DOI: https://doi.org/10.47391/JPMA.5405

Evaluating a physicians' perspective on the use of probiotics and vitamins against coronavirus disease

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Abstract

Objective: To evaluate the perspective of family physicians on probiotics and vitamins against coronavirus disease-2019.

Methods: The cross-sectional study was conducted from June 1 to 30, 2021, after approval from the ethics review committee of Bursa Uludag University, Bursa, Turkey, and comprised family physicians of either gender working at family health centres in the country. Data was collected using an online questionnaire to measure the sociodemographic characteristics, habits, health status related to coronavirus disease-2019, and their knowledge, awareness and behaviour towards the use of probiotics and vitamins during the pandemic. Data was analysed using SPSS 25.

Results: Of the 218 family physicians, 130(59.6%) were male and 88(40.4%) were female. The overall mean age was 46.82±5.85 years, mean professional experience was 22.32±8.75 years, and mean experience in family medicine was 10.14±3.51 years. The knowledge and awareness level about coronavirus disease-2019 was high 4.18±0.58, exposure to the disease 3.36±0.83 and their inclination towards the use of vitamins and probiotics 1.68±0.75 was low. Among the participants, 90(41.3%) used probiotic products and 120(55%) used drugs, such as vitamins and minerals. Vitamin C 99(45.4%) was the most commonly used supplement.

Conclusion: Physicians' knowledge and awareness and a realistic scientific approach are important when recommending supplements, such as probiotics, vitamins and minerals, to individuals during the pandemic.

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Key Words: COVID-19, SARS-CoV-2, Probiotics, Vitamins, Survey.

Introduction

The novel severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection, causing the coronavirus disease-2019 (COVID-19), has been declared a pandemic by the World Health Organisation (WHO) and has caused concerns globally.[1] Virus containment strategies are insufficient for protection from the disease. Some food products, used as medicine and nutrients, have immunomodulatory effects in the form of anti-oxidative and anti-inflammatory activities, even though their intracellular mechanisms are unclear.[2] Probiotics, vitamins, minerals and some food supplements are beneficial against viral infections by increasing the immune response with an immunomodulatory effect.[3–6] Probiotics that counteract the cytokine storm produced during coronavirus infection can modulate host immune responses.[7–8]

The positive effects of dietary supplements and functional foods on human health have also been seen during the coronavirus pandemic. The European Food Safety Authority reported that this positive effect should be demonstrated by the tests applied.[9] Probiotics, vitamins and some trace elements are effective in increasing immunity, particularly in the elderly population.[10] The use of food supplements has been recommended, particularly in children[11] and cancer patients.[12]

Thus, probiotics and vitamins could be used in the prevention and management of COVID-19.[13] A study indicating malnutrition to be the main cause of more adverse outcomes and higher mortality among patients with the disease focussed on the positive effects of diet and probiotics on the gut microbiome.[14]

Probiotics, vitamins and supplements also have a regulatory role in systemic inflammation or endothelial damage; two important aspects of COVID-19. Probiotics and supplements reduce inflammatory cell accumulation in the respiratory epithelium and facilitate virus clearance.[15]

A study investigating chronic or immunosuppressive diseases, obesity and malnutrition among the risk factors for severe coronavirus infection stated the

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importance of nutrition during the pandemic. Nutrients with anti-inflammatory, anti-thrombotic and anti-oxidant properties are believed to prevent or reduce the inflammatory and vascular manifestations associated with COVID-19.[16]

As the pandemic continues to affect a significant population, it is important to evaluate the perspective of family physicians on the use of probiotics and vitamins. The current study was planned to evaluate the family physicians' perspective on the use of probiotics and vitamins during the pandemic.

Subjects and Methods

The cross-sectional study was conducted from June 1 to 30, 2021, after approval from the ethics review committee of Bursa Uludağ University, Bursa, Turkey, and comprised family physicians of either gender working at family health centres in the country. Data was collected through an online questionnaire (Appendix) using web link provided by the Vademecum Medication Guide[17] to measure the sociodemographic characteristics, habits, health status related to COVID-19, and their knowledge, awareness and behaviour towards the use of probiotics and vitamins during the pandemic.

After permission was obtained from the Turkish Ministry of Health, the sample was calculated with 10% error margin and 98% confidence level[18]. The sample was raised using simple random sampling method from among family physicians practicing in the region during the specified study period and provided informed consent. The questionnaire had a Cronbach alpha coefficient of 0.85 which was sufficiently reliable. Factor analysis for the construct validity test determined that 25 statements were gathered in a single dimension. In the evaluations, the scale was prepared using a 3-point Likert structure. A score of 3 or close to 3 indicated a high level of knowledge and awareness. The questionnaire was provided anonymously, after obtaining informed consent from the physicians.

Data was analysed using SPSS 25. Descriptive statistics were presented as frequencies, percentages, mean values and standard deviations. Independent sample t-

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tests and analysis of variance (ANOVA) were conducted to examine the differences in the scales according to the characteristics of the participants. Correlation analysis was performed to examine the relationship between the scales. The level of statistical significance was set at $p<0.05$.

Results

Of the total 2521 family physicians eligible for inclusion, 218(8.6%) were enrolled; 130(59.6%) males and 88(40.4%) females. The overall mean age was 46.82±5.85 years, mean professional experience was 22.32±8.75 years, and mean experience in family medicine was 10.14±3.51 years. The sociodemographic characteristics of the sample were evaluated based on smoking, alcohol consumption, consumption of immunity-affecting drugs, exercise and diet consumed (Table 1). Also noted was COVID-19 status of the individuals (Table 2) and the supplementary medicines, if any, that the physicians were using to protect themselves from COVID-19. Among the participants, 90(41.3%) used probiotic products and 120(55%) used drugs, such as vitamins and minerals. Vitamin C 99(45.4%) was the most commonly used supplement (Table 3).

The knowledge and awareness level about COVID-19 was high 4.18±0.58, exposure to the disease was 3.36±0.83 and their inclination towards the use of vitamins and probiotics 1.68±0.75 was low.

However, these parameters varied according to smoking history ($p=0.01$). The level of negative impact from COVID-19 in current smokers was lower than that in non-smokers ($p=0.01$). No difference was found in the inclination towards the use of probiotics and vitamins against the disease and levels of knowledge and awareness towards it ($p>0.05$).

The level of adverse effects from COVID-19 differed according to the exercise status of the participants ($p=0.01$). Participants who exercised >150min a week were not affected by the disease and had higher COVID-19 knowledge and awareness levels.

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Inclination towards the use of probiotics and vitamins against the disease was lower in participants who exercised >150 min (p=0.01) (Table 4).

The level of adverse effects from COVID-19 also differed according to the participants' status of being diagnosed with the disease and using drugs for its treatment (p=0.01). Participants diagnosed with COVID-19 and undergoing treatment had a higher level of negative effects from the disease (p<0.05). However, the inclination towards the use of probiotics and vitamins against COVID-19 and the level of knowledge and awareness towards it did not differ significantly on being diagnosed with the disease and using COVID-19 medication (p>0.05).

The level of protection against the disease, inclination towards the use of probiotics and vitamins, and knowledge and awareness levels of the disease varied according to the COVID-19 polymerase chain reaction (PCR) test and vaccination status of the participants (p=0.01). The participants who had taken the PCR test and vaccine were negatively affected by the disease, had a low level of knowledge and awareness towards it, and had a high level of inclination towards the use of probiotics and vitamins against the disease.

The level of protection against the disease, inclination towards the use of probiotics and vitamins against it, and the knowledge and awareness levels of the disease did not differ according to the probiotic use of the participants (p>0.05), and the same was the case with vitamin A (p>0.05) (Table 5).

According to the participants' use of vitamins B, C and D, magnesium, selenium and omega 3 during the pandemic, the inclination towards the use of probiotics and vitamins against the disease, and the level of knowledge and awareness towards the disease were not different (p>0.05), but those who used these supplements were found to be less affected by the disease than non-users (p=0.03 for vitamin B, p=0.04 for vitamin C, p=0.01 for vitamin D, magnesium, selenium, and omega 3 (Table 6).

The age and experience of the participating physicians had a significant relationship (p<0.05) with the level of protection against COVID-19, inclination towards the use of probiotics and vitamins against the disease, and the knowledge and awareness levels

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of the disease, which, in contrast, had an inverse and significant relationship with the participants' professional experience in family medicine ($p<0.05$). Among the participants with a high level of family medicine experience, the negative effects of the disease ($r=-0.12$, $p=0.04$), inclination towards the use of probiotics and vitamins against it ($r=-0.15$, $p= 0.03$), and COVID-19 knowledge and awareness levels ($r=-0.18$, $p=0.01$) were lower than in participants with less experience in family medicine. The level of protection against the disease was found to be positively correlated with the inclination towards the use of probiotics and vitamins against COVID-19 ($r=0.14$, $p=0.04$) and disease knowledge and awareness levels ($r=0.37$, $p= 0.01$). In contrast, a negative correlation existed ($r=-0.47$, $p=0.01$) between inclination towards the use of probiotics and vitamins and the disease knowledge and awareness levels.

Discussion

The current study found that the participating family physicians' level of knowledge and awareness towards COVID-19 was very high, the level of negative impact from the disease was high, and the inclination towards the use of probiotics and vitamins against it was low. Participants diagnosed with the disease and using its medication had higher levels of adverse effects from COVID-19 than those not diagnosed with the disease. As expected, vaccinated participants showed lower levels of adverse effects from the disease than the unvaccinated participants.

Modern lifestyle and various diseases can cause an imbalance in the intestinal flora. Although the use of probiotics is recommended to address this, the dosage should be accurately calculated, considering interdependent factors. Several studies have examined the beneficial effects of probiotics as a potential adjuvant therapy for COVID-19.[19] Evaluation and management of the potential role of probiotics in the pandemic require a tailored approach and scientific awareness.[20]

Factors such as individuals' lifestyles, their current diseases, and the risks they are exposed to have been effective in the prevention, treatment and recovery phases of COVID-19. However, family physicians are primarily responsible for addressing these

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phases and convey scientific and reliable information to individuals and societies. Thus, family physicians need to have sound scientific knowledge and awareness of adjuvant treatments, vaccination and treatment methods. During the COVID-19 pandemic, the approach of family physicians towards probiotics, vitamins and other supplements is important.

Functional foods optimise the immune system's capacity to prevent and control pathogenic viral infections. However, physical activity has similar protective effects. Exercise improves adaptive immune systems in the acute, temporary and long-term phases. Regular moderate exercise, healthy dietary habits, and functional foods can contribute to reducing viral risk and improving sleep quality during quarantine. Adequate nutrition with a healthy lifestyle and functional foods is important for protection against COVID-19.[21] The current findings corroborate the above information.

According to the results of a study investigating the effects of the regular consumption of dietary supplements on SARS-CoV-2 infection, women who took multivitamins, omega-3 fatty acids, probiotics, or vitamin D reported a lower risk of SARS-CoV-2 infection, while a clear benefit was seen for men in the same study.[22] No effects of vitamin C, garlic or zinc have been reported. The use of vitamins and minerals also strengthens human immunity against COVID-19.[23]

The level of protection against COVID-19, inclination towards the use of probiotics and vitamins, and knowledge and awareness levels of the disease varied among participants who took the COVID-19 PCR test. Besides, vitamin C was the most commonly consumed supplement.

Various dietary supplements and nutraceuticals often contain vitamin C, vitamin D, and zinc, which are believed to treat respiratory infections or boost immunity. Consumers need to be aware of false claims regarding some supplements. Scientific regulations should be enacted by authorities in this regard.[24] The current study suggests that society and individuals obtain reliable and scientific information instead

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of baseless claims. Thus, the physicians should work on their perspectives and awareness levels towards probiotics and supplements.

The current study is one of the few presenting the level of awareness about probiotics, vitamins and similar supplements among family physicians during the COVID-19 pandemic. However, it has its limitations as it was a cross-sectional study. It is generally applicable to educated and economically stable populations residing in metropolitan cities.

Conclusion

During the pandemic, the tendency to use probiotics, vitamins and similar supplements was generally low among the family physicians, and it was observed that the negative effects of the disease were lower in those who used supplements than those who did not. The knowledge and awareness of COVID-19 was high among the family physicians. For a healthier approach, guidelines about the indications of probiotic and vitamin usages during routine practice and pandemics must be determined for the physicians.

Acknowledgement: We would like to thank Vademecum (http://www.vademecumonline.com.tr) for its online support, Editage (http://www.editage.com) for English language editing and ARGEV (The Turkish Family Medicine Research Development and Education Foundation http://www.argev.org.tr) for providing education before the study and for their cooperation, and our colleagues and family physicians who have contributed to this study by participating in all regions of Turkey.

Disclaimer: None.

Conflict of Interest: None.

Source of Funding: None.

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Appendix: The study questionnaire.

1-Age
2-Gender: Female / Male
3-City/District where you work
4-How many years have you been practicing medicine?
5-How many years have you been practicing family medicine?
6-Have you smoked? Yes (…….pack/year) No
7-Do you still smoke? Yes (…… pack/year) No
8-Do you drink alcohol? Yes (……..often) No
9-Do you use medication? (Medicines that affect the immune system) Yes No
10-Do you exercise? >150 minutes/week <150 minutes/week None
11-How do you usually eat? High Calorie Snack Home Made Meal
12-Have you been diagnosed with COVID-19? Yes No
13-Have you used medication for COVID-19? Yes No
14-Have you had a COVID-19 PCR test? Yes No
15-If you had a COVID-19 PCR test, the result? Negative Positive
16-Have you been vaccinated against COVID-19? Yes No
17-Have you used probiotics during the COVID-19 pandemic? Yes No
18-Did you use vitamins, minerals, etc. during the COVID-19 pandemic? Yes No

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19-If you have used it, you can mark more than one: Vitamin A / Vitamin B / Vitamin C / Vitamin D /
Zinc / Magnesium / Selenium / Omega 3 / Other
Responses received as I agree / I have no idea / I do not agree ;
20-COVID-19 can be seen in all age groups, preventive medicine is important.
21-COVID-19 causes pneumonia in some patients.
22-COVID-19 does not cause symptoms or signs in some people
23-Those who have COVID-19 asymptomatically can also transmit the virus to other people
24-Some diseases such as diabetes, obesity, asthma, heart disease, cancer may increase the risk of contracting COVID-19 or cause COVID-19 to progress more severely. Additional treatments may be required.
25-SARS-CoV-2 virus may mutate (change), vaccine and additional measures may be required.
26-I feel safe having the COVID-19 vaccine.
27-Since I have been vaccinated against COVID-19, I no longer apply additional protection methods very strictly.
28-People who have had COVID-19 can be checked to see if antibodies have developed against the SARS-CoV-2 virus
29-Vaccination is very important in the prevention of COVID-19. Additional prevention methods should also be applied.
30-I think that COVID-19 will never end.
31-I feel tired because of COVID-19.
32-I think my diet is inadequate due to COVID-19.
33-I feel stressed because of COVID-19.
34-I am having trouble sleeping due to COVID-19.
35-I have been away from my family, friends and social circle due to COVID-19.
36-Omega-3 is very important to protect from COVID-19. I prescribe it to my patients.
37-It is very important to take vitamin supplements to protect against COVID-19. I prescribe it to my patients
38-It is very important to take mineral supplements to protect against COVID-19. I prescribe it to my patients
39-Fermented dairy products may contain probiotics.
40-Probiotics may be useful in diarrhea associated with antibiotic use.
41-Probiotics may be useful in some diarrhea caused by travel.
42-It is very important to use supplemental probiotics to protect against COVID-19. I recommend it to my patients
43-Probiotics are useful in the prevention and treatment of COVID-19 and other inflammatory bowel diseases.
44-Herbal supplements are useful for protection from COVID-19. I recommend it to my patients.

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SARS-CoV-2: Severe acute respiratory syndrome coronavirus 2, COVID-19: Coronavirus disease-2019.

Table 1: Sociodemographic characteristics of the participating physicians.

		n	%
Gender	Male	130	59,6%
	Female	88	40,4%
Did you smoke?	Yes	69	31,7%
	No	149	68,3%
Are you still smoking?	Yes	29	13,3%
	No	189	86,7%
Do you drink alcohol?	Yes	58	26,6%
	No	160	73,4%
Are you using medication? (medicine that affect the immune system)	Yes	34	15,6%
	No	184	84,4%
Are you exercising?	< 150 min/week	122	56,0%
	> 150 min/week	68	31,2%
	None	28	12,8%
How do you usually eat?	Home-cooked Food	207	95,0%
	High Calorie Snack	11	5,0%

Table 2: COVID-19 status of the participating physicians.

		n	%
Have you been diagnosed with COVID-19?	No	195	89,4%
	Yes	23	10,6%
Have you taken medicine for COVID-19?	No	192	88,1%
	Yes	26	11,9%
Have you had a COVID-19 PCR test?	No	29	13,3%
	Yes	189	86,7%
COVID-19 PCR test result?	Not done	29	13,3%
	Negative	168	77,1%

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	Positive	21	9,6%
Have you been vaccinated against COVID-19?	No	2	0,9%
	Yes	216	99,1%
Have you used probiotics during the COVID-19 pandemic?	No	128	58,7%
	Yes	90	41,3%
Have you used vitamins, minerals, etc. during the COVID-19 pandemic?	No	98	45,0%
	Yes	120	55,0%

[COVID-19: Coronavirus disease-2019, PCR: Polymerase chain reaction.

Table 3: Supplementary medicine used by the participating physicians to protect themselves from COVID-19.

		N	%
Vitamin A	No	203	93,1%
	Yes	15	6,9%
Vitamin B	No	150	68,8%
	Yes	68	31,2%
Vitamin C	No	119	54,6%
	Yes	99	45,4%
Vitamin D	No	144	66,1%
	Yes	74	33,9%
Zinc	No	169	77,5%
	Yes	49	22,5%
Magnesium	No	176	80,7%
	Yes	42	19,3%
Selenium	No	194	89,0%
	Yes	24	11,0%
Omega 3	No	189	86,7%
	Yes	29	13,3%
Other	Ginseng, UMCKA	1	0,5%

COVID-19: Coronavirus disease-2019, UMCKA: Pelargonium sidoides.

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Table 4: Comparative analysis of the factors of the participating physicians regarding the adverse effect of COVID-19, their level of knowledge, and their inclination towards the use of probiotics and vitamins depending on habits.

Physician Feature			Level of Adverse Impact from COVID-19	Inclination towards the use of probiotics and vitamins against COVID-19	COVID-19 Knowledge and Awareness	p Negative	p Probiotic	p Attitude
			X±s.s.	X±s.s.	X±s.s.			
Gender	Male	130 (59,6%)	3,42±0,87	1,71±0,79	4,18±0,61	0,33	0,25	0,96
	Female	88 (40,4%)	3,29±0,75	1,62±0,69	4,18±0,53			
Did you smoke?	Yes	69 (31,7%)	3,05±0,84	1,92±0,89	3,96±0,72	0,01	0,01	0,01
	No	149 (68,3%)	3,51±0,78	1,57±0,65	4,28±0,47			
Are you still smoking?	Yes	29 (13,3%)	2,93±0,9	1,85±0,89	4,00±0,79	0,01	0,13	0,15
	No	189 (86,7%)	3,43±0,8	1,65±0,72	4,21±0,54			
Do you drink alcohol?	Yes	58 (26,6%)	3,2±0,86	1,7±0,75	4,16±0,64	0,12	0,33	0,65
	No	160 (73,4%)	3,43±0,81	1,67±0,75	4,19±0,56			
Are you using medication? (medicine that affect the immune system)	Yes	34 (15,6%)	3,21±0,75	1,55±0,58	4,16±0,5	0,45	0,09	0,63
	No	184 (84,4%)	3,23±0,83	1,7±0,78	4,19±0,59			
Are you exercising?	< 150 minute/week	122 (56,0%)	3,29±0,77	1,79±0,77	4,12±0,56	0,01	0,04	0,01
	> 150 minute/week	68 (31,2%)	3,65±0,85	1,50±0,69	4,41±0,47			
	None	28 (12,8%)	3,01±0,85	1,79±0,78	3,87±0,70			
What is your usual diet?	Kitchen Food	207 (95,0%)	3,36±0,82	1,89±0,75	4,19±0,56	0,12	0,35	0,12

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	High Calorie Snack 11 (5,0%)	3,42±1,09	1,91±0,64	4,04±0,93			

389 COVID-19: Coronavirus disease-2019.

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393 **Table 5: Comparative analysis of COVID-19-related conditions of the participating physicians and the effect**
394 **of COVID-19, their level of knowledge, and their inclination towards the use of probiotics and vitamins.**

Feature		Level of Adverse Impact from COVID-19	Inclination towards the use of probiotics and vitamins against COVID-19	COVID-19 Knowledge and Awareness	p Negative	p Probiotic	p Attitude
		X±s.s.	X±s.s.	X±s.s.			
Have you been diagnosed with COVID-19?	No 195 (89,4%)	2,47±0,76	1,67±0,74	4,20±0,56	0,01	0,14	0,08
	Yes 23 (10,6%)	3,44±0,83	1,77±0,82	3,98±0,71			
Have you taken medicine for COVID-19?	No 192 (88,1%)	2,49±0,76	1,67±0,75	4,21±0,56	0,01	0,18	0,07
	Yes 26 (11,9%)	3,47±0,78	1,73±0,76	3,97±0,68			
Have you had a COVID-19 PCR test?	No 29 (13,3%)	3,10±0,78	2,21±1,06	3,84±0,69	0,04	0,01	0,03
	Yes 189 (86,7%)	3,40±0,83	1,61±0,67	4,23±0,55			
Have you been vaccinated against COVID-19?	No 2 (0,9 %)	2,67±0,47	1,34±0,63	3,14±0,2	0,01	0,01	0,01
	Yes 216 (99,1%)	3,37±0,83	1,98±0,75	4,19±0,57			
Have you used probiotics during the COVID-19 pandemic?	No 128 (58,7%)	3,41±0,86	1,84±0,74	4,19±0,64	0,23	0,05	0,71
	Yes 90 (41,3%)	3,3±0,77	1,44±0,7	4,16±0,48			
Have you used vitamins, minerals, etc. during the COVID-19 pandemic?	No 98 (45,0%) Yes 120 (55,0%)	3,37±0,74 3,32±0,81	1,69±0,72 1,66±0,78	4,27±0,6 4,10±0,56	0,51	0,56	0,21

395 COVID-19: Coronavirus disease-2019, PCR: Polymerase chain reaction.

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Table 6: Comparative analysis of the COVID-19-related supplement usage and the factors of the participating physicians regarding the effect of COVID-19, their level of knowledge, and their inclination towards the use of probiotics and vitamins.

Content Used			Level of Adverse Impact from COVID-19	Inclination towards the use of probiotics and vitamins against COVID-19	COVID-19 Knowledge and Awareness	p Negative	p Probiotic	p Attitude
			X±s.s.	X±s.s.	X±s.s.			
Vitamin A	No	203 (93,1%)	3,39±0,83	1,69±0,76	4,18±0,58	0,06	0,08	0,42
	Yes	15 (6,9%)	3,03±0,79	1,47±0,62	4,15±0,5			
Vitamin B	No	150 (68,8%)	3,50±0,80	1,57±0,78	4,20±0,60	0,03*	0,12	0,34
	Yes	68 (31,2%)	3,08±0,82	1,78±0,64	4,15±0,53			
Vitamin C	No	119 (54,6%)	3,53±0,82	1,58±0,76	4,21±0,64	0,04*	0,19	0,36
	Yes	99 (45,4%)	3,17±0,80	1,75±0,72	4,15±0,5			
Vitamin D	No	144 (66,1%)	3,57±0,76	1,62±0,69	4,27±0,55	0,01*	0,06	0,23
	Yes	74 (33,9%)	2,96±0,81	1,80±0,84	4,01±0,6			
Zinc	No	169 (77,5%)	3,48±0,79	1,65±0,72	4,23±0,58	0,01*	0,06	0,13
	Yes	49 (22,5%)	2,97±0,85	1,85±0,84	4,01±0,54			
Magnesium	No	176 (80,7%)	3,45±0,79	1,70±0,77	4,20±0,61	0,01*	0,23	0,38
	Yes	42 (19,3%)	2,99±0,88	1,59±0,67	4,11±0,45			
Selenium	No	194 (89,0%)	3,43±0,8	1,69±0,77	4,19±0,59	0,01*	0,54	0,36
	Yes	24 (11,0%)	2,81±0,9	1,54±0,59	4,07±0,47			
Omega 3	No	189 (86,7%)	3,41±0,82	1,64±0,72	4,22±0,57	0,01*	0,05	0,08
	Yes	29 (13,3%)	3,06±0,825	1,89±0,91	3,96±0,6			
Other Ginseng,UMCA		1 (0,5%)						

COVID-19: Coronavirus disease-2019.

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