

The Relationship Between Health Literacy and Adherence to Treatment in Hypertension Patients During the COVID-19 Pandemic: A Web-Based Cross-Sectional Study

COVID-19 Pandemi Sürecinde Hipertansiyon Hastalarında Sağlık Okuryazarlığı ve Tedaviye Uyum Arasındaki İlişki: Web Tabanlı Kesitsel Bir Çalışma

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ABSTRACT Objective: Inadequate health literacy and treatment incompatible are seen as an important factors in accelerating the development of hypertension-related complications and increasing the rate of admission to hospital in patients with hypertension during the coronavirus disease-2019 (COVID-19) pandemic. This research was conducted to determine the relationship between health literacy and adherence to treatment in hypertension patients during the pandemic process. **Material and Methods:** This web-based cross-sectional study was carried out with 223 hypertension patients. The research data were collected using the online questionnaire method and snowball sampling method. Multiple regression analysis and Pearson correlation test were utilized for statistical analysis. **Results:** The model established according to the results of the regression analysis is significant, and the variables in the model account for 74.7% of treatment compliance. In order of importance, regular blood pressure monitoring, passing COVID-19, application/use, health literacy, age, and duration of diagnosis was found to affect treatment compliance according to the model. In our research, it was determined that as the level of health literacy increased, the adherence to hypertension treatment increased. **Conclusion:** It was determined that regular blood pressure monitoring, having COVID-19, and health literacy were the most important variables that predicted adherence to treatment during the pandemic, respectively. In this context, it is suggested that use of methods to promote treatment adherence, such as using telehealth apps and web-based training.

Keywords: Hypertension; adherence to treatment; health literacy; COVID-19

ÖZET Amaç: Yetersiz sağlık okuryazarlığı ve tedavi uyumsuzluğu, koronavirüs hastalığı-2019 [coronavirus disease-2019 (COVID-19)] pandemisi sırasında hipertansiyona bağlı komplikasyonların gelişimini hızlandıran ve hipertansiyonu olan hastalarda hastaneye başvuru oranlarını artıran önemli bir faktör olarak görülmektedir. Bu araştırma, pandemi sürecinde hipertansiyon hastalarında sağlık okuryazarlığı ve tedaviye uyum arasındaki ilişkiyi belirlemek amacıyla yapılmıştır. **Gereç ve Yöntemler:** Bu web tabanlı kesitsel çalışma, 223 hipertansiyon hastası ile gerçekleştirilmiştir. Araştırma verileri çevrim içi anket yöntemi ve kartopu örnekleme yöntemi kullanılarak toplanmıştır. İstatistiksel analiz için çoklu regresyon analizi ve Pearson korelasyon testi kullanılmıştır. **Bulgular:** Regresyon analizi sonuçlarına göre kurulan model anlamlı olup, modelde yer alan değişkenler tedavi uyumunun %74,7'sini açıklamaktadır. Modede önem sırasına göre düzenli tansiyon takibi, COVID-19 geçirme, uygulama/kullanım, sağlık okuryazarlığı, yaş ve tanı süresinin tedaviye uyumu etkilediği bulunmuştur. Araştırmamızda, sağlık okuryazarlığı düzeyi arttıkça hipertansiyon tedavisine uyumun da arttığı belirlenmiştir. **Sonuç:** Pandemi sürecinde tedaviye uyumu yordayan en önemli değişkenlerin sırasıyla düzenli tansiyon takibi, COVID-19 hastası olma ve sağlık okuryazarlığı olduğu belirlendi. Bu bağlamda, tedaviye uyumu artırmak için tele sağlık uygulamaları ve web tabanlı eğitim gibi yöntemlerin kullanılması önerilmektedir.

Anahtar Kelimeler: Hipertansiyon; tedaviye uyum; sağlık okuryazarlığı; COVID-19

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Highlights

- Coronavirus disease-2019 (COVID-19) directly affects adherence to treatment.
- Adherence to treatment is higher in those who regularly monitor blood pressure.
- There is a strong relationship between health literacy and adherence to treatment.

COVID-19, which made its appearance in December 2019 with cases of previously undiagnosed viral pneumonia, has quickly grown into a global issue. It is seen from the data obtained in the early period that the virus is more common and more severe in individuals with chronic diseases.¹ The most common disease accompanying COVID-19 reported in epidemiological studies is hypertension, the incidence of which is increasing due to increased life expectancy, atherogenic diet, sedentary life, stress, and genetic factors.²⁻⁴

COVID-19 cases with hypertension have a high mortality and morbidity rate over the world, placing a significant financial and healthcare burden on the country. Severe acute respiratory syndrome-coronavirus-2, which is the causative agent of COVID-19, may cause undesirable effects on the lungs, kidneys and blood vessels by acting on angiotensin converting enzyme 2, which is very important in the mechanism of hypertension. As a result of this situation, the need for follow-up in ischemic heart diseases, mechanical ventilation and intensive care units increases in patients with a diagnosis of hypertension who have had COVID-19.⁴ In fact, hypertension is a highly preventable and controllable risk factor. The most important problem encountered in the treatment of hypertension is treatment incompatibility.^{5,6}

Today, in consequence of advancements in health care and the ease with which patients may acquire services such as information and counseling, compliance with treatment is improving in comparison to the past. Problems such as non-compliance with diet, sedentary life, taking the medication without a prescription, using the wrong medication, not going to regular health checks are still encountered in patients.⁷⁻⁹ It is not enough for patients to know about the treatment of hypertension, and they need to transform this knowledge into behavior. This concept

is called health literacy and is frequently mentioned in the management of chronic diseases today. The process of understanding, criticizing, and transforming information into behavior to be healthy and improve the quality of life of individuals is called health literacy. The level of health literacy must also be strong for patients to participate actively in the treatment process and for good communication between the patient and the health care provider.¹⁰⁻¹² It is understood more and more every day that health literacy is very important in the management of chronic diseases such as hypertension. Hypertension management consists of 3 basic components such as medication, diet and regular health checks. Health literacy increases compliance with treatment in patients by providing effective management of these concepts. It is known that drug use errors are high and dietary compliance is low in hypertension patients with low health literacy.^{4,6,7} Even though the COVID-19 pandemic drives individuals to learn about the new virus and acquire protective attitudes and behaviors as a result of the virus's rapid spread, the degree of health literacy in this process is still not at the intended level.⁴ In a study examining awareness, attitudes, and behaviors related to COVID-19, it was determined that approximately one-third of the participants did not accurately describe the symptoms and ways of prevention specific to COVID-19.¹³ Moreover, in studies examining the level of health literacy in patients with hypertension, it was reported that the health literacy of patients was not at the desired level.^{11,14,15} In this sense, patients with hypertension's lack of health literacy, hospitals' inability to function at full capacity during the pandemic, and the fact that patients do not go to frequent check-ups owing to the risk of contamination in this procedure all contributed to poor medication adherence.^{16,17} Severe fluctuations in blood pressure and the emergence of complications have been caused by inadequate compliance with treatment, especially in a disease such as hypertension that requires strict treatment compliance.^{18,19}

In the literature review there are studies examining the relationship between hypertension and health literacy. However, no study has been found that associates these 2 concepts with a special period

such as the COVID-19 pandemic. In this sense, it is thought that our original study, which determines the relationship between health literacy and treatment compliance, and associates these concepts with a special period such as the COVID-19 pandemic, will make significant contributions to the literature.

MATERIAL AND METHODS

STUDY DESIGN AND SAMPLE

Individuals with a diagnosis of hypertension living in Türkiye between 01.07.2021-31.10.2021 constitute the population of the descriptive and cross-sectional study. Hypertension patients who were diagnosed with hypertension at least 6 months ago by a specialist physician are 18 years of age or older, have the mental and cognitive competence to answer the forms used in the research, can understand and speak Turkish, agree to participate in the study, and sign the informed consent form, were included in the study. The data of the study were collected using the online questionnaire method and snowball sampling method. By predicting a medium effect size of 0.3 between the Health Literacy Scale and The Hill-Bone Compliance to High Blood Pressure Therapy Scale in the study, it was determined that 138 individuals should be included in the study with 95% power and 0.05 margin of error.²⁰ 223 patients who met the inclusion criteria were included in the study within the mentioned date range. In our study, post hoc power analysis was performed ($n=223$, $\alpha=0.05$, $d=0.19$), and the power of the study was found to be 0.82.

DATA COLLECTION TOOLS

Personal Information Form: It was created by the researchers as a result of the literature review.^{7,12,14} There are 18 questions in the form, 9 questions questioning the descriptive characteristics of the participants such as age, gender, marital status, education level, place of residence, etc. in part I and 9 questions questioning health-disease-related features such as hypertension diagnosis time, drug use, treatment compliance, etc. in part II.

Health Literacy Scale: The Health Literacy Scale for which Turkish validity and reliability studies were conducted was used in the study. The scale,

which is a 5-point Likert type, consists of 25 items and 4 sub-dimensions. The score to be obtained from the scale is between 25 and 125. All items of the scale without reverse items are positive. Low scores indicate that the level of health literacy is insufficient, and high scores indicate that it is sufficient and very good. The health literacy level of the individual increases as the score to be obtained increases.^{21,22}

The Hill-Bone Compliance to High Blood Pressure Therapy Scale: The Hill-Bone Compliance to High Blood Pressure Therapy Scale, for which Turkish validity and reliability study was conducted, was used in the study. The scale, which is a 4-point Likert type, consists of 14 items and 3 sub-dimensions. Except for the 6th item of the scale, all of the other items are in the form of negative questions. If the individual gives the most positive answers to all questions in the scale scoring and gets a total score of "0", he/she is considered to be fully compatible. Scores different from zero reflect the level of incompatibility. Since the questions are in the form of negative questions, the coherence decreases inversely as the score increases.^{23,24}

ETHICAL CONSIDERATIONS

This study was approved by Aksaray University Human Research Ethics Committee (date: Jun 21, 2021, no: 2021/01-63) and informed consent from the participants were obtained before data collection. The study was conducted in line with the Declaration of Helsinki.

STATISTICAL ANALYSIS

An appropriate statistical program was used in the evaluation of the data. Categorical variables were represented by numbers and percentages, whereas continuous variables and scale scores were represented by mean, standard deviation, and minimum-maximum values. Since the Health Literacy Scale and The Hill-Bone Compliance to High Blood Pressure Therapy Scale kurtosis and skewness values ranged from -1.5 to +1.5 in our study, it was accepted that the data were normally distributed. Multiple regression analysis was utilized for determining the effect of independent variables on scale scores in the study. Besides, the Pearson correlation test was used

to determine the relationship between the scales and their sub-dimensions. For all comparisons, statistical significance was defined as $p < 0.05$.

RESULTS

Of the individuals included in the study, 58.3% are women, 44.4% are 61 years old and over, 72.2% live in the city, 84.8% live with their families, and 50.2% are primary school graduates.

In addition, of the participants, 59.6% have not had COVID-19, 70.9% have regular blood pressure monitoring, 70.9% have not received training on hypertension, and 52.5% have an additional chronic disease other than hypertension (Table 1).

Variables	n	%
Gender		
Female	130	58.3
Male	93	41.7
Age		
18-40	53	23.8
41-60	71	31.8
61 age and above	99	44.4
Place		
Urban	161	72.2
Rural	62	27.8
Accommodation		
Living alone	34	15.2
Living with family	189	84.8
Education status		
Primary school	112	50.2
High school and above	111	49.8
Passing COVID-19		
Yes	90	40.4
No	133	59.6
Regular blood pressure monitoring		
Yes	158	70.9
No	65	29.1
Education on hypertension		
Yes	65	29.1
No	158	70.9
Comorbidities		
Yes	117	52.5
No	106	47.5

COVID-19: Coronavirus disease-2019.

In our study, it was determined that the Health Literacy Scale score of the hypertension patients was 92.62 ± 31.76 , and The Hill-Bone Compliance to High Blood Pressure Therapy Scale score was 11.92 ± 11.52 (Table 2). Considering the number of items in the sub-dimensions of the scales, it was determined that the highest score was obtained from the Health Literacy Scale sub-dimensions, the application, and the lowest score was obtained from the information comprehension sub-dimension. According to the number of sub-dimension items in The Hill-Bone Compliance to High Blood Pressure Therapy Scale, the interview sub-dimension had the largest inconsistency, and the medical sub-dimension had the lowest.

The model established according to the results of the regression analysis is significant, and the variables in the model account for 74.7% of treatment compliance. In order of importance, regular blood pressure monitoring, passing COVID-19, application, health literacy, age, and duration of diagnosis was found to affect treatment compliance according to the model. It was determined that the treatment compliance of those who regularly monitor blood pressure, have COVID, have high health literacy, and application sub-dimensions was higher according to the model. Similarly, it was determined that treatment compliance increased with increasing age. On the other hand, treatment incompatible is higher for those with a long diagnosis (Table 3).

It was observed that there was a significant negative correlation between The Health Literacy Scale and The Hill-Bone Compliance to High Blood Pressure Therapy Scale used in the study ($r = -0.826$, $p < 0.001$). In this sense, individuals with a low score on the Health Literacy Scale have higher treatment incompatible (Table 4).

DISCUSSION

The relationship between treatment compliance and health literacy in hypertension patients during the COVID-19 pandemic has been discussed in this section in line with the literature.

Treatment incompatible is seen as an important factor in accelerating the development of hypertension-related complications and increasing the rate of

TABLE 2: Mean scores for Health Literacy Scale and Hill-Bone Compliance to High Blood Pressure Therapy Scale.

Scales and sub-dimensions	Number of scale items	Minimum	Maximum	Mean±SD*
Health Literacy Scale	25	25	125	92.62±31.76
Access	5	5	25	18.57±7.42
Understanding	7	7	35	24.67±9.19
Appraisal	8	8	40	30.38±10.14
Application	5	5	25	18.99±6.27
Hill-Bone Compliance to High Blood Pressure Therapy Scale	14	0	39	11.92±11.52
Medical	8	0	22	5.70±6.74
Nutrition	3	0	9	2.69±2.57
Interview	3	0	9	3.52±2.69

*Standard deviation.

TABLE 3: Predictors of adherence to treatment in hypertension patients.

Variables	Hill-Bone Compliance to High Blood Pressure Therapy Scale (Model)					
	B	Std. error	Beta	t	p value	95% CI
Gender (female)	-0.528	0.869	-0.023	-0.608	0.544	-2.24, 1.18
Age	-0.155	0.047	-0.214	-3.325	0.001	-0.24, -0.06
Place (urban)	-0.441	1.089	-0.017	-0.405	0.686	-2.58, 1.70
Accommodation (with family)	-1.635	1.161	-0.051	-1.408	0.160	-3.92, 0.65
Education (high school and above)	1.343	1.151	0.058	1.166	0.245	-0.92, 3.61
Passing COVID-19 (yes)	-2.217	0.929	-0.095	-2.387	0.018	-4.04, -0.38
Duration of diagnosis	0.021	0.005	0.206	3.900	<0.001	0.01, 0.03
Regular BP ^f monitoring (yes)	3.198	0.929	0.139	3.443	0.001	1.36, 5.02
Education on hypertension (yes)	-0.320	1.127	-0.013	-0.284	0.777	-2.54, 1.90
Comorbidities (yes)	1.658	0.989	0.072	1.676	0.095	-0.29, 3.60
Health literacy	-0.186	0.046	-0.513	-4.019	<0.001	-0.27, -0.09
Application	-0.458	0.210	-0.249	-2.176	0.031	-0.87, -0.04
R ₂ :0.733	Adjusted R ₂ :0.747	F:51.722	p<0.001		Durbin-Watson:1.741	

^fBlood pressure; CI: Confidence interval; COVID-19: Coronavirus disease-2019.

admission to hospital in patients with hypertension.^{7,12} The participant's scores on the medical and nutrition sub-dimensions of the treatment compliance scale were found to be higher than the interview sub-dimension in our study. In studies conducted with hypertension patients, it was observed that treatment compliance differed.^{5,18,25} Patients with hypertension are more likely to follow medical treatment and nutritional recommendations, according to our findings, because they are aware that COVID-19 is more severe in individuals with chronic conditions. It is thought that the interview sub-dimension score is

lower than the other sub-dimensions due to the fear of contamination during the pandemic process, not going to health checks, and not communicating with health professionals enough.

It was observed that the health literacy of the patients was at a good level in our study. The mean score of the Health Literacy Scale sub-dimension of understanding information, on the other hand, was found to be lower than the other sub-dimensions. In our study, it is desirable that the hypertension patients have a good health literacy level. Because health literacy is key in the management of an important

TABLE 4: Correlation between Health Literacy Scale and Hill-Bone Compliance to High Blood Pressure Therapy Scale.

Variables		Hill-Bone Scale [§]	Medical	Nutrition	Interview
Health Literacy Scale	r	-0.826**	-0.792**	-0.783**	-0.800**
	p	<0.001	<0.001	<0.001	<0.001
Access	r	-0.759**	-0.723**	-0.734**	-0.733**
	p	<0.001	<0.001	<0.001	<0.001
Understanding	r	-0.765**	-0.733**	-0.725**	-0.741**
	p	<0.001	<0.001	<0.001	<0.001
Appraisal	r	-0.838**	-0.811**	-0.784**	-0.803**
	p	<0.001	<0.001	<0.001	<0.001
Application	r	-0.807**	-0.767**	-0.766**	-0.797**
	p	<0.001	<0.001	<0.001	<0.001

[§]Hill-Bone Compliance to High Blood Pressure Therapy Scale.

**Correlation is significant at the 0.01 level (2-tailed).

chronic disease such as hypertension. It is very important to maintain medication, diet and regular health control in the management of the disease in hypertension. In this context, the patient's level of knowledge, understanding what she/he reads, and transforming it into correct behavior are required for the effective implementation of these healthy lifestyle behaviors. Therefore, it can be said that individuals with high health literacy are more successful in disease management. In the literature review, many studies are reporting that health literacy is insufficient in hypertension patients.^{10,14,19} In our study, it is thought that the more frequent use of information resources, especially internet resources, on subjects such as virus prevention, chronic disease management, etc., during the pandemic process positively affects the level of health literacy. The information comprehension sub-dimension score, on the other hand, is lower because the accuracy of the information sources obtained in this process is unknown, and the patients are unsure how to use them.

In our study, in the context of treatment compliance, it was observed that individuals who had COVID-19, had regular blood pressure monitoring, and were older were better. In studies conducted on the subject, similar results were obtained with our findings.^{6,12,26} It is an expected situation that positive health behaviors such as regular blood pressure monitoring will reflect positively on treatment compliance. In our study, it was determined that regular

blood pressure monitoring was the most important independent variable affecting treatment compliance. It has been reported with the increase of data on COVID-19 that the virus affects those with chronic diseases and the elderly more seriously. In consequence of this circumstance, it is considered that COVID-19 patients, particularly the elderly and hypertensive, pay more attention to activities that promote treatment compliance, such as diet, exercise, regular blood pressure monitoring, and drug use.

According to our study, patients with longer diagnosis times have a higher treatment incompatibility. When the literature is reviewed, contrary to our finding, it is seen that patients with longer diagnosis times have higher treatment compliance.^{27,28} Individuals with a long diagnosis period of hypertension are thought to be negatively affected by the pandemic's restrictions, and because they have to adapt to many changes over time, their treatment compliance is insufficient due to boredom with matters such as dietary regulations, drug use, and drug side effects.

According to the results of our study, it was determined that there was a significant negative correlation between the Health Literacy Scale and The Hill-Bone Compliance to High Blood Pressure Therapy Scale. Within this scope, it is seen that individuals with low health literacy levels have a high treatment incompatibility. In studies conducted on the subject, it has been reported that health literacy is an important predictor of treatment compliance.^{7,19,27} Obtaining and

implementing accurate information is useful in lowering chronic illness complications and enhancing treatment compliance during the current pandemic. Within this scope, individuals may seek knowledge and create habits related to hypertension control in consequence of their anxiety about the rising number of cases and death rates during the pandemic, and treatment compliance may improve as a result.

CONCLUSION

It was determined that regular blood pressure monitoring, having COVID-19, and health literacy were the most important variables that predicted adherence to treatment during the pandemic, respectively in our study. Besides, during the pandemic, patients had difficulty interpreting the information and going to regular health controls, according to our study. Within this scope, it is extremely important to maintain nurse-patient communication at the highest level, to organize online training for nurses on the subjects that patients need, and to integrate evidence-based practices into the care process by following up-to-date research to ensure correct information and understanding of patients during the pandemic process. It is also suggested that new tactics are being developed to promote treatment adherence, such as asking

about health conditions and needs, informing about how to obtain relevant internet resources, and using telehealth apps such as phone monitoring at regular intervals and web-based training.

Source of Finance

During this study, no financial or spiritual support was received neither from any pharmaceutical company that has a direct connection with the research subject, nor from a company that provides or produces medical instruments and materials which may negatively affect the evaluation process of this study.

Conflict of Interest

No conflicts of interest between the authors and / or family members of the scientific and medical committee members or members of the potential conflicts of interest, counseling, expertise, working conditions, share holding and similar situations in any firm.

Authorship Contributions

Idea/Concept: Esra Çavuşoğlu, Abdullah Avcı, Meral Gün; **Design:** Esra Çavuşoğlu, Abdullah Avcı; **Control/Supervision:** Esra Çavuşoğlu, Meral Gün; **Data Collection and/or Processing:** Esra Çavuşoğlu, Abdullah Avcı, Meral Gün; **Analysis and/or Interpretation:** Esra Çavuşoğlu, Meral Gün; **Literature Review:** Esra Çavuşoğlu, Abdullah Avcı; **Writing the Article:** Esra Çavuşoğlu, Abdullah Avcı; **Critical Review:** Esra Çavuşoğlu, Meral Gün; **References and Fundings:** Esra Çavuşoğlu, Abdullah Avcı.

REFERENCES

1. Alsharif W, Qurashi A. Effectiveness of COVID-19 diagnosis and management tools: a review. *Radiography (Lond)*. 2021;27(2):682-7. [Crossref] [PubMed] [PMC]
2. Ahammed B, Maniruzzaman M, Talukder A, Ferdousi F. Prevalence and risk factors of hypertension among young adults in Albania. *High Blood Press Cardiovasc Prev*. 2021;28(1):35-48. [Crossref] [PubMed]
3. Ghose B, Yaya S. Blood pressure-controlling behavior in relation to educational level and economic status among hypertensive women in Ghana. *Family Medicine and Community Health*. 2018;6(3):115-23. [Crossref]
4. Sandalcı B, Uyaroğlu OA, Sain Güven G. COVID-19'da kronik hastalıkların rolü, önemi ve öneriler [The role and importance of chronic diseases in COVID-19 and related recommendations]. *Flora*. 2020;25(2):132-8. [Crossref]
5. Al-Daken LI, Eshah NF. Self-reported adherence to therapeutic regimens among patients with hypertension. *Clin Exp Hypertens*. 2017;39(3):264-70. [Crossref] [PubMed]
6. Alhaddad IA, Hamoui O, Hammoudeh A, Mallat S. Treatment adherence and quality of life in patients on antihypertensive medications in a Middle Eastern population: adherence. *Vasc Health Risk Manag*. 2016;12:407-13. [Crossref] [PubMed] [PMC]
7. Bakan G, İnci FH. Hipertansiyonlu hastalarda tedavi uyumu ve sağlık okuryazarlığı [Treatment compliance and health literacy in patients with hypertension]. *Türk J Cardiovasc Nurs*. 2021;12(28):81-7. [Crossref]
8. Burnier M, Egan BM. Adherence in Hypertension. *Circ Res*. 2019;124(7):1124-40. [Crossref] [PubMed]
9. Poulter NR, Borghi C, Parati G, Pathak A, Toli D, Williams B, et al. Medication adherence in hypertension. *J Hypertens*. 2020;38(4):579-87. [Crossref] [PubMed]
10. Chajae F, Pirzadeh A, Hasanzadeh A, Mostafavi F. Relationship between health literacy and knowledge among patients with hypertension in Isfahan province, Iran. *Electron Physician*. 2018;10(3):6470-7. [Crossref] [PubMed] [PMC]
11. Du S, Zhou Y, Fu C, Wang Y, Du X, Xie R. Health literacy and health outcomes in hypertension: an integrative review. *Int J Nurs Sci*. 2018;5(3):301-9. [Crossref] [PubMed] [PMC]
12. Elnaem MH, Kamarudin NH, Syed NK, Huri HZ, Dehele IS, Cheema E. Associations between Socio-Demographic Factors and Hypertension Management during the COVID-19 Pandemic: Preliminary Findings from Malaysia. *Int J Environ Res Public Health*. 2021;18(17):9306. [Crossref] [PubMed] [PMC]

13. Nguyen HC, Nguyen MH, Do BN, Tran CQ, Nguyen TTP, Pham KM, et al. People with suspected COVID-19 symptoms were more likely depressed and had lower health-related quality of life: the potential benefit of health literacy. *J Clin Med*. 2020;9(4):965. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
14. Park NH, Song MS, Shin SY, Jeong JH, Lee HY. The effects of medication adherence and health literacy on health-related quality of life in older people with hypertension. *Int J Older People Nurs*. 2018;13(3):e12196. [[Crossref](#)] [[PubMed](#)]
15. Tavakoly Sany SB, Behzad F, Ferns G, Peyman N. Communication skills training for physicians improves health literacy and medical outcomes among patients with hypertension: a randomized controlled trial. *BMC Health Serv Res*. 2020;20(1):60. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
16. Al-Rahimi JS, Nass NM, Hassoubah SA, Wazqar DY, Alamoudi SA. Levels and predictors of fear and health anxiety during the current outbreak of COVID-19 in immunocompromised and chronic disease patients in Saudi Arabia: a cross-sectional correlational study. *PLoS One*. 2021;16(4):e0250554. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
17. Durduran Y, Küçükkartallar 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. [[Crossref](#)]
18. Amer M, Rahman NU, Rashid Nazir SU, Raza A, Riaz H, Sadeeqa S, et al. Hypertension-related knowledge, medication adherence and health-related quality of life (HRQoL) among hypertensive patients in Islamabad, Pakistan. *Trop J Pharm Res*. 2019;18(5):1123-32. [[Crossref](#)]
19. Gaffari-Fam S, Babazadeh T, Ollaei S, Behboodi L, Daemi A. Adherence to a health literacy and healthy lifestyle with improved blood pressure control in Iran. *Patient Prefer Adherence*. 2020;14:499-506. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
20. Faul F, Erdfelder E, Buchner A, Lang AG. Statistical power analyses using G*Power 3.1: tests for correlation and regression analyses. *Behav Res Methods*. 2009;41(4):1149-60. [[Crossref](#)] [[PubMed](#)]
21. Aras Z, Bayik Temel A. Evaluation of validity and reliability of the Turkish Version of health literacy scale. *Florence Nightingale J Nurs*. 2017;25(2):85-94. [[Crossref](#)]
22. Toci E, Burazeri G, Jerliu N, Sørensen K, Ramadani N, Hysa B, et al. Health literacy, self-perceived health and self-reported chronic morbidity among older people in Kosovo. *Health Promot Int*. 2015;30(3):667-74. [[Crossref](#)] [[PubMed](#)]
23. Karademir M, Koseoglu IH, Vatanserver K, Van Den Akker M. Validity and reliability of the Turkish version of the Hill-Bone compliance to high blood pressure therapy scale for use in primary health care settings. *Eur J Gen Pract*. 2009;15(4):207-11. [[Crossref](#)] [[PubMed](#)]
24. Song Y, Han HR, Song HJ, Nam S, Nguyen T, Kim MT. Psychometric evaluation of hill-bone medication adherence subscale. *Asian Nurs Res (Korean Soc Nurs Sci)*. 2011;5(3):183-8. [[Crossref](#)] [[PubMed](#)]
25. Shi S, Shen Z, Duan Y, Ding S, Zhong Z. Association between medication literacy and medication adherence among patients with hypertension. *Front Pharmacol*. 2019;10:822. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
26. Al-Ramahi R. Adherence to medications and associated factors: a cross-sectional study among Palestinian hypertensive patients. *J Epidemiol Glob Health*. 2015;5(2):125-32. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]
27. Firat Kilic H, Dag S. The relationship between health literacy and medication adherence in a hypertensive patient population. *International Journal of Caring Sciences*. 2020;13(1):102. [[Link](#)]
28. Pan J, Wu L, Wang H, Lei T, Hu B, Xue X, et al. Determinants of hypertension treatment adherence among a Chinese population using the therapeutic adherence scale for hypertensive patients. *Medicine (Baltimore)*. 2019;98(27):e16116. [[Crossref](#)] [[PubMed](#)] [[PMC](#)]