



QT and P-Wave Dispersion of Patients with Antisocial Personality Disorder

Antisosyal Kişilik Bozukluğu Olan Hastalarda QT ve P Dalgası Dispersiyonu

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Abstract

Aim: The purpose was to examine the electrocardiographic arrhythmia risk determinants of the QT and P-wave dispersions of the patients who have Antisocial Personality Disorder (ASPD) by comparing them with the healthy control group.

Material and Method: A total of 52 patients who were diagnosed with ASPD according to DSM-5 Criteria and a healthy control group that consisted of 54 people were included in the study. Twelve lead Electrocardiograms (ECGs) were obtained from all participants in the supine position and at rest, and P-wave dispersion and QT dispersion were also calculated. The participants were administered the Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Buss-Durke Aggression Scale (BDAS), Barratt Impulsivity Scale (BIS-11) and sociodemographic clinical data form. The SPSS version 22 package program was used for statistical analyses.

Results: The mean age of the ASPD group and control group were no statistically significant differences between them ($p=0.092$). QT max ($p=0.016$), QTd ($p<0.001$), P max ($p<0.001$), and Pd ($p<0.001$) values of the ASPD group were higher than the values of the control group at significant levels; and QT min ($p<0.001$) and P min ($p<0.001$) values were found to be significantly lower. The BAI, BDI, BDAS scores and the motor impulsiveness score of the BIS-11 subscales of the ASPD group were significantly higher than those of the control group ($p<0.001$).

Conclusion: The findings of study showed that ASPD patients were at risk for electrical problems of the heart, especially cardiac arrhythmia, and this must be considered in the general psychiatric follow-up of these patients.

Keywords: Antisocial personality disorder, QT dispersion, P dispersion

Öz

Amaç: Antisosyal kişilik bozukluğu (ASKB) olan hastalarda elektrokardiyografik aritmi risk belirleyicileri olan QT ve P dalgası dispersiyonlarının sağlıklı kontrol grubuyla karşılaştırılarak incelenmesi amaçlanmıştır.

Gereç ve Yöntem: Çalışmamıza DSM-5 kriterlerine göre ASKB tanısı alan 52 hasta ve 54 kişiden oluşan sağlıklı kontrol grubu dahil edildi. Tüm katılımcıların boy, kiloları, tansiyonları ölçüldü ve vücut kitle indeksleri(VKI) hesaplandı. Vücut kitle indeksi $> 24,9$ kg/m² olan katılımcılar çalışma dışı bırakıldı. Tüm katılımcılardan on iki derivasyon elektrokardiyogramı (EKG) yatar pozisyonda ve istirahatte alındı. P dalgası dispersiyonu ve QT dispersiyonu hesaplandı. Ayrıca katılımcılara Beck Anksiyete Ölçeği (BAÖ), Beck Depresyon Ölçeği (BDÖ), Buss-Durke Saldırganlık Ölçeği (BDSÖ), Barratt Dürtüsellik Ölçeği (BrDÖ) ve sosyodemografik klinik veri formu uygulandı. İstatistiksel analizler için SPSS versiyon 22 paket programı kullanıldı.

Bulgular: ASKB grubunda bulunanların yaş ortalaması $29,6\pm 6,5$, kontrol grubunun yaş ortalaması ise $31,8\pm 7,1$ olarak bulunmuş olup aralarında istatistiksel olarak anlamlı farklılık görülmemiştir ($p=0,092$). ASKB grubunun QT max ($p=0,016$), QT disp ($p<0,001$), P max ($p<0,001$), P disp ($p<0,001$) değeri kontrol grubunun değerlerinden anlamlı şekilde yüksek; QT min ($p<0,001$) ve P min ($p<0,001$) değeri ise anlamlı şekilde düşük bulunmuştur. ASKB grubunun BAÖ ve BDÖ puanı kontrol grubunun puanından anlamlı şekilde yüksek bulunmuştur ($p<0,001$). BDSÖ tüm alt ölçek puanları kontrol grubuna kıyasla daha yüksekti ($p<0,001$), BrDÖ alt ölçeklerinden ise motor dürtüsellik puanı ASKB grubunda daha yüksekti ($p<0,001$).

Sonuç: Çalışma bulgularımız ASKB hastalarının kardiyak aritmi başta olmak üzere kalbin elektriksel temelli sorunları açısından risk taşıdıkları ve bu durumun bu hastaların genel psikiyatrik takibinde göz önünde bulundurulması gerektiğini göstermektedir.

Anahtar Kelimeler: Antisosyal kişilik bozukluğu, QT dispersiyonu, P dispersiyonu



INTRODUCTION

The mental disorder known as antisocial personality disorder (ASPD) is chronic and treatment-resistant. It does not significantly impair a person's basic affection, thinking, or cognitive abilities, but it does cause problems in their relationships with others, their ability to function in family and work settings, and it disturbs society.^[1] The tendency to infringe another person's rights without feeling regret is described as ASPD in the Diagnostic and Statistical Manual of Mental Disorders (DSM) by the American Psychiatric Association (APA).^[2] Such people are given a behavior disorder diagnosis when they are young, and an ASPD diagnosis when they are over the age of 18. The most accurate diagnostic for personality disorders is ASPD.^[3]

Due to the complexity of ASPD, many variables, including genetic, environmental, biological, psychodynamic, cognitive, and psychosocial factors, are highlighted in connection to its etiology.^[4] The etiopathogenesis of ASPD has not yet been fully elucidated, despite the fact that many of these factors are thought to interact to cause the illness.

It is argued that the Hypothalamic-Pituitary-Adrenal (HPA) axis, which is involved in the regulation of the emotion of fear, creating sensitivity to punishment, and triggering the withdrawal signs, has a lower activity in ASPD. In a study that was conducted with adolescents who had antisocial behavior, it was shown that both basal and stress-induced blood cortisol levels were significantly lower than in those without antisocial behavior.^[5]

An extensively used non-invasive heart imaging technique is electrocardiography (ECG). QT dispersion (QTd) on the Electrocardiogram demonstrates ventricular repolarization and depolarization. Due to the fact that an elevated QTd is a sign of ventricular instability, it can result in severe ventricular arrhythmia and sudden cardiac mortality.^[6] P wave dispersion (Pd) is the difference between the lengthiest and shortest P wave lengths on an ECG.^[7] Longer Pd intervals are thought to be an independent risk factor for atrial fibrillation that is linked to abnormal electrical signaling.^[8] Since QTd and Pd have a clear correlation with cardiac autonomic function, they both have the potential to predict abnormalities of the autonomic nervous system.

The purpose of the present this study was to investigate the relations between cardiac autonomic markers and clinical variables such as QT and P-wave dispersion to better explain the etiopathogenesis of ASPD.

MATERIAL AND METHOD

Participants

A total of 60 patients, who had antisocial personality disorder according to the DSM 5 diagnostic criteria, who were admitted to the psychiatry clinic, were included in the study. Five of the patients were excluded from the study because they could not fill in the given scales, and 3 of them

had a BMI of >24.9 kg/m². For this reason, 52 patients were included in the study. The control group included 60 healthy individuals who did not have any psychiatric, neurological, or cardiological diagnoses. Three were excluded from the study because they did not meet the study criteria, and three were excluded because they did not agree to participate in the study.

Both groups were excluded if they had any cardiological (cardiac arrhythmias, unstable coronary artery disease, atrioventricular blocks or bundle branch block, or heart failure), neurological, endocrinological, pulmonary, neoplastic, autoimmune, metabolic, or psychiatric disorders, any electrolyte imbalance, systolic blood pressure less than 140 mm Hg or diastolic blood pressure less than 90 mm Hg. All participants included in the research were normotensive. In addition, the participants who were included in the study have not been using an active drug for the last 3 months.

The research was given the go-ahead by Firat University's Ethics Committee (24.01.2019-02.04). The protocols adhered to the Declaration of Helsinki and the Institutional and National Human Experiments Committee's ethical guidelines.^[9]

Procedure

All participants signed the Informed Consent Forms. The detailed history of the participants who were included in the study was taken, and their height, weight, and blood pressure values were measured. All participants were normotensive. Participants were formed from people who have not used alcohol or drugs for at least 3 months. The Sociodemographic and Clinical Data Form, Beck Depression Inventory (BDI), Beck Anxiety Inventory (BAI), Barratt Impulsivity Inventory (BIS-11), and Buss-Durke Aggression Scale (BDAS) were administered to all participants by the same psychiatrist. After the scale application, Twelve lead electrocardiograms (ECGs) were obtained from all participants in the supine position and at rest in the ECG recording room in the same hospital .

1) Sociodemographic and Clinical Data Form

The study made use of the sociodemographic and clinical data form that the researchers had created in accordance with their clinical experience, data from their sources, and their understanding of the study's objectives. This semi-structured form collects sociodemographic information, including age, gender, marital status, level of education, profession, place of residence, family structure, and place of employment.

2) Beck Depression Scale (BDI)

Beck created the scale in 1961 to assess adult depressive symptom severity, chance of developing depression, and level of depressive symptoms.^[10] Hisli performed the validity and reliability study in Turkey in 1989.^[11] The scale's cutoff was found to be 17 points. It is commonly used as a 21-item Likert-type self-assessment scale in studies on depression. Each item pertains to a personality characteristic associated with depression. The things are graded from 0 to 3 depending on how severe the depression is. The total number can be

anything from 0 to 63. If the number is 0 to 9, there are no depressive symptoms; 10 to 16 points, mild symptoms; 17 to 24 points, moderate symptoms; and 25 or more, severe symptoms.

3) Beck Anxiety Scale (BAI)

It was created by Beck and associates.^[12] It is a self-assessment tool with 21 items on a Likert-type measure with a score range of 0 to 3. It is used to gauge how frequently people experience anxiety symptoms. Ulusoy et al. conducted research on the validity and dependability of it in Turkey.^[13]

4) Barratt Impulsivity Scale (BIS-11)

One of the key clinical characteristics of many distinct psychiatric disorders is impulsivity. The most widely used tool to assess impulsivity is the 11th edition of the Barratt Impulsivity Scale (BIS-11). H Güleç et al.^[14] evaluated the validity and reliability of the measure created by Barrat ES^[15] in Turkey.

5) Buss-Durke Aggression Scale (BDAS)

It was created to gauge a person's propensity for violence. It is a 34-item self-report measure of the Likert type, with a 1–5 scale for each item. Sub-dimensions include physical aggression, verbal aggression, hostility, rage, and indirect aggression. Additionally, general aggression is calculated along with the overall score, and high scores suggest an aggressive tendency.^[16] Can performed the validity and reliability tests on the Turkish version of the scale.^[17]

ECG Procedure

After 10 minutes of relaxation, the participants' blood pressures were discreetly assessed using an automatic sphygmomanometer (Omron HEM-7113, Omron Healthcare, Lake Forest, Illinois). Participants whose systolic and diastolic blood pressures were less than 140 and 90 mm Hg, respectively, were excluded from the categories. After 10 minutes of relaxation, a 12-derivation ECG (Cardiofax S, Nihon Kohden, Japan) was used. It had three standard (I-III), three unipolar (aVR, aVL, aVF), and six precordial (V1-V6) leads. The cardiologist (M. Y.), who was unaware of the groups, manually assessed the findings. The QT interval, which is measured in milliseconds, is the distance from the Q-start wave's to the place where the T-wave transitions to the isoelectric line. If there was a U-wave, the lowest point of the combined T-wave and U-wave section was recognized as the T wave's endpoint.^[18] The final number was determined to be the mean over three successive QT intervals. The highest and minimum values in each of the 12 derivatives of each range were measured, and the minimum and maximum were then subtracted to determine the QTd values. According to Bazett's Algorithm, QTc times were computed: $QTc = QT / \sqrt{RR}$.^[19] In accordance with the rules, QTc was deemed long (long QT) at 450 and 460 milliseconds in males and girls, respectively. The distance between the P-beginning wave's point and the points where the isoelectric line, the P-end wave's point, and those lines meet was measured to determine how long the P-wave lasted. The difference between the maximum

and minimum P-wave durations was used to determine Pd.^[20]

Body Mass Index (BMI, kg/m²)

Calculation was made with the equation of body weight/height² (kg/m²). Using the World Health Organization (WHO) BMI classification, patients were divided into four groups: normal weight (18.5–24.9 kg/m²), overweight (25–29.9 kg/m²), obese (30–39.9 kg/m²), and morbidly obese (>40 kg/m²).^[21]

Statistical analysis

The SPSS 22 package application was used to conduct the analyses (Statistical Package for Social Sciences; SPSS Inc., Chicago, IL). The study's descriptive data were presented as n and % values for categorical data and as mean, SD, median, and interquartile range (numbers between 25 and 75 percentiles) for continuous data. The categorical factors were compared between the groups using the Chi-Square Analysis (Pearson Chi-Square). The Kolmogorov-Smirnov Test was used to assess how closely the continuous factors adhered to a normal distribution. The Mann-Whitney U-Test was employed to compare non-normally distributed variables between groups, and the Independent Samples T-Test was used to compare normally distributed variables between groups. The relationships between the continuous factors were investigated using the Spearman Correlation Test. In the analyses, p0.05 was accepted as the statistically significant threshold.

RESULTS

A total of 106 people, which included 52 patients and 54 healthy controls, were included in the study. The mean age of the patients was 29.6±6.5 (min=20-max=48) in the patient group, and the mean age was 31.8±7.1 (min=20-max=44) of the control group, which was not statistically significant (p=0.092). Only one person in the patient and control group was female, and the rest were male. No significant differences were detected between the groups in terms of gender (p=1.000). It was found that the rate of being single (59.6%) was higher in the patient group than the rate of being single (40.7%) in the control group (p<0.001). It was found that the education level of the control group was significantly higher than the education level of the patient group (p<0.001). The working rate was found to be significantly lower in the patient group (57.7%) than that of the control group (100%) (**Figure 1**). A total of 59.6% of the patient group was in prison. Although in the past, alcohol and substance use was higher in the patient group than in the control group (p<0.001), smoking was higher in the control group (p<0.001). Tattoo, incision scar, and prison history rates of the patient group were significantly higher than those of the control group (p<0.001). When the patient group was evaluated in terms of crime types, there were 40.6% injury, 15.6% theft, 12.5% using drugs, 12.5% murder, 9.4% extortion, 6.3% terrorism, and 3.1% abuse (**Table 1**).

Table 1. The comparison of some variables of the patient and control group

	Patient		Control		p*
	Numbers	%	Numbers	%	
Age. Mean±SD	29.6±6.5		31.8±7.1		0.092
Income level	<1000 ₺	39	75.0	1	1.9
	1000-2000 ₺	9	17.3	0	.0
	2000-3000 ₺	3	5.8	19	35.2
	3000-4000 ₺	1	1.9	0	.0
	>4000 ₺	0	.0	34	63.0
Patient came from	Home	13	25.0	51	94.4
	Other hospital	5	9.6	1	1.9
	Emergency	3	5.8	0	.0
	Other (Prison)	31	59.6	2	3.7
	Willingly	30	57.7	53	98.1
Arrival form	Not willingly	2	3.8	0	.0
	With family	5	9.6	0	.0
	Alone	1	1.9	1	1.9
	Police	1	1.9	0	.0
	Other	13	25.0	0	.0
Smoking	Yes	2	3.8	15	27.8
	No	49	94.2	36	66.7
Tattoo/ incision scar	Quit	1	1.9	3	5.6
	Yes	46	88.5	0	.0
History of prison	No	6	11.5	54	100.0
	Yes	32	61.5	0	.0
Type of offence	No	20	38.5	54	100.0
	Injury	13	40.6	0	.0
	Theft	5	15.6	0	.0
	Drug abuse	4	12.5	0	.0
	Murder	4	12.5	0	.0
Alcohol use	Extorsion	3	9.4	0	.0
	Teror	2	6.3	0	.0
	Abuse	1	3.1	0	.0
Substance use	No	18	34.6	49	90.7
	Quit (3 monts ago)	34	65.3	5	9.3
Substance use	No	19	36.5	54	100.0
	Quit (3 monts ago)	33	53.5	0	.0

Chi-Square analysis was applied.

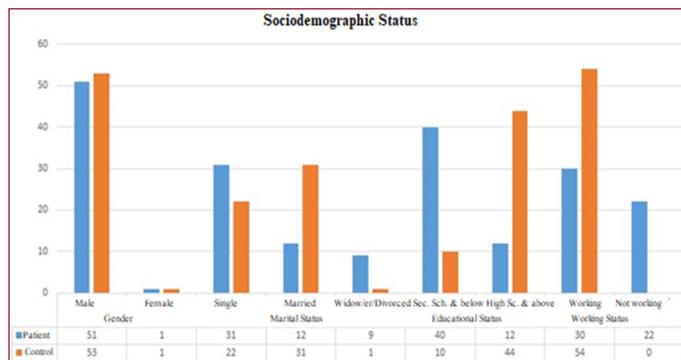


Figure 1. The comparison of the sociodemographic variables of the patient and control group
Sec.Sch & below: Secondary school and below
High Sc & above: High school and above

It was discovered that the case group's BAI and BDI scores were noticeably greater than those of the control group (p 0.001). The case group's Tp-e gap, Tp-e/QT ratio, and Tp-e/QTc ratio were all noticeably greater than those of the control group (p<0.001). It was discovered that the case group's incidence of fragmented QRS (60%) was significantly greater than the control group's incidence (36%) (p=0.016) (Table 2).

It was found that the height (p=0.022) and weight (p=0.041) of the patient group were significantly lower than those of the control group, but BMI was similar in both groups (Table 2).

Table 2. The comparison of the anthropometric values of the patient and control group

	Patient	Control	p*
	Mean (IQR)	Mean (IQR)	
Height	172.0 (170.0-180.0)	176.0 (173.0-180.0)	0.022
Weight	70.5 (65.0-75.5)	75.0 (68.0-80.0)	0.041
BMI	23.2 (21.4-24.9)	23.5 (22.6-24.9)	0.309

*Mann Whitney U-test was used.

QT max (p=0.016), QTd (p<0.001), P max (p<0.001), Pd (p<0.001), BDI (p<0.001), BAI (p<0.001), motor impulsiveness (p<0.001), physical aggression (p<0.001), indirect aggression (p=0.007), irritability (p<0.001), negativizm (p<0.001), verbal aggression (p<0.001) and general aggression (p<0.001) values of the patient group were significantly higher than those of the control group; and QT min (p<0.001) and P min (p<0.001) values were significantly lower (Table 3).

In the correlation analysis, a negative correlation was detected between QTd and age, and there was a significant and positive correlation between motor impulsiveness with QTd. (Table 4).

Table 3. The comparison of the ECG and scale scores of the patient and control group

	Patient	Control	p*
	Median (IQR)	Median (IQR)	
QT Max	362.5 (350.0-390.0)	352.0 (333.0-375.0)	0.016
QT Min	310.0 (285.0-330.0)	340.0 (320.0-352.0)	<0.001
QTd	60.0 (40.0-70.0)	31.5 (23.0-55.0)	<0.001
P Max	100.0 (90.0-110.0)	80.0 (75.0-100.0)	<0.001
P Min	40.0 (40.0-50.0)	60.0 (40.0-93.0)	<0.001
Pd	60.0 (50.0-70.0)	30.0 (19.0-50.0)	<0.001
BDI	28.0 (9.0-40.0)	1.0 (0-5.0)	<0.001
BAI	24.0 (9.5-36.0)	2.5 (0-8.0)	<0.001
BIS-11			
Attention Impulsiveness	31.5 (28.0-34.0)	31.0 (27.0-34.0)	0.254
Motor Impulsiveness	15.0 (12.0-18.0)	11.0 (10.0-13.0)	<0.001
Non-planning impulsiveness	19.0 (17.0-21.0)	18.5 (16.0-20.0)	0.136
BDAS			
Physical aggression	5.0 (3.5-7.0)	3.0 (2.0-4.0)	<0.001
Indirect aggression	4.0 (3.0-5.0)	3.0 (2.0-4.0)	0.007
Irritability	6.0 (4.0-7.0)	3.0 (2.0-5.0)	<0.001
Negativism	4.0 (3.0-4.0)	2.0 (1.0-4.0)	<0.001
Verbal aggression	11.0 (9.0-12.0)	7.0 (5.0-10.0)	<0.001
General Aggression Score	25.5 (20.5-29.5)	17.0 (12.0-20.0)	<0.001

*Mann Whitney U test was used. BDI: Beck Depression Scala, BAI: Beck Anxiety Scala, BIS-11: Barratt Impulsivity Scala, BDAS: Buss-Durke Aggression Scale

Table 4. The correlation of the ECG values with age and scale score in the patient group

		QT Max	QT Min	QT Disp	P Max	P Min	P Disp
Age	r	-.062	.114	-.286	.138	.232	-.003
	p	.664	.423	.040	.333	.102	.986
BDI	r	.008	-.184	.264	-.146	-.084	-.147
	p	.954	.191	.059	.306	.556	.303
BAI	r	.029	-.139	.163	-.114	.035	-.202
	p	.840	.327	.249	.424	.810	.155
BDAS-General	r	-.070	-.169	.132	-.034	.097	-.169
	p	.621	.230	.349	.812	.499	.237
BIS-11-Attention Impulsiveness	r	-.136	-.176	.060	-.064	-.214	.123
	p	.338	.212	.670	.656	.132	.391
BIS-11-Motor Impulsiveness	r	-.039	-.198	.294	-.010	-.179	.136
	p	.783	.160	.035	.947	.209	.341
BIS-11-Non-planning impulsiveness	r	-.169	-.265	.157	.102	-.131	.257
	p	.230	.057	.267	.476	.360	.069

BDI: Beck Depression Scale, BAI: Beck Anxiety Scale, BIS-11: Barratt Impulsivity Scale, BDAS: Buss-Durke Aggression Scale

DISCUSSION

In this study, QT and P dispersion in ASPD cases and healthy controls were examined, as well as their associations with clinical variables. The patient group was found to have considerably higher QT max, QTd, P max, and Pd, while having significantly lower QT min and P min. It was discovered that the patient group had higher BDI and BAI ratings. All BDAS subscale scores were higher than the control group ($p < 0.001$), and the motor impulsivity score of the BIS-11 subscales was higher in the sick group than the control group. The rate of smoking was found to be higher in the control group, despite the fact that alcohol and drug abuse were considerably higher in the patient group than in the control group. BMI scores were similar in both groups. In the correlation analysis, a negative correlation was detected between QTd and age, and there was a significant and positive correlation between motor impulsiveness with QTd.

ECG is used widely in the clinical settings for the diagnosis of heart diseases, rhythm and conduction disorders as well as in the analysis of the side effects of some drugs. The repolarization time between the electrodes is different on the ECG. Since the QT dispersion employed to measure this difference varies according to heart rate, it is calculated by correcting with the Bazett Formula. This correction prevents the changes occurring because of heart rate and allows for a more accurate analysis. Recently, ECG has been used not only in the context of heart diseases, but also in many risky psychiatric disorders, especially in studies conducted to identify ventricular arrhythmias.^[22,23]

In the literature, there is no such study that was conducted in ASPD cases. Previous studies showed that QTd is significantly higher in panic disorder such as anxiety disorder and social phobia than in controls. This correlation was evaluated as a result of prolonged anxiety.^[6] The group of psychiatric patients with eating problems who scored highly on depression and

anxiety had a longer QTd. In a meta-analysis of five studies, people with elevated levels of anxiety had longer QTds.^[24] Similarly, when compared to controls, patient anxiety and QTd levels were considerably higher.

Studies in Major depressive disorder (MDD) patients have found QTd prolongation findings supporting ventricular arrhythmia. It has been thought that both depression and antidepressant drugs used in the treatment of the treatment of the autonomic nervous system and cause some ECG findings.^[25-27] In our research, the patient group's BDI scores were significantly higher than those of the controls. The participants had no treatment for the last three months, including antidepressant and antipsychotic drugs. The results of our study may also be considered to affect depressive disorder due to the height of BDI scores.

In a research with bipolar disorder patients, it was discovered that fundamental electrocardiographic indicators, such as QTcmax, QTcd, and Pmin, increased at significant levels in the patient group when compared to the control group.^[28] Additionally, it was claimed that a longer QTd is a sign of ventricular tachycardia. Atrial fibrillation is already known to be linked to sudden cardiac death and a lengthy Pd interval.^[6,29] Bipolar illness has been shown to interact with Cluster B personality disorders like borderline and antisocial personality disorders. Bipolar disorder and Cluster B personality disorders were linked to traits like impulsivity, self-destructive behavior, and criminal activity.^[30] QTcd was found to be increased in a study conducted with borderline personality disorder, one of the cluster B personality disorders.^[31] Our findings were similar to those found in bipolar and borderline personality disorders.

Pd is a sensitive and specific precursor of atrial fibrillation (AF) in a variety of clinical conditions because it displays the difference between the lowest and maximum P-wave durations. According to reports, it was used to forecast paroxysmal AF.^[32] Significant variations in cardiac atrial conduction are associated with systemic autonomic symptoms of anxiety attacks.^[33] In a research that looked at the connection between arrhythmia and Pd in anxiety disorders, it was discovered that state anxiety had a greater impact on Pd than trait anxiety.^[34] Pd times in the patient group of a study with 30 hypochondriasis sufferers were discovered to be considerably higher.^[35] Another study examined 40 patients and 40 controls and found that Pd was prolonged in patients with panic disorder who also had significant somatic symptoms.^[36] The BAI scores and Pd in the current research were significantly higher.

A total of 65.3% of the patient group had used alcohol and 53.5% had used the substance in the past (had not used it for at least three months). Chronic alcohol use can cause the immune system damage, lead to heart failure, myocardial infarction, and sudden death by causing arrhythmia and contractile dysfunction, as well as autonomic nervous system dysfunction, QT prolongation,

myocarditis, and myocyte degeneration.^[37-39] In a study that was performed with patients with alcohol use disorder, a significant prolongation of QTd and Pd values was found in the patient group.^[40] The results of the present study show that ASPD patients are at risk for electrical-based problems of the heart, especially cardiac arrhythmia, and this must be considered in the general psychiatric follow-up of such patients.

It is suggested that HPA axis has lower efficacy in ASPD. It was shown in a study that was conducted with adolescents who had antisocial behaviors that both basal and stress-induced blood cortisol levels were significantly lower than those without antisocial behaviors.^[5] Abnormalities in the functioning of the HPA axis were associated with the characteristics of psychopathy.^[41,42] It has long been believed that low cortisol may contribute to the reduction of fear in the psychopathic personality. However, cortisol levels can be affected by environmental factors such as chronic stress conditions. Loomans et al. (2016) measured CAR (Cortisol Awake Response) and afternoon and evening cortisol levels in a group of inpatient male ASPD patients and two healthy comparison groups (male employees in the same hospital and general population sampling) grouping the ASPD patients as those with high and low psychopathy scores (26 points and above, 25 points and below).^[43] Although no differences were detected in cortisol secretion between the groups that had personality disorder, both ASPD and psychopathic groups (and hospital staff) had more tendency to show high cortisol levels, which was interpreted as evidence that patients live in more stressful conditions than the general population, which, also suggests that cortisol daily rhythms may be affected by environmental events.^[43] The fact that 59.6% of the patient group was in prison and the elevated BAI scores predict that this group led a stressful life. Assuming that the normally low expected cortisol levels might have been elevated because of these reasons, it may have affected the ECG findings.

A cohort study published in 2022 revealed that QRS duration was associated with age, gender, HDL, TG, LDL, and BMI.^[44] In another study, obesity was found to prolong Pd and QTcd.^[45] In our study, the height and weight of the patient group were significantly lower than the control group, but BMI values were similar. While the median BMI value of the patient group was 23.2, it was 23.5 in the control group. It is in the normal weight class according to the WHO classification.^[21]

In our correlation analysis results, a negative correlation was found between age and QTd. However, literature information was that there was no significant relationship between age and QTd.^[46,47] There are studies showing an increase in QT dispersion in patients with predominant impulsivity such as manic episode and borderline personality disorder.^[28,31] In our study, the results supported the literature and found a positive correlation between motor impulsivity and QTd.

The present study had some limitations. The first was that the majority of the patient and control group were men. The second was that more samplings are needed in terms of numbers. Also, it was considered that uncontrollable factors e.g. high alcohol and substance use in the patient group, high rate of being in prison, and differences in daily living activities e.g. nutrition and exercise affected the results. On the other hand, the fact that the levels of the related hormones, especially cortisol, which may be associated with ASPD and autonomic dysfunction, were not checked can be considered as another limitation. For this reason, another study can be planned with a larger sampling by minimizing the variables which may affect the parameters such as alcohol and substance use.

CONCLUSION

The findings of the present study showed that ASPD patients are at risk for electrical problems of the heart, especially cardiac arrhythmia, and this must be considered in the general psychiatric follow-up of these patients. Treatment of depression and anxiety disorders, providing treatment in alcohol and substance rehabilitation centers, changing nutritional habits and adding exercise to daily living activities in ASPD patients are important both in terms of cardiac and psychiatric.

ETHICAL DECLARATIONS

Ethics Committee Approval: The study was carried out with the permission of Firat University Ethics Committee (Date: 24.01.2019, Decision No: 02/04).

Informed Consent: All patients signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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