

## RESEARCH ARTICLE

 **Hatice Kucukceran<sup>1</sup>**  
 **Fatma Goksin Cihan<sup>1</sup>**  
 **Munise Daye<sup>2</sup>**

<sup>1</sup> Department of Family  
Medicine, Necmettin  
Erbakan University, Meram  
Medical Faculty, Konya,  
Turkey

<sup>2</sup> Department of  
Dermatology, Necmettin  
Erbakan University, Meram  
Medical Faculty, Konya,  
Turkey

**Corresponding Author:**  
Hatice Kucukceran  
Necmettin Erbakan  
University, Meram Medical  
Faculty, Department of  
Family Medicine, Konya,  
Turkey  
mail: drhaticeran@gmail.com  
Phone: +90 551 9337733

Received: 21.04.2021  
Acceptance: 04.07.2021  
DOI: 10.18521/kt.924043

**Konuralp Medical Journal**  
e-ISSN1309-3878  
konuralptipdergi@duzce.edu.tr  
konuralptipdergisi@gmail.com  
www.konuralptipdergi.duzce.edu.tr

## Teachers' Approaches to Strengthening Their Immune Systems during the COVID-19 Pandemic

### ABSTRACT

**Objective:** Strengthening the immune system constitutes an important part of struggling with COVID-19. The aim of this study was to evaluate the approaches of the teachers to strengthen their immunity during COVID-19 pandemic in Turkey.

**Methods:** This descriptive study was conducted between 15 June - 15 July 2020 in teachers using social media. The 31-questioned online survey included multiple-choice questions about sociodemographic characteristics, health conditions before and after the onset of the COVID-19 pandemic, lifestyle changes such as nutrition, sleep, stress and exercise, information about the immune system, methods used to strengthen immunity, and training needs of the participants.

**Results:** The median age of all 500 participants was 37 (min: 22, max: 69) years and 76.8% were women. Of the teachers, 47.4% stated that they gained weight during COVID-19 pandemic period. Fruit and vegetable consuming (52.8%), praying (36.2%) and sunbathing (26.0%) were the most common methods to strengthen immunity. Of the teachers, 45.2% (n:226) were using supplementary products. The most commonly used supplements are; Vitamin D (17%), vitamin C (14.2%) and multi-vitamin (10.8%). While there was no statistically significant difference between supplementary product usage and income levels ( $p = 0.839$ ), there was a significant difference with allotting of money for their health ( $p = 0.001$ ). Of the teachers, 46.2% were confident about their knowledge on immunity strengthening methods and 61.2% stated that they would like to be trained.

**Conclusions:** In this study, more than half of the teachers stated that their stress increased during the pandemic period and almost half of them gained weight during this period. Teachers are eager to learn how to improve their health. Informing the teachers, who are good role models for the society, about the methods that strengthen the immune system, may cause permanent behavioral changes in the society.

**Keywords:** COVID-19, Immune System, Nutrition, Healthy Lifestyle, Complementary Therapies.

## Öğretmenlerin COVID-19 Pandemisi Döneminde Bağışıklık Sistemini Güçlendirme ile İlgili Yaklaşımları

### ÖZET

**Amaç:** Bağışıklık sistemini güçlendirmek, COVID-19 ile mücadelenin önemli bir bölümünü oluşturur. Bu çalışmanın amacı, öğretmenlerin COVID-19 pandemisinden nasıl etkilendiklerini ve bağışıklıklarını güçlendirmeye yönelik yaklaşımlarını değerlendirmektir.

**Gereç ve Yöntem:** Tanımlayıcı tipteki bu çalışma, sosyal medya kullanan öğretmenlere 15 Haziran - 15 Temmuz 2020 tarihleri arasında anket uygulanarak gerçekleştirilmiştir. Otuzbir soruluk online ankette sosyodemografik özellikler, COVID-19 pandemisinin başlamasından önceki ve sonraki sağlık koşulları, beslenme, uyku, stres ve egzersiz gibi yaşam tarzı değişiklikleri, bağışıklık sistemi hakkındaki bilgileri, bağışıklığı güçlendirmek için kullanılan yöntemler ve eğitim ihtiyaçları hakkında çoktan seçmeli sorular yer aldı.

**Bulgular:** 500 katılımcının medyan yaşı 37 (min: 22, max: 69) yıl ve %76.8'i kadındı. Öğretmenlerin %47.4'ü COVID-19 pandemi döneminde kilo aldıklarını belirtti. Bağışıklığı güçlendirmek için kullandıkları en yaygın yöntemler, meyve ve sebze tüketimi (%52.8), dua etmek (%36.2) ve güneşlenmek (%26.0) olarak tespit edildi. Öğretmenlerin %45.2'si (n: 226) takviye ürün kullanıyordu. Takviye preparatlardan en sık kullanılanlar; vitamin D (%17) , vitamin C (%14.2) ve multi vitamin (%10.8) idi. Takviye ürün kullanımı ile gelir seviyeleri arasında istatistiksel olarak anlamlı bir fark yok iken ( $p=0.839$ ), sağlıklarına para ayırma ile ( $p = 0.001$ ) anlamlı farklılık vardı. Öğretmenlerin %46.2'si bağışıklığı güçlendirme yöntemleri konusundaki bilgilerine güvenirken, %61.2'si bu konuda eğitim almak istediğini belirtti.

**Sonuç:** Çalışmamızda, öğretmenlerin yarıdan fazlası pandemi döneminde streslerinin arttığını ve bu dönemde neredeyse yarısı kilo aldığını belirtti. Öğretmenler sağlıklarını nasıl iyileştireceklerini öğrenmeye isteklidir. Toplum için iyi bir rol model olan öğretmenlere, bağışıklık sistemini güçlendiren yöntemler hakkında bilgi verilmesi, toplumda kalıcı davranış değişikliğine sebep olabileceğini düşünmekteyiz.

**Anahtar Kelimeler:** COVID-19, Bağışıklık Sistemi, Beslenme, Sağlıklı Yaşam, Tamamlayıcı Tedaviler.

## INTRODUCTION

In December 2019, a disease emerged in Wuhan, China, with clinical symptoms of acute upper respiratory tract infection (1). COVID-19 is a new type of corona virus quickly spreading among humans through droplets, and the World Health Organization declared it is a controllable pandemic on March 10, 2020 (2). That same day, it was declared that the virus was also detected officially in Turkey (3).

Besides many negative consequences in terms of health, economic and social aspects, COVID-19 pandemic also has negative consequences in the field of education (4). This study is important as it was carried out at the early months of the pandemic, when schools were closed and distance education was initiated. Because, it has been observed that individuals perceive an increased level of fear, anxiety and stress, especially during the emergence of the epidemic and the increase in the number of cases (5).

As pandemic termination time cannot be assumed, strengthening the immune system is important. Since the Spanish influenza pandemic in 1918, both insufficient and excessive nutrition have been found to negatively affect viral infection prognosis (6). Obesity, additional chronic diseases, and an unhealthy lifestyle interact to impair immune function and increase the risk of serious infectious diseases (7). Physical exercise is the strongest non-pharmacological and most positive immunomodulatory intervention. A moderate degree of aerobic exercise (fit-walking, cycling, swimming and running) has a anti-inflammatory effect, decreasing alpha-TNF, MCP-1 and IL-6 and increasing IL-10 (6).

In pandemics whose influence has expanded so much, the issue must be dealt with in a very comprehensive way in order to cope with the disease and overcome it with the least damage. Such an approach is to exhibit the many stakeholders (media, health care organizations, educators, general ducation services, public institutions, all academic fields, etc.) is extremely important to act together (8).

Teachers and health workers are two important occupational groups that interact with each other and set role models for the society. At the Ottawa First Health Promotion Conference (1986), while discussing health promotion at a universal level, it was stated that health promotion activities are not only the responsibility of the health sector, but a multisectoral working environment is needed (9).

The students are spending more time with their teachers than their parents and other relatives. Teachers adopting a healthy life will also have a lasting impact on students.

The aim of this study was to evaluate how teachers are affected by the COVID-19 pandemic

and their approaches to strengthening their immunity.

## MATERIAL AND METHODS

This descriptive study was approved by the Ministry of Health and ethical board of the xxx University (2019/2619) and conducted according to the ethical principles of Helsinki Declaration.

The study group was consisted of teachers who had social health insurance, and were using social media accounts. A literature review with words “immune system, nutrition, healthy lifestyle” was made in PubMed, Clinical Key and Google Scholar databases and an online survey with 31 questions was prepared according to the previous studies. Participants were reached through national ‘Turkish teacher’s Facebook group’. Ten pilot survey were fulfilled and the questions were arranged according to the feedback of the participants. The survey could be completed in about 15 minutes. It contained multiple-choice questions on socio-demographic characteristics, health conditions before and after the initiation of the COVID-19 pandemic, lifestyle changes, such as nutrition, sleep, stress and exercise, knowledge on the immune system, methods used to strengthen immunity and training needs of the participants. The survey was performed online between June 15 and July 15, 2020, in three months after the schools were closed due to the COVID-19 pandemic in Turkey. All volunteers (n = 513) approved to join the online study. Thirteen participants did not complete the survey, so they were excluded during data analysis.

**Statistical Analysis:** Data coding and statistical analyses were done using SPSS 13.0. Minimum and maximum values, means, standard deviations, medians, percentage values and chi-square, Mann Whitney U, Kruskal-Wallis and paired sample T tests were used. The significance level was accepted as  $p < 0.05$ .

## RESULTS

The median age of all 500 participants was 37 (min: 22, max: 69) years old. Socio-demographic characteristics of the participants are given in Table 1.

**Table 1.** Socio-demographic characteristics of participants

	n	%
<b>Gender</b>		
Female	384	76.8
Male	116	23.2
<b>Working status</b>		
Unemployed	19	3.8
Works in a public institution	411	82.2
Works in a private institution	55	11.0
Retired	7	11.4
Other	8	1.6
<b>Income Level</b>		
Income lower than the expenses	68	13.6
Income is equal to the expenses	300	60.0
Income is higher than the expenses	132	26.4

About 59% of the participants (n = 295) allotted a small share of their budget for their health needs, 23.2% (n = 116) allotted a high share and 19.4% (n = 97) allotted no money for their health.

Income levels were correlated with the allowance for health (p < 0.001). Median body mass index (BMI) of the participants was 25.14 (min:16.53 - max:43.55) kg/m<sup>2</sup> (Table 2).

**Table 2.** BMI values according to gender

BMI classification	Gender		Total n (%)	$\chi^2$	P
	Female n (%)	Male n (%)			
Thin (<18.5 kg/m <sup>2</sup> )	9 (2.3)	0 (0.0)	9 (1.8)	53.709	<0.001
Normal (18.5-24.9 kg/m <sup>2</sup> )	236 (61.5)	32 (27.6)	268 (53.6)		
Overweight (25-29.9 kg/m <sup>2</sup> )	97 (25.3)	58 (58.6)	165 (33.0)		
Fat (≥30 kg/m <sup>2</sup> )	42 (10.9)	16 (13.8)	58 (11.6)		

BMI: Body mass index

While 47.4% (n:237) gained weight during COVID-19 pandemic, 41.4% (n: 207) stated that their weight were stable and 11.2% (n:56) lost weight. There was not any significant difference between the genders (p=0.318). Weight change and BMI changes were significantly related (p=0.007).

Of the participants, 23.8% (n:119) had chronic diseases. Gender was not related with chronic disease presence (p=0.252) whereas age and chronic disease presence were significantly related (p<0.001).

Of the teachers, 21.8% (n:109) had regular medical screening even though they did not have complaints. There was no significant difference between the genders (p:0.061).

Of participants, 46.2% (n:231) believed that they knew immune system strengthening methods very well, 49.4% (n:247) had few information while 4.4% (n:22) had no idea. A significant

relationship was present between their knowledge and caring about healthy nutrition (p<0.001).

Of the teachers, 64.4% (n:322) stated that they never smoked while 27.6% (n:138) were still smoking and 8% (n:40) quitted. Among smokers, 62 (44.9%) smoked the same amount, 50 (36.2%) smoked less and 26 (18.8%) stated that they increased number of cigarettes during COVID-19 pandemic. Smoking rate was significantly higher in males (p<0.001).

According to the participants, there was no difference in their health condition before and during COVID-19 (p:0.294).

Of the participants, 3.8% (n:19) were using anti-depressants and two (0.4%) of them initiated during COVID period.

The participants' stress levels, exercising condition, sleep duration and quality changes with COVID-19 pandemic are listed in Table 3.

**Table 3.** Evaluation of lifestyle changes during COVID-19 pandemic based on genders

	How would you evaluate your lifestyle changes in COVID-19 compared to the past?									P
	Increased			Decreased			Didn't change			
	Female n (%)	Male n (%)	Total n (%)	Female n (%)	Male n (%)	Total n (%)	Female n (%)	Male n (%)	Total n (%)	
Stress level	230 (59.9)	44 (37.9)	274 (54.8)	56 (14.6)	22 (19.0)	78 (15.6)	98 (25.5)	50 (43.1)	148 (29.6)	p<0.001
Exercising Condition	86 (22.4)	17 (14.7)	103 (20.6)	132 (34.4)	56 (48.3)	188 (37.6)	166 (43.2)	43 (37.1)	209 (41.8)	p=0.019
Total sleep duration per day	231 (60.2)	82 (70.7)	313 (62.6)	59 (15.4)	14 (12.1)	73 (14.6)	94 (24.5)	20 (17.2)	114 (22.8)	p=0.844
Sleep Quality	72 (18.8)	20 (17.2)	92 (18.4)	173 (45.1)	50 (43.1)	223 (44.6)	139 (36.2)	46 (39.7)	185 (37.0)	p=0.789
Spending time for one's self	231 (60.2)	82 (70.7)	313 (62.6)	59 (15.4)	14 (12.1)	73 (14.6)	94 (24.5)	20 (17.2)	114 (22.4)	p=0.117
Caring about healthy nutrition	128 (33.3)	34 (29.4)	152 (30.4)	94 (24.5)	26 (22.4)	120 (24.0)	162 (42.2)	56 (48.3)	218 (43.6)	p=0.506

Seven (1.4%) participants had positive COVID-19 test while 98.4% (n:492) did not performed any test.

Of the participants, 79.0% (n:395) were afraid of being infected by COVID-19 and fear was significantly higher in women (p:0.003).

Methods and treatments applied by the participants to strengthen their immunity during COVID-19 pandemic are listed in Table 4. Of the teachers, 54.8% (n:274) were not using any

supplementary products. Among 226 individuals using supplementary products, 121 (53.53%) said quality/certificate of the product is important, 97 (42.92%) used a product recommended by their doctor, 77 (34.07%) preferred the ones sold at pharmacy and 17 (7.52%) cared the price of the product.

Income levels didn't affect supplementary product usage (p=0.839) but it was correlated with allotting money to their health (p=0.001).

**Table 4.** Methods and treatments to strengthen immunity during COVID-19 pandemic

Methods	n	%	Treatments	n	%
Vegetable and fruit-based nutrition	264	52.8	Using multi vitamin reinforcement	54	10.8
Praying	181	36.2	Traditional and Complementary Medicine	9	1.8
Sunbathing	130	26.0	Taking vitamin D supplement	85	17.0
Probiotics rich nutrition	126	25.2	Taking probiotic supplement	16	3.2
Consuming honey	113	22.6	Using Propolis supplements	37	7.4
Eating fish for 1-2 times a week	70	14.0	Taking Omega 3 supplement	40	8.0
Exercising regularly	85	17.0	Taking zinc supplement	27	5.4
Consuming blackseed	59	11.8	Using blackseed or blackseed oil supplement	23	4.6
Meditation, yoga	16	3.2	Using Vitamin C supplement	71	14.2

When the side effects were questioned, 7 participants (1.4%) stated that they had gastrointestinal system side effects related with iron, magnesium, omega-3 and B12 supplements and 4 (0.8%) had skin rashes or allergy related to the use of aloe vera containing products, fish oil, zinc and multi-vitamin use. One person (0.2%) reported decreased kidney functions due to vitamin D supplementation while another participant reported impaired liver functions due to omega-3 supplement.

Of the teachers, 61.2% (n:306) stated that they wanted to be trained on immunity strengthening methods. Willingness to take training were not related with gender (p:0.068) but it was significantly related to age (p:0.006).

Of the teachers, 84.8% (n:424) agreed that they would suggest the methods they experienced and benefited, to their relatives, neighbors, friends or students.

## DISCUSSION

Infectious diseases not only affect the physical health of individuals, but also the psychological health and well-being of the entire population, whether infected or not. Even after the epidemic ends, the psychological effects will likely last for months or even years when we return to our normal lives (10). Our study is important because it reveals how teachers, who are an exemplary role model for the society, are affected by the COVID-19 pandemic and what they do to improve their immunity. Actually, no similar study was found in the literature.

In our study, more than half of the teachers stated that their stress increased during the pandemic and one out of five participants stated that they were afraid of contracting the COVID-19 disease. Chronic stress now appears consistently in the literature as factors that often have a weakening effect on the immune system (11). Their stress levels increased, and this could be attributed to the increased time spent at home, news about the pandemic, worries about health, etc.

Increased stress levels resulted in an increased amount of fat, carbohydrate and protein consumption. Sleep disorders also increase nutrient

intake, and this leads to a dangerous and vicious cycle (12). Nearly half of the participants gained weight during pandemic, and the quality of their sleep was also impaired despite increased sleep durations. Physical activity is advantageous for health and lowers anxiety levels (13), and regular mild and heavy exercise strengthens the immune system (14). Less than one fifth of the participants stated that they perform regular exercise. This may be related to the fact that they live and work at home, but nearly half of the participants were not performing regular exercise before the start of the pandemic. Regular exercising habits in teachers are not only healthy but these habits also position them as good role models for their students.

Noncontagious diseases constitute 70% of all global deaths (15), and underlying systemic inflammation may exacerbate COVID-19 infections (16). In our study, nearly one fourth of the teachers had a chronic disease and one third were smokers. Healthy lifestyle changes are highly important for both the prevention and treatment of noncontagious diseases (15).

Interestingly, activities, such as the consumption of fruits and vegetables, praying and sunbathing were among the main methods applied by the teachers to strengthen their immune systems. Nutrition can have a substantial impact on fighting infections (17). Evidence-based therapeutics or treatment strategies to reduce the prevalence or severity of COVID-19 have not yet been identified (17). A high consumption of a western diet, which is rich in saturated fats, sugar and refined carbohydrates, contributes to obesity and type-2 diabetes and may expose individuals to the high risk of COVID-19. However, adequate diet and nutrition fortify the immune system (17).

As pandemic termination time cannot be estimated, strengthening the immune system is important. Immunity is divided into innate and adaptive immunity. Innate immunity comprises of the elements of the immune system that provide immediate defense. Adaptive immunity deals with the reactions of T and B lymphocytes, which form the antigen-specific response (18). Antioxidants increase the lymphocyte response to mitogens, interleukin-2 production, natural killer cell activity

and the number of subsets of T cells (12). Different vitamins, including vitamins A, B6, B12, C, D and E and folate and trace elements, such as zinc, iron, selenium, magnesium and copper, play important and complementary roles in strengthening both innate and adaptive immune systems (19). In our study, about half of the teachers were using supplementary products. About half of those who used vitamin and mineral supplements preferred to use the product recommended by their doctor. Only 14 participants mentioned the side effect of the supplement they used. Health professionals should search for evidence-based studies on supplements and inform patients about their positive and negative effects.

Religions provide an optimistic philosophy on life and may propose the presence of an individual transcendental force that loves and cares about people and responds to their needs. This cognition gives individuals a subjective feeling of control over events (if God controls, he can influence the situation, and prayers may be effective in changing conditions positively) (20). Immunity has been found to increase in studies examining the relationship between religion and immune function. There is also qualitative and quantitative research showing that religion/spirituality can help people to cope better with difficulties (20). In our study, more than one third of the participants prayed to strengthen their immunity.

Approximately one-fourth of the teachers had a chronic disease and approximately one-fifth of them went to regular health check-ups even though they had no complaints. The fact that primary health care services are the first place of application and provide continuous, person-centered care is also the main reason for contact

with teachers. Informing teachers about healthy life during periodic health examinations is also of great importance in terms of public health.

In a study conducted in Turkey, it was concluded that teachers had positive attitudes toward in-service training (21). Although nearly half the teachers participating in our study believed they had very good knowledge of immunity-strengthening methods, more than half wanted to take in-service training on this subject. A majority of the teachers also reported that they would share the immunity strengthening methods they tried and benefited from, with their social environment and students. Teachers are willing to learn how to improve their health.

**Limitation:** The teachers who participated in this study are interested in this subject and actively use the internet to acquire information about it, which may have affected our results. Another limitation was that the sample did not contain sufficient number of individuals who were at high risk of mortality or hospitalization in case of being infected by COVID-19.

#### CONCLUSION

In our study, more than half of the teachers stated that their stress increased during the pandemic period and almost half of them gained weight during this period. Teachers are eager to learn how to improve their health. We think that informing the teachers, who have an important impact on and are good role models for the society, about the methods that strengthen the immune system, may cause permanent behavioral changes in the society.

We hope that this study, having been carried out in the midst of the current global health crisis, will inspire future studies in seeking solutions to global health problems.

#### REFERENCES

1. Küçükceran K, Ayrancı MK, Girişgin AS, Koçak S, Dündar ZD. The role of the BUN/albumin ratio in predicting mortality in COVID-19 patients in the emergency department. *The American journal of emergency medicine.* 2021;48:33-7.
2. Kutlu R. What we have learned about the new coronavirus pandemic, current diagnostic and therapeutic approaches and the situation in Turkey. *Turkish Journal of Family Medicine and Primary Care.* 2020;14(2):329-44.
3. Durduran Y, Kucukkartallar T, Kandemir B, Cihan FG. Experiences of a university hospital during the COVID-19 pandemic in Turkey. *Konuralp Medical Journal.* 2020;12(2):344-6.
4. Çakın M, Külekçi Akyavuz E. The Covid-19 process and its reflection on education: An analysis on teachers' opinions. *International Journal of Social Sciences and Education Research.* 2020;6(2):165-86.
5. Rajkumar R P. COVID-19 and mental health: A review of the existing literature. *Asian Journal of Psychiatry.* 2020;52:102066.
6. Luzi L, Radaelli MG. Influenza and obesity: Its odd relationship and the lessons for COVID-19 pandemic. *Acta Diabetol.* 2020;57(6):759-64.
7. de Frel DL, Atsma DE, Pijl H, Seidell JC, Leenen PJM, Dik WA, et al. The impact of obesity and lifestyle on the immune system and susceptibility to infections such as COVID-19. *Front Nutr.* 2020;19(7):597600.
8. Altındış S. Pandemilerde sağlık okuryazarlığı ve medya. *Sağlık Düşüncesi ve Tıp Kültürü Dergisi.* 2020;55:64-65.
9. Dost A, Üner E. Öğretmenlerin sağlık okuryazarlığı düzeylerinin yükseltilmesi neden önemlidir? *İstanbul Gelişim Üniversitesi Sağlık Bilimleri Dergisi.* 2020;12:475-83.

10. Bozkurt Y, Zeybek Z, Aşkın R. Covid-19 pandemisi: Psikolojik etkileri ve terapötik müdahaleler. İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi. 2020;19(37):304-18.
11. Vitlic A, Lord JM, Phillips AC. Stress, ageing and their influence on functional, cellular and molecular aspects of the immune system. AGE. 2014;36(3):9631.
12. Muscogiuri G, Barrea L, Savastano S, Colao A. Nutritional recommendations for COVID-19 quarantine. European Journal of Clinical Nutrition. 2020;74(6):850-851.
13. Antunes R, Frontini R, Amaro N, Salvador R, Matos R, Morouço P, et al. Exploring lifestyle habits, physical activity, anxiety and basic psychological needs in a sample of Portuguese adults during COVID-19. Int J Environ Res Public Health. 2020;17(12):4360.
14. Campbell JP, Turner JE. Debunking the myth of exercise-induced immune suppression: redefining the impact of exercise on immunological health across the lifespan. Front Immunol. 2018;9:648.
15. Lunde P, Nilsson BB, Bergland A, Kværner KJ, Bye A. The effectiveness of smart phone apps for lifestyle improvement in noncommunicable diseases: systematic review and meta-analyses. J Med Internet Res. 2018;20(5):e162.
16. Zabetakis I, Lordan R, Norton C, Tsoupras A. COVID-19: The inflammation link and the role of nutrition in potential mitigation. Nutrients. 2020;12(5):1466.
17. Iddir M, Brito A, Dingeo G, Fernandez Del Campo SS, Samouda H, La Frano MR, et al. Strengthening the immune system and reducing inflammation and oxidative stress through diet and nutrition: Considerations during the COVID-19 crisis. Nutrients. 2020;12(6):1562.
18. Parkin J, Cohen B. An overview of the immune system. Lancet. 2001;357(9270):1777-89.
19. Calder PC, Carr AC, Gombart AF, Eggersdorfer M. Optimal nutritional status for a well-functioning immune system is an important factor to protect against viral infections Nutrients. 2020;12(4):1181.
20. Koenig HG. Religion, spirituality, and health: the research and clinical implications. ISRN Psychiatry. 2012;2012:278730.
21. Cemaloglu N, Kukul V, Ustundag MT, Gunes E, Arslangilay AS. Determining the in-service training needs of the teachers: Bilecik province sample. Turkish Studies Educational Sciences. 2018;13(11):399-420.