the outbreak became significantly more organized in this regard during the pandemic (35.96%) (p = 0.008). In addition, we identified a significant increase in the number of respondents who started shopping after a home-made list during the pandemic (21% vs. 14.6%, p <0.0001) (Table 2).

Before the pandemic, 36.61% of respondents worked on-site, and the number had decreased to 13.06% during the pandemic. Similarly, while 9.25% of respondents worked from home before, this number increased to 33.38% during the pandemic. In addition, the number of unemployed respondents increased during the pandemic from 42.58% to 50.48%. The statistical analysis regarding the economical and professional status of respondents is listed in Table 2.

We also found that the level of physical activity decreased significantly (p <0.0001) during isolation, probably due to the restrictions imposed by the COVID-19 quarantine (Table 2).

When asked if the quarantine period caused changes in their eating behavior, 31% answered affirmatively, 28.7% negatively, while 38.9% stated that the pandemic caused only slight changes in their eating patterns. Regarding the food stock, 54% of respondents stated that they did not make provisions, 21.9% made provisions, and 24% made few provisions (Table 3).

Table 3 also illustrates the situation of purchases during quarantine, noting that 21.6% of respondents bought more than necessary, and 76.8% bought only as much as they needed. More than half of the respondents have tried new recipes (54.7%), followed by 24.7% who tried new recipes only occasionally, and 20.2% stated that they did not try new combinations and recipes. Also, when it comes to cooking, 50% said they exhibited similar cooking pat-

TABLE 3. The impact of the pandemic on the food preferences and eating behavior of the population

Questions	Answer options	n	%
Has the isolation/quarantine period caused changes in your eating behavior?	Yes	192	31.0
	No	178	28.7
	I do not know	9	1.5
	To a small extent	241	38.9
Did the isolation/quarantine period lead you to stock up food products?	Yes	136	21.9
	No	335	54.0
	To a small extent	149	24.0
The amount of food shopping during isolation...	I bought more than I needed	476	76.8
	I only bought as much as I needed	134	21.6
	I bought less (compared to the needs)	10	1.6
Did you start cooking more during the isolation period?	Yes, I cook more	237	38.2
	I cook like before	310	50.0
	No, I cook less	73	11.8
Opinion about your diet during isolation/quarantine period compared to before?	I eat healthier	140	22.6
	I eat less healthier	95	15.3
	I eat like before	333	53.7
	I do not know	52	8.4
Do you think that after this period is over, you will maintain your eating behavior adopted during pandemic?	Yes	216	34.8
	No	103	16.6
	I do not know	229	36.9
	I will try	72	11.6
During the isolation/quarantine period, did you try to be more economical, to spend less money on food?	Yes	223	36.0
	No	321	51.8
	I do not know/prefer not to answer	76	12.3
Do you suffer from chronic diseases?	No	481	77.6
	I do not know	53	8.5
	Type 1 diabetes	2	0.3
	Type 2 diabetes	3	0.5
	History of myocardial infarction	1	0.2
	Other heart disease	12	1.9
	Hypercholesterolemia (high cholesterol)	3	0.5
	Hypertriglyceridemia (elevated triglycerides)	1	0.2
	Hypertension	17	2.7
	Hepatic steatosis	2	0.3
	Gout	0	0.0
	Thyroid disease	35	5.6
	Cancer	2	0.3
	Other	8	1.3

terns as before the COVID-19 outbreak, 38.2% stated they cooked more, and 11.8% less than before the pandemic.

More than half of the respondents (54%) stated that they did not change their food consumption in terms of quality during isolation, and 23% stated that they were eating healthier than before (Table 3).

To the question "Do you think that after this period ends you will maintain the eating behavior adopted now?", about 35% answered affirmatively, 16.6% answered negatively, 11.6% answered that they will try, and 36.9% were unsure whether they will keep the eating habits adopted during the isolation period (Table 3).

DISCUSSIONS

This prospective study provides an image of the nutritional habits and lifestyle of Romanian citizens, who partook in an online survey conducted between January and March 2021, after almost 2 months of total quarantine, and several months of emergency and national alert status. To

our knowledge, this study is among the first publications to explore the initial effect of the SARS-CoV-2 outbreak on nutritional behavior and lifestyle modifications among Romanian residents.

This period of quarantine during the COVID-19 outbreak has caused important changes in the daily lives of the study participants, affecting their daily routine, diet, and time spent in their home.

The most significant changes were observed in regards to the eating behavior of respondents, the majority applying immediate changes in their eating behavior after isolation. These results were similar to those observed in a 2020 study conducted by Renzo *et al*. on a group of Italian respondents, in which they observed that 53.9% of subjects had changed their eating behavior after isolation.[1] A study conducted in Zimbabwe, which included 507 respondents, reported that 96.6% (n = 490) of participants had changed their diet and consumption patterns during the COVID-19 pandemic.[13]

Our study also identified a predisposition to buy food over other needs, which may have been caused by uncertainties and concerns about the quarantine period. Over 20% of subjects stated that they made food supplies, and the same share of respondents said they bought more food than they needed. We also highlighted a link between the habit of cooking and the intake of fast food. The habit of cooking during the pandemic had increased, and the consumption of fast food had decreased by about 40%. In a similar study conducted in Kuwait, it was observed that there was a drastic decrease in the frequency of fast food consumption during the COVID-19 outbreak, up to 82% of subjects reporting that they no longer consumed fast food ($p < 0.001$).[14]

Spending most of their free time at home has also brought changes to cooking and cooking experiments, with more than 70% of study participants saying they have tried new recipes as well as introduced new foods into their diet. The share of people who spent more time in the kitchen was 40% higher than before the pandemic.

Our study also revealed that the level of physical activity has decreased significantly during the isolation period, probably due to the fact that all gyms were closed and outdoor activities were rather restricted. A study conducted in Italy reported a slight increase in physical activity, especially for bodyweight training, in 38.3% of study participants.[1]

Regarding the consumption of fruits, vegetables, and legumes, over 40% of the respondents had increased their intake and reported a decrease in the consumption of fast food, sweets, and fats. This behavior was also highlighted in the habits of the Italian population.[1] In a similar study conducted in Spain on a group of 7,514 subjects, it was reported that the adult population is yet far from attaining healthy eating behaviors considering the Mediterranean diet as a reference for healthy eating.[15] However, an improvement in nutritional habits was seen in this research during the COVID-19 pandemic. The health-related food choices of the Spanish population included a higher intake of fruits, vegetables, or legumes and a lower intake of red meat, alcohol, fried foods, or pastries compared to their pre-pandemic habits.[15] Despite the observed change and the shift towards a healthier diet, permanent eating habits are difficult to maintain. The results of our study revealed a difficulty in maintaining healthy eating habits, as less than a quarter of our respondents said they will not maintain habits acquired during the pandemic.

CONCLUSIONS

In this observational research we analyzed the impact of isolation during the COVID-19 pandemic on lifestyle and daily diet. The surveyed subjects presented a significant reduction in the level of physical activity, which was reflected in body weight. A significant share of study respondents increased the amount of food purchases, made stocks and supplies, but increased the frequency of cooking and they experimented with new recipes during the pandemic.

The study highlights beneficial changes regarding the eating behavior of subjects, due to a significant increase in intake of healthy foods, with positive effects on body weight and tone.

The pandemic period and isolation at home, analyzed from the point of view of eating habits, created positive consequences for about half of the study participants, who adopted an organized, diversified eating behavior and balanced lifestyle.

However, as the COVID-19 contagion is still undergoing, our results need to be strengthened and investigated in future studies on larger cohorts.

CONFLICT OF INTEREST

Nothing to disclose.

REFERENCES

1. Di Renzo L, Gualtieri P, Pivari F, et al. Eating habits and lifestyle changes during COVID-19 lockdown: an Italian survey. *J Transl Med*. 2020;18:229.
2. Wang C, Horby PW, Hayden FG, Gao GF. A novel coronavirus outbreak of global health concern. *Lancet*. 2020;365:470-473.
3. Velavan TP, Meyer CG. The COVID-19 epidemic. *Trop Med Int Heal*. 2020;25:278-280.
4. FAQ—Covid-19, domande e risposte. Available at: http://www.salut e.gov.it/porta le/nuovo coron aviru s/detta glioF aqNuo voCor onavi rus.jsp?lingua = itali ano&id = 228#11

5. Balanzá-Martínez V. Lifestyle behaviours during the COVID-19—Time to connect. *Acta Psychiatr Scand*. 2020;141:399-400.
6. Yau Y, Potenza M. Stress and eating behaviors. *Minerva Endocrinol*. 2013;38:255-267.
7. Anton S, Miller P. Do negative emotions predict alcohol consumption, saturated fat intake, and physical activity in older adults? *Behav Modif*. 2005;29:677-688.
8. Wiklund P. The role of physical activity and exercise in obesity and weight management: Time for critical appraisal. *J Sport Health Sci*. 2016;5:151-154.
9. Kalligeros M. Association of obesity with disease severity among patients with COVID-19. *Obesity*. 2020;28:1200-1204.
10. Lighter J. Obesity in patients younger than 60 years is a risk factor for COVID-19 hospital admission. *Clin Infect Dis*. 2020;71:896-897.
11. Rogero M, Calder P. Obesity, inflammation, toll-like receptor 4 and fatty acids. *Nutrients*. 2018;10:432.
12. WHO. Food and Nutrition Tips during Self-Quarantine. 2020. Available at: https: //www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/technical-guidance/ food-and-nutrition-tips-during-self-quarantine?fbclid = IwAR1JRTDs6a0B08DlqfrJo17qvoba2X-W_QS7oqcTAryUgSWw5n5E3Kx_qQE)#article (accessed on 16 August 2020).
13. Matsungo TM, Chopera P. Effect of the COVID-19-induced lockdown on nutrition, health and lifestyle patterns among adults in Zimbabwe. *BMJ Nutr Prev Health*. 2020;3:205-212.
14. AlMughamis N, AlAsfour S, Mehmood S. Poor eating habits and predictors of weight gain during the COVID-19 quarantine measures in Kuwait: A cross sectional study. *Research*. 2020;9:914.
15. Rodriguez-Perez C, Molina-Montes E, Verardo V, et al. Changes in Dietary Behaviours during the COVID-19 Outbreak Confinement in the Spanish COVIDiet Study. *Nutrients*. 2020;12:1730.