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Evoked potentials in bipolar disorder - review of the literature

Potencjały wywołane w chorobie afektywnej dwubiegunowej – przegląd literatury

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Streszczenie

Praca zawiera przegląd piśmiennictwa dotyczącego potencjałów wywołanych rejestrowanych u pacjentów z rozpoznaniem choroby afektywnej dwubiegunowej. Badania, które dotyczą tej tematyki analizują morfologię poszczególnych potencjałów, wpływ leków na potencjały wywołane oraz są próbą szukania endofenotypów tej choroby, a także próbą zastosowania metody badania zależności AEP od siły bodźca dla prognozowania skuteczności leczenia lekami SSRI i litem zaburzeń dwubiegunowych.

Summary

This publication is the review of the literature on evoked potentials in bipolar disorder. Patients with bipolar disorder (BD) exhibit aberrations in evoked potentials. Increasing number of investigations of evoked potentials in bipolar disorder gave contribution to an effort to discover the endophenotypes for this disorder mesurment of evoked potentials could also be the method of efectivness of the treatments with SSRIs and lithium of bipolar disorder. Increasing number of investigations of evoked potentials in bipolar disorder gave many important information and allowed this clinical and neuropsychological data to extrapolate to neurophysiological background although currently, no neurophysiological marker exists for bipolar disorder.

Słowa kluczowe: choroba afektywna dwubiegunowa, potencjały wywołane
Key words: bipolar disorder, evoked potentials

The presence of cognitive deficits across all phases of bipolar disorder has become recently a focus of intensive neuropsychological and neuropsychiatric research [1,2,3,4]. The results show that cognitive deficits involving attention, executive function, and verbal memory, episodic memory and, to a lesser extent, visuospatial skills are evident across all phases of bipolar disorder [1,2,3]. Osuji stresses that "efforts directed toward phenotyping neuropsychiatric disorders using such measures, in addition to other clinical, neuroimaging, neurophysiologic, and genotypic information, may yield important insights into the development, nature, and course of illness. It is hoped that this understanding will lead to better identification of individuals who may be prone to greater cognitive impairment or decline and those who might be more responsive to specific treatments." [3]. Increasing number of investigations of evoked potentials in bipolar disorder gave many important information and allowed this clinical and neuropsychological data to extrapolate to neurophysiological background.

Patients with bipolar disorder (BD) exhibit aberrations in evoked potentials. Some publications show that BD is significantly associated with smaller P300 amplitude of auditory event-related potentials [5,6,7] and with smaller P200 amplitude of auditory event-related potentials [8], although the other investigations did not confirmed reduced P200 amplitude of auditory event-related potentials of BD patients [9,10,11,12]. There is one publication which shows that P300 amplitude of patients with the first psychotic episode of BD is not differ from the amplitude for controls. There is one publication [13] which reports reduced P300 amplitude of patients with BD, who were in remission for at least 6 months, the researchers conclude that smaller P300 amplitude can be an indicator of relatively stable deficit which persists even in the period of longer duration of symptomatic remission. Kaya at al. [13] in the study aimed to assess interepisode residual symptoms in remitted BD from depressive episode, P300 test results revealed low amplitude in the BP-D group.

Auditory P300 latency prolongation has been reported in patients affected by BD [6,7,11]. Strik at al 1998 observed P300 latency prolongation and normal P300 amplitude of patients suffering of mania without psychotic features, Salisbury at al also did not observed prolongation of P300 amplitude of bipolar patients [14,15].

Kaya at al in publication concerning patients with BD, who were in remission for at least

6 months reported that there were no aberrations of P300 latency of examined patients with BD, and they conclude that it can be the expression of improvement in association with symptomatic improvement [13]. P300 latency prolongation and amplitude reduction were seen in chronic bipolar patients [12].The researchers stress that aberrations of P300 of examined patients with BD are regardless of their mood state at testing, medication status, or history of psychosis [5,7,9,17]. Fridberg, points the importance of influence of coexistence of anxiety disorders on prolongation of P300 latency in BD patients and nacessity of futher investigations to confirm this influence, Enoch [16], reports increase in P300 amplitude. Some investigators stress that symptoms of disturbed mood can influence the P300 parameters: Lahera [18] conducted the evaluation of auditory P300 event-related potentials in 24 euthymic bipolar patients and 38 healthy volunteers. There were no significant differences between groups, in the P300 responses. P300 response might be driven by the presence of mood symptoms and authors see the nacessity of futher investigations of euthymic patients with diagnosis of BD, becouse many investigations already conducted which reported aberrations of P300 of BD patients, could be distorted by the influence of disordered mood. In some investigations of P300 in BD the state of mood was not assesed. According to Szelenberger [19] intensity dependence of auditory evoked potentials (IAEP) procedure can be used for the prognosis of positive results of the treatment with SSRIs and lithium of bipolar disorder becouse the bipolar patients are augmenters of amplitude N1/P2 which is a predictor of this prognosis. The possible influence of treatment on P300 parameters was examined in BD patients: in the research conducted on BD patients who did not admited any psychotropic medication reduced P300 amplitude and latency prolongation was observed [11]. Strik [10] did not recognized any differences in P300 latency or amplitude in manic patients with BD treated with lithium or without such treatment. Reductions in P300 amplitude and prolonged P300 latency , suggest a disturbance of the temporal-parietal generators of this component. Prolonged P300 latency is consistent with impaired attentional processing in symptomatic BD patients. [12] One of the most interesting fields of research in BD is investigation of endophenotypes. Gershon and Goldin [20] described four criteria useful for the identification of endophenotypes in complex genetics: 1. Marker is associated with ilness in population 2.Marker is heritabdle 3. Marker is state independent (manifest in the individual whever or not ilness is active 4. Within families, marker and illness co-segregate. Markers are found in non affected family members of proband in higher rate than in general population [21] Marker to be assesed as "enophenotype" should be independent of stete of mood, reflect the reasons of disorder not the consequences and should occure indepently of comorbidity of BD [22] „Electrophysiological endophenotypes are far less explored in bipolar disorder as compared to schizophrenia." [17]. Aberrations of auditory event related potentials were reported as candidates for endophenotypes in BD [17,9], Benes F 2007 [23,22,24]. Hall at al report the results of the first twin study of event-related potentials (ERPs) in bipolar illness conducted only recently in 2007. Bipolar disorder was significantly associated with smaller P300 amplitude and decreased P50 suppression. Genetic correlations were the main source of the associations, individual-specific environmental influences were not significant. MMN and P300 latency were not associated with the illness [17]. P50 suppression deficits have been found in patients with bipolar disorder with psychotic symptoms, as well as in their unaffected first-degree relatives, suggesting P50 to be an endophenotypic marker for the illness [25]. Bestelmeyer reports that "evidence from the twin study indicated that the auditory, but not visual, P300 amplitude is genetically influenced at centro-parietal sites. Similarly, auditory and to a lesser extent visual P300 amplitude were decreased in schizophrenia and bipolar disorder. Results indicate that the auditory P300 may serve as an endophenotype for schizophrenia. However, given that schizophrenia and bipolar disorder patients could not be distinguished on these measures at midline sites, it appears that the P300 may be a marker for functional psychosis in general rather than being specific to schizophrenia." [26] Metaanalysis of reaserch of tweens and families indicate significance of the influence of heriditance on the parameters of P300: the amplitude is inherited in examined group in 60%, latency in 51% [27] Schulze KK at al. performed very interesting studies on P300 auditory evoked potentials from BD with psychotic symptoms, and their unaffected first-degree relatives from families multiply affected with BD or another functional psychotic disorder. Patients from both groups showed significantly delayed P300 latency. The groups did not differ in P300 amplitude. Schulze concludes that "P300 latency delays are associated with both psychotic BD and familial liability for this illness In future it will be of interest to directly compare groups of families with psychotic and non-psychotic forms of BD to explore further the role of psychotic symptoms with regard to P300

measures in the disorder. Results indicate that delayed P300 latency is a promising candidate endophenotype for psychotic BD, as well as schizophrenia, and may reflect the impact of shared susceptibility genes for both types of psychosis."[9]. Similar results, shared susceptibility genes for both types of psychosis suggest Bestelmeyer PE [26]. 2008, a separate study, the Maudsley Bipolar Family Study, reported diminished P50 gating in unaffected relatives of psychotic bipolar patients[28].

Currently, no neurophysiological marker exists for bipolar disorder. Patterson at al. [29] in their research investigated not previously examined gating of an auditory brain potential at 85ms (P85), the results were compared with data from control groups of patients: schizoaffective disorder, paranoid schizophrenia, and bipolar disorder and from healthy controls. The P85 gating ratio was significantly larger in the bipolar disorder group compared to each of the other groups. The authors conclude: "The previously unstudied P85 gating ratio may provide a new marker specific to bipolar disorder. The findings will promote further studies to investigate the unique contribution of this measure as an endophenotype."

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