**Original Article**

# Predictors of Blood Pressure Control and Medication Adherence among Primary Hypertensive Patients

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**Abstract**

**Background:** The burden from hypertension is continuously increasing in Turkey. There have been a limited number of studies both in Turkey on the predictors of adherence to drug treatment and blood pressure in the young population.
**Aim:** The aim of the study was to assess predictors of blood pressure control and adherence to medication among hypertensive patients
**Method:** This crossectional study was conducted between March 2017 and June , 2017 at Family Health Center located in the northwest of Turkey. A total of 231 hipertensive patients were participated in the study. Data of the study were collected by Patient Description Information Form and Medication Adherence Self-Efficacy Scale-Short Form (MASES-SF). Blood pressures measurements were performed at patients' home according to standart protocol.Kolmogorov- smirnov test, multiple regression and, binary logistic regression analysis were used to assess data.
**Results:** Taking into account the significance tests of the regression coefficients, it is seen that the independent variables of diet, physical activity, income level, work status, and systolic and diastolic blood pressure ($p<0.05$) have a significant effect on adherence to drug treatment. With binary logistic regression analysis, diet, education, physical activities and number of antihypertensive drugs were found to be significantly associated with optimal BP control.
**Conclusion:** It is recommended that socially based education and monitoring programs should be set up to facilitate blood pressure control and adherence to drug treatment according to the sociodemographic characteristics of patients.

**Keywords:** blood pressure control, hypertension, medication adherence

## Introduction

Hypertension is a leading cause of mortality and disease burden (Lee et al.,2018). It is responsible for 9.4 million deaths globally annually, and the burden from hypertension is continuously increasing in developing countries (Kintscher,2013; NCD Risk Factor Collaboration, 2017). In Turkey with its young population, 8.8% of deaths are from hypertension, and cardiovascular diseases are the primary cause of death (Turkish Ministry of Health, 2015). Despite recent advances in the diagnosis and treatment of hypertension, blood pressure (BP) control especially among the young population is still not at the desired level (Hales, Carroll, Simon, Kuo & Ogden, 2017; Zhang & Moran, 2017). The lack of blood pressure control can lead to an increase in complications, a rise in the cost of treatment and care, and problems for the country arising from the loss of work force among the young productive population. For this reason, it is important to improve blood pressure control in the young population of developing countries (Turkish Ministry of Health, 2015). Despite an increase in hypertension awareness and treatment in

Turkey since 2003, the blood pressure control rate remains at 28.7%. The burden from hypertension is continuously increasing in Turkey (Sengul et al., 2013). It is emphasized in the literature that effective education and monitoring programs need to be created in order to achieve blood pressure control, and it is important to know the factors affecting blood pressure control so that such programs can be planned in combatting hypertension (Turkish Ministry of Health, 2015; Mancia et al., 2013).

Adherence to drug treatment is defined as the patient's use of antihypertensive medication or medications regularly, and at the dose, frequency and time specified by a health professional (Vrijens, Antoniou, Burnier, de la Sierra & Volpe, 2017). It has been found that 50% of patients stop taking their medication within a year of hypertension diagnosis, and 75% cease within five years. It has also been found at monitoring after 12 months that 50% of hypertensive patients had abandoned medication use (Vatansever & Unsar, 2014). Effective antihypertensive treatment should be maintained indefinitely to reduce the relative risk of stroke and other cardiovascular disease events (Asgedom, Atey & Desse, 2018; Teke & Arslan, 2018) . In Turkey, the adherence of hypertensive patients to drug treatment is not at the desired level (Vatansever & Unsar, 2014; Teke & Arslan, 2018). Epidemiological studies have been carried out on this topic on a wide-ranging population aged 18 and above and on a specific population of 65 years and above, but there have been a limited number of studies both in Turkey and in Middle East countries on the predictors of adherence to drug treatment and blood pressure in the young population aged 40-65 (Vatansever & Unsar, 2014; Teke & Arslan, 2018; Alsolami, Correa-Velez & Hou, 2015; Khayyat, Saeed Khayyat, Hyat Alhazmi, Mohamed & Hadi, 2017; Omar, Elnour, Adam, Osman & Adam, 2018; Jahangiry, Ghanbari, Abbasalizad Farhangi, Sarbakhsh & Ponnet,2017). In order to address these significant gaps in the adherence literature in Middle East countries, our study documents factors associated with medication adherence and blood pressure control among hypertensive patients in north-west Turkey.

## Methods

***Participants and setting:*** This cross-sectional study was conducted between March 2017 and June 2017. The research sample consisted of 231 patients who were randomly selected from individuals registered at a family health center in the north-west of Turkey, in accordance with the inclusion and exclusion criteria. A power analysis was performed for logistic regression using G*Power 3.1 (Faul, Erdfelder, Buchner & Lang, 2009), with an odds ratio of 2.15, a Cronbach α value of .05, and power of 80%. Estimation of the odds ratio was based on previously reported medication adherence, which was one of the main variables that could affect sex (Khayyat et al, 2017). We found that a sample size of 219 individuals would provide 80% power, and our sample was considered adequate for our analysis.

Patients were included who met the following inclusion criteria: being between 40 and 65 years of age, having been diagnosed with primary hypertension in the previous six months, taking at least one antihypertensive medication, and having the ability to communicate in Turkish. Excluded subjects were those with secondary hypertension, pregnant women, those with an acute or terminal condition (e.g., myocardial infarction, stroke, diabetes, heart failure, kidney failure or cancer), or a psychiatric diagnosis (e.g., schizophrenia or cognitive impairment), and those taking other drugs that could increase BP.

***Data Collection:*** Data for the study were collected using a patient description information form and the medication adherence self-efficacy scale-short form (MASES-SF). The data collection forms were used and blood pressure measurements were performed in the patients' homes.

***Patient description information form:*** This form was prepared by the researcher in line with the relevant literature to determine patients' sociodemographic characteristics (age, gender, income level, work status and educational level) and their state of health (the number of antihypertensive drugs used, smoking and alcohol consumption, diet and physical activity (Vatansever & Unsar, 2014; Teke & Arslan, 2018; Alsolami, Correa-Velez & Hou, 2015; Khayyat, Saeed Khayyat, Hyat Alhazmi, Mohamed & Hadi, 2017; Omar, Elnour, Adam, Osman & Adam, 2018; Jahangiry, Ghanbari, Abbasalizad Farhangi, Sarbakhsh & Ponnet,2017). The form contained a total of ten questions

***Medication adherence self-efficacy scale short form (MASES-SF):*** This form was developed by Ogedegbe et al. (2003) and revised by Fernandez et al. (2008). Validity and reliability were tested on the Turkish version by Hacıhasanoğlu et al. (2012). The scale consists of 13 statements inquiring about the factors affecting the regular use of antihypertensives used by hypertensive patients. Scores are from 1 to 4, so that the lowest possible score is 13 and the highest is 52. A high score indicates that the patient's adherence to antihypertensive drug treatment is good (Hacihasanoğlu, Gözüm & Capik , 2012).

***Blood pressure measurement:*** Patient refrained from smoking, exercising and drinking caffeinated beverages or alcohol within 30 minutes of measurement. We used a properly calibrated and validated instrument, and we checked that the cuff size fıtted. BP was measured by trained staff, using an automated device, twice in the same arm, with subjects in the sitting position, after the patient had rested for at least 15 minutes. The patient's arm was kept at the level of the heart. The mean of two blood pressure readings at an interval of five minutes was calculated. BP was measured in the morning before taking medication (Mancia et al., 2013).

***Definitions:*** Uncontrolled BP was defined as BP ≥ 140 mm/Hg. Controlled BP was defined as BP < 140/90 mm/Hg (Mancia et al., 2013).

***Ethical considerations***

Before commencing the study, permission was obtained from the Ethics Committee (Approval no. 1/4) and the institution (Approval no. 71207605/663.08). Also, information was provided to the individuals meeting the criteria of the study, explaining the aim, plan and benefits of the study. Those who accepted the offer to participate were assured that they were free to leave the study any time they chose, that their data would not be used outside the study, and that the principle of confidentiality would be maintained, after which written or oral voluntary approval was obtained.

***Data analysis:*** Statistical analyses were performed using SPSS software version 18. The variables were investigated using visual methods (histograms and probability plots) and analytical methods (Kolmogorov-Smirnov/ Shapiro-Wilk's test) to determine whether or not they were normally distributed. A multiple linear regression model was used to identify independent predictors of medication adherence. The model fit was assessed using appropriate residual and goodness-of-fit statistics. Binary logistic regression analysis was performed with BP control as the outcome variable. Hosmer-Lemesshow goodness-of-fit statistics were used to assess model fit. A 5% type-I error level was used to infer statistical significance.

## Results

Table 1 shows data relating to the demographic characteristics and health status of the patients. More than half of the 231 patients who participated in the study (55.4%) were females, and their mean age was 48.5±10.4 years. The rate of BP control was 62.3%. The mean score of the patients from the MASES-SF was found to be at a moderate level (28.4±10.3).

**Table 1 Patients' Demographics and Health Status**

| Variables | N | % |
|---|---|---|
| **Gender** | | |
| Female | 128 | 55.4 |
| Male | 103 | 44.6 |
| **Work status** | | |
| Working | 165 | 71.4 |
| Not working | 66 | 28.6 |
| **Income Level** | | |
| Adequate | 57 | 24.7 |
| Inadequate | 174 | 75.3 |
| **Educational level** | | |
| Below high school | 189 | 81.8 |
| High school & above | 41 | 18.2 |
| **Diet** | | |
| Dieting | 28 | 12.1 |
| Not dieting | 203 | 87.9 |
| **Physical activity** | | |
| Performing | 30 | 13.0 |
| Not performing | 201 | 87.0 |
| **Number of medications** | | |
| One | 130 | 56.3 |
| Two | 101 | 43.7 |
| **Smoking** | | |
| Smoking | 57 | 24.7 |
| Not smoking | 174 | 75.3 |
| **Alcohol** | | |
| Consuming | 15 | 6.5 |
| Not consuming | 216 | 93.3 |
| **Blood Pressure Control** | | |
| BP ≥ 140/90 mm/Hg | 87 | 37.7 |
| BP < 140/90 mm/Hg | 144 | 62.3 |

**Table 2 The Independent Effects of Various Predictors on Drug Treatment**

| Variables | B | Standard Deviation | β | t | p |
|---|---|---|---|---|---|
| Constant | 13.64 | 7.41 | - | 17.74 | 0.001 |
| Age | 0.03 | 0.04 | .04 | 0.92 | 0.358 |
| Systolic blood pressure | -.54 | 0.05 | -.55 | -9.23 | 0.001 |
| Diastolic blood pressure | -.23 | 0.09 | -.14 | -2.59 | 0.010 |
| Diet (not dieting) | -8.09 | 1.62 | -.25 | -4.97 | 0.001 |
| Physical activity (performing) | 3.12 | 1.55 | .10 | 2.01 | 0.045 |
| Income level (inadequate) | -3.92 | 1.07 | -.16 | -3.65 | 0.001 |
| Work status (working) | 2.50 | 1.06 | .11 | 2.34 | 0.020 |
| Education level (high school and above) | 1.30 | 1.17 | .04 | 1.11 | 0.269 |
| Gender (male) | 0.36 | 0.94 | .01 | 0.38 | 0.702 |
| Number of drugs (two) | -.48 | 0.90 | -.02 | -.53 | 0.594 |
| R: 0.78 R2: 0.61 F: 34.54 p=0.001 | | | | | |

**Table 3 Binary Logistic Regression Analysis Identifying Factors Predicting BP Control**

| Variable | B | Standard error | Wald | p | Exp (B) | 95 % C.L for Exp Lower | Upper |
|---|---|---|---|---|---|---|---|
| **Gender** | | | | | | | |
| Female (reference) | | | | | | | |
| Male | -.31 | 0.27 | 1.37 | 0.241 | 0.72 | 0.42 | 1.23 |
| **Work status** | | | | | | | |
| Not working (reference) | | | | | | | |
| Working | 0.49 | 0.29 | 2.75 | 0.097 | 1.63 | 0.91 | 2.91 |
| **Income level** | | | | | | | |
| Adequate (reference) | | | | | | | |
| Inadequate | -. 40 | 0.32 | 1.53 | 0.216 | 0.67 | 0.35 | 1.26 |
| **Number of medications** | | | | | | | |
| One (reference) | | | | | | | |
| Two | 0.56 | 0.18 | 9.70 | 0.002 | 1.76 | 0.46 | 1.35 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Diet** | | | | | | | |
| Dieting (reference) | -1.17 | 0.51 | 5.24 | 0.022 | 0.30 | 0.11 | 0.84 |
| Not dieting | | | | | | | |
| **Physical activity** | | | | | | | |
| Performing (reference) | -1.03 | 0.47 | 4.67 | 0.031 | 0.35 | 0.13 | 0.90 |
| Not performing | | | | | | | |
| **Education** | | | | | | | |
| Below high school (reference) | | | | | | | |
| High school and above | 1.34 | 0.43 | 9.35 | 0.002 | 3.83 | 1.62 | 9.06 |
| **Smoking** | | | | | | | |
| Smoking (reference) | | | | | | | |
| Not smoking | -.10 | 0.37 | 0.08 | 0.771 | 0.89 | 0.43 | 1.86 |
| **Alcohol Consumption** | | | | | | | |
| Consuming (reference) | | | | | | | |
| Not consuming | -.66 | 0.73 | 0.83 | 0.361 | 0.51 | 0.12 | 2.15 |
| $R^2$ : %15,4; $\chi^2$: 3,070 p= 0,930 | | | | | | | |

Table 2 shows the independent effects on drug treatment adherence of the independent effects of various predictors, using the multilinear regression model. A significant correlation (R: 0.78, $R^2$: 0.61) was found between adherence to drug treatment and the variables of age, work status, the number of drugs used, systolic blood pressure, diastolic blood pressure, income level, diet and physical activity (F: 34.54, p = .000). These ten variables explained 61.1% of the model. According to standardized regression coefficients, the order of importance of the independent variables on drug treatment adherence was systolic BP (β: -.55), diet (β: -.25), income level (β: -.16), diastolic BP (β: -.14), physical activity (β: .10) and work status (β: .11). Taking into account the significance tests of the regression coefficients, it is seen that the independent variables of diet, physical activity, income level, work status, and systolic and diastolic blood pressure ($p<0.05$) have a significant effect on adherence to drug treatment. The mean MASES-SF scores of patients not following a diet were 8.09 lower than those of patients who were following a diet, and the mean MASES-SF scores of patients with an insufficient income level were 3.92 lower than those of patients whose income level was adequate. The mean MASES-SF scores of patients who were working and of those who were performing physical activity were higher than those of other patients.

Table 3 summarizes the predictors of blood pressure control using the binary logistic regression. About 15 % of the change in blood pressure can be explained by this model. With binary logistic regression analysis, diet, education, physical activities and number of antihypertensive drugs were found to be significantly associated with optimal BP control.

## Discussion

A significant correlation was found between the systolic and diastolic blood pressure of hypertensive patients and their adherence to drug treatment. Several studies show a strong association between adherence to medication and BP control, so that this result is similar to findings in the literature (Boima et al., 2015; Ramli, Ahmad & Paraidathathu, 2012;

Hacıhasanoğlu et al., 2012; Omar et al, 2018). It can be said that taking antihypertensive drugs in the right dose and at the right time, renewing prescriptions when they run out, reporting side effects to health personnel, and not ceasing treatments without the knowledge of health personnel play an important part in the improvement of patients' blood pressure control..

In the present study, level of income was significantly associated with adherence to medication. This finding is similar to that reported in Nigeria by Ikechuwku (Ikechuwku, Obinna & Ogochukwu, 2010). This finding is in contrast to those of a study conducted in Ghana and Nigeria in which level of income was not significantly associated with adherence to medication (Boima et al., 2015). The reason for this difference in results may derive from differences from one country to another in the proportion of an individual's monthly income which is set aside for health expenses, and which is paid out on medication costs and health insurance payments.

A significant correlation was found in the study results between physical activity and diet and adherence to drug treatment. Similar findings were obtained in a study conducted in Hong Kong (Kang et al, 2015). Adherence to treatment in hypertension is the extent to which individuals conform to the recommendations of health professionals such as diet, physical activity, and keeping up drug treatment. Gaining the habit of conforming to a diet or taking regular physical exercise may be factors which trigger each other in ensuring adherence to treatment as motivation increases.

In the present study, BP control rates were higher than those reported in previous studies in Cameroon, Tanzania, Ethiopia, Iran, and Sudan, where blood pressure control rates of 36.8%, 47.7%, 44.9% and 45.3% were found respectively (Omar et al., 2018; Maginga et al, 2016; Jahangiry et al., 2017). A European study showed a similar control rate to that found in the current study, but it was also lower than the rate that we found (Borghi et al., 2016). The reason why blood pressure control rates were found to be higher in this study than in others may be that under the Return to Health program in Turkey the expenses of health services and medications of low-income hypertensive patients are met by the government, medicines are sold at a considerable discount and access to medicines is made easy, and that hypertension awareness is increased through 90-minute information and education programs which radio and television stations are obliged to broadcast every month. It may be that access to health services has been made easier for hypertensive patients, who are provided with free services at Family Health Centers, which are part of this program, whether or not they have health insurance.

In the present study, diet and physical activity were found to be independent predictors associated with optimal blood pressure control. Several studies have reported the positive impact of lifestyle modifications such as a healthy dietary plan and regular physical activity not only on reducing systolic and diastolic blood pressure but also on preventing complications associated with hypertension (Mancia et al, 2013; Saneei, Salehi-Abargouei, Esmaillzadeh & Azadbakht, 2014) . Therefore, nurses should educate patients about the benefits of a healthy lifestyle and encourage lifestyle modifications if required, especially with regard to diet and regular physical activity.

Another predictor of blood pressure control found in the present study was the number of medications. The probability of patients who were using two types of antihypertensive drug having blood pressure under control was 1.7 times greater than that of patients who were using a single type of antihypertensive drug. In a study by Brown et al., it was found that blood pressure control in patients being treated with a combination of two drugs was better than that of patients treated with monotherapy

(Brown, McInnes, Papst, Zhang & MacDonald, 2011) . In the literature, it is reported that monotherapy provides the patient with the target blood pressure only to a limited extent, and that in most hypertensive patients, blood pressure control is achieved with a combination of at least two drugs (Mancia et al, 2013). A large number of mechanisms and factors play a part in the occurrence of hypertension, and many hypertension drugs only affect one of this complex of mechanisms. For this reason, a single drug is not enough to achieve blood pressure control in some patients. For the patient's blood pressure to reach the target level, a combination of two different drugs may be prescribed which affect different mechanisms (Mancia et al, 2013).

Another factor that affected BP control was level of education. In the present study, level of education was significantly associated with BP control. Patients who were educated to high school level or above were more likely to have optimal BP control. A higher educational level increased awareness of complications of high blood pressure, so that treatment-seeking behaviors, that is the individual's decisions on the time, place and type of treatment, could be affected positively. This finding is in contrast to those in studies conducted in Sudan, Tanzania, Hong Kong and Cameroon, in which education level was not significantly associated with BP control (Zhang et al, 2018; Omar et al., 2018; Maginga et al., 2016). The difference in the results of the present study suggests that the results may have been different in relation to the characteristics of the group included in the sample, and the differing education systems, social life, and culture in the countries.

## Conclusion

Education level, physical activity, diet and number of medications are important factors for blood pressure control in patients with hypertension on this setting. Diet, physical activity, income, working status and BP are important factors for adherence to medication in patients with hypertension on this setting. It is recommended that socially based education and monitoring programs should be set up to facilitate blood pressure control and adherence to drug treatment according to the sociodemographic characteristics of patients.

A limitation of the study was that adherence to drug treatment was measured only on a scale depending on self-reporting. It is recommended that in future studies, adherence to drug treatment should be measured by more than one method, such as drug counting, pharmacy records or patients' journals.

## Reference


Alsolami, F., Hou, X., & Correa-Velez, I. (2012). Factors Affecting Antihypertensive Treatment Adherence: A Saudi Arabian Perspective. *Clinical Medicine And Diagnostics*, *2*(4), 27-32.

Asgedom, S., Atey, T., & Desse, T. (2018). Antihypertensive medication adherence and associated factors among adult hypertensive patients at Jimma University Specialized Hospital, southwest Ethiopia. *BMC Research Notes*, *11*(1).

Boima, V., Ademola, A., Odusola, A., Agyekum, F., Nwafor, C., & Cole, H. et al. (2015). Factors Associated with Medication Nonadherence among Hypertensives in Ghana and Nigeria. *International Journal Of Hypertension*, *2015*, 1-8.

Borghi, C., Tubach, F., De Backer, G., Dallongeville, J., Guallar, E., & Medina, J. et al. (2016). Lack of control of hypertension in primary cardiovascular disease prevention in Europe: Results from the EURIKA study. *International Journal Of Cardiology*, *218*, 83-88.

Brown, M., McInnes, G., Papst, C., Zhang, J., & MacDonald, T. (2011). Aliskiren and the calcium channel blocker amlodipine combination as an initial treatment strategy for hypertension control (ACCELERATE): a randomised, parallel-group trial. *The Lancet*, *377*(9762), 312-320.

Faul, F., Erdfelder, E., Buchner, A., & Lang, A. (2009). Statistical power analyses using G*Power 3.1: Tests for correlation and regression analyses. *Behavior Research Methods*, *41*(4), 1149-1160.

Gozum, S., & Hacihasanoglu, R. (2012). Validity of the Turkish version of the medication adherence self-efficacy scale-short form in hypertensive patients. *Anadolu Kardiyol Derg.*, 12(3):241-8.

Hales, C., Carroll, M., Simon, P., Kuo, T., & Ogden, C. (2017). Hypertension Prevalence, Awareness, Treatment, and Control Among Adults Aged ≥18 Years — Los Angeles County, 1999–2006 and

2007–2014. *MMWR. Morbidity And Mortality Weekly Report*, *66*(32), 846-849.

Ikechuwku, E.O., Obinna, U.P., Ogochukwu, A.M. (2010). Predictors of self reported adherence to antihypertensive medication in a Nigerian populatıon. *Journal of Basic and Clinical Pharmacy* , *1(2)*, 133-138.

Jahangiry, L., Ghanbari, J., Abbasalizad Farhangi, M., Sarbakhsh, P., & Ponnet, K. (2017). Predictors of poor blood pressure control among Iranian hypertensive patients. *BMC Research Notes*, *10*(1)

Kang, C., Tsang, P., Li, W., Wang, H., Liu, K., Griffiths, S., & Wong, M. (2015). Determinants of medication adherence and blood pressure control among hypertensive patients in Hong Kong: A cross-sectional study. *International Journal Of Cardiology*, *182*, 250-257.

Khayyat, S., Khayyat, S., Hyat Alhazmi, R., Mohamed, M., & Abdul Hadi, M. (2017). Predictors of Medication Adherence and Blood Pressure Control among Saudi Hypertensive Patients Attending Primary Care Clinics: A Cross-Sectional Study. *PLOS ONE*, *12*(1), e0171255.

Kintscher, U. (2013). The burden of hypertension. *Eurointervention*, *9*(R), R12-R15.

Lee, J., Kim, S., Kang, S., Cho, J., Cho, Y., & Oh, I. et al. (2018). Blood Pressure Control and Cardiovascular Outcomes: Real-world Implications of the 2017 ACC/AHA Hypertension Guideline. *Scientific Reports*, *8*(1).

Maginga, J., Guerrero, M., Koh, E., Holm Hansen, C., Shedafa, R., & Kalokola, F. et al. (2015). Hypertension Control and Its Correlates Among Adults Attending a Hypertension Clinic in Tanzania. *The Journal Of Clinical Hypertension*, *18*(3), 207-216.

Mancia, G., Fagard, R., Narkiewicz, K., Redon, J., Zanchetti, A., Böhm, M., … Zannad, F. (2013). 2013 ESH/ESC Practice Guidelines for the Management of Arterial Hypertension. *Blood Pressure*, *23*(1), 3-16.

NCD Risk Factor Collaboration (2017). Worldwide trends in blood pressure from 1975 to 2015: a pooled analysis of 1479 population-based measurement studies with 19·1 million participants. *Lancet.* 389(10064),37-55.

Omar, S. M., Elnour, O., Adam, G. K., Osman, O. E., & Adam, I. (2018). Assessment of blood pressure control in adult hypertensive patients in eastern Sudan. *BMC Cardiovascular Disorders*, *18*(1).

Paraidathathu, T., Azuana, & Nur Sufiza, A. (2012). Medication adherence among hypertensive patients of primary health clinics in Malaysia. *Patient Preference and Adherence*, 613.

Saneei, P., Salehi-Abargouei, A., Esmaillzadeh, A., & Azadbakht, L. (2014). Influence of Dietary Approaches to Stop Hypertension (DASH) diet on blood pressure: A systematic review and meta-analysis on randomized controlled trials. *Nutrition, Metabolism and Cardiovascular Diseases*, *24*(12), 1253-1261.

Sengul, S., Erdem, Y., Akpolat, T., Derici, U., Sindel, S., Karatan, O., Erturk, S. (2013). Controlling hypertension in Turkey: not a hopeless dream. *Kidney International Supplements*, *3*(4), 326-331.

Teke,N., & Arslan, S.(2018). Hypertensive individuals's medication adherence self efficacy level in rural population and determination of the affeting factors. *Deuhfed*, 11 (2), 120-128.

Turkish Ministry of Health.(2015). *Türkiye Kalp ve Damar Hastalıkları Önleme ve Kontrol Programı [Cardiovascular Disease Prevention and Control Program in Turkey 2015-2020]*. Ankara, Turkey: Ministry of Health publication.

Vatansever, Ö., & Ünsar, S. (2014). Determination Of Medical Treatment Adherence, Self-Efficacy Levels Of Patients With Essential Hypertension And Affecting Factors. *Journal of Cardiovascular Nursing*, *5*(2), 66-74.

Vrijens, B., Antoniou, S., Burnier, M., De la Sierra, A., & Volpe, M. (2017). Current Situation of Medication Adherence in Hypertension. *Frontiers in Pharmacology*, *8*.

Zhang, Y., Li, X., Mao, L., Zhang, M., Li, K., Zheng, Y., Jing, M. (2018). Factors affecting medication adherence in community-managed patients with hypertension based on the principal component analysis: evidence from Xinjiang, China. *Patient Preference and Adherence*, *12*, 803-812.

Zhang, Y., & Moran, A. E. (2017). Trends in the Prevalence, Awareness, Treatment, and Control of Hypertension Among Young Adults in the United States, 1999 to 2014. *Hypertension*, *70*(4), 736-742.