

ORIGINAL ARTICLE

Changes in Diet, Lifestyle and Orthorexia Nervosa Attitudes of Vegetarian, Vegan and Omnivorous Individuals in COVID-19 Pandemic

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ARTICLE INFO

Keywords:
COVID-19
Nutrition
Orthorexia
Vegetarian
Vegan

ABSTRACT

Background: During the coronavirus disease 2019 (COVID-19) pandemic, one of the most changing practices of individuals has been the eating habits. This study evaluated the effects of COVID-19 on nutritional habits of vegetarian, vegan and omnivorous individuals.

Methods: In a cross-sectional online survey, questions about eating habits, lifestyle behaviours and self-reported anthropometric measurements were assessed using different social media platforms (instagram, twitter, facebook, etc.). A total of 965 people (357 vegetarians, 246 vegans and 362 omnivores) were enrolled.

Results: Organic food consumption and food label reading habits of vegan (respectively OR:4.66; 95%CI 1.81-5.9 and OR:4.64; 95%CI 1.13-8.91) and vegetarian (respectively OR:4.66; 95%CI 1.60-7.54 and OR:1.79; 95%CI 1.08-2.97) individuals in the COVID-19 pandemic significantly increased compared to omnivores. While the physical activity duration of individuals in all groups decreased at a high rate, the most significant change was observed in the vegan group. Body weight increased mostly in the omnivorous group. Those in the vegetarian group had the least change in screen time, body weight and sleep time. With the COVID-19 pandemic, orthorexia nervosa (ON) score of vegetarians (-1.0±2.9), vegans (-1.6±3.09) and omnivores (-1.4±3.0) decreased significantly.

Conclusion: With the COVID-19 pandemic, physical activity duration and ON score decreased in each group. More than one third of the individuals in each group stated that their body weight increased. Considering the nutritional sensitivity of vegetarian and vegan individuals, it is recommended that the nutritional and physical activity recommendations given during the COVID-19 pandemic to be increased.

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Received: January 8, 2021

Revised: May 19, 2021

Accepted: June 15, 2021

Please cite this article as: Yücel ÜÖ, Kömbeci K, Tuğrul G, Uçar A, Yüksel S. Changes in Diet, Lifestyle and Orthorexia Nervosa Attitudes of Vegetarian, Vegan and Omnivorous Individuals in COVID-19 Pandemic. Int J Nutr Sci. 2021;6(2): 74-80. doi: 10.30476/IJNS.2021.90358.1126.

Introduction

The new type of coronavirus, Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV-2), which first appeared in December 2019

and causes severe acute respiratory failure, has been declared a pandemic by the World Health Organization (1). Coronavirus disease 19 (COVID-19), by its most common name, has

been changing our lives because of its deadly consequences since it entered our lives. Due to the lack of a specific and authentic treatment method during the initial process of the outbreak, individuals only tried to combat the outbreak by increasing their immunity and social distancing (2). Therefore, one of the most changing practices of individuals have been their eating habits (3).

During the COVID-19 pandemic, many organizations that are considered authorities in the field of nutrition have made recommendations for adequate and balanced nutrition for omnivores (3). But these are general recommendations, and individuals who have never consumed certain foods such as vegetarians and vegans, have not been considered. Although there are subgroups of vegetarianism, it covers the state of non-consumption of red meat, poultry and seafood by its general definition (4).

Veganism, on the other hand, covers the case of not consuming any animal derived foods including secondary products such as eggs, milk, cheese, and honey obtained from animals, hence absolutely not accept exploiting animals for the benefit of humans (5). Vegetarianism and veganism are not just a form of diet; they are considered as ethical approaches, which are becoming increasingly common in many areas today. Although the dietarty sensitivity of these individuals was high, they entered a more sensitive period during COVID-19 pandemic, due to the limitations in their food selection (4, 5).

Vegetarian and vegan individuals are also more prone to orthorexia nervosa (ON) than omnivores, because of their restrictions to animal foods. The tendency of ON, which means a high-level struggle for healthy and correct food selection, it is expected to increase further with COVID-19 (6). At the same time, it is expected that nutritional problems would increase as a result of a decrease in the duration of physical activity in this process (7). In this study, it was aimed to determine the changes in diet, lifestyle and ON tendency of vegetarian, vegan and omnivorous individuals during the COVID-19 pandemic.

Materials and Methods

This cross-sectional online study was conducted between September and November 2020 enrolling adults aged between 20 and 65 years. Individuals already following a regular diet program, pregnant or lactating and (due to the potential effects of COVID-19 on appetite) individuals who previously had COVID-19; were not included in the study. The questionnaire including demographic characteristics, nutritional habits, lifestyle and ON questions of the individuals was sent via Google

Docs and the individuals were included in the study on a voluntary basis. In order to reach vegetarian, vegan and omnivorous individuals, a questionnaire form was sent via e-mail to dietitians working in this field. In addition, social media platforms (instagram, twitter and facebook) were also used for this purpose. After the removal of 78 people who did not meet the criteria of the study, the study was completed with a total of 965 people (357 vegetarians, 246 vegans and 362 omnivores).

The differences in food consumption habits and lifestyle of individuals during the COVID-19 pandemic were questioned with the options of "increased", "decreased" and "not changed". Individuals' food consumption habits were questioned with the titles 'Organic food consumption', 'Fast food consumption', 'food label reading', 'frozen food consumption', 'vitamin-mineral supplement use', 'junk-food consumption', 'night eating', 'food restriction', 'number of main meals' and 'number of snacks'. In addition to these, "physical activity time", "TV watching time", "sleep time" and "body weight" changes were also questioned in order to evaluate the changes in lifestyle.

The Ortho-15 scale, validated in Turkish, was used to evaluate the orthorexia status of individuals. The lowest possible score on the scale is 15 points and the highest score is 60. The decrease in the score obtained from the scale reflects the increase in ON tendency (8). Each question was asked twice as before and after COVID-19. Data collection was carried out in accordance with the principles of the Declaration of Helsinki and the study was approved by the Ankara University Science Ethics Committee.

Data analyses were carried out using the SPSS software (version 22, Chicago, IL, USA). Descriptive statistics were shown as mean±standard deviation (SD) or number (n) and percentage (%). Multinomial logistic regression analysis was used to evaluate the nutritional habits of individuals in the COVID-19 pandemic. In dependent variables, the category 'omnivorous nutrition' was taken as a reference, while in independent variables, the category 'unchanged' was taken as a reference. To adjust for potential confounding, age and gender were included into the regression model. One way ANOVA test and post hoc (bonferroni) analyses were used to compare Ortho-15 scores between groups. Post-hoc analysis results were shown with different letters. Paired t-test was used to compare Ortho-15 scores before COVID-19 and during COVID-19 pandemic. Chi-Square analyses were used for categorical variables. All statistical analyses were performed within a confidence interval of 95.0%, and p values of <0.05 were considered significant.

Results

Among the total of 965 people who were vegetarian (n=357), vegan (n=246) and omnivorous (n=362), the vast majority of individuals in all groups were between the ages of 20-29 years and were women. Individuals in each group were mostly single and graduate from college. About half of the individuals were unemployed. (Table 1). In the COVID-19 pandemic, the organic food consumption (OR: 4.66; 95%CI 1.60-7.54), food label reading habits (OR:1.79; 95%CI 1.08-2.973) and snack consumption (OR:2.54; 95%CI 1.11-3.81) of vegetarian individuals increased significantly when compared to omnivores ($p<0.05$). Fast food consumption (OR: 2.59; 95%CI 1.14-5.88), frozen food consumption (OR:2.94; 95%CI 1.48-4.83) and food restriction status (OR: 2.64; 95%CI 1.46-4.77) decreased significantly when compared to omnivores ($p<0.05$) (Table 2).

Organic food consumption (OR:4.66; 95%CI 1.81-5.9) and food label reading habits (OR:4.64; 95%CI 1.13-8.91) of vegan individuals in the COVID-19 pandemic significantly increased when compared to omnivores ($p<0.05$). Fast food consumption (OR: 2.49; 95%CI 1.05-5.91), frozen food consumption (OR:2.95; 95%CI 0.43-6.06), junk food consumption (OR: 1.90; 95%CI 0.03-3.508) and food restriction status (OR: 2.87; 95%CI 1.54-5.36) decreased significantly when compared to omnivores ($p<0.05$) (Table 3).

During the COVID-19 pandemic, while the physical activity duration of individuals in all groups decreased at a high rate, the most significant change

was observed in the vegan group ($p<0.05$). Screen time increased most significantly in vegan group. Those who gave the highest rate of “unchanged” response in screen time, body weight and sleep time were vegetarians ($p<0.05$). The group with the highest increase in body weight and sleep duration was omnivores ($p<0.01$) (Figure 1). Before COVID-19 and during the COVID-19 pandemic, those with the lowest orthorexia score were vegetarians (respectively; 36.5 ± 3.81 and 35.5 ± 3.82) ($p<0.05$). With the COVID-19 pandemic, orthorexia scores of vegetarians (-1.0 ± 2.9), vegans (-1.6 ± 3.09) and omnivores (-1.4 ± 3.0) decreased significantly ($p<0.01$) (Table 4).

Discussion

With the restrictions imposed by the COVID-19 pandemic, our diet and lifestyle have changed significantly (9). Individuals' sensitivity to nutrition has increased even more and they mostly tended to eat rich and fresh foods (10). The nutritional sensitivity of individuals with nutritional selectivity, such as vegetarians and vegans, was expected to increase even more in this period (6). In this study, while the organic food consumption of vegetarian and vegan individuals increased significantly in comparison to the omnivore group, their consumption of fast food and frozen food decreased. The consumption of junk food by vegan individuals has also decreased when compared to omnivores. In other studies on the subject, individuals' consumption of organic and fresh foods increased, while their consumption of fast food, frozen food and processed food

Table 1: Demographic information of individuals.

Variable	Vegetarian (n=357)	Vegan (n=246)	Omnivore (n=362)
Age (years): n (%)			
20-29	249 (69.7)	210 (85.4)	338 (93.4)
30-39	67 (18.8)	24 (9.8)	10 (2.8)
40+	41 (11.5)	12 (4.9)	14 (3.8)
Gender: n (%)			
Women	282 (79.0)	217 (88.2)	237 (65.5)
Men	75 (21.0)	29 (11.8)	125 (34.5)
Marital status: n (%)			
Married	30 (8.4)	21 (8.5)	28 (7.7)
Single	327 (91.6)	225 (91.5)	334 (92.3)
Level of education: n (%)			
Primary-High school	46 (12.8)	38 (15.4)	50 (13.8)
University	245 (68.6)	179 (72.8)	279 (77.0)
Master+	66 (18.4)	29 (11.8)	33 (9.2)
Work status: n (%)			
Employed	140 (39.2)	82 (33.3)	97 (26.8)
Unemployed	197 (55.2)	153 (62.2)	257 (71.0)
Left work	20 (5.6)	11 (4.5)	8 (2.2)

n: number. %: percentage.

Table 2: Changes in the food consumption habits of vegetarian individuals in the COVID-19 pandemic.

Nutrition type (ref): Omnivore	B	OR [Exp (B)]	Lower 95% CI	Upper 95% CI	p value
Organic food consumption (ref: unchanged)					
Increased	1.541	4.668	1.609	7.542	0.005**
Decreased	0.080	1.083	0.660	1.776	0.753
Fast food consumption (ref: unchanged)					
Increased	0.510	1.665	0.987	2.811	0.056
Decreased	1.049	2.590	1.144	5.882	0.022*
Food label reading (ref: unchanged)					
Increased	0.587	1.798	1.088	2.973	0.022*
Decreased	0.380	0.973	0.079	2.633	0.380
Frozen food consumption (ref: unchanged)					
Increased	0.356	1.428	0.830	2.457	0.199
Decreased	1.080	2.946	1.488	4.830	0.002**
Use of vitamin-mineral supplements (ref: unchanged)					
Increased	0.103	0.902	0.300	2.711	0.854
Decreased	0.058	1.060	0.660	1.702	0.809
Junk food consumption (ref: unchanged)					
Increased	-0.311	0.733	0.371	1.447	0.371
Decreased	-0.529	0.589	0.329	1.057	0.076
Night eating status (ref: unchanged)					
Increased	-0.058	0.944	0.448	1.991	0.880
Decreased	0.510	1.665	0.993	2.791	0.053
Food restriction status (ref: unchanged)					
Increased	-0.141	0.868	0.422	1.785	0.701
Decreased	0.973	2.647	1.468	4.771	0.001**
Number of main meals (ref: unchanged)					
Increased	-0.204	0.815	0.395	1.680	0.580
Decreased	-0.084	0.919	0.499	1.695	0.788
Number of snacks (ref: unchanged)					
Increased	0.935	2.548	1.117	3.812	0.026*
Decreased	0.297	1.116	0.620	2.091	0.215

Multinomial logistic regression analysis was used. Age and gender were included into the regression model. OR: Odds ratio. CI: Confidence interval (* $p < 0.05$ ** $p < 0.01$).

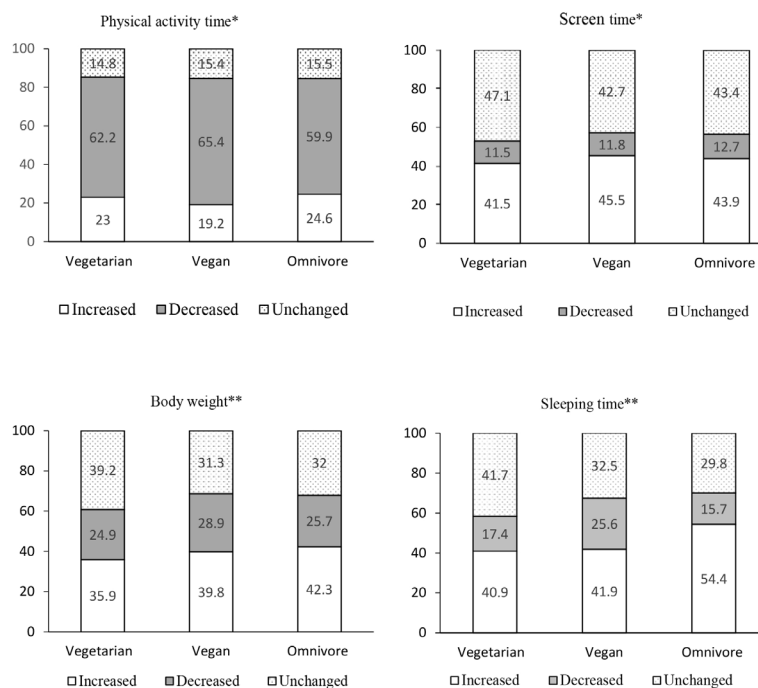


Figure 1: Changes in lifestyle and body weight of individuals in the COVID-19 pandemic. Chi-square test was used (* $p < 0.05$ ** $p < 0.01$).

Table 3: Changes in the food consumption habits of vegan individuals in the COVID-19 pandemic.

Nutrition type (ref): Omnivore	B	OR [Exp(B)]	Lower 95% CI	Upper 95% CI	p value
Organic food consumption (ref: unchanged)					
Increased	1.735	4.66	1.818	5.9	0.003**
Decreased	0.215	1.239	0.735	2.091	0.421
Fast food consumption (ref: unchanged)					
Increased	0.919	1.405	0.809	2.441	0.227
Decreased	1.09	2.49	1.051	5.91	0.038*
Food label reading (ref: unchanged)					
Increased	1.535	4.641	1.139	8.91	0.032*
Decreased	0.465	1.593	0.941	2.695	0.083
Frozen food consumption (ref: unchanged)					
Increased	0.350	1.419	0.805	2.501	0.226
Decreased	1.082	2.950	0.434	6.069	0.003*
Use of vitamin-mineral supplements (ref: unchanged)					
Increased	0.110	1.117	0.352	3.539	0.851
Decreased	0.026	0.975	0.593	0.603	0.920
Junk food consumption (ref: unchanged)					
Increased	0.581	0.559	0.107	0.276	0.135
Decreased	0.642	1.901	0.030	3.508	0.040*
Night eating status (ref: unchanged)					
Increased	0.079	0.924	0.428	1.993	0.841
Decreased	0.514	1.672	0.977	2.863	0.061
Food restriction status (ref: unchanged)					
Increased	0.099	0.905	0.423	1.938	0.798
Decreased	1.057	2.877	1.543	5.365	0.001*
Number of main meals (ref: unchanged)					
Increased	0.262	0.769	0.363	1.630	0.493
Decreased	0.1310	0.877	0.462	1.663	0.687
Number of snacks (ref: unchanged)					
Increased	0.720	2.054	0.867	4.869	0.102
Decreased	0.433	1.543	0.879	2.707	0.131

Multinomial logistic regression analysis was used. Age and gender were included into the regression model. OR: Odds ratio. CI: Confidence interval (* $p < 0.05$ ** $p < 0.01$).

Table 4: Orto-15 scores of individuals before COVID-19 and during COVID-19 pandemic.

Variable	Vegetarian	Vegan	Omnivore	p value ¹
Ortho-15 (before)	36.5±3.81 _a	37.3±3.85 _b	38.2±3.78 _c	0.018
Ortho-15 (during)	35.5±3.82 _a	35.7±3.80 _a	36.6±3.94 _b	0.023
Change	-1.0±2.9 _a	-1.6±3.09 _b	-1.4±3.0 _c	0.027
p ²	0.001**	0.001**	0.001**	

p¹: Intergroup p values. One way ANOVA test was used. p²: Within-group p values. Paired t-test was used. Post-hoc results are shown in different letters (** $p < 0.01$).

decreased (9-11).

Considering the effects of food processing on the immune system and health, these changes in the pandemic process are common. During the pandemic, one of the frequently given recommendations about nutrition was adequate, balanced and safe nutrition (10). Therefore, individuals were expected to check food labels to learn about the ingredients and expiration dates of the foods (12). In this study, vegetarian and vegan individuals' food label reading habits increased significantly during this period when

compared to omnivores. In similar studies, it was also found that individuals' practices for food safety increased during the pandemic process (12, 13).

Another nutritional change during the pandemic process was the increase in total food intake. The increase in food preparation time at home is the main reason for this situation (14). In this study, nutritional restrictions of vegetarian and vegan individuals decreased significantly when compared to omnivores. The main reason for this may be the thoughts of vegetarians and vegans who do not

consume certain food groups to fill this gap by eating more. In other studies conducted in the COVID-19 pandemic, it was found that the total food intake of individuals increased similar to this study (14, 15).

Due to health concerns during the pandemic process, the time allocated to social life decreases, while the time spent at home increases (16). This situation makes it more difficult to control body weight. In this study, the physical activity durations of vegetarian, vegan and omnivorous individuals decreased significantly in comparison to the pre-pandemic level. As a result, more than one third of the individuals in each group stated that their body weight and screen time increased. The group with the highest increase in body weight was omnivores. One reason for this situation may be that omnivores had more food options than those in other groups. Another reason of this situation may be that the group with the most increased sleep duration during the pandemic was omnivores. Identical to this study, it was found in other studies that the duration of physical activity decreased, and sleep time and screen time increased during the pandemic (16, 17).

Increasing nutritional stress of individuals leads to an increase in some eating disorders such as binge, night, and restrictive eatings (18). Frequent mentions of the effects of nutrition on COVID-19 in the social media and also coronaphobia bring some eating disorders (19). In this study, vegetarians and vegans were the most likely to have orthorexia. Orthorexia tendencies of individuals in all groups have increased significantly when compared to pre-COVID-19. In other studies, it has been shown that different eating disorders increase significantly during the pandemic process (19-21).

This study has some limitations. There are no clinical findings and detailed anthropometric measurements in the study. However, this is inevitable due to the social distance rules brought by the pandemic process. Comparison of individuals with different diets, such as vegetarians and vegans, added strength to the study. This study is the first to examine the ON status of vegetarians and vegans during the pandemic process.

Conclusion

In this study, vegetarian and vegan individuals' organic food consumption increased significantly in comparison to omnivores. ON tendency increased significantly in all groups. As a result of decreased physical activity, more than one third of the individuals in each group stated that their body weight increased. Since it is uncertain when the pandemic process will end, it is very important to prevent this increase in body weight. Considering

the nutritional sensitivity of individuals with special diets such as vegetarians and vegans, nutritional recommendations given during the COVID-19 pandemic should be increased.

Acknowledgment

The authors would like to thank participants. No funding was received for the study.

Conflict of Interest

None declared.

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