The Impact of Positive and Negative Affect on QT Dispersion in Healthy Young Adult Men

Barbaros Ozdemir¹, Murat Erdem², Abdullah Bolu³, Taner Oznur⁴, Huseyin Gunay⁵, Hakan Balibey⁶, Sarper Ercan⁷, Omer Uz⁸

ABSTRACT:
The impact of positive and negative affect on QT dispersion in healthy young adult men

Objective: In this study, we aimed to determine whether QT dispersion known to be associated with development of coronary artery disease is related with positive (PA) and negative affect (NA) in healthy young adult men.

Method: Two hundred and forty-four healthy males aged between 21-30 years were included in this study. Standard electrocardiographic (12 derivation and 50 mm/sec) and echocardiographic evaluations were performed. The duration of QT dispersion was measured digitally. Patients with sinus bradycardia, sinus tachycardia, bundle branch block, preexcitation and electrolyte imbalances were excluded. PA and NA scores of the subjects were determined by the Positive and Negative Affect Scale and clustered into “high” and “low” affect subtypes.

Results: QT dispersion was significantly increased in subjects with high NA compared with those with low NA. There was no difference between the subjects having high PA and low PA. QT dispersion correlated positively with NA but not with PA.

Conclusion: The results of this study have shown that there may be a relation between QT dispersion and NA in healthy young adult men.

Keywords: QT dispersion, negative affect, positive affect

INTRODUCTION

QT interval and QT dispersion (QTd) has been used as a noninvasive measurement for inhomogeneity of myocardial repolarization¹-³. Moreover, recent observations show that patients with increased QTd have a high risk of sudden death⁴-⁷. Although the factors that cause prolongation remain unclear, mood states or affects such as anxiety may influence QT interval and QTd⁴-⁶. Likewise, anxiety, worry, and anger are among the psychological conditions associated with increased risk of death from cardiovascular disease⁴. Because of these reasons, relationships between affective status and
cardiovascular diseases have been investigated for a long time. QTd has been found to be increased in patients with social phobia, anxiety, and bulimia nervosa (with high levels of depression and anxiety). Before 1980, affect was evaluated in one dimension, but since then it has been bidimensionally classified as positive (PA) and negative affect (NA). To our best knowledge, correlations between QTd and different components of affect have not been studied and published before. Accordingly, in this study, we aimed to investigate whether different components of affect correlated with QTd values of otherwise healthy young adult men.

**METHOD**

Two hundred and eighty physically healthy males, aged between 20-31 years, who did not have axis I/II diagnoses after being evaluated with the Turkish versions of the Structured Clinical Interview for DSM-IV Axis I Disorders (SCID-I) and the Structured Clinical Interview for DSM-III-R Personality Disorders (SCID-II), were recruited. All subjects were informed about the study procedure and consented to participate. Subjects with normal cardiac examinations (including electrocardiographic and echocardiographic findings) were enrolled. Individuals who had any pathology that would affect QT assessment e.g. sinus tachy/bradycardia, bundle branch block, preexcitation syndrome, electrolyte abnormalities, hypertension and hyperlipidemia (n=36) were excluded. The study was completed with 244 individuals. PA (active, alert, attentive, determined, enthusiastic, excited, inspired, interested, proud, and strong) and NA (afraid, scared, nervous, jittery, irritable, hostile, guilty, ashamed, upset, and distressed) were assessed with the Turkish version of the Positive Affect Negative Affect Schedule (PANAS). It is a 20-item (10 positive and 10 negative) scale whereby each item is scored between 1 (“very slightly” or “not at all”) to 5 (“extremely”). The scale is used to assess the affect level pertaining to the last week.

**Electrocardiogram (ECG)**

A standard ECG (12 derivation and 50 mm/sec) was performed. QT intervals (starting from the onset of Q wave until the end of T wave) were measured digitally. Derivations where the T wave could not be detected were not taken into analysis. QTd was defined as the difference between the longest and shortest QT intervals and rate correction was performed with Bazett’s formula; \( QTc = QT/M(RR) \) in ms. This traditional correction procedure is intended to obviate the dependence of QT interval on heart rate. The measurements were evaluated by a cardiologist.

**Statistical Analysis**

SPSS version 15.0 was used throughout the statistical analysis. Descriptive statistics regarding continuous variables were expressed by mean±standard deviation. The Student t test was used to compare mean values of two independent groups. Partial correlation and linear regression analyses were applied concerning NA as the predicted variable. Statistical significance was set at p<0.05.

**RESULTS**

Demographic features, cardiac measurements and PA/NA are given in Table 1. According to the mean scores for PA and NA (32.3 and 20.8, respectively), subjects were grouped as “low” and “high”. Table 2 summarizes the comparison of QTd between different groups. QTd values were statistically
similar between low vs. high groups regarding PA (p>0.05); and QTd values were found to be higher in the high group when compared with the low group regarding NA (p<0.001). Age, body mass index and NA had a significant effect on QTd (Table 3). NA was the most related parameter after correction for positive, body mass index and age (r=0.57, p<0.001).

**DISCUSSION**

In this study, we aimed to explore whether different components of affect correlated with QTd values of healthy individuals, to establish the relationship between NA and QTd. This study is the first to differentiate between the impact of NA and PA on QTd. The relationship between cardiac disorders and psychiatric disorder such as depression and anxiety has been reported in previous studies\textsuperscript{13,18}. Spindler et al.\textsuperscript{18}, by using the Danish Global Mood Scale, have found a negative relationship between PA/NA and health-related quality of life in 502 patients with various cardiac diseases. They have proposed that PA and NA might be an important psychological measure for future cardiovascular diseases. Uyarel et al.\textsuperscript{6}, have studied 726 healthy volunteers, and by using The State Anxiety Scale and the Trait Anxiety Scale (STAI I-II), they found increased QTd in subjects with elevated levels of anxiety. In our study, we have also evaluated other NA components. Minorettia et al.\textsuperscript{20}, in a group of 658 healthy subjects, observed that QT interval paralleled increased neurotism scores. Due to the fact that high neurotism reflects a pervasive tendency toward states of negative emotions, their results can be considered to be in accordance with ours. Takimoto et al.\textsuperscript{13}, observed increased QTd in patients with major depression accompanying eating disorders when compared with healthy individuals. In their study, keeping in mind the demographic features of the study population, polypharmacy, electrolyte imbalance, hypoglycemia, increased estrogen and fatty acids may be considered as possible confounders affecting QTd. Beyond this, in our study we excluded all those relevant factors by enrolling only healthy young adult men and showed the relationship between NA and QTd. Regarding the underlying mechanism(s), it has been shown that anxiety and anger similarly trigger the catecholaminergic system\textsuperscript{21-24}. The catecholaminergic system may be the possible underlying mechanism of QTd increase. Hence, the lack of hormonal (norepinephrine etc.) evaluation and its relation to affect can be considered as a limitation of our study. In short, keeping in mind that increased QTd is related with ventricular arrhythmia and sudden cardiac death\textsuperscript{17,25,26}, we may conclude that subjects with high levels of NA might be under risk for various cardiac disorders. Future studies with different groups of psychiatric disorders are needed to demonstrate whether QTd is also related with other psychiatric manifestations of such patients.
The impact of positive and negative affect on QT dispersion in healthy young adult men

References:


