P wave dispersion in obsessive-compulsive disorder

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ABSTRACT

Background: P wave dispersion (Pd) is defined as the difference between the maximum and the minimum P wave duration. It has recently been associated with increased anxiety levels, thereby predisposing affected individuals to fatal heart disease. Despite of evidence of this autonomous nervous system (ANS) relationship, there are no electrocardiography (ECG) studies in the patients with obsessive-compulsive disorder (OCD). Thus, in this study, we aimed to evaluate the Pd in OCD patients.

Materials and Methods: The study consisted of a total of 25 patients with OCD and same number of physically and mentally healthy age- and gender-matched controls. For psychological testing, Yale-Brown Obsession and Compulsion (Y-BOCS) was administered.

Results: Pmax was found to be significantly higher in the patients compared to controls. Pmin did not differ between groups. As for the main parameter investigated in the present study, it was found that Pd was significantly increased in the OCD patients than the controls. Y-BOCS scores for the patient group was positively correlated with Pd ($r = 0.73$, $P < 0.01$).

Conclusions: In conclusion, our results suggest that Pd may be associated with OCD though our sample is too small to allow us to obtain a clear conclusion. Future studies with larger sample evaluating the effects of treatment are required.

Key words: Autonomous nervous system, obsessive-compulsive disorder, P wave dispersion

INTRODUCTION

Obsessive-compulsive disorder (OCD) is a chronic and often disabling anxiety disorder and is characterized by obsessions and compulsions to reduce this distress. Data from the Epidemiological Catchment Area survey and other epidemiological studies demonstrated the lifetime prevalence of OCD to be very frequent with the rates of 2% and 3% in the general population.[1]

It has been well-established that the autonomous nervous system (ANS) is involved in anxiety states. This involvement shows itself by the symptoms like palpitations, shortness of breath sweating, irritability, and chest pain. There is also evidence to suggest that panic disorder (PD) and panic-like anxiety is related to poorer CAD prognosis, such as increased risk for postmyocardial infarction.[2] On the other hand, it was demonstrated that psychotropic drugs could lead to electrocardiographic (ECG) studies in the patients with obsessive-compulsive disorder (OCD). Thus, in this study, we aimed to evaluate the Pd in OCD patients.

P wave dispersion (Pd), defined as the difference between the maximum and the minimum P wave duration, and maximum P wave duration (P maximum) are ECG markers that have been used to evaluate the discontinuous propagation of sinus impulses and the prolongation of atrial conduction time, respectively. In anxiety states, several studies have investigated the involvement of the ANS.[4,5] In this context, we previously measured Pd in 30 outpatients with PD and in 30 physically and mentally healthy age- and gender-matched controls.[6] In that study, both Pmax and
Pmin were significantly higher than those of healthy controls and Pd was found significantly greater in the PD group than the controls, as was the rate-corrected Pd. Increased ANS activity and accompanying anxiety become evident when OCD patients attempt to focus on their obsessional thoughts and sometime compulsions.[7,8] In this context, the studies evaluating ANS functioning in the patients with OCD showed higher levels of skin conductance or heart rate, indicative of elevated autonomic arousal.[9,10] The Spielberger State-Trait Anxiety Inventory was found to be associated with an increase in P (max) and Pd in healthy young population.[11]

In their review on mean and variability of QT-interval on psychiatric illness and psychotropic medication, Kumar et al. concluded that there might be a decrease in cardiac vagal function in anxiety, depression, and schizophrenia and thus drugs increasing sympathetic activity might have detrimental effects in these patients.[12] On the other hand, we previously measured the plasma adiponectin and glucose concentrations in 23 patients and same number of healthy controls and found that the mean adiponectin levels were significantly lower in the patients compared to controls and suggested that there might be an interaction between OCD and plasma adiponectin and that it should be kept into mind both pathophysologic dimension and cardiovascular vulnerability.[12] Despite of evidence of this ANS relationship and probable cardiac vulnerability aforementioned there are no ECG studies in the patients with OCD. Thus, in this study, we aimed to evaluate the Pd in OCD patients.

MATERIALS AND METHODS

Study population
A total of 25 patients with OCD according to the Diagnostic and Statistical Manual of Mental Disorders-4th Edition were recruited from First University School of Medicine Department of Psychiatry. The comparison group was composed of the same number of healthy controls who had no current or lifetime history of psychiatric or cardiac illnesses.

The patients were evaluated in order to obtain the diagnostic detail by one trained psychiatrist. All patients were free of all medications or on stabilized treatment regime at least for 1 month. None of the study participants were receiving either vasoactive agents, and none consumed alcohol or drugs. The following exclusion criteria were used in all subjects: current or previous evidence of congestive heart failure, another significant cardiac condition, a resting blood pressure higher than 180/120 mm Hg, a serious systemic illness (e.g. diabetes), serious psychiatric and neurological states blocking the psychiatric interview such as mental retardation, any psychotic and mood disorder, dementia, delirium and amnestic disorders.

Under the standardized procedure, in order to reduce emotional distress or state anxiety during the ECG recording, all recordings were performed in the same quiet room during spontaneous breathing, following 10 min of adjustment in the supine position. Furthermore, to exclude the possible influence of diurnal variations, all the recordings were performed between same time period of the day. For psychological testing, Yale-Brown Obsession and Compulsion (Y-BOCS)[14] was administered.

P wave dispersion analysis
In the resting supine position, 12-lead surface ECGs was obtained from all subjects in the by using Nihon Kohden(TOKYO-JAPAN) machine. All patients were breathing freely but not allowed to speak during the ECG recordings. The ECGs were recorded at a paper speed of 50 mm/s. Three leads were recorded simultaneously. Two investigators without knowledge of patients’ clinical status measured the P wave durations manually. To improve accuracy, measurements were performed with Calipers and magnifying lens for defining the ECG deflection.[15-17] The onset of P wave was defined as the junction between the isoelectric line and the beginning of the P wave deflection, and the offset of the P waves as the junction between the end of the P wave deflection and the isoelectric line.[18] While Pmax in any of the 12-lead surface ECG was calculated and used as a marker of prolonged atrial conduction time, Pd, defined as the difference between Pmax and Pmin, was calculated from the 12-lead ECG.

Statistical analysis
All values are shown as mean ± standard deviation and analyzed using Student’s t-test. The Chi-square test was used to compare categorical variables. When required, analysis of covariance (ANCOVA) was used to control for covariates. All data were evaluated by SPSS for Windows 13.0(SPSS/PC, 1998). Correlation analysis was performed by Spearman rank correlations test. Differences were considered significant at P < 0.05 for all these tests.

RESULTS
No significant differences in age, gender distribution, a positive history of cardiovascular disease or education were detected between OCD patients and controls [Table 1].

Table 1: Participants characteristics

|                      | Patients | Controls | P      |
|----------------------|----------|----------|--------|
| Age (range)          | 32.2±10.2| 36.3±6.5 | >0.05  |
| Sex ratio (female/male) | 16/9    | 15/10    | >0.05  |
| Duration of illness (years) | 8.6±5.4 | -        |        |
| Y-BOCS               | 21.3±5.8 | 6.8±2.5  | <0.001 |
| Pmax                 | 95.2±17.3| 87.0±9.0 | >0.05  |
| Pmin                 | 54.4±13.6| 58.3±9.3 | >0.05  |
| Pd                   | 54.6±9.6 | 32.5±7.6 | <0.001 |
| LA size              | 31.3±3.5 | 31.9±2.9 | >0.05  |
| EF                   | 61.6±4.0 | 61.4±3.2 | >0.05  |

The values are the mean±SD (range). Y-BOCS – Yale-brown obsession compulsion scale; Pd – P wave dispersion; LA – Left atrium; EF – Ejection fraction; SD – Standard deviation.
On the other hand, no significant differences in nutrient intake or smoking status were observed between the patient and control groups (data not shown). As expected, OCD patients had significantly higher Y-BOCS scores than controls ($P < 0.001$).

As can be seen in Table 1 which represents the ECG data, while Pmax was significantly higher in the patients compared with controls (95.2 ± 17.3 ms for the patient group vs. 87.0 ± 9.0 ms for controls, $P < 0.05$), Pmin did not differ between groups (54.4 ± 13.6 ms for the patient group vs. 58.3 ± 9.3 ms for controls, $P > 0.05$). Left atrium (LA) sizes were not different between groups ($P > 0.05$). As for the main parameter investigated in the present study, it was found that Pd was significantly increased in the OCD patients than the controls ($P < 0.001$) (54.6 ± 9.6 ms for the patient group vs. 32.5 ± 7.6 ms for controls). As for the ANCOVA analyses, it revealed the main effect of OCD diagnosis on Pmax ($F = 4.39, P = 0.041$), and Pd values ($F = 15.17, P < 0.001$) after heart rate and LA sizes as covariates. Meanwhile, correlation analyses were performed to power our findings. Y-BOCS scores for the patient group was positively correlated with Pd ($r = 0.73, P < 0.01$).

**DISCUSSION**

To the best of our knowledge, the present study evaluating Pd in patients with OCD is the first investigation and revealed following important preliminary findings: (i) Pmax (95.2 ± 17.3 ms for the patient group vs. 87.0 ± 9.0 ms for controls, $P < 0.05$) was found to be significantly higher in the patients compared to controls; (ii) as for the main parameter investigated in the present study, it was found that Pd was significantly increased in the OCD patients than the controls ($P < 0.001$), supporting by the ANCOVA analyses which revealed the main effect of OCD diagnosis on Pmax ($F = 4.39, P = 0.041$), and Pd values ($F = 15.17, P < 0.001$) after heart rate and LA sizes as covariates; (iii) 9 Y-BOCS scores for the patient group was positively correlated with Pd ($r = 0.73, P < 0.01$).

Although the association between anxiety itself and ANS is well-established, there has been a very dearth of investigations in anxiety disorders that evaluates cardiac parameters. Among these limited studies, in their study, Nahshoni et al.[19] examined QT dispersion in 16 physically healthy and nondepressed outpatients with long-term social phobi and in 15 healthy controls and found SP patients to have significantly higher QTd and rate-corrected QTd values compared to the controls, and reported that QTd values were highly correlated with the two Liebowitz Social Anxiety Scale subscores. On the other hand, in another study, our group previously[20] measured Pd in 30 outpatients with PD and in 30 physically and healthy controls with the evaluations of PAS and HDRS, concomitantly. In that study, we found that both Pmax, Pmin and Pd values were significantly higher than those of healthy controls and that PAS was significantly higher for the PD group than the controls and correlated significantly with Pd. Studies implicated that excessive anxiety itself in physically healthy subjects is associated with cardiac autonomic imbalance and increases the risk of coronary heart disease.[20] Morris et al.[21] examined the comorbidity of PD with heart disease and the prevalence of PD in 128 outpatients presenting to cardiologist. They found that 16 patients (12%) met the criteria of PD, and 73 (57%) were shown to have actual cardiac illness; of these, 10 (14%) had PD.[21] In this context, it cannot be considered that the patients with any anxiety disorder are not affected. As convenient this opinion, our finding that both Pmax, Pmin and the main parameter investigated in the present study, Pd were found to be significantly higher in the patients compared to controls is an important implication for the fact that this association may result from prolonged anxiety and increase in sympathetic modulation. On the other hand, in our a previous study,[12] we examined the adiponectin and glucose values in patients with OCD and found that the patient group had significantly lower adponectin levels compared with those of healthy controls and suggested that there might be an interaction between OCD and adiponectin in regard to both pathophysiologic dimension and cardiovascular vulnerability. When considering that lacobellis et al.[22] reported that adiponectin has a protective role in human coronary arteries, the findings of the present study merits further exploration to deal with cardiac vulnerability for these patients. However, to support this notion, long-term follow-up designed investigation in which screening Pd values in different times throughout the course of the disorder should be performed.

The small sample size is the main limitation of the present study. Another methodological flaw of the present study is the fact that some patients had under the under the stabilized anti obsessional treatment. In conclusion, our results suggest that Pd may be associated with OCD though our sample is too small to allow us to obtain a clear conclusion. Future studies with larger sample evaluating the effects of treatment are required.

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Source of Support: Nil, Conflict of Interest: None declared