



Published: February 29, 2024

Citation: Kesebir S, 2024. Two New Biomarkers and Mood Disorders: Bipolar Self, Bipolar EEG, Medical Research Archives, [online] 12(2).

<https://doi.org/10.18103/mra.v12i2.5071>

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DOI

<https://doi.org/10.18103/mra.v12i2.5071>

ISSN: 2375-1924

RESEARCH ARTICLE

Two New Biomarkers and Mood Disorders: Bipolar Self, Bipolar EEG

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ABSTRACT

Background: Although self theory was initially interested in narcissism, it began to explain depression over time. In our previous study, we showed that there was a relationship between self-inventory and mood disorder questionnaire scores in healthy individuals. Self-inventory defensive subscale scores of cases diagnosed with bipolar disorder were higher than healthy individuals. The aim of this study is to investigate whether there is a relationship between self-inventory scores and EEG spectral power densities in bipolar patients.

Methods: For this purpose, 50 cases diagnosed with bipolar disorder according to DSM-V were evaluated consecutively during their regular check-ups in our outpatient clinic. Subjects who gave voluntary consent to participate in the study were required to be in remission period for at least 8 weeks. Self Inventory and EEG applied.

Results: A relationship was found between compensatory grandiose self and FP1 alpha activity, and between defensive grandiose self and F3, Pz, T4, T5 beta activity (Table-1). There is a relationship between compensatory idealized parent image and FP1 delta ve theta, F7, P4, T4 theta, and between defensive idealized parent image and O1, O2 theta T6 beta activity.

Conclusion: According to our results, self-pathology and bipolar disorder overlap electrophysiologically. This suggests that more investigation should be done on the structural origin of mood disorders, in other words, whether the predisposition is a trait or not. As a matter of fact, the mind uses the brain as an interface. Self pathology is a spatiotemporal disorder.

Keywords: Self psychology, bipolar disorder, qEEG

Introduction

Self is the state of feeling and experiencing the existence of the subject called me. The newborn has a fragmented self¹. The first piece is called grandiose self. When mirrored appropriately by the caregiver, it provides feelings of vitality and self-esteem. The grandiose self develops in relationship with its self-object. The self-object, in other words, the "significant other" is the caregiver. The continuity and permanence of the self occurs through a real relationship and living processes. Experiences of time and space accumulate to form an integrated self.

"Unification by fusion" is the most primitive form of the need for approval and acceptance². It corresponds to the need for soothing and peace. The next step is to consider "identification or twinship" as identical and to meet the need for experience. In the third stage, "mirroring" ends with validation through testimony. This relatively integrated first part is both the source and organizer of the ego function.

The second piece is the "idealized parent image" projected onto the self-object. It provides balance in tension, the ability to wait/postpone, and impulse control. Sometimes the grandiose self demands, the idealized parent image fulfills. Sometimes the idealized parental image demands, the grandiose self fulfills. With these displacements, the human child grows. When there are needs that are not met correctly at the right time by the self, the first part begins to take over the function of the second part. The balance between the two poles reveals curiosity and enthusiasm, ideals and talents, talents and skills. Any emotional or physical neglect during this period, which corresponds to the first year of life, is associated with mood disorders³. If the grandiose self is disturbed, the reactive mood remains in a dependent relationship with the self-object, and psychomotor retardation dominates the phenomenology⁴. If the idealized parental image is damaged, feelings of guilt set in. In a more severe trauma such as abuse, unintegrated aggression and sexuality, and a paranoid position are products of dissociation of the self⁵.

In our previous study, we showed that there was a relationship between self-inventory and mood disorder questionnaire scores in healthy individuals, especially compensatory subscale scores⁶. Self-inventory defensive subscales scores of cases

diagnosed with bipolar disorder were higher than healthy individuals. The aim of this study is to investigate whether there is a relationship between self-inventory scores and EEG spectral power densities in patients diagnosed with bipolar disorder who are in remission period.

Methods

SAMPLE

For this purpose, 50 cases diagnosed with bipolar disorder according to DSM-V were evaluated consecutively during their regular check-ups in our outpatient clinic. Subjects who gave voluntary consent to participate in the study were required to be in remission period for at least 8 weeks.

ASSESSMENT

Self Inventory was developed by SI Susan L. Slyter in 1989⁶. Turkish validity-reliability study was conducted by R. Levi (1994). It has "compensatory" and "defensive" subdimensions for the grandiose self and the idealized parent image. It is a likert type measurement tool.

All EEGs were recorded in a quiet, subtly lit room, in sitting position, with eyes closed. 19 scalp electrodes were placed according to the 10-20 system. Linked mastoid electrodes (A1-A2) were used for reference. Recording time was 3 minutes. The data of each subject were averaged across the recording epochs for each electrode and absolute power was computed for the five bands. The article implements 18 electrodes by 128 frequency bins ranging from 1 Hz to 30 Hz with a resolution of 0.0078 Hz. We implemented a normative database embedded in Neuroscan software z-scores which calculates of spectral values. Z-scores were used to correct for individual variation. Spectral power density was calculated for the 18 electrodes representing brain regions (FP1, F3, C3, P3, O1, F7, T3, T5; F4, C4, P4, O2, F8, T4, T6; Fz, Cz, Pz).

EEG data were analyzed using Neuroguide Deluxe v.2.5.1 (Applied Neuroscience, Largo, FL). The statistical analyses were performed using the SPSS (Statistical Package for the Social Sciences) 20 software for 363 patients. Kolmogorov-Smirnov test was used to check for normal distribution. The correlation analysis was performed with Pearson's correlation test according to normal distribution. False discovery rate (FDR) was computed using methodology described by Benjamini and Hochberg. Significant results were determined based on an FDR-adjusted p value ≤ 0.05 .

Results

The average age of 50 cases, 29 women and 21 men, was calculated as 34.5 ± 6.7 years. Average disease duration is 9.4 ± 3.5 years.

A relationship was found between compensatory grandiose self and FP1 alpha activity, and between

defensive grandiose self and F3, Pz, T4, T5 beta activity (Table-1). There is a relationship between compensatory idealized parent image and FP1 delta ve theta, F7, P4, T4 theta, and between defensive idealized parent image and O1, O2 theta T6 beta activity.

Table-1: Correlations between qEEG spectral power density and Self Inventory scores in bipolar disorder

	Frequencies	r	p	FDR p
Compensatory grandiose self Defensive grandiose self	FP1 alpha	0.513	0.004	0.010
	F3 beta	0.425	0.017	0.035
	Pz beta	0.452	0.016	0.032
	T4 beta	0.438	0.017	0.034
Compensatory idealized parent image	T5 beta	0.407	0.022	0.045
	FP1 delta	0.583	0.001	0.005
	FP1 theta	0.557	0.002	0.005
	F7 theta	0.588	0.001	0.005
Defensive idealized parent image	P4 theta	0.511	0.007	0.010
	T4 theta	0.345	0.037	0.045
	O1 theta	0.489	0.021	0.030
	O2 theta	0.514	0.003	0.005
	T6 beta	0.396	0.016	0.035

$r > 0.2$, $p < 0.05$, FDR adjusted

Discussion

Although self theory was initially interested in narcissism, it began to explain depression over time³. A strong sense of self regulates mood. On the other hand, mood causes temporary changes in the self.

In bipolar disorder, the self tends to fragment⁵. In the first pole, the grandiose self swallowing the self is associated with mania, and in the second pole, the rigid superego and aggression in the idealized parental image, reducing the person's self-esteem, is associated with depression.

A relationship was found between compensatory grandiose self and FP1 alpha activity, and between defensive grandiose self and F3, Pz, T4, T5 beta activity (Table-1). There is a relationship between compensatory idealized parent image and FP1 delta ve theta, F7, P4, T4 theta, and between defensive idealized parent image and O1, O2 theta, T6 beta activity. Compensatory structures seem to be related to anxiety and obsession, while defensive structures seem to be related to anger and paranoia. Another phenomenology that may be related to defensive structures is sensitivity in interpersonal relationships.

In our first study, we showed that the EEG changes that occur in mania disappear in the consecutive remission period⁷. In our second study, we examined the relationships between scl subdimensions and qeeg spectral power densities⁸. Fast wave activity was occurring as a response to slow wave activity⁹. This situation, which was compensatory up to a point, created a new pathophysiological situation after a point. The extent to which it was compensatory was determined by temperamental factors¹⁰.

We show that lithium inhibits chaotic phase transitions¹¹. We showed that the energy change that occurs during chaotic phase transitions divides the bipolar disorder spectrum into three subgroups¹². We saw that the distinction in question was framed by psychiatric and medical comorbidity. Because the mind uses the brain as an interface. For this reason, psychiatric disorders and physical diseases occur through similar mechanisms and processes^{13,14}.

Our electrophysiological findings also overlap structurally and regionally with brain imaging findings on the subject. Midline brain structures and the right temporoparietal junction are the structures suggested for self, especially the right insula^{15, 16}. An increased DMN activity has been suggested for

both self and depression^{17,18}. Which has been associated with GABA dysfunction¹⁹.

Conclusion

Slow wave activity is associated with depression, fast wave activity with hypomanic and manic defenses¹³. A similar paradigm can be applied to compensatory and defensive self-structures. The

findings of this study are consistent with the results of our previous studies involving the projections of bipolar disorder on the EEG. Accordingly, self-pathology and bipolar disorder overlap electrophysiologically. This suggests that more investigation should be done on the structural origin of mood disorders, in other words, whether the predisposition is a trait or not. Self pathology is a spatiotemporal disorder.

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