

## Impact of Nutritional Habits and Status on the Symptoms Degree with (COVID-19)

تأثير العادات والحالة الغذائية على أعراض الإصابة  
بـ (كوفيد - ١٩)

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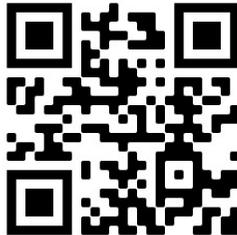
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### Abstract

Dietary habits play an important role in the outcome of a variety of different infectious diseases. So, this study aimed to assess the impact of nutritional habits and status on (covid-19) symptoms degree in Egyptian patients. Random patients of 336 (130 men and 206 women) aged 12- 76 years, selected from Damietta Governorate (128 from rural and 208 from urban), using an electronic questionnaire, includes preliminary data and nutritional habits measurements in addition to measuring height and weight to calculate body mass index. The results found that most of the patients whether from rural or urban were spent from 14 to 21 days in the (COVID-19) infection period, It was noticed that, most of the patients (56.5%) have poor nutritional habits. Also, according to the relationship between nutritional habits and COVID-19 symptoms degree patients who had poor nutritional habits, the most severe symptoms were fatigue (38.7%), followed by loss of sense of smell and taste (29.8 %), while diarrhea recorded the lowest percentage (5.4%) compared to other clinical symptoms in severe symptoms. Relatively, Body Mass Index (BMI) most of the patients (36.9%) were overweight, the fewest of the patients (2.3%) were under weight. Notably the relationship between body mass index and symptoms degree with COVID-19 patients with COVID-19 who were overweight had an increase in the severity of symptoms of fatigue by (24.4%) followed by loss of smell or taste (19.1%) compared to other clinical symptoms, while diarrhea recorded the lowest percentage (5.4%) of

symptoms of infection with COVID-19. In conclusion, most of patients have poor nutritional habits, also most of patients who had poor nutritional habits have severe symptoms from fatigue, also a majority of Covid-19 patients are overweight and obese, and they had an increase in the severity of symptoms of fatigue.

**Key words:** coronavirus, food habits, body mass index.

## Introduction

World Health Organization (WHO) declared coronavirus disease COVID-19 a pandemic on 11 March 2020, as of 8 April 2020 there have been 1,484,811 cases worldwide (WHO, 2020). Since its discovery, the virus has spread globally, causing thousands of deaths and having an enormous impact on our health systems and economies (Ciotti *et al.*,2019). So, social distancing necessary to reduce the spread of COVID-19 (Sahloul, 2020). Egypt is among the five countries reporting the highest number of cases in Africa with a total of 17 265 cases as of 25 May 2020 (Radwan, 2020).

Most of the common clinical symptoms in patients with Coronavirus disease COVID-19 are fever and cough, shortness of breath, and other breathing difficulties in addition to other nonspecific symptoms including loss of the sense of smell and taste, headache, fatigue, and muscle pain (Wang<sup>a</sup> *et al.*, 2020). Moreover, some patients also report digestive symptoms such as vomiting and diarrhea (Huang *et al.*,2020). Although patients initially have a fever with or without respiratory symptoms, various degrees of lung abnormalities develop later in all patients, and these can be seen on chest (Wang<sup>b</sup> *et al.*,2020).

Dietary habits represent the second most important risk factor for morbidity and mortality in the world. Any disruption in nutrition, therefore, will have a significant immediate and long-term impact on health. Improvements in dietary behavior can also

have a beneficial therapeutic effect in patients with or without clinical symptoms (**Rodriguez and Pierce., 2021**). Regarding Egyptians food habits, changes are taking place in the present, also according the traditional Egyptian diet in the recent decades have witnessed the progressive erosion (**El-Gilany and El-Masry., 2011**). In addition to numerous studies has shown that the patient's nutritional status have a significant effect on an individual's immunity and overall health status and it has been observed that nutritional deficiencies may predispose to severe forms of COVID-19 infections. Studies have also shown that malnourished individuals have less ability to survive severe COVID-19 than others (**Briguglio et al., 2020**). COVID-19 pandemic had significant morbidity, mortality, social and financial implications for the global population. However, little is known about its effect of nutritional habits and nutritional status on symptoms of COVID-19 (**Rodriguez and Pierce., 2021**). Some studies have also attempted to link nutrition and COVID-19 infection however, no significant association between nutritional status and clinical signs of COVID-19 infection or severity of COVID-19 has been identified (**Allard et al., 2020**).

This study provided a summary description of the impact of nutritional habits and nutritional status on COVID-19 symptoms degree in Egyptian.

## Subjects and Methods

### Study Design and Participants

In February 2020, the first case of COVID-19 appeared in Egypt, therefore did an electronic questionnaire to recognize the impact of nutritional habits and nutritional status on COVID-19 Symptoms Degree on Damietta's society. So, a random patients of 336 (130 men and 206 women) aged 12- 76 years, selected from

Damietta Governorate (128 of the patients members from rural and 208 of the patients members from urban), using an Electronic questionnaire. All participants' recovered patients of coronavirus were confirmed agreed to share their data, and sending the electronic questionnaire was considered their approval. The validity of the test was verified by a number of specialized faculty members from the faculty of specific education, Damietta University. The coefficient of two test stability was calculated before using. The average time spent on the survey was 15 min.

#### Survey Development

The study includes preliminary data (name- age- education level) in addition to measuring body mass index and nutritional habits (**Corina and Nicolae., 2012**). In addition to the test, Height and weight were measured to calculate body mass index (**Eknoyan and Quetelet., 2008**)

BMI (kg/m<sup>2</sup>) was used to classify into categories of

<i>Underweight</i>	$(BMI < 18.5 \text{ kg/m}^2)$
<i>Normal weight</i>	$(18.5 \text{ kg/m}^2 \leq BMI < 25 \text{ kg/m}^2)$
<i>Overweight</i>	$(25 \text{ kg/m}^2 \leq BMI < 30 \text{ kg/m}^2)$
<i>Obese</i>	$(BMI \geq 30 \text{ kg/m}^2)$

(**National Heart, Lung, and Blood Institute., 1998**).

The research tools included test to measure the nutritional habits of the patient's members prepared by the researchers. Questions included keep eating breakfast, also eating three meals daily, making sure to eat vegetables, plus for eating in groups, in addition to watching TV, also eating junk food, Hence drinking soda, plus for drinking milk, Moreover going to bed early, in addition to eating sweets, furthermore eating fried foods, also drinking more over water, in addition to eating oily foods, Making sure to keep track of weight, Moreover chewing food, drinking tea or cafe, furthermore drinking fruit juice, also eating salty foods, in addition to making exercise, eating at night, and making variety in eating foods (**Sahloul, 2017**).

The electronic questionnaire was built by using Google Form application (Di Renzo *et al.*, 2020)

[https://docs.google.com/forms/d/e/1FAIpQLSdgBAKfZLSAyMfdHdi7dC\\_I09vUoG7PljvbwUWiLecMoS0w2w/viewform?usp=sf\\_link](https://docs.google.com/forms/d/e/1FAIpQLSdgBAKfZLSAyMfdHdi7dC_I09vUoG7PljvbwUWiLecMoS0w2w/viewform?usp=sf_link)

### Statistical analysis

Collected data were subjected statistically analyzed by SPSS computer software (version 11.0). The results are presented as means +SE, using one way a nova in p-value < 0.05 was considered statistically significant. (SPSS, 1999).

## Result and discussion

### Frequency distribution of the patients according to their Infection period of COVID-19.

Data in table (1) declares the frequency distribution of the patients according to their Infection period of COVID-19. It is found that most of the patients whether from rural or urban were spent from 14 to 21 days in COVID-19 infection period (46.9% and 49% respectively).

In light of what is presented in Table 1, there are slight differences changes in infection period between rural or urban except in period from 21 to 30 days where observed increase rural and in the period above 30 days where an observed increase in urban

**Table (1): Frequency distribution of the patients according to their Infection period of coronavirus.**

Infection period	Rural		Urban	
	N	%	N	%
under 7 days	0	0	2	1
From 7 to14 days	20	15.6	30	14.4
From 14 to 21 days	60	46.9	102	49
From 21 to 30 days	46	35.9	54	26
Above 30 days	2	1.6	20	9.6
<b>Total</b>	<b>128</b>	<b>100</b>	<b>208</b>	<b>100</b>

### Frequency distribution of the patients according to their nutritional habits.

Data in the table (2) declares the frequency distribution of the patients according to their nutritional habits. It is found that most of the patients 190 (56.5%) have poor nutritional habits, the fewest of them have good nutritional habits 18 (5.4%).

These results converge with (Bedock et al., 2020) who found that the prevalence of malnutrition was (42%) in patients with COVID-19. In another study, similar results (39% of COVID-19 infected patients exhibited malnutrition) were obtained. Malnutrition was also detected in 67% of patients with coronavirus who were admitted to the intensive care unit. In addition, moderate malnutrition was observed in 24% of COVID-19 infected patients (Allard et al., 2020).

In this regard ( Koch and Pokorn., 1999) found a significant statistical difference between adult age groups, and adults in the age above 45 years have good nutritional habits.

**Table (2): Frequency distribution of the patients according to their nutritional habits.**

Nutritional habits	Poor Nutritional habits		Medium Nutritional habits		Above medium nutritional habits		Good Nutritional habits	
	N	%	N	%	N	%	N	%
	190	56.5	72	21.4	56	16.7	18	5.4

### Frequency distribution of the patients according to the relationship between nutritional habits and symptoms degree with COVID-19

Data in table (3) declares the frequency distribution of the patients according to the relationship between nutritional habits and symptoms degree with COVID-19. It's found that in patients who had poor nutritional habits, the most severe symptoms were fatigue (38.7%), followed by loss of sense of smell and taste (29.8 %), while diarrhea recorded the lowest percentage (5.4%)

compared to other clinical symptoms in severe symptoms. Regarding patients who had medium nutritional habits, the most severe symptoms were fatigue (15.5%), followed by loss of sense of smell and taste (8.3 %), While Nasal congestion and runny nose recorded the lowest percentage (2.4%) compared to other clinical symptoms in terms of severity. On the one hand, in patients who had above medium nutritional habits, the most severe symptoms were fatigue (9.5%), followed by loss of sense of smell and taste (7.1 %), while diarrhea recorded the lowest percentage (1.8%) compared to other clinical symptoms in terms of severity.

According to good nutritional habits the most severe symptoms were fatigue and loss of sense of smell and taste (3.6 %), while diarrhea recorded the lowest percentage (0.6%) compared to other clinical symptoms in severe symptoms. The results also showed a significant decrease in the symptoms of Covid-19 infection, whether they were mild, moderate and severe. Where, fatigue and loss of smell or taste recorded the highest percentage (3.6%), while diarrhea, nasal congestion and runny nose were recorded the lowest percentage (0.6%) compared to other clinical symptoms in terms of severity. The results also showed a significant decrease in the symptoms of Covid-19 infection, whether they were mild, moderate and severe.

There aren't any significant differences ( $p < 0.05$ ) between all groups. In light of the above, most patients had poor nutritional habits, and suffering from severe fatigue symptoms, followed by loss of sense of smell and taste.

In general, the data showed a significant decrease in the severity of clinical symptoms for COVID-19 patients with good nutritional habits compared to patients with poor nutritional habits. These findings are in agreement with (**Briguglio et al., 2020**) who found that the patient's nutritional status has a significant effect on an individual's immunity and overall health status and it has been observed that nutritional deficiencies may predispose to severe forms of COVID-19 infections.

In this respect (**Mehta, 2020**) indicated that malnutrition negatively affects clinical outcomes and that complications, length of stay, and mortality were significantly worse in patients at

nutritional risk compared to patients without risk. Several studies have also shown that older patients or patients with multiple diseases who received trial nutritional support had reduced complications including infectious complications and improved quality of life (**Jie et al., 2010**).

Table (3): Frequency distribution of the patients according to relationship between nutritional habits and symptoms degree with COVID-19.

Nutritional habits	Poor nutritional habits				Medium nutritional habits				Above medium nutritional habits				Good nutritional habits					
	None	Mild	Medium	Severe	None	Mild	Medium	Severe	None	Mild	Medium	Severe	None	Mild	Medium	Severe		
Injury Symptoms	N	20	24	78	68	16	8	24	24	6	10	22	18	2	6	4	6	2.94 ±.055
	%	6	7.1	23.2	20.2	4.8	2.4	7.1	7.1	1.8	3	6.5	5.4	0.6	1.8	1.2	1.8	
Fever	N	0	12	48	130	2	2	16	52	2	4	18	32	0	2	4	12	3.59 ±.036
	%	0	3.6	14.3	38.7	0.6	0.6	4.8	15.5	0.6	1.2	5.4	9.5	0	0.6	1.2	3.6	
Fatigue	N	34	36	40	60	18	18	24	12	10	20	12	14	10	0	4	4	2.59 ±.060
	%	10.1	10.7	11.9	17.9	5.4	5.4	7.1	3.6	3	6	3.6	4.2	3	0	1.2	1.2	
Cough	N	30	42	74	44	26	20	18	8	16	16	16	8	6	8	2	2	2.46 ±.057
	%	8.9	12.5	22	13.1	7.7	6	5.4	2.4	4.8	4.8	4.8	2.4	1.8	2.4	0.6	0.6	
Nasal congestion and runny nose	N	28	32	58	72	16	18	26	12	12	16	20	8	4	4	6	4	2.72 ±.058
	%	8.3	9.5	17.3	21.4	4.8	5.4	7.7	3.6	3.6	4.8	6	2.4	1.2	1.2	1.8	1.2	
Sore throat	N	72	42	58	18	34	16	12	10	24	14	12	6	6	2	8	2	1.85 ±.049
	%	23.2	12.5	17.3	5.4	10.1	4.8	3.6	3	7.1	4.2	3.6	1.8	1.8	0.6	2.4	0.6	
Diarrhea	N	30	28	78	54	20	12	22	18	12	16	18	10	4	6	2	6	2.68 ±.058
	%	8.9	8.3	23.2	16.1	6	3.6	6.5	5.4	3.6	4.8	5.4	3	1.2	1.8	0.6	1.8	
Shortness of breath	N	20	24	46	100	20	6	18	28	8	4	20	24	2	2	2	12	3.08 ±.059
	%	6	7.1	13.7	29.8	6	1.8	5.4	8.3	2.4	1.2	12	7.1	0.6	0.6	0.6	3.6	

## Frequency distribution of the patients according to their Body Mass Index.

Data in table (4) declares the frequency distribution of the patients according to their body mass index. It is found that most of the patients 124 (36.9%) were overweight, next in order 102(30.4%) were normal weight or obese, the fewest of the patients 8 (2.3%) were under weight.

In light of the above, most of the patients 226 (67.3%) were up normal weight, this means people has up normal weight is more exposed to the risks of COVID-19

On the one hand (**Johnson et al., 2021**) they found that 59% of the samples were overweight or obese 63% of females and 54% of males. Their BMI selection for normal weight, overweight and obese was 90%, 36%, and 33% respectively.

**Table (4): Frequency distribution of the patients according to their body mass index**

Body mass index	Under weight		Normal weight		Over weight		Obesity		Up normal weight (Over weight and Obesity)	
	N	%	N	%	N	%	N	%	N	%
	8	2.3	102	30.4	124	36.9	102	30.4	226	67.3

## Frequency distribution of the patients according to relationship between body mass index and symptoms degree with COVID-19

Data in the table (5) declares the relationship between body mass index and symptoms degree with COVID-19. The results in a table (5) draw attention that patients with COVID-19 who are overweight and obese have an increase in the severity of symptoms of fatigue by (24.4%, 21.4%) respectively, followed by Loss of smell or taste (19.1%, 12.5%) respectively, compared to other clinical symptoms in terms of severity. While diarrhea recorded the lowest percentage (5.4%, 4.2%) for both of them respectively.

There aren't any significant differences ( $p < 0.05$ ) between all groups. The results also indicated a gradual decrease in symptoms of both fatigue and Loss of smell or taste in patients infected with Covid-19 who are of normal weight by (19.7%, 16.7%) respectively. Diarrhea was also recorded the lowest percentage (1.2%) compared to other clinical symptoms in terms of severity

In this regard (**Sattar et al., 2020**) showed that, obesity adversely affects the immune system, and consequently increases the risk of severe COVID-19 infection. Studies also showed that obese men ( $BMI \geq 28 \text{ kg/m}^2$ ) was associated with an increased risk of severe COVID-19 than normal weight men ( $BMI < 24 \text{ kg/m}^2$ ) (**Cai et al., 2020**).

Also, an agreement with these results was by (**Kompaniyets et al., 2021**) showed an association between body mass index (BMI) and risk for severe COVID-19 outcomes. Among 148,494 adults who received a COVID-19 diagnosis during an emergency department or inpatient visit at 238 U.S. hospitals during March–December 2020, 28.3% had overweight and 50.8% had obesity. Overweight and obesity were risk factors for hospitalization and death, particularly among adults aged  $< 65$  years. Risks for hospitalization, ICU admission, and death were lowest among patients with BMIs of  $24.2 \text{ kg/m}^2$ ,  $25.9 \text{ kg/m}^2$ , and  $23.7 \text{ kg/m}^2$ , respectively, and then increased sharply with higher BMIs. **Poly et al., (2021)** also showed that obesity was associated with an increased risk of death from COVID-19, particularly in patients aged more than 65 years.

**Kang and Kong (2021)** also pointed out the existence of a non-linear (U-shaped) relationship between BMI and covid 19. Subjects with a BMI of  $< 18.5 \text{ kg/m}^2$  and those with a BMI  $\geq 25 \text{ kg/m}^2$  had a high risk of contracting COVID-19. Maintaining a healthy weight is important not only for preventing cardiovascular disease, but also for improving COVID-19 outcomes.

Table (5): Frequency distribution of the patients according to relationship between body mass index and symptoms degree with COVID-19.

Body mass index		Under weight (BMI<19.5)				Normal weigh (BMI19.5–24.9)				Overweight (BMI 25-29.9)				Obesity (BMI >30)				Means + SE
		None	Mild	Medium	Severe	None	Mild	Medium	Severe	None	Mild	Medium	Severe	None	Mild	Medium	Severe	
Fever	N	2	0	6	0	12	16	40	34	16	16	46	46	14	16	36	36	2.94 ±.055
	%	0.6	0	1.8	0	3.6	4.8	12	10.1	4.8	4.8	13.7	13.7	4.2	4.8	10.7	10.7	
Fatigue	N	0	2	0	6	0	4	32	66	0	8	34	82	4	6	20	72	3.59 ±.036
	%	0	0.6	0	1.8	0	1.2	9.5	19.7	0	2.4	10.1	24.4	1.2	1.8	6	21.4	
Cough	N	2	4	2	0	18	30	26	28	30	30	34	30	22	24	26	30	2.59 ±.060
	%	0.6	1.2	0.6	0	5.4	8.9	7.7	8.3	8.9	8.9	10.1	8.9	6.5	7.1	7.7	8.9	
Nasal congestion and runny nose	N	2	4	2	0	6	32	44	20	36	28	30	30	34	22	34	12	2.46 ±.057
	%	0.6	1.2	0.6	0	1.8	9.5	13.1	6	10.7	8.3	8.9	8.9	10.1	6.5	10.1	3.6	
Sore throat	N	2	2	2	2	2	28	32	40	32	20	34	38	24	20	42	16	2.72 ±.058
	%	0.6	0.6	0.6	0.6	0.6	8.3	9.5	12	9.5	6	10.1	11.3	7.1	6	12.5	4.8	
Diarrhea	N	4	2	2	0	36	28	34	4	52	18	36	18	44	26	18	14	1.85 ±.049
	%	1.2	0.6	0.6	0	10.7	8.3	10.1	1.2	15.5	5.4	10.7	5.4	13.1	7.7	5.4	4.2	
Shortness of breath	N	2	2	2	2	16	26	38	22	26	18	48	32	22	16	32	32	2.68 ±.058
	%	0.6	0.6	0.6	0.6	4.8	7.7	11.3	6.5	7.7	5.4	14.3	9.5	6.5	4.8	9.5	9.5	
Loss of smell or taste	N	2	0	4	2	12	10	24	56	16	10	34	64	20	16	24	42	3.08 ±.059
	%	0.6	0	1.2	0.6	3.6	3	7.1	16.7	4.8	3	10.1	19.1	6	4.8	7.1	12.5	

## Conclusion

In conclusion, the vast majority of patients spent from 14 to 21 days in COVID-19 infection period, most of them have poor nutritional habits, also most of who had poor nutritional habits had severe symptoms from fatigue, followed by loss sense of smell and taste, most of the patients were overweight, overweight and obese patients have an increase in the severity of symptoms of fatigue followed by Loss of smell or taste.

## Recommendations

- 1) Paying attention to nutritional awareness among community members because of its impact on many diseases, including COVID-19.
- 2) Awareness among community members of the damages of being overweight because of its impact on many diseases, including COVID-19.

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## تأثير العادات والحالة الغذائية على أعراض الإصابة بـ (كوفيد- ١٩)

تلعب العادات الغذائية دورًا مهمًا في تجنب العديد من الأمراض المعدية. لذلك، هدفت هذه الدراسة إلى تقييم تأثير العادات والحالة الغذائية على أعراض الإصابة بفيروس كورونا في مصر. تم اختيار عينة عشوائية قوامها ٣٣٦ مريضاً (١٣٠ رجلاً و ٢٠٦ امرأة) تتراوح أعمارهم بين ١٢ و ٧٦ عاماً، تم اختيارهم من محافظة دمياط (١٢٨ من المرضى من الريف و ٢٠٨ من المرضى من الحضر). استخدم استبيان الكتروني يتضمن بيانات أولية بالإضافة لقياس العادات الغذائية، كما تم أيضاً قياس كلاً من الطول والوزن لحساب مؤشر كتلة الجسم. ووجدت النتائج أن معظم المرضى سواء من الريف أو الحضر كانت مدة اصابتهم بفيروس كورونا من ١٤ إلى ٢١ يوماً، وقد لوحظ أن معظم المرضى (٥٦,٥%) لديهم عادات غذائية سيئة، وفقاً للعلاقة بين العادات الغذائية وأعراض الإصابة بفيروس كورونا للمرضى الذين يعانون من عادات غذائية سيئة، فإن أشد الأعراض كان الإعياء (٣٨,٧%)، يليه فقدان حاسة الشم والتذوق بنسبة (٢٩,٨%) مقارنة بالأعراض السريرية الأخرى من حيث الشدة. أما بالنسبة لمؤشر كتلة الجسم فكان معظم المرضى (٣٦,٩%) يعانون من زيادة الوزن، وكان أقل عدد من المرضى (٢,٣%) يعانون من نقص الوزن. وبالنسبة للعلاقة بين مؤشر كتلة الجسم وأعراض الإصابة بفيروس كورونا وجد أن النسبة الأعلى من المصابين بالسمنة زادت شدة أعراض الإعياء بنسبة (٢٤,٤%) يليها فقدان حاسة الشم أو التذوق بنسبة (١٩,١%)، بينما سجل الإسهال أقل نسبة (٥,٤%) من الأعراض. وفي الختام، معظم المرضى لديهم عادات غذائية سيئة، كما أن معظم المرضى الذين لديهم عادات غذائية سيئة يعانون من أعراض شديدة من الإعياء ونسبة كبيرة من مرضى كوفيد ١٩ يعانون من زيادة الوزن والسمنة.

**الكلمات المفتاحية:** فيروس كورونا، عادات الاكل، مقياس كتلة الجسم.