Comparative study of the nutritional and health status among some individuals in the Kingdom of Saudi Arabia and Egypt during the period of the Covid 19 pandemic

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Abstract

The WHO announced that the COVID-19 virus was a pandemic in March of 2020. In order to combat viruses, it is crucial to maintain a balanced and nutritious diet routine. This will help the immune system function to be better. The study aimed to The effect of the COVID-19 pandemic on the consumption of vitamins and mineral salts supplements, the nutritional status, health status, the study of the dietary pattern, fast food consumption, the study of recovery rate from the infection with the COVID-19 virus and its relationship to chronic diseases and proper food behavior among adults in Saudi Arabia and Egypt was examined by using an online survey. This study included a total number of 400 Person from AL-Baha in Kingdom Saudi Arabia and Egypt. Persons were divided into two groups : A –200 Person from Saudi Arabia .B –200 Person from Egypt**.** The results showed that the majority of the respondents reported that having healthy food, (meat, fish, poultry,Vegetables and Fruits) was on a daily basis during COVID-19 (47.25 % - 44%, 41.255- 46.25 %, 36.25%-30.75% and 33.75-27.5 %) Respectively . alsot the score for the consumption of vitamins and minerals supplements was slightly higher (A – 37.5% -22.5 %), (D-32%-38.75 %), (E- 22.5% - 22.5 %),(C -47.5 %-50%) and (Zinc 40.5 %-18.75%) respectively in the Egyptian and Saudi society during the COVID-19 period **.**Conclusion: Increase consumption of vitamins and minerals supplements, having healthy food, exposure to the sun increased to obtain vitamin D, and fast food intake decreased during the period spread of the covid-19 virus in both the Kingdom of Saudi Arabia and the Arab Republic of Egypt.

1-Introduction:

SARS-COVID-2 (severe acute respiratory syndrome coronavirus-2) became a global pandemic rapidly and has attributed for many deads, so far, for infecting 5.8 million of people and claiming the life of more than 350,000. There are no Food and Drug Administration5 or European Medicines Agency6 approved with vaccines or medications for the treatment of COVID-19

Qing et al., (2020) they indicates that vitamins and supplements play a potential role in reducing the cytokine storm associated with COVID-19. To develop high immunity and protect the body from viruses, nutrition is considered a public health priority at this time. A balanced and nutritious diet daily help to improve the immune system of the human body, which is essential in fighting viruses Muscogiuri et al,(2020). Healthy diets will protect the community from excessive coronavirus inflammatory responses. During the pandemic, however, the abrupt change has caused global uncertainty and anxiety regarding food security **Ribeiro et al.,(2020).**

Dietary supplementation of micronutrients with recognized immune functions can optimize the immune response regulation of the body and reduce the risk of infections **Name et al., (2020)**

Increased glutathione production prevents the use of ascorbic acid (vitamin C), which also has antimicrobial properties, and has been discussed for the prevention and treatment of COVID-19 **Erol, (2020).** Vitamin C reduces the time spent on mechanical ventilation in patients with COVID-19. vitamin C has a role in the care of patients with sepsis and acute respiratory distress syndrome (ARDS), which has been associated with COVID-19. The administration of high-dose vitamin C (1,000-6,000 mg) decrease the time spent by critically ill patients on mechanical ventilation by 25%, and reduced their length of stay in an intensive care unit **Hemilä and Chalker,(2020)**

2. Subjects and Methods
2.1.Subjects
This study included a total number of 400 Person from AL-Baha in Kingdom Saudi Arabia and Egypt. Persons were divided into two groups: A –200 Person from Saudi Arabia .B –200 Person from Egypt.

2.2 .Methods

The data was collected by using an electronic questionnaire that was distributed through social media and it contains the following: (Name, gender, age, nationality, gross income, weight and height)

2.3. Anthropometric measurements: Without shoes, height was measured by using a wall stadiometer to the nearest 1mm. Subjects were weighed to the nearest 0.1kg on a clinical balance while wearing light clothing and not wearing shoes.. BMI was calculated as weight (in kg)/height (in m^2)(**Garrow et.al.,1985**)

2.4 Statistical analysis: Statistical package spreadsheet software (SPSS) version 16 was used for statistical analysis. Mean±SD and analysis of variance (ANOVA) test were used as appropriate. Qualitative data were expressed as percentages. For comparing the groups.

3. Results

Distribution of studied subjects according to Nationality is shown in Table (1) & Figure (1). The sample consisted of 400 adult of female and Male, Female was 280 – 70 %, and Male 120 - 30 % .

Table (1): Distribution of studied subjects according to nationality.

Categories parameters	Female (No – %)		Men (No –%)	
Saudi	No	No %	No	No %
Egyptian	140	35	60	15
Total	140	35	60	15
	280	70	120	30

* $p < 0.05$ significant ** $p < 0.01$ high significant *** $p<0.001$ very high significant   negative correlation

Fig (1): Distribution of studied subjects according to nationality
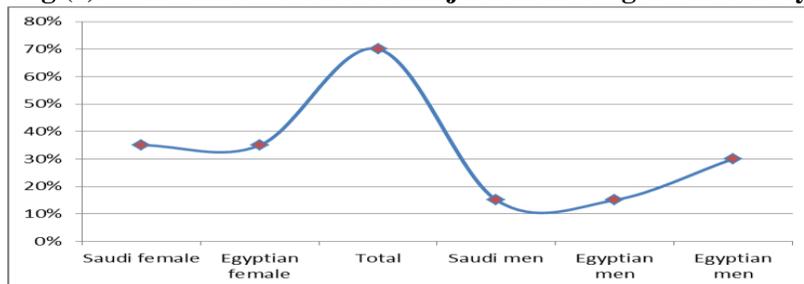
Table (2) : Mean ± SD of age, family income, type of work and anthropometric indices

Categories / Parameters	Saudi ((No- 200) Mean ± SD	Egyptian (No – 200) Mean ± SD
Age (years)	35.58 ± 4.99	37.95 ± 8.99
Weight (kg	60 ±11.32	71.52 ± 12.28
Height (cm	159.78 ± 4.400	160.3 ±6.54
Family income		
1000-3999	120 -60%	25-12.5%
4000-6999	30 -15%	25- 12.5%
7000-12000	50- 25%	150-75%
type of work		
Government	100 - 50%	120 - 60 %
	4.3± .23*	
private	50 - 25 %	60 - 30%
	1.2 ± .13**	
No work	50 - 25 %	20 - 10%
	1.3 ± .22*	

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant
-- negative correlation

Mean ± SD of age, family income, type of work and anthropometric indices are shown in Table (2). The age of the sample ranged from 35.58 and above, while the weight of the sample ranged between 60 to 71.5 kg, and the family income ranged between 1000-3999, where the highest number was 60% and 12.5respectively in the Egyptian and Saudi society . Regarding the type of work among the sample members, it was Government(50%and 60%), private(25% and 30%) and No work (25% and 10%) respectively in the Egyptian and Saudi society

Table (3) : Distribution of studied sample according to health status during the period spread of the covid-19 virus.

categories parameters	Egyptian (N0 – 200)			Saudi ((No –200)		
	No-(yes)	No %	Mean ± SD	No –(yes)	No %	Mean± SD
Cold injury	122	30.5	030 ±.61	100	25	.25 ± .01**
Anemia	50	12.5	.123 ± .02*	60	15	.15 ± .03*
Pulmonary disease	26	6.5	.065 ± .01	20	5	.05 ±025
chronic diseases	30	7.5	.07 ± .03	40	10	.1 ±.002
Fatigue and dizziness	40	10	.1 ±.02	30	7.5	.07 ±.001
Infection with the covid-19 virus	154	38.5	.385 ± .182	120	30	.3 ±.02*
covid-19 virus infection and recovery	144	36	.36 ±.012*	111	27.75	.277 ±.07
Vitamin D deficiency	123	30.75	.307±.02*	111	27.75	.277 ±.05

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant negative correlation

Distribution of studied sample according to health status during the period spread of the covid-19 virus are shown in Table (3). The values of Persons with Cold injury were 30.5 % and 25%, Anemia (12.5 % and 15%), Pulmonary diseases (6.5 % and 5%), chronic diseases (7.5 % and 10%) , Fatigue and dizziness (10 % and 7.5%), infection with the covid-19 virus (38.5% and 30%) , covid-19 virus infection and recovery (36%   and 27.75 %   ) and Vitamin D deficiency (30.75 and 27.75 %) respectively in the Egyptian and Saudi society .

Table (4) : Distribution of the study sample according to food consumption during the period spread of the covid-19 virus.

Categories Parameters	Egyptian (N –200)			Saudi ((N – 200)		
	No	No %	Mean ± SD	No	No %	Mean± SD
Fruits	135	33.75	**.33 ±.08**	110	27.5	.27 ± .03
Vegetables	145	36.25	**.36 ±.06**	123	30.75	**.30 ±**.012*
(meat, fish, poultry)	165	41.25	**.312±**..14*	185	46.25	**.462±**.025*
healthy food	189	47.25	**.47±.04***	176	44	**.44±.05**

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant negative correlation

       Table (4) displays that Distribution of the study sample according to food consumption during the period spread of the covid-19 virus . It is noticed that an increase in consumption from fruits (33.75%and 27.5% %), Vegetables (36.25**%** and 30.75**%**) , (meat, fish, poultry, 41.25**%** and46.25**%**) and   healthy food (47.25**%** and 44**%)** during the period spread of the covid-19 virus significantly (p = 0.05) between study samples respectively in the Egyptian and Saudi society .

Table (5) : Distribution of the study sample according to the consumption of vitamin and mineral supplements during the period spread of the covid-19 virus.

Categories / Parameters	Egyptian (N – 200)			Saudi ((N– 200)		
	No	No %	Mean ± SD	No	No %	Mean± SD
Vitamin A (ug)	150	37.5	.375 ±.02*	90	22.5	.22 .01**
Vitamin D(ug)	128	32	.32 ± .01**	155	38.75	.38± .032*
Vitamin E(mg)	90	22.5	.225 ±.03*	89	22.25	.22±.005*
Vitamin C (mg)	190	47.5	.47 ±.032*	200	50	.5 ±.1
Zinc (mg)	162	40.5	.405±.013**	75	18.75	.187 ±.02*

* $p < 0.05$ significant ** $p < 0.01$ high significant *** $p<0.001$ very high significant negative correlation, mg (= Milligram), ug (= Microgram).

Table (5) displays that there was a highly positive significant ($p<0.05$) consumption of vitamins and minerals supplements during the period spread of the covid-19 virus from Vitamin A(ug) (37.5% and 22.5%), Vitamin D(ug) (32% and 38.75%) , Vitamin E(mg) (22.5% and 22.25%) , Vitamin C(mg) (47.5% and 50%) and Zinc(mg) (40.5% and 18.75%) between Egyptians and Saudis respectively.

Table (6) : Comparison of food pattern before and during COVID-19 for the sample.

Categories / Parameters		Egyptian (N – 200)		Saudi ((N– 200)		Egyptian (N – 200)		Saudi ((N– 200)	
		Before COVID-19				During COVID-19			
		No	No %	No	No %	No	No %	No	No %
Eating healthy foods per week	Yes	70	35%	50	25%	110	55%	90	45%
	Sometimes	50	25%	80	40%	80	40%	79	39.5%
	No	80	40%	70	35%	20	10%	31	15.5%
Eat home-cooked meals per week	1-2 times/week	60	30%	40	20%	80	40%	75	37.5%
	3-6 times/week	50	25%	30	15%	100	50%	90	45%
	Daily	20	10%	10	5%	20	10%	30	15%
	NO	70	35%	120	60%	-	-	5	2.5%
Buy Fast food per week	1-2 times/week	80	40%	150	75%	100	50%	95	47.5%
	3-6 times/week	90	45%	30	15%	40	20%	45	22.5%
	Daily	20	10%	20	10%	10	5%	40	20%
	NO	10	5%	-		50	25%	20	10%

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant
   negative correlation

Data presented in Table (6) demonstrate Comparison of food pattern before and during COVID -19 for the sample.. There was increase in the respondents rating eating healthy food 55% and 45% respectively between Egyptians and Saudis during the COVID-19 period. However, the consumption Before COVID-19 was from 35% and 25% respectively (p=0.001).

However, the consumption of food cooked at home was increased 25% and 15% Before COVID-19 while There was increase consumption of food cooked at home was 50%,45% during COVID-19 respectively between Egyptians and Saudis. Although it decreases buy fast food to 25% and 10% respectively.

Data presented in Table (7) demonstrate the correlation between vitamins and minerals intake and age, Family income, weight and Infection covid-19 virus for studied samples . There was a highly positive significant relationship between vitamins and minerals intake and each of age, decreased infection with covid-19 virus was (Vit . C(mg), .664, Vit . D(ug), .548 and Zinc(mg), .422) significant p < 0.01. While there was a low positive significant relationship between vitamins and minerals intake with reduced low family income(.222) between Egyptians and Saudis .

Table (7) : Study of correlation between vitamins and minerals intake and age, family income, weight and infection with covid-19 virus for studied samples..

Categories Parameters	Age	Family income	Weight	Decreased infection with covid-19 virus
Protein(g)	.312[*]	.247[**]	.227[**]	.294[**]
Vit . C (mg)	.664	.548[**]	.024	.664[*]
Vit . D (ug)	.548[**]	.063	.548[**]	.548[**]
Vit . A (ug)	.063	.329[*]	.127	.384
Vit E (mg)	.384	.222[**]	.377	.329[*]
Zinc (mg)	.329[**]	.222[*]	.342[**]	.422[**]

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant negative correlation , mg (= Milligram), ug (= Microgram).

Data presented in Table (8) shows that correlation between vitamins and minerals intake and was associated with reduced of cold injury, pulmonary diseases, chronic diseases and increase recover from infection with covid-19 virus for studied samples. There was a highly positive significant (p=0.005).

Table (8) : Study of correlation between vitamins and minerals intake and cold injury, pulmonary diseases, chronic diseases and recover from infection with covid-19 virus for studied samples.

Categories / Parameters	Cold injury	Pulmonary diseases	chronic diseases	Recover from Infection with covid-19 virus
Vit . C(mg)	-.247	.172[*]	.173[*]	.245[**]
Vit . D (ug)	-.132[*]	.472	.572[**]	. 456[*]
Vit . A (ug)	.472[*]	.372[*]	.272[*]	.377
Vit E (mg)	- .172[*]	- .472	.152[**]	.3 8 6[*]
Zinc(mg)	-.172	.142[* *]	.172[*]	.172[**]
chronic diseases	.472[*]	.152[*]	1	-.147

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant
negative correlation, mg (= Milligram), ug (= Microgram),

Data presented in Table (9) shows that correlation between food consumption , family income, Lack of Family income and infection with covid-19 virus during the period spread of the covid-19 virus for studied samples.There was a highly positive significant (p < 0.05) relationship between consumption of increased home food and Lack of family income(.994) , and decreased infection with covid-19 virus during the period spread of the covid-19 virus. but it was a negative significant correlation between (fast food with Infection with covid-19 - .018.), (healthy food with increase Infection with covid-19 virus .247) , (Food shortage with the spread of the virus and increase Infection with covid-19 virus .001)

Table (9) : Study of correlation between food consumption , family income, Lack of Family income and infection with covid-19 virus during the period spread of the covid-19 virus for studied samples.

Categories Parameters	Family income	Lack of Family income	Infection with covid-19 virus
Fruits	.329[**]	.172	.384
Vegetables	.032	.995[**]	.329[*]
Protein	.319[*]	.432[*]	.662[*]
healthy food	.257[**]	.132	.247[**]
Fast food	.339[**]	- .034	- .018
Home food	.248[**]	.994[**]	.232[*]
Food shortage with the spread of the virus	-.664	.521[*]	.001
chronic diseases	.172[*]	.413	.995[**]
Exposure to the sun	-.003	.091	.435[*]

* $p < 0.05$ significant ** $p < 0.01$ high significant *** $p < 0.001$ very high significant negative correlation

Data presented in Table (10) shows that correlation between recover from infection with covid-19, chronic diseases, infection with covid-19 and fast food , eating healthy foods during the period spread of the covid-19 for studied samples.There was a highly positive significant ($p < 0.05$) relationship between eating healthy foods with increase recover from Infection covid-19 virus, fast food with increase Infection covid-19 virus and chronic diseases   with increase infection covid-19 virus between Egyptians and Saudis .

Table (10) : Study of correlation between recover from infection with covid-19 virus, chronic diseases, infection with covid-19 virus and fast food , eating healthy foods during the period spread of the covid-19 virus for studied samples.

Categories Parameters	Recover from Infection with covid-19 virus	chronic diseases	Infection with covid-19 virus	Fast food	Eating healthy foods
Recover from Infection with covid-19 virus	1	.247**	.327	.194**	.794**
chronic diseases	.247**	1	.624	.747*	.664*
Infection with covid-19 virus	..000	.624*	1	.824*	.548**
Fast food	.194**	.747*	.824*	1	.000
Eating healthy foods	.794**	.664*	.548**	.0000	1

* p < 0.05 significant ** p < 0.01 high significant *** p<0.001 very high significant negative correlation

4-Discussion

Our results revealed that, there was a highly positive significant correlation between covid-19 virus infection and each of Cold injury, Anemia , Pulmonary diseases , chronic diseases , fatigue and dizziness in the Egyptian and Saudi society. These data agree with **(Saniasiaya and Kulasegarah, *2020*)** they found that Vertigo or dizziness has recently been described as a clinical manifestation of COVID-19.

On the other hand, in this study, exposure to sunlight resulted in a recovery from Covid 19 virus, These data agree with reports **(Wei & Christakos, 2015)** and **Zhonghua et al., (2020)** that 1,25(OH)2D3 encourages the development of cytokine by the T-helper type 2 (Th2) cells, which helps to improve the indirect inhibition of Th1 cells by supplementing this with actions influenced by a variety of cell types . In addition, 1,25(OH)2D3 facilitates activation of T regulatory cells and thus inhibits inflammation processes, **Martineau ,(2017)** showed that vitamin D supplementation lowers the odds of developing acute respiratory tract infections (most of which are assumed to be due to viruses) by 12% to 75%,vitamin D also improves the production of anti-oxidation-related genes (glutathione reductase and subunit controller glutamate–cysteine ligase).

Healthy sources of vitamins and minerals are fruit, vegetables, meat, fish, poultry and dairy products., Our results revealed that, there was a highly positive significant correlation between food consumption during the period spread of the covid-19 virus Such that fruits, vegetables, (meat, fish, poultry) ,healthy food in the Egyptian and Saudi society . This result agrees with **Gombart et al.,(2020)** they found that higher dietary intakes of fruits, vegetables, protein and omega-3 fatty acids may be useful to promote immune function during COVID-19 disease.

In the present study, the findings refer that the intake of vitamins and minerals supplements during the time of spread of the covid-19 virus from vitamin A, vitamin D, vitamin E, vitamin C and zinc was good significant (p=0.005). this study agreed with that reported by *Gombart et al.,(2020)* who investigated To ensure the proper function of the immune system, the relationship between the intake of sufficient quantities of vitamins and minerals by diet is important.

Meanwhile Read et al .,(2019) reported that, Nutrients contribute to the natural immune system functions, Vitamin D supplementation 10 ug / day preserves bones and muscles health during the COVID-19 pandemic. In addition to the consumption of

balanced diet, other nutrients such as Zn, *n*-3 fatty acids EPA + DHA ,vitamin C and the at levels above the daily reference values, help to reduce nutritional gaps, support optimal immune functions and possibly reduce risk and consequences of infection **(Grant et al.,2020 and Calder et al.,2020) .**

There has been a strong relationship between vitamins and minerals intake , age, Family income, weight and covid-19 virus infection. we found out in our results that samples that recovered from covid-19 virus were taking vitamins(A,C,D,E) and minerals (Zn). These results were supported by **Read et al .,(2019)** . Also, there is an inverse relationship between age and the deficiency of minerals and vitamins. Older adults are deficient in these helpful micronutrients, and they can derive the greatest benefit from supplementation, These data agree with **Wu and Meydani, (2014)** and **Vasarhelyi et al.,(2011)** they showed that   Serum **25-hydroxyvitamin D** concentrations appear to decrease with age, decrease active vitamin D concentrations with increased age due to less sunlight exposure and decreased skin production of 7-DHC. This could also partially explain why the COVID-19 mortality rate in older adults is higher., Also, older adults are most often deficient in these micronutrients, There is a role for the vit. E in deficiency the risk of respiratory infections by improving the response of immune in elderly people residing in elderly care homes

Table (7) show correlation between vitamins and minerals intake and recover from Infection with covid-19 virus. The values of recover from infection with covid-19 virus which take vitamins for cases were significantly higher (P=0.000) than for cases that do not take vitamins. These data agree with **Ischia ,(2020)** and **Jovic et al., (2020)** they described that This zinc supplementation is able to reduce symptoms associated with COVID-19, such as inflammation of the lower respiratory tract. Also, in micronutrient-deficient individuals at risk of COVID-19 infection, vitamin C supplementation is a sensible choice to assist with the prevention and support of immune responses.

Our results revealed that, there was a highly positive significant (P=0.05))correlation between period spread of the covid-19 virus and each of increase consumption food, Increased sun exposure and increased intake of healthy food . Nevertheless, Lack of income and fast food correlated negatively significant with period spread of the covid-19 virus , Dietary supplementation of micronutrients with recognized roles in immune function can optimize the modulation of the body's immune response, reducing the risk of infections , zinc and vitamins C and D are the micronutrients for which there is robust evidence of their immunomodulating activity these data agree with (**Name et al., 2020**).

The data agree with (**Fertig et al. ,2019**) they illustrated that Nutrition is considered a public health priority at this time to build strong immunity and prevent the body from viruses ,and Interventions that encourage home-cooked meals can help households to incorporate nutritious food items into their diet.

In addition to, **(Alhusseini and Alqahtani,2020)** they found that dietary habits have changed significantly during the COVID-19 pandemic among Riyadh residents. While some positive behaviors were developed, the food's quality and quantity were harmed.

5-Conclusion

The consumption of vitamins and minerals increased in the Corona pandemic, as was the consumption of healthy food, and the consumption of fast food decreased in the Saudi Arabia and Egyptian society, Dietary habits have also changed to consuming healthy food to increase recovery from the covid-19 virus, the aim of the recent study that the risk of becoming infected could be reduced by consumption of healthy food and vitamins and minerals from food .

6-References

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دراسة مقارنة للحالة التغذوية والصحية لدى بعض الأفراد في المملكة العربية السعودية و وجمهورية مصر العربية خلال فترة جائحة كوفيد 019

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أعلنت منظمة الصحة العالمية أن فيروس (كوفيد– 19)– وباءً في مارس من عام 2020. ولمكافحة الفيروسات ، لابد من الحفاظ على نظام غذائي متوازن وكافي. حيث سيساعد ذلك على تحسين وظيفة الجهاز المناعي. هدف البحث الى تقييم تأثير جائحة (كوفيد– 19) على استهلاك المكملات من الفيتامينات والمعادن، وكذلك تناول الطعام المتوازن، واستهلاك الوجبات السريعة وعلاقه ذلك بالتعافي من الإصابة بفيروس (كوفيد–19) بين البالغين في المملكة العربية السعودية ومصر تم ذلك باستخدام الاستبيان الالكترونى وتوزيعه عبر الإنترنت. تضمنت هذه الدراسة مجموعه مكونه من 400 شخص من منطقة الباحة في المملكة العربية السعودية وجمهورية مصر العربية. تم تقسيم الأشخاص إلى مجموعتين: المجموعة الاولى– 200 فرد من المملكة العربية السعودية– المجموعة الثانية مكونه من 200 فرد من مصر 0 وكانت النتائج ان الغالبية من افراد العينة كانوا يتناولون الطعام الصحي مثل (اللحوم – الأسماك – الدواجن – الخضروات والفواكه) بشكل يومي على التوالي (47.25٪– 44%) (41.25%) –(46.25 – 36.25 ٪) –(30.75 ٪) و (33.75% –27.5%) على التوالى في المجمع السعودى والمصرى خلال انتشار الجائحة. كما كانت كميه استهلاك المكملات من الفيتامينات والمعادن تمثل (37.5% –22.5% من فيتامين أ) – (32% –38.75%من فيتامين د)– (22.25 %– 22.25%من فيتامين هـ) – (47.5% –50% من فيتامين ج) و(40.5% – 18.75 % من الزنك) على التوالي خلال فترة الجائحة 0خلصت الدراسة الى زيادة استهلاك المكملات من الفيتامينات والمعادن ،كما تم تناول الطعام صحي ، وزيادة التعرض لأشعة الشمس للحصول على فيتامين د ، كما انخفض تناول الوجبات السريعة خلال فترة انتشار فيروس كوفيد – 19فى كلا من في المملكة العربية السعودية وجمهورية مصر العربية.

الكلمات المفتاحية : الفيتامينات ـ المعادن – (كوفيد -19) ـ جهاز المناعة