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Relation Between Food Intake Pattern, Body Weight Status and Severity of COVID 19 Infection in Benghazi, Libya

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Abstract: *The coronavirus disease 2019 (COVID-19) isolation has altered individuals' food purchasing behavior and dietary intake patterns. Therefore, this study aims to investigate the changes in the nutritional status and body weight in relation to severity of the disease in Benghazi city during the COVID-19 lockdown. This cross-sectional study involved 206 young adults in Benghazi got previous infection. The changes in dietary intake patterns were assessed using the Dietary Diversity Questionnaire with slight modifications, while anthropometric measurements including body height, body weight before the pandemic and current body weight were self-reported. The analyzed by Chi square or T test at α< 0.05 for statistically differences. Overall, nearly one third of the respondents (48.8%) gained weight during the confinement, with an average increment of 4.06 ± 3.23 kg. The subjects reported consuming less fruits and 60.2% had higher plain water intake during the pandemic. It is observed that 41.0% to 66.8% of the young adults changed their dietary intake patterns during the pandemic. Decreased consumption of cereals and grains and other foods were associated with weight loss during the pandemic. On the contrary, an increased water and other soft drink intake were associated with weight gain during the lockdown (P< 0.05). The relation between degree of symptoms and body weight status revealed that with increased the diseases severity the body weight and BMI sharply increased (P< 0.05). Increase the severity of diseases associated with significant reduced food intakes. In spit body weight increased. Furthermore, decreased food intake have been noticed for all food stuffs and also dietary intake patterns changed.*
Keywords: dietary intake, patterns, weight status, young adults, COVID-19

INTRODUCTION

As of August 2021, the coronavirus disease 2019 (COVID-19) has affected over 200 million individuals worldwide (1). In Libya, nearly 500,000 cases have been reported, with a recent spike in infections largely attributed to the highly contagious Delta variant (2). In response to the escalating situation, the Libyan government has opted to reintroduce a nationwide lockdown, known as the Movement Control Order 2020. During the pandemic, several stringent measures were enforced, including the temporary closure of non-essential businesses and educational institutions, restrictions on grocery shopping to two individuals per household, and limitations on travel for essential purposes from one's home (3).

A substantial amount of researches have shown that the isolation measures associated with COVID-19 have significantly influenced individuals' food purchasing habits and dietary consumption (4, 5). Many people have intentionally decreased the frequency of their grocery shopping, opted to stockpile non-perishable items (such as frozen, instant, processed, or canned goods), and/or increased their home-cooking frequency as a means to lower the risk of infection. These behavioral shifts have resulted in various mixed effects on dietary patterns, including heightened consumption of sugars, salts, and fats from non-perishable foods, a decline in the intake of fresh produce (fruits, vegetables, seafood, and meats), and a greater dependence on healthier home-cooked meals. Furthermore, the emotional strain and boredom experienced during the COVID-19 lockdown have also intensified cravings for high-energy foods that are rich in sugar and fat (6).

Apart from the aforementioned unhealthy dietary patterns, emotional eating and lack of physical activity during the pandemic isolation may also worsen dietary intake pattern, the overweight and obesity crisis in Libya after the pandemic. Therefore, this study aimed to investigate the changes in dietary intake patterns and their impacts on the body weight status and severity of COVID 19 infection of young adults aged 18–40 years old in Benghazi throughout the COVID-19 home confinement.

METHODOLOGY

Study Design and Population

Data collection took place from March to October 2021. The participants in this research were individuals who had previously experienced an infection. An anonymous self-administered questionnaire was created using Google Forms and distributed to potential

respondents via various social media platforms, including WhatsApp, Facebook, Twitter, and Instagram, as well as through direct face-to-face interactions. Prior to answering the first survey question, informed consent was secured from all participants. The sample size was calculated based on the methodology outlined by Krejcie and Morgan (15), with a target of 99% confidence level and a 5% margin of error, considering a population of 3 million young adults in Libya as of 2020 (16). Consequently, the minimum sample size deemed necessary for this study ranged from 200 to 300 respondents. Ultimately, 206 individuals participated in the survey; however, the analysis was conducted solely on the responses from these 206 participants residing in Libya, excluding those who did not meet the criteria for young adult age.

Ethical approval was obtained from the Research Ethics Committee of Benghazi university.

Socio-Demographic Characteristics and Self-Reported Weight Change

Socio-demographic details such as gender, age, marital status, and educational level were provided by the participants themselves. Respondents recalled their body weight (kg) from before the pandemic, while their current body weight (kg) was recorded through self-measurement using a bathroom scale whenever feasible. The change in weight was determined by calculating the difference between the current and pre-pandemic weights (17). Additionally, all participants were asked to report their height (cm) to facilitate the calculation of body mass index (BMI) (kg/m^2). The BMI values were subsequently categorized as outlined in the referenced material (18).

Changes in Dietary Intake Patterns

Changes in dietary intake patterns were evaluated using a modified version of the dietary diversity questionnaire (19). The original tool comprises 17 food groups designed to analyze food consumption patterns at both household and individual levels. For this study, 13 food groups were retained, and two additional items—salt and plain water—were incorporated to encompass all food groups outlined in the Food Pyramid 2020. The final

questionnaire consists of 15 items categorized into three scales: reduced consumption, unchanged consumption, and increased consumption. Participants were asked to select the scale that most accurately reflected their current dietary intake in comparison to pre-pandemic levels.

Questionnaire designed and classification of the symptoms

The predesigned questionnaire containing personal information, socio-demographic , food intake and degree of the symptoms. The degree of the symptoms was classified into mild, moderate and severs according to description in (20).

Statistical Analysis

Data analysis was performed using IBM SPSS version 23.0 (IBM Corp, Armonk, Westchester, NY, USA). Descriptive statistics, including frequency, percentage, mean, and standard deviation (SD), were utilized to characterize socio-demographic factors, weight status, BMI, and shifts in dietary intake patterns during the COVID-19 pandemic. Continuous variables such as age, body weight (kg), and BMI (kg/m^2) before and during the pandemic underwent normality testing. A paired samples t-test was conducted to assess the mean difference in BMI across the two time points. Additionally, partial correlations were calculated, controlling for gender, age, ethnicity, marital status, and educational level, to explore the relationship between changes in dietary intake patterns (Δdietary intake patterns) and changes in body weight (Δbody weight) among respondents during the home confinement period of the pandemic.

Outcome: Changes in Weight Status

Changes in weight status were self-reported by asking the question of "how is your weight now compared to infected period?" There are five scales in response to this question, i.e.,

unchanged, increased by 1–2.5 kg, increased by 2.5 kg or more, decreased by 1–2.5 kg, and decreased by 2.5 kg or more.

RESULTS

The data collected on 206 patients after infected with covid 19 shown that the number of female four times than male (80:20) (Figure 1). About 65% of the subjects were have age groups between 18-25 years old followed by age groups 26-40 years old (21.3%) (Figure 2).

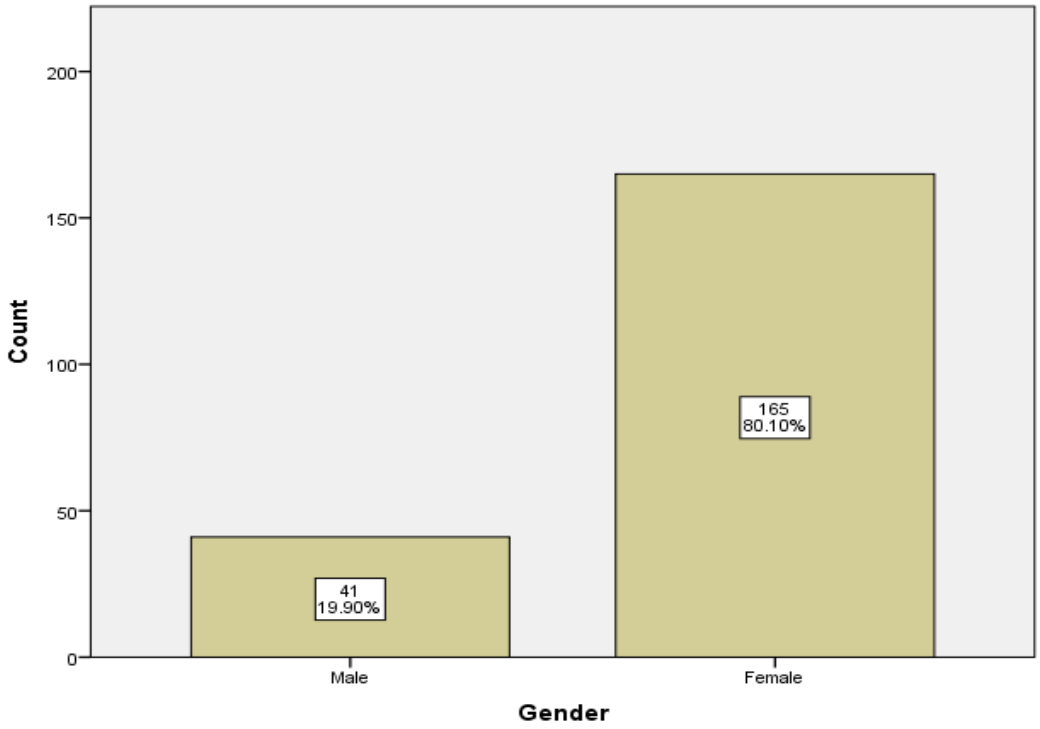

Figure 1: Gender distribution.

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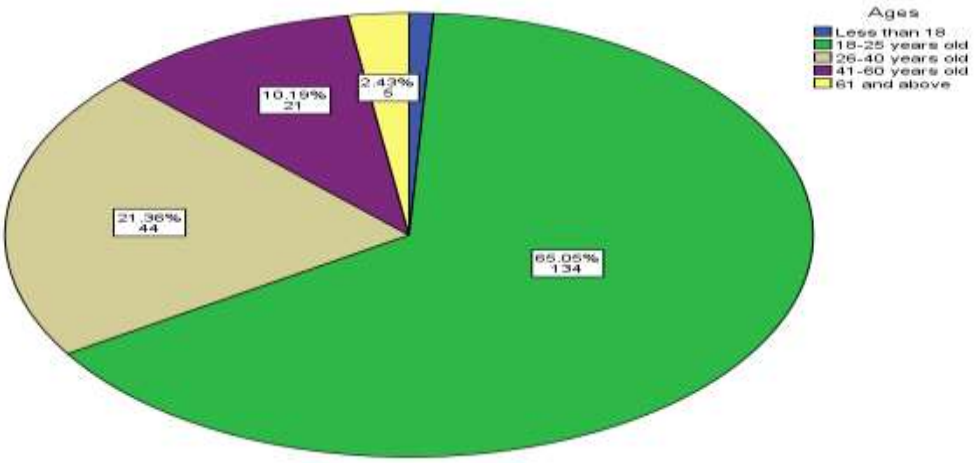

Figure 2: Ages distribution.

In regarding socio-demographic characteristics, the highest education levels reported was college (90.8%) while primary and secondary 7.3%, 1.9% respectively. The occupation of the subjects revealed that most of the subjects were students (61.7%) and employed and teachers were reported less than 25%. In regarding marital status, about 66% were single and 30% married while divorced and widow being the least (Table 1).

Table 1: Socio-demographic characteristics.

		N	N %
Education level	Primary	4	1.9%
	Secondary	15	7.3%
	College	187	90.8%
	Total	206	100.0%
Occupation	Students	127	61.7%
	Teachers	36	17.5%
	Employed	43	20.9%
	Total	206	100.0%
Marital status	Single	136	66.0%
	Married	62	30.1%
	Divorced	4	1.9%
	Widow	4	1.9%
	Total	206	100.0%

The anthropometric measurement described in table 2, the mean ± SEM of BMI 24.11±0.28. and the waist and waist hip ratio found in the normal range. The weight status shown that more than one third their body weight were decreased during the infection. (Table 2).

Table 2: Anthropometric data.

		Mean ± SEM	N	N %	P values
weight		66.5±0.9			
height		1.72±0.68			
BMI		24.11±0.28			
waist		87±12			
hip		107±10			
Waist hip ratio		0.79±0.06			
Weight status	No changes		51	24.8%	0.01
	Increased		18	8.7%	
	Decreased		77	37.4%	
	Maintain		25	12.1%	
	Do not know		35	17.0%	
	Total		206	100.0%	

Chi-square test has been used and considered significant at $\alpha < 0.05$.

The degree of symptoms were reported in (table 3-5), in table 3 the significant most common symptoms have been found fatigue (66.5%) while the less common symptoms of covid infection described in table 4 shown no significant increase in neither one. About two third of severe symptoms reported was shortness of breath (P=0.000) (table 5).

In the table 6 A-E all food stuffs were significant decreased intake (P< 0.05).

Table 3: most common symptoms of COVID 19

		N	N %	P values
Fever	Yes	58	28.2%	
	No	148	71.8%	
	Total	206	100.0%	
Dry cough	Yes	69	33.5%	
	No	137	66.5%	
	Total	206	100.0%	
Fatigue	Yes	137	66.5%	0.000
	No	69	33.5%	
	Total	206	100.0%	

Chi-square test has been used and considered significant at $\alpha < 0.05$.

Table 4: less common symptoms of COVID 19

		N	N %
Aches and pains	No	36	17.5%
	Yes	170	82.5%
	Total	206	100.0%
Sore throat	Yes	47	22.8%
	No	159	77.2%
	Total	206	100.0%
Diarrhea	Yes	63	30.7%
	No	143	69.3%
	Total	206	100.0%
Conjunctivitis	Yes	59	28.6%
	No	147	71.4%
	Total	206	100.0%
Headache	Yes	61	29.6%
	No	145	70.4%
	Total	206	100.0%
Rash	Yes	93	45.1%
	No	113	54.9%
	Total	206	100.0%

Discoloration of fingers or toes	Yes	82	39.8%
	No	124	60.2%
	Total	206	100.0%
Loss of sense of smell taste	Yes	54	26.2%
	No	152	73.8%
	Total	206	100.0%

Table 5: Serious symptoms.

		N	N %	P values
Difficulty or shortness of breath	Yes	135	65.5%	0.000
	No	71	34.5%	
	Total	206	100.0%	
Chest pain or pressure	Yes	65	31.6%	
	No	141	68.4%	
	Total	206	100.0%	
Loss of speech or movement	Yes	32	15.5%	
	No	174	84.5%	
	Total	206	100.0%	

Chi-square test has been used and considered significant at $\alpha < 0.05$.

Table 6 A: Food intake pattern

		N	N %
has the frequency of eating changed	Eat more often	21	10.2%
	Eat less often	137	66.5%
	No change	48	23.3%
	Total	206	100.0%
Reliable type of food salty snacks	Yes	52	25.2%
	No	154	74.8%
	Total	206	100.0%
Sweet snacks	Yes	31	15.0%
	No	175	85.0%
	Total	206	100.0%
Fast food	Yes	35	17.0%
	No	171	83.0%
	Total	206	100.0%

Table 6 B: Food intake pattern

		N	N %
Red meat	Yes	47	22.8%
	No	159	77.2%
	Total	206	100.0%
White meat	Yes	75	36.4%
	No	131	63.6%
	Total	206	100.0%
Fresh fish	Yes	28	13.6%
	No	178	86.4%
	Total	206	100.0%
Frozen fish	Yes	13	6.3%
	No	193	93.7%
	Total	206	100.0%

Egg	Yes	78	37.9%
	No	128	62.1 %
	Total	206	100.0%
Dairy product	Yes	94	45.6%
	No	112	54.4%
	Total	206	100.0%
Fresh bread	Yes	69	33.5%
	No	137	66.5%
	Total	206	100.0%

Table 6 C: Food intake pattern

		N	N %
Homemade bread	Yes	28	13.6%
	No	178	86.4%
	Total	206	100.0%
Fresh fruit	Yes	105	51.0%
	No	101	49.0%
	Total	206	100.0%
Fresh vegetable	Yes	99	48.1%
	No	107	51.9%
	Total	206	100.0%
Grain product	Yes	70	34.0%
	No	136	66.0%
	Total	206	100.0%
Nuts	Yes	52	25.2%
	No	154	74.8%
	Total	206	100.0%

Table 6 D: Food intake pattern

		N	N %
Sweet beverage	Yes	29	14.1%
	No	177	85.9%
	Total	206	100.0%
Energy drinks	Yes	17	8.3%
	No	189	91.7%
	Total	206	100.0%
Coffee	Yes	77	37.4%
	No	129	62.6%
	Total	206	100.0%
Tea	Yes	69	33.5%
	No	137	66.5%
	Total	206	100.0%
Water	Yes	138	67.0%
	No	68	33.0%
	Total	206	100.0%
Snacks	Yes	39	18.9%
	No	167	81.1%
	Total	206	100.0%

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Table 6 E: Food intake pattern

		N	N %
Changes in fluid intake	Yes	107	51.9%
	No	47	22.8%
	Do not know	52	25.2%
	Total	206	100.0%
Start ate much better during symptoms	Yes	54	26.2%
	No	152	73.8%
	Total	206	100.0%
Has the number of meals changes	Yes	127	61.7%
	No	79	38.3%
	Total	206	100.0%
start eating more regular meals	No	132	64.1%
	Yes main meals	60	29.1%
	Most meals	14	6.8%
	Total	206	100.0%
Start cooking more meals by yourself	No	142	68.9%
	Yes	64	31.1%
	Total	206	100.0%

In regarding the physical activities, approximately 78% were shown no physically active (P=0.000) (Table 7).

Table 7: Physical activities of the subjects.

		N	N %	P values
physical activity changes	No physical activities	161	78.2%	0.000
	Exercise 1-2 time/week	22	10.7%	
	Exercise 3-4 time/week	18	8.7%	
	Exercise for more time	5	2.4%	
	Total	206	100.0%	

Chi-square test has been used and considered significant at $\alpha < 0.05$.

In table 8, the degree of symptoms found that moderate degree was significant reported (56.3%) (P=0.00). The relation between degree of symptoms and body weight status revealed that with increased the diseases severity (moderate) body weight and BMI sharply increased.

Table 8: classification of the symptoms

		N	N %	P values
Severity of the disease	Mild	71	34.5%	0.00
	Moderate	116	56.3%	
	Severe	19	9.2%	
	Total	206	100.0%	

Chi-square test has been used and considered significant at $\alpha < 0.05$.

Table 9: Relation between body weight and severity of the symptoms

	Degree of the symptoms		
	Mild	Moderate	Severe
	Mean± SEM	Mean± SEM	Mean± SEM
weight	66.0±8	70.0±9	77.5±3
BMI	23.88±2	25.12±3	27.88±4

Increase the severity of diseases associated with significant reduced food intakes (table 10 A & B) and similar result for the other foods (data not shown).

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Table 10 A: relation between degree of symptoms and food intake

		Degree of symptoms					
		Mild		Moderate		Severe	
		N	N %	N	N %	N	N %
Red meat	Yes	13	18.3%	31	26.7%	3	15.8%
	No	58	81.7%	85	73.3%	16	84.2%
	Total	71	100.0%	116	100.0%	19	100.0%
White meat	Yes	27	38.0%	42	36.2%	6	31.6%
	No	44	62.0%	74	63.8%	13	68.4%
	Total	71	100.0%	116	100.0%	19	100.0%
Fresh fish	Yes	7	9.9%	18	15.5%	3	15.8%
	No	64	90.1%	98	84.5%	16	84.2%
	Total	71	100.0%	116	100.0%	19	100.0%
Frozen fish	Yes	1	1.4%	11	9.5%	1	5.3%
	No	70	98.6%	105	90.5%	18	94.7%
	Total	71	100.0%	116	100.0%	19	100.0%
Egg	Yes	28	39.4%	43	37.1%	7	36.8%
	No	42	59.2%	73	62.9%	12	63.2%
		1	1.4%	0	0.0%	0	0.0%
	Total	71	100.0%	116	100.0%	19	100.0%
Dairy product	Yes	34	47.9%	53	45.7%	7	36.8%
	No	37	52.1%	63	54.3%	12	63.2%
	Total	71	100.0%	116	100.0%	19	100.0%
Fresh bread	Yes	22	31.0%	41	35.3%	6	31.6%
	No	49	69.0%	75	64.7%	13	68.4%
Red meat	Total	71	100.0%	116	100.0%	19	100.0%
	Yes						

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Table 10 B: relation between degree of symptoms and food intake

		Degree of symptoms					
		Mild		Mild		Mild	
		N	N	N	N	N	N
Homemade bread	Yes	7	9.9%	18	15.5%	3	15.8%
	No	64	90.1%	98	84.5%	16	84.2%
	Total	71	100.0%	116	100.0%	19	100.0%
Fresh fruit	Yes	34	47.9%	61	52.6%	10	52.6%
	No	37	52.1%	55	47.4%	9	47.4%
	Total	71	100.0%	116	100.0%	19	100.0%
Fresh vegetable	Yes	35	49.3%	54	46.6%	10	52.6%
	No	36	50.7%	62	53.4%	9	47.4%
	Total	71	100.0%	116	100.0%	19	100.0%
Grain product	Yes	28	39.4%	37	31.9%	5	26.3%
	No	43	60.6%	79	68.1%	14	73.7%
	Total	71	100.0%	116	100.0%	19	100.0%
Nuts	Yes	17	23.9%	31	26.7%	4	21.1%
	No	54	76.1%	85	73.3%	15	78.9%
	Total	71	100.0%	116	100.0%	19	100.0%

In the table 11, the relation between food intake and body weight status shown that decreased food intake associated with weight loss for all food stuffs in the table 11 and other types (data not shown).

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Table 11: Relation between weight status and food pattern intake

		Weight status									
		No Changes		Increased		Decreased		Maintain		Do not know	
		N	N %	N	N %	N	N %	N	N %	N	N %
Red meat	Yes	13	25.5%	6	33.3%	18	23.4%	3	12.0%	7	20.0%
	No	38	74.5%	12	66.7%	59	76.6%	22	88.0%	28	80.0%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%
White meat	Yes	19	37.3%	5	27.8%	34	44.2%	9	36.0%	8	22.9%
	No	32	62.7%	13	72.2%	43	55.8%	16	64.0%	27	77.1%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%
Fresh fish	Yes	6	11.8%	0	0.0%	14	18.2%	5	20.0%	3	8.6%
	No	45	88.2%	18	100.0%	63	81.8%	20	80.0%	32	91.4%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%
Frozen fish	Yes	3	5.9%	2	11.1%	7	9.1%	1	4.0%	0	0.0%
	No	48	94.1%	16	88.9%	70	90.9%	24	96.0%	35	100.0%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%
Egg	Yes	17	33.3%	8	44.4%	36	46.8%	6	24.0%	11	31.4%
	No	34	66.7%	10	55.6%	40	51.9%	19	76.0%	24	68.6%
		0	0.0%	0	0.0%	1	1.3%	0	0.0%	0	0.0%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%
Dairy product	Yes	21	41.2%	5	27.8%	41	53.2%	12	48.0%	15	42.9%
	No	30	58.8%	13	72.2%	36	46.8%	13	52.0%	20	57.1%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%
Fresh bread Red meat	Yes	15	29.4%	9	50.0%	27	35.1%	9	36.0%	9	25.7%
	No	36	70.6%	9	50.0%	50	64.9%	16	64.0%	26	74.3%
	Total	51	100.0%	18	100.0%	77	100.0%	25	100.0%	35	100.0%

DISCUSSION

This study aimed to identify dietary patterns among young adults in Libya during the COVID-19 pandemic and to explore their relationship with changes in weight status. Our findings indicate that over half of the participants experienced weight loss, while approximately 8% reported weight gain. The alterations in dietary patterns are linked to weight loss in both men and women. Adopting a prudent dietary pattern may help prevent weight gain, but it could also influence weight loss. Notably, a small percentage of adults reported weight gain during the pandemic, with around 20% experiencing an increase of more than 2.5 kg. This observation aligns with findings from recent studies in other countries that noted weight gain during the pandemic. For instance, a cross-sectional study conducted in Italy reported similar results (21). Additionally, a study involving 173 participants in the United States found that 22% of individuals gained between 5 to 10 pounds (1 pound equals 0.45 kg), citing reasons such as overeating, late-night snacking, decreased physical activity, and insufficient sleep (22). Weight gain can elevate the risk of obesity and various serious health conditions, including non-communicable diseases (NCDs) such as coronary heart disease, stroke, type 2 diabetes, osteoarthritis, certain cancers, hypertension, and elevated cholesterol levels (23, 24).

Concerns have emerged regarding the impact of the COVID-19 pandemic on patients with non-communicable diseases (NCDs), who appear to be delaying their access to healthcare services compared to those infected with COVID-19 (25). This situation arises from the fact that healthcare systems and resources have predominantly been directed towards managing COVID-19 cases, leading to overwhelmed intensive care units (ICUs) due to severe respiratory complications (26). Consequently, it has become crucial to focus on the prevention of NCDs, such as maintaining a healthy weight during the pandemic. Our research indicates that approximately 35% of participants experienced weight loss, with over 2% reporting a loss exceeding 2.5 kg. While many studies have highlighted the

dangers and consequences of weight loss, few have specifically addressed this issue in the context of the COVID-19 pandemic (27, 28). The hypothesize of this study bserved weight loss may be linked to inadequate nutritional intake among individuals facing food supply challenges during periods of self-isolation. These circumstances have significantly heightened the risk of malnutrition, particularly among the elderly population. The dietary patterns discussed in this study were based on the food pyramid model. Unhealthy food choices, especially fried foods and sugary beverages, have been widely recognized as contributors to weight gain and an increased risk of obesity due to their high caloric content, which promotes excessive energy consumption (28, 29).

The current findings indicate that the relationships between dietary patterns and weight changes were anticipated. Our earlier research highlighted the diversity of dietary habits across different regional areas (30). This study corroborates our previous results and emphasizes the connections between dietary patterns and regional influences on weight change among both men and women during the COVID-19 lockdown. Such disparities may contribute to the future prevalence of non-communicable diseases (NCDs) and their associated burdens in various regions of China. Consequently, public health nutrition interventions aimed at preventing NCDs during and after the COVID-19 lockdown should take these regional dietary differences into account. As of now, there is no scientific evidence supporting the notion that specific foods or supplements can prevent or cure COVID-19. However, maintaining a healthy, balanced diet that promotes overall well-being is a prudent strategy, offering general health benefits beyond just sustaining health during the pandemic (31). A diverse diet can enhance the intake of various nutrients that support immunity, including vitamins A, B, C, and D, as well as folate, iron, zinc, and selenium, while also benefiting our gut microbiota through probiotics (32, 33).

This research also sought to examine the relationship between prior disease severity, dietary habits, and fluctuations in weight. The results indicated that weight gain and low

dietary intake were correlated with the severity of the disease. The findings imply that adhering to a nutritious and balanced diet is linked to the maintenance of a healthy weight, which may help mitigate the risk and impact of diet-related non-communicable diseases during the COVID-19 pandemic. A notable strength of this study is its large and varied population sample. The research is timely and provides compelling evidence of the connection between dietary patterns and changes in weight status. This evidence can inform the development of strategies to prevent weight gain and loss during the COVID-19 pandemic.

CONCLUSIONS

The findings of this research indicate that 50% of participants observed fluctuations in their body weight throughout the lockdown period. Weight loss was primarily linked to alterations in dietary habits, including a reduced consumption of fruits, vegetables, and other food items. The most frequently reported symptoms were fatigue and shortness of breath. Additionally, the data revealed that over one-third of the respondents experienced a decrease in body weight during the infection. In light of these results, it is essential to create new programs focused on dietary intake during pandemics and to promote health awareness among individuals who have previously been infected.

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Conflict of interest

Authors have declared that no conflict of interest

References

1. Tan, S.T.; Tan, C.X.; Tan, S.S. Changes in Dietary Intake Patterns and Weight Status during the COVID-19 Lockdown: A Cross-Sectional Study Focusing on Young Adults in Malaysia. Nutrients 2022, 14, 280

2. https://www.statista.com/statistics/1177553/coronavirus-cases-in-libya/.
3. Chen P, Mao L, Nassis GP, et al. Coronavirus disease (COVID-19): the need to maintain regular physical activity while taking precautions. J Sport Health Sci 2020;9:103–4.
4. Jaramillo M, Ñopo H. Covid-19 Y El shock externo: Impactos económicos Y opciones de política en El Perú. PNUD, 2020.
5. Tarqui Mamani C. Prevalencia Y factores asociados a la Baja actividad física de la población peruana. Nutr Clin Diet Hosp 2018;4:108–15.
6. Pellegrini M, Ponzo V, Rosato R, et al. Changes in Weight and Nutritional Habits in Adults with Obesity during the "Lockdown" Period Caused by the COVID-19 Virus Emergency. nutrients2020;12:2016.
7. Centers for Disease Control and Prevention. Evidence for conditions that increase risk of severe illness. Available: https://www.cdc.gov/coronavirus/2019-ncov/science/science-briefs/underlying-evidencetable.html [Accessed 28 Dec 2020].
8. Rodríguez-Pérez 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.
9. Reyes-Olavarría D, Latorre-Román Pedro Ángel, Guzmán-Guzmán IP, et al. Positive and negative changes in food habits, physical activity patterns, and weight status during COVID-19 confinement: associated factors in the Chilean population. Int J Environ Res Public Health 2020;17:5431.
10. Deschasaux-Tanguy M, Druesne-Pecollo N, Esseddik Y, et al. Diet and physical activity during the coronavirus disease 2019 (COVID-19) lockdown (March-May 2020): results from the French NutriNet-Santé cohort study. Am J Clin Nutr 2021;113:924–38.
11. 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;3:205–12.
12. Agurto HS, Alcantara-Diaz AL, Espinet-Coll E, et al. Eating habits, lifestyle behaviors and stress during the COVID-19 pandemic quarantine among Peruvian adults. PeerJ 2021;9:e11431.
13. Montero P, Morales EM, Carbajal Á. Valoración de la percepción de la imagen corporal mediante modelos anatómicos. Antropo 2004;8:107–16
14. Sidor A, Rzymski P. Dietary choices and habits during COVID-19 Lockdown: experience from Poland. Nutrients 2020;12:1657.
15. Mytton OT, Nnoaham K, Eyles H, et al. Systematic review and metaanalysis of the effect of increased vegetable and fruit consumption on body weight and energy intake. BMC Public Health 2014;14:886.

16. Guyenet SJ. Impact of whole, fresh fruit consumption on energy intake and adiposity: a systematic review. Front Nutr 2019;6:66.
17. Sawada K, Takemi Y, Murayama N, et al. Relationship between rice consumption and body weight gain in Japanese workers: white versus brown rice/multigrain rice. Appl Physiol Nutr Metab 2019;44:528–32.
18. Vandevijvere S, De Ridder K, Drieskens S, et al. Food insecurity and its association with changes in nutritional habits among adults during the COVID-19 confinement measures in Belgium. Public Health Nutr 2021;24:950–6.
19. Cañari-Casaño JL, Cochachin-Henostroza O, Elorreaga OA, et al. Social predictors of food insecurity during the stay-at-home order due to the COVID-19 pandemic in Peru. results from a crosssectional web-based survey. medRxiv 2021:2021.02.06.21251221.
20. Bejarano-Roncancio JJ, Samacá-Murcia L, Morales-Salcedo IS. Caracterización de la seguridad alimentaria en familias colombianas durante El confinamiento POR COVID-19. Rev Esp Nutr COMUNITARIA 2020;4:235–41.
21. Khan MA, Menon P, Govender R, et al. Systematic review of the effects of pandemic confinements on body weight and their determinants. Br J Nutr 2022;127:298–317.
22. Butler MJ, Barrientos RM. The impact of nutrition on COVID-19 susceptibility and long-term consequences. Brain Behav Immun 2020;87:53–4.
23. World Health Organization. WHO Coronavirus Disease (COVID-19) Dashboard. (2020). Available online at: https://covid19.who.int/ (accessedMay 7, 2021).
24. Zhang, X.; Chen, B.; Jia, P.; Han, J. Locked on salt? Excessive consumption of high-sodium foods during COVID-19 presents an underappreciated public health risk: A review. Environ. Chem. Lett. 2021, 19, 3583–3595. [CrossRef]
25. Murphy, B.; Benson, T.; McCloat, A.; Mooney, E.; Elliott, C.; Dean, M.; Lavelle, F. Changes in consumers' food practices during the COVID-19 lockdown, implications for diet quality and the food system: A cross-continental comparison. Nutrients 2021, 13, 20.
26. Di Renzo, L.; Gualtieri, P.; Pivari, F.; Soldati, L.; Attinà, A.; Cinelli, G.; Cinelli, G.; Leggeri, C.; Caparello, G.; Barrea, L.; et al. Eating habits and lifestyle changes during COVID-19 lockdown: An Italian survey. J. Transl. Med. 2020, 18, 1–15.
27. Abbas, A.M.; Fathy, S.K.; Fawzy, A.T.; Salem, A.S.; Shawky, M.S. The mutual effects of COVID-19 and obesity. Obes. Med. 2020, 19, 100250.
28. Tan, S.T.; Tan, S.S.; Tan, C.X. Screen time-based sedentary behaviour, eating regulation and weight status of university students during the COVID-19 lockdown. Nutr. Food Sci. 2021.
29. Pung, C.Y.Y.; Tan, S.T.; Tan, S.S.; Tan, C.X. Eating Behaviors among Online Learning Undergraduates during the COVID-19 Pandemic. Int. J. Environ. Res. Public Health 2021, 18, 12820.

30. Tan, S.T.; Tan, C.X.; Tan, S.S. Physical activity, sedentary behavior, and weight status of university students during the COVID-19 lockdown: A cross-national comparative study. Int. J. Environ. Res. Public Health 2021, 18, 7125.
31. Ismail, L.C.; Osaili, T.M.; Mohamad, M.N.; Al Marzouqi, A.; Jarrar, A.H.; Jamous, D.O.A.; Magriplis, E.; Ali, H.I.; Al Sabbah, H.; Hasan, H.; et al. Eating habits and lifestyle during COVID-19 lockdown in the united arab emirates: A cross-sectional study. Nutrients 2020, 12, 3314.
32. Changes in weight and nutritional habits in adults with obesity during the "lockdown" period caused by the COVID-19 virus emergency. Nutrients 2020, 12, 2016.
33. Jayawardena R, Misra A. Balanced diet is a major casualty in COVID19. Diabetes Metab Syndr. (2020) 14:1085–6.