***Clinical Research***

# Temperament and Character Traits and Levels of Depression, Anxiety and Alexithymia in Patients with Essential Hypertension

Mehmet Gürkan GÜROK[1,a], Faruk KILIÇ[2], Sevler YILDIZ[3]

[1]*Fırat University, School of Medicine, Department of Psychiatry, Elazig, Turkey,*
[2]*Suleyman Demirel University, School of Medicine, , Department of Psychiatry, Isparta, Türkiye*
[3]*Fethi Sekin City Hospital, Department of Psychiatry, Elazig, Turkey*

**ABSTRACT**

**Objective:** Essential hypertension (EH) is a cardiovascular disease with psychological etiopathogenesis. We examined the temperament, depression, anxiety and alexithymia levels of patients with essential hypertension.
**Material and Method:** The study included 50 healthy controls and 50 patients diagnosed with essential hypertension. Sociodemographic and Clinical Data Form, Temperament and Character Inventory (TCI), Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI) and Toronto Alexithymia Scale (TAS-20) were applied to all participants.
**Results:** There was no statistically significant difference between BAI and BDI scores between both groups (p =0.112; p =0.150). Total and subscale TCI scores are significantly higher in the essential hypertension patient group compared to the healthy control group (p <0.001; p =0.006; p <0.001; p <0.001). In the temperament and character inventory, the extravagance-frugality subscale scores in the novelty-seeking scale (p =0.008) and the empathy and virtuousness subscale scores in the cooperation scale were significantly lower in the patient group when compared to the control (p =0.007; p =0.021).
**Conclusion:** The study findings revealed differences between the alexithymia levels, temperament, and character traits of the EH patient group. Differences in temperament could suggest the significance of hereditary traits. Further studies are required to determine whether these differences were the causes or consequences of EH.

***Keywords:*** *Essential Hypertension, Temperament, Character, Depression, Anxiety, Alexithymia.*

**ÖZ**

**Esansiyel Hipertansiyon Tanılı Hastaların Mizaç ve Karakter Özellikleri ve Depresyon, Anksiyete ve Aleksitimi Düzeyleri**
**Amaç:** Esansiyel hipertansiyon etiyopatogenezinde ruhsal sebeplerin de olduğu kardiyovasküler bir hastalıktır. Bu çalışmada esansiyel hipertansiyon tanılı hastaların mizaç ve karakter özelliklerini ve depresyon, anksiyete ve aleksitimi düzeylerini incelemeyi amaçladık.
**Gereç ve Yöntem:** Çalışmaya 50 sağlıklı kontrol ile 50 esansiyel hipertansiyon tanısı olan kişi dahil edildi. Tüm katılımcılara Sosyodemografik Veri Formu, Mizaç ve Karakter Envanteri (MKE), Toronto Aleksitimi Ölçeği (TAÖ-20), Beck Depresyon Ölçeği (BDÖ), Beck Anksiyete Ölçeği (BAÖ) uygulandı.
**Bulgular:** Hasta grubunun BAÖ ve BDÖ skorları ile kontrol grubununkiler arasında istatistiksel açıdan anlamlı farklılık izlenmedi. (p değerleri sırasıyla; p =0.112, p =0.150). Hasta grubunun TAÖ toplam ve alt ölçek skorları kontrol grubundan anlamlı derecede yüksekti (p değerleri sırasıyla; p <0.001, p =0.006, p <0.001, p <0.001). Mizaç karekter envanterinde ise yenilik arayışı ölçeğinin savurganlık-tutumluluk alt ölçeği (p =0.008), iş birliği yapma ölçeğinin ise empati duyma ve erdemlilik alt ölçekleri hasta grubunda kontrol grubuna göre anlamlı olarak küçüktür (p değerleri sırasıyla p =0.007, p =0.021).
**Sonuç:** Esansiyel hipertansyon hastalarının aleksitimi düzeyleri, mizaç ve karakter özelliklerinin sağlıklı grupdan farklı olduğunu bulduk. Mizaçtaki farklılıklar kalıtsal özelliklerin önemine işaret edebilir. Bu farklılıkların esansiyel hipertansiyonun nedeni mi yoksa sonucu mu olduğunu belirlemek için daha fazla çalışma yapılması gerekmektedir.

***Anahtar Sözcükler:*** *Esansiyel Hipertansiyon, Mizaç, Karekter, Depresyon, Anksiyete, Aleksitimi.*

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**ORCID IDs:** M.G.G. 0000-0001-8998-0743, F.K. 0000-0002-2259-4028, S.Y. 0000-0002-9951-9093.

Diseases in which psychological states play a key role in the etiology of symptoms are called psychosomatic disorders (1). Essential hypertension is among these disorders where psychogenic factors play a role in physio-pathological mechanisms (2). Age, gender, salt consumption, nutritional habits, smoking and drinking, genetic predisposition, dyslipidemia, glucose tolerance disorder, and certain psychiatric conditions are among the risk factors of essential hypertension (3). It is known that both anxiety and depression could affect hypertension, since increases were observed in sympathetic system discharge, adrenocorticotropic hormone, and cortisol secretion in patients with anxiety disorders and depression (4-6). Higher depression and anxiety

[a]Yazışma Adresi: Mehmet Gürkan GÜROK, Fırat University, School of Medicine, Department of Psychiatry, Elazig, Turkey
Tel: 0424 233 3555 e-mail: mggurok@hotmail.com
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levels were reported in patients with essential hypertension (7).

Temperament is the innate ability to respond to emotional stimuli with a certain approach, and character was described as the individual's observable behaviors and self-described internal experiences to environmental stimuli. Cloninger developed a dimensional psychobiological personality model that aimed to explain variations in temperament and character, the two main components of personality. This personality model included four temperament dimensions: harm avoidance, novelty seeking, reward dependence and perseverance, which were assumed to be genetically independent, static throughout life, and unchangeable by sociocultural influences, personal and social activities, and develop under environmental and educational influences; and thus, could change over time. It included three character dimensions that were assumed to affect self-direction, cooperation, and self-transcendence. The Cloninger model argued that temperament and character correlate with a specific central monoaminergic system activity (8, 9). It is known that temperament and character contribute to the development of psychosomatic diseases (10). The mechanisms that underlie personality and hypertension are unclear. Smoking, unhealthy food choices, and stressful lifestyles of individuals with neurotic personality traits increase the cardiovascular disease risk (11, 12). A study conducted in 2022 reported that the probability of developing essential hypertension was more than 3 fold in individuals with low emotional stability/high neuroticism (13).

Alexithymia is a personality trait characterized by difficulties in identifying and expressing both sensations and sensations and poor empathy (14). Thus, alexithymia is a risk factor for various disorders such as anxiety, depression, and psychosomatic diseases (15, 16).

Determination of the psychological factors, which are among the modifiable hypertension risk factors, is important to prevent complications and hypertension. It could be suggested that investigation of TCI scores in psychosomatic diseases would be important, since it also emphasizes the biological aspects of personality traits. Our hypothesis was that psychological states such as temperament and personality traits of patients with essential hypertension may be different from healthy individuals. We aimed to evaluate this situation with psychiatric scales, which are inexpensive and feasible methods, and the differences we can detect will be useful for essential hypertension and the treatment process. The aim of the present study was to investigate the temperament and character, and depression, anxiety and alexithymia levels of individuals with hypertension based on Cloninger's psychobiological personality model.

## MATERIAL AND METHOD

The study was approved by the Institutional Clinical Research Ethics Committee (Approval no: 2024/04-25). Written informed consent was obtained from all study participants. The study was conducted with 57 patients diagnosed with essential hypertension after they presented to Firat Unıversity Hospital Cardiology clinic and 54 individuals without any systemic or mental disease, presented to the Firat Unıversity Hospital for routine annual check-up, and who voluntarily agreed to participate in the study. The mental status of the participants was evaluated by a psychiatrist based on DSM-5. The patient group included 18 - 65 years old individuals who were diagnosed with essential hypertension based on ESC Arterial Hypertension (17). HT diagnosis was based on and diastolic blood pressure of 90 mmHg or above and systolic blood pressure of 140 mmHg or above. Individuals who were illiterate, diagnosed with a known psychiatric and neurological disease, had a history of alcohol or substance abuse, or systemic diseases such as heart failure, chronic kidney failure, coronary artery disease, and immunological disease were excluded from the study. Since 7 patients did not complete the scales and 4 individuals in the healthy control group later stated that they desired to withdraw from the study, these individuals were also excluded. Sociodemographic and Clinical Data Form, Temperament Character Inventory (TMI), Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI) and Toronto Alexithymia Scale (TAS-20) were administered to all participants.

### Data Collection Instruments

**Sociodemographic and Clinical Data Form:** A semi-structured form was developed by the authors that included clinical data such as gender, place of residence, length of the disease, and the presence of concomitant diseases.

**Beck Depression Inventory (BDI)**: The scale was developed by Beck to measure depression risk, the level of depression symptoms, and the change in severity in adults (18). A higher scale score reflects high level of depression symptoms. Turkish language reliability and validity of the scale were determined in a previous study (19).

**Beck Anxiety Inventory (BAI)**: It is a self-report scale developed by Beck et al. (1988) and aims to determine the frequency of anxiety symptoms. A higher scale score reflects high anxiety. Turkish language reliability and validity of the scale were determined in a previous study (20, 21).

**Toronto Alexithymia Scale (TAS-20)**: The reliability and validity study of the scale, which was developed to determine alexithymia level in individuals, in Turkish language were determined (22, 23). The scale includes 20 items and three subscales: emotion recognition, difficulty in verbalizing emotions, and extraverted

thinking. A high scale score indicates difficulty in expressing emotions.

**Temperament and Character Inventory (TCI)**: It is a self-report scale that includes 240 items. It includes 7 scales and 25 subscales, 12 of which measure temperament (excitement of discovery, impulsivity, extravagance, disorganization, anticipatory anxiety, fear of uncertainty, aversion to strangers, fatigue easily, emotionality, attachment, dependence, persistence, and 13 of which measure character, purposefulness, resourcefulness, self-acceptance, adaptable secondary temperaments, social approval, empathy, helpfulness, compassion, virtue, self-loss, transpersonal identification, and spiritual acceptance. The scale score is the total of subscale scores, and the reliability and validity ty of the scale was tested in Turkish language (24, 25).

### Statistical Analysis

The study data were analyzed with Statistical Package for Social Sciences (SPSS) version 22.0 (SPSS Inc., Chicago, IL). Normal distribution of the data was determined with the Shapiro-Wilk test. Categorical variables were compared with the Chi-square test. Continuous numerical variables with normal distribution were analyzed with the independent samples t-test, and those without normal distribution were analyzed with the Mann-Whitney U test. The correlations between the variables were determined with the Spearman correlation.

## RESULTS

The mean age of the essential hypertension patients was 52.72 ± 11.15, and the mean age of the control group was 49.1 ± 10.69 (p =0.101). The gender distribution was similar across the groups. All participant demographics were similar. Participant demographics are presented in table 1.

***Table 1.***

| Sociodemographic Characteristics | Hypertensiyon (n :50) | Control (n :50) | t / $\chi$2 | p |
|---|---|---|---|---|
| Age | 52.72± 11.15 | 49.1± 10.69 | 1.656 [a] | 0.101 |
| Gender | | | | |
| Female | 29 (%58) | 26 (%52) | .364 [b] | 0,546 |
| Male | 21 (%42) | 24 (%48) | | |
| Cigarette | | | | |
| User | 12 (%24) | 17 (%34) | 1.214 [b] | 0,271 |
| Not | 38 (%76) | 33 (%66) | | |
| Education | | | | |
| Primary education | 35 (%70) | 27 (%54) | | 0.213 |
| High school | 5 (%10) | 10 (%20) | 3.090 [b] | |
| University | 10 (%20) | 13 (%26) | | |
| Marital status | | | | |
| Single | 7 (%14) | 11 (%22) | 1.084 [b] | 0.298 |
| Married | 43 (%86) | 39 (%78) | | |
| Economical situation low | 5 (%10) | 8 (%16) | | |
| middle | 41 (%82) | 39 (%78) | .885 [b] | 0.642 |
| high | 4 (%8) | 3 (%6) | | |

[a] *Student's t-test;* [b] *Chi square test; Values in boldface are statistically significant (p <0.05).*

The two groups were compared based on the scale scores. There was no statistically significant difference between BAI and BDI scores between both groups (p =0.122; p =0.150). The mean BAI score was 15.56+9.97 in the patient group, and 11.8+5.39 in the control group (p =0.150). The mean BDI score was 10.34+7.11 in the patient group, and 7.66+3.98 in the control group (p =0.122).

The total TAS and subscale scores (difficulty in verbalizing emotions, difficulty in recognizing emotions and extraverted thinking) were significantly higher in the patient group when compared to the control group (p <0.001, p =0.006, p <0.001, p <0.001). Patient group TAS scores were significantly higher when compared to the control group. The mean TAS-total score was 57.14+11.46 in the patient group, and 45.6+7.77 in the control group (p <0.001). The TAS difficulty in recognizing emotions, difficulty in verbalizing emotions, and extraverted thinking subscale scores were higher in the patient group when compared to the controls, and the differences were statistically significant (p =0.006, p <0.001, p <0.001).

In the temperament character inventory, the extravagance-frugality subscale scores in the novelty-seeking scale (p =0.008) and the empathy and virtuousness subscale scores in the cooperation scale were significantly lower in the EH group when compared to the control group (p =0.007, p =0.021). The extravagance-frugality subscale score in the TCI innovation seeking scale was 3.70+1.84 in the patient group and 4.72+2.03 in the control group. The empathy subscale score in the cooperation scale in the character dimension of TCI was 3.84+1.77 in the patient group and 4.76+1.15 in the control group, and the virtuousness subscale score was 6.52+1.34 in the patient group and 7.18+1.36 in the control group. Inter-group comparison of the scale scores is presented in table 2.

***Table 2.*** *Inventory scores for the patient and control groups.*

| | Hypertension (n :50) min-max/SD | Control (n :50) min-max/SD | t / z / $\chi 2$ | p |
|---|---|---|---|---|
| BDI | 10.34 (0-33) | 7.66 (0-19) | -1.545 [a] | 0.122 |
| BAI | 15.56 (0-39) | 11.8 (0-24) | -1.440 [a] | 0.150 |
| TAS-20 | 57.14±11.46 | 45.6±7.77 | 5.889 [c] | **<0.001** |
| TAS-1 identifying feelings | 16.76 (7-31) | 13.6 (8-25) | -2.745 [a] | **0.006** |
| TAS-2 Difficulty describing feelings | 14.88±3.28 | 10.98±2.59 | 6.597 [c] | **<0.001** |
| TAS-3 Externally-oriented thinking | 25.5±4.80 | 21.02±3.86 | 5.134 [c] | **<0.001** |
| **MOOD**-Novelty-seeking | 16.12 (8-26) | 17.84 (10-28) | -1.538 [a] | 0.124 |
| Feeling excited by discovery | 4.98 (1-9) | 5.54 (3-10) | -1.670 [a] | 0.095 |
| Impulsivity | 3.98 (1-7) | 3.98 (0-8) | -.063 [a] | 0.950 |
| Extravagance | 3.70 (0-8) | 4.72 (0-9) | -2.650 [a] | **0.008** |
| Disorder | 3.46 (1-7) | 3.60 (0-8) | -.022 [a] | 0.902 |
| -Harm avoidance | 18.26 (9-35) | 16.62 (5-29) | -.923 [a] | 0.356 |
| Concern for expectation | 5.92 (2-11) | 5.18 (1-11) | -1.694 [a] | 0.090 |
| Fear of uncertainty | 4.48 (0-7) | 4.50 (0-7) | -.137 [a] | 0.891 |
| Shyness with strangers | 3.40 (0-8) | 3.26 (0-8) | -.428 [a] | 0.668 |
| Easy fatigability | 4.46 (0-9) | 3.68 (0-9) | -1.522 [a] | 0.128 |
| -Reward dependence | 13.76±2.68 | 14.12±2.60 | -.680 [c] | 0.498 |
| Affectivity | 7.02 (4-10) | 7.12 (4-10) | -.228 [a] | 0.820 |
| Commitment | 4.28 (1-8) | 4.6 (1-8) | -1.044 [a] | 0.296 |
| Dependence | 2.46 (0-5) | 2.4 (0-5) | -.230 [a] | 0.817 |
| Persistence | 5 (2-8) | 4.54 (1-8) | -1.408 [a] | 0.159 |
| **Character**-Self management | 25.86 (10-38) | 27.26 (16-43) | -.808 [a] | 0.419 |
| Taking responsibility | 4.12 (1-8) | 4.68 (0-8) | -1.302 [a] | 0.193 |
| Intentionality | 5.44 (2-8) | 5.66 (0-8) | -.668 [a] | 0.504 |
| Skillfulness | 2.68 (0-5) | 2.86 (0-4) | -.850 [a] | 0.395 |
| Self-acceptance | 5.32 (1-9) | 5.5 (2-11) | -.167 [a] | 0.867 |
| Compatible sec. temperaments | 8.3 (4-12) | 8.56 (4-12) | -.477 [a] | 0.633 |
| -Collaboration | 28.42 (17-38) | 30.32 (20-40) | -1.600 [a] | 0.110 |
| Social approval | 5.64 (1-8) | 6.34 (3-8) | -1.933 [a] | 0.053 |
| Empathy | 3.84 (0-7) | 4.76 (2-7) | -2.694 [a] | **0.007** |
| Charitableness | 4.7 (3-7) | 4.64 (3-7) | -.404 [a] | 0.686 |
| Sympathy | 7.72 (0-10) | 7.4 (1-10) | -.894 [a] | 0.371 |
| Virtuousness | 6.52 (3-8) | 7.18 (4-9) | -2,302 [a] | **0.021** |
| -Getting over oneself | 19.7±5.04 | 18.38±5.11 | 1.299 [c] | 0.197 |
| Self-loss | 6.46 (2-11) | 5.7 (1-11) | -1.367 [a] | 0.171 |
| Self-transcendence | 5.44 (1-9) | 5 (0-9) | -.993 [a] | 0.320 |
| Getting over oneself | 7.8 (1-12) | 7.68 (1-12) | -.160 [a] | 0.872 |

## DISCUSSION

In the present study that aimed to investigate temperament and character, alexithymia level, and psychiatric status of essential hypertension patients, it was concluded that essential hypertension patients experienced difficulties in recognizing and describing their emotions, their temperament was frugal, their virtuousness and empathy scores were low, and they had mild anxiety and depression.

Although personality could lead to cardiovascular diseases (26), few studies investigated the correlation between hypertension and personality (27, 28). People with type D personality (29) with traits such as negative affect and social inhibition were prone to cardiovascular diseases (30). It was also demonstrated that ambitious, impatient individuals who cannot manage their anger were at risk for cardiovascular diseases (31). Lakatos et al. reported that highly neurotic individuals with low emotional stability were more than 3 times more likely to develop primary hypertension (11). Celik et al. reported that the dependency and pity temperament character inventory subscale scores were higher and the resourcefulness and loss of self scores were lower in essential hypertension patients when compared to healthy controls (32). Novelty seeking (NS) is one of the temperament components in TCI and was genetically associated with curiosity in discovery, impulsiveness in decision-making, and quick anger. In the present study, we determined that the novelty seeking scale extravagance-frugality subscale score (33), which was associated with the behavioral activation system, was low in essential hypertension patients. NS was associated with lower dopaminergic activity. Individuals with a low NS score are rigid, budget-conscious, and monotonous. The low NS subscale scores determined in EH patients in the present study could predispose the patients to hypertension due to their rigidity and monotonous orientation. Although economic problems could affect the mental state and lead to high blood pressure (34), sufficient frugality to disrupt self-needs could also create stress. In the character dimension, we determined that virtuousness and empathy were weak among the patients. Therefore, it can be said that individuals who do not respect the rights of others may experience a feeling of loneliness, which may increase stress and cause an increase in blood pressure.

It was reported that the skill to identify self-emotions is a prerequisite for adequate emotion regulation, and related problems could lead to an increase in autonomic stimuli (35). It was reported that individuals with high alexithymia scores have high sympathetic nervous

system discharge; and thus, higher pulse or blood pressure (36). A conducted with 1245 individuals reported that hypertensive individuals had higher alexithymia when compared to normotensive individuals (37). Ardahanli et al. reported that alexithymia could be reduced with blood pressure regulation in essential hypertension patients (38). In support of the literature, this study also showed that patients with essential hypertension had higher alexithymia scores. The present study findings suggested that alexithymia could explain essential hypertension symptomatology.

We also observed that essential hypertension patients were mildly depressed and anxious. Since mental disorders could lead to blood pressure fluctuations, this could cause hypertension in these patients (39). Abdisa et al. reported that 27.2% and 32.7% of individuals with hypertension experienced depression and anxiety symptoms, respectively (40). Individuals with depression and anxiety disorders are prone to essential hypertension (41). The alexithymia scores of the patients were high in the current study, suggesting that individuals who cannot describe their emotions could experience psychological problems, which could lead to essential hypertension.

The limitations of this study are its cross-sectional nature, the study participants were recruited from a single hospital, use of self-reporting tools and small sample size. In conclusion, this study demonstrated that a detailed psychological evaluation of essential hypertension patients and the determination of their subclinical mental states can provide insight into susceptibility to cardiovascular diseases, even if the patients are not diagnosed with a psychiatric disorder. Thus, certain differences in EH patients were identified such as temperament and character traits like novelty seeking and empathy, and difficulty in recognizing and expressing their emotions like alexithymia. It should be remembered that the psychological properties measured in the study are biological and hereditary. We can say that our findings obtained with applicable methods can support guidelines that can be used in clinical practice in the light of information to be obtained with further studies. It could be suggested that early cardiological diagnosis and treatment of patients prone to hypertension, as well as identification of their psychiatric state, could reduce morbidity and mortality.

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