

ERPs IN BIPOLAR AFFECTIVE DISORDER*

Bipolar affektif bozuklukta olaya ilişkin potansiyeller

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Summary

Purpose: Event related potentials (ERPs), which are known as endogenous or cognitive potentials reflect the process of attention, recognition, evaluation and retrieval from memory and it has been accepted that these potentials originate from the subcortical structures. The changes in these potentials might be produced from some pathologies in the central structures. Consequently, the search of ERPs may give us some information about the psychiatric conditions. In the light of this hypothesis, we compared the ERPs of a group of bipolar patients with those of healthy controls.

Patients and Methods: Forty-two patients (30 male and 12 female, mean age: 35.14±10.34 years) who were admitted to the Psychiatry Clinic of Gevher Nesibe Hospital and who fulfilled the DSM-III-R criteria for bipolar affective disorder with remission and 41 healthy controls (29 male and 12 female, mean age: 34.70±9.50 years) were included in this study. ERPs were recorded with the 'odd-ball' voice discrimination task.

Results: The mean latency of N200 in the patient group was larger than that of the control subjects ($p < 0.02$). There was no statistically significant difference between the two groups in any other ERP components.

Conclusion: Considering that ERPs originate from the subcortical structures, these findings constitute further evidence of the importance of subcortical structures in bipolar affective disorder.

Key Words: Bipolar disorder, Event -related potentials, P300

Özet

Amaç: Endojen veya kognitif potansiyeller olarak da bilinen olaya ilişkin potansiyellerin (ERP) uyarılara dikkat edilmesi, onların tanınması, değerlendirilmesi ve hatırlanması süreçlerini yansıttığı ve subkortikal yapılardan kaynaklandığı kabul edilir. Bu potansiyellerdeki değişiklikler santral yapılarıdaki patolojiler tarafından oluşturuluyor olabilir. Bu nedenle ERP araştırmaları bazı psikiyatrik hastalıklar hakkında bilgi verebilir. Bu varsayımdan hareketle bir grup bipolar hastanın ERP ölçümlerini kontrol grubu ile karşılaştırmayı amaçladık.

Hastalar ve Yöntem: Gevher Nesibe hastanesi Psikiyatri kliniğine başvuran ve bipolar affektif bozukluk yönünden DSM-III-R kriterine uyan remisyondaki 42 hasta (30 erkek, 12 kadın, yaş ortalaması: 35.14±10.34) ile 41 sağlıklı kontrol (29 erkek, 12 kadın, yaş ortalaması 34.70±9.50) çalışmaya alındı. ERP'ler oddball paradigması kullanılarak elde edildi.

Bulgular: Hasta grubunun N 200 latansı kontrol grubuna göre gecikmiş bulundu ($p < 0.02$). Diğer herhangi bir ERP componentinde istatistiksel olarak anlamlı bir fark bulunamadı.

Sonuç: ERP'lerin subkortikal yapılardan kaynaklandığı düşünüldüğünde, bu bulgular bipolar affektif bozukluklarda subkortikal yapıların önemini vurgulayan ek bir kanıt teşkil etmektedir.

Anahtar Kelimeler: Bipolar bozukluk, Olaya bağlı potansiyeller, P300

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Sensorial evoked potentials (EPs) are the responses of the brain to a specific sensory stimulus. There is, however, another distinct class of evoked potential, the "endogenous" or "cognitive" potentials (ERPs), which can be recorded in response to an external stimulus or event. The term cognitive subsumes a broad range of psychological concepts, including

attention, expectancy, surprise, storage and retrieval of information from memory, and linguistic processing. The amplitude and latency of these potentials may depend on the motivation of the subject and the cognitive, affective or motor response to that particular stimulus and it has been accepted that these potentials originate from the subcortical structures (4, 11, 14). The peaks or components of EPs, and ERPs are typically labelled according to their polarity (negative N or positive P) and latency. In some cases the peaks are designated by their ordinal position in the wave form (e.g., N1, P2, N2, P3) and in others by their latency in milliseconds (e.g., N100, P200, N200, P300).

In previous studies there is a prolongation of latencies and decrease in amplitude of P300 (9,16,17,18,21) and similarly there is prolongation of N200 latencies in patients with dementia (10,21). Also there is a prolongation *of latencies and decrease in amplitude of P300 in schizophrenic patients (2,3,8,19,22). Furthermore there is a decrease in the amplitude of P300 in patient with depression (3,16,18). An increase in amplitude of N200 in obsessive compulsive disorder was found (24). In this study, we planned to search the ERP of a group of bipolar patients.

PATIENTS and METHODS

Patients

Forty-two patients who were admitted to the Psychiatry Clinic of Gevher Nesibe Hospital and who fulfilled the DSM-III-R criteria for bipolar affective disorder were included in this study. Thirty were males and 12 females with a mean age of 35.14 ± 10.34 years. The mean age of onset of illness was 23.85 ± 7.15 years (range 12-40) and the mean duration of illness (between first and last episode) was 9.71 ± 5.84 years (range 1-23).

The healthy control group consisted of 29 males and 12 females without any physical or psychiatric disorder and the mean age of this group was 34.70 ± 9.50 years.

All patients were in remission during the study. None of them had a history of head injury and chronic institutionalization.

Methods

ERPs were recorded with the 'odd-ball' two voice discrimination task (11). Active electrodes were placed at CZ, FZ, and earth electrode was placed at FPZ, according to the 10-20 International EEG system. Reference electrodes were placed at the mastoids and connected to each other. Potentials were recorded from both electrodes but only CZ records were evaluated in the study. The electrode impedance was less than $5k\Omega$. Subjects were instructed to count silently infrequent high-pitch tones of 2000 Hz randomly presented in a series of low-pitch tones of 1000 Hz. The ratio of high to low pitch tones was 20%. The responses to frequent and rare tones were averaged separately. A Nihon Kohden MEB-530 signal averaging computer was used. Twenty artifact-free traces were recorded with a sweep time of a second. The peaks were evaluated by visual observation as N100, P200, N200 and P300. The latencies were measured according to the highest point by means of a cursor. If there were two peaks for P300, two lines were drawn from the descending and ascending parts of the trace and the crossing point of the lines accepted as the peak and latencies were measured from this point. The amplitude measurements were done from peak to peak. The results were evaluated by Student's t test.

RESULTS

As it is shown on table I, the latency of N200 in the patient group has been found as delayed when compared to the controls. The delay in the other components is not statistically significant. The mean P3 amplitude of patient group was smaller than the controls, but this was not statistically significant; this finding may indicate a tendency of getting smaller in the P300 in the patient group.

Table I. Comparison of the values obtained from the bipolar patients and controls

		Bipolars (n:42) Mean ± SD	Controls (n:41) Mean ± SD	Comparison t*
Latencies (msec)	N1	97.10 ± 11.95	93.90 ± 14.33	1.136
	N2	230.33 ± 37.52	213.90 ± 17.52	2.545**
	P2	172.19 ± 21.82	170.04 ± 18.15	0.485
	P3	323.28 ± 28.05	316.48 ± 25.29	1.158
Amplitude (v)	P2	10.147 ± 4.14	10.289 ± 3.355	-0.170
	N2	5.836 ± 3.49	5.565 ± 3.239	0.351
	P3	11.374 ± 5.81	12.780 ± 4.898	-1.191

* Student's t test (unpaired)

** $p < 0.02$

DISCUSSION

If one keeps abreast of the fact that temporal lobe structures may play an important role in the origin of ERPs (5, 12, 15, 20), this means that the changes in one of the components may reflect some disorders in these subcortical structures despite disagreements (4). Some studies carried out using brain imaging techniques have shown that there were some pathological changes in subcortical structures in bipolar disorder (1, 7, 13, 23). It has also been reported that these changes in the temporal lobe structures could be correlated with a delay in the latency of P300 (5). In one study, the Huntington's and Parkinson's demented groups (classified by the authors as having subcortical dementia) differed from the Alzheimer's group (classified as cortical dementia) in showing a greater degree of N2 and P300 prolongation and by greater latency of the earlier N1 and N2 components (10).

In the light of above studies, our findings may constitute further evidence of the importance of temporal lobe structures in bipolar disorder.

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