

# EEG Changes in Patients with Functional Psychosis in Babylon Province

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## ABSTRACT

**Introduction:** Psychosis is a combination of psychological symptoms resulting in a loss of contact with reality, around 1.5 to 3.5% of people will meet diagnostic criteria for a psychotic disorder. Psychosis is a known feature of many psychiatric, neuropsychiatric, neurologic, neurodevelopmental, and medical conditions.

**Highlight:** prevalence of EEG changes was 28.6% while those without EEG changes was 71.4%.

only 4.3% had mild EEG changes, 4.3% had moderate abnormalities, 20.0% of participants had severe abnormalities.

There was significant association between residence, marital status, educational level, patient status, duration of disease, No suicidal ideation and psychological trauma and EEG changes.

### Objectives:

1-To assess the role of EEG in three of the most common psychotic disorders (schizophrenia, bipolar 1 disorder, major depression).

2-To determine if there are any abnormal EEG changes in these disorders.

3- To clarify the types of these changes if any.

4-To estimate the prevalence of these changes if any.

**Method:** observational cross sectional study was conducted on 70 patients with psychosis, 46 males and 24 females, 27 schizophrenia, 18 psychotic depression, 25 bipolar 1 disorder. Their age ranged from (18-50) from 1st of September 2019 to 1st of October 2020 in Merjan medical city Neurophysiology department, EEG was done to all patients in quiet room with 10/20 system of electrode placements in which a 21 electrodes placed at the scalp.

**The result:** showed that the prevalence of EEG changes was 28.6% while those without EEG changes was 71.4%, only 4.3% had mild EEG changes, 4.3% had moderate abnormalities, 20.0% of participants had severe abnormalities, There was significant association between residence, marital status, educational level, patient status, duration of disease, No suicidal ideation and psychological trauma and EEG changes. Also, there was significant association between medication use and EEG changes. ( $\chi^2=11.557, P=0.003^*$ ).

**Conclusion:** This study concluded that the prevalence of abnormal EEG changes in these psychotic disorders was high compared to other studies (28.6%), and the most common EEG abnormality was score 3 (severe) with prevalence of 20.0%, The most common disorder with an abnormal EEG finding was Psychotic depression with a prevalence of 33.3%.

**Keywords:** EEG, schizophrenia, major depression, bipolar disorder.

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## INTRODUCTION

Psychosis is a combination of psychological symptoms resulting in a loss of contact with reality. around 1.5 to 3.5% of people will meet diagnostic criteria for a psychotic disorder, a significantly larger number will experience at least one psychotic symptom in their lifetime. (1) EEG has an important role in distinguishing possible psychotic episodes and acute confusional states from complex partial seizures and non-convulsive status epilepticus. (2,3)

## Methods

### Study design and setting

observational cross sectional study was conducted on 70 patients with psychosis, 46 males and 24 females, 27 schizophrenia, 18 psychotic depression, 25 bipolar 1 disorder. Their age ranged from (18-50) from 1st of September 2019 to 1st of October 2020 in Merjan medical city Neurophysiology department in Al-Hilla Governorate.

**Inclusion criteria:** all patients with one of the psychotic disorders (schizophrenia, bipolar 1 disorder, major depression) aged between (18-50) years were included.

**Exclusion criteria:** patients with past medical history such as epilepsy or space occupying lesion), history of head trauma, electroconvulsive therapy (ECT).

### psychological assessment and clinical examination

subjects were carefully chosen in order to avoid effects of the medical history of the individual patients and the kind of medication received. History was taken from all participants regarding name, age, address, occupation, marital state, educational level, and the duration of the disorder, family history, previous EEG records. For this study 70 volunteer patients were selected, diagnosed as psychosis according to (DSM5) adopted by world health organization (WHO).

### Electrophysiological assessment

Awake EEG recordings were performed according to recommendations of the American Electroencephalographic Society, with a standard 10/20

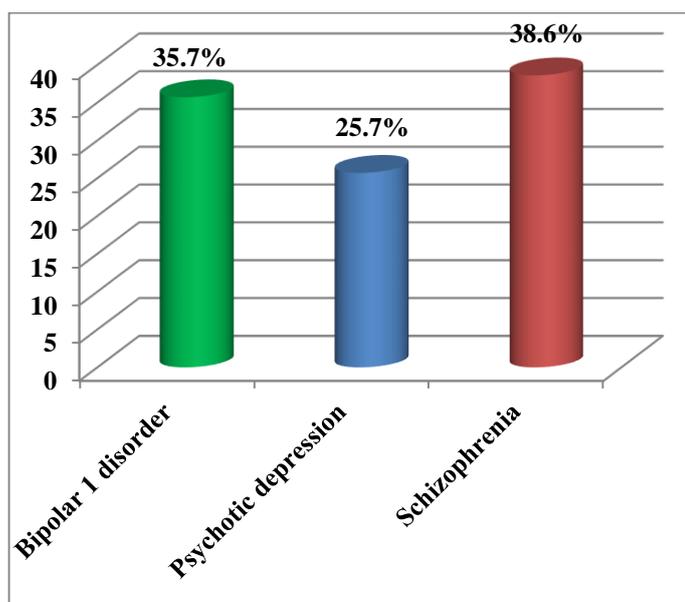
placement of 21 electrode leads; bipolar montages were used. (4)EEG activity was scored as follows: 0=no abnormality; 1=mild abnormality (generalized or frontal symmetrical theta slowing; 2=moderate abnormality (theta and delta slowing, delta/alpha frequency activity, that is, higher delta and lower alpha synchronization, decreased activity of alpha or beta , asymmetry increase activity of alpha or beta ,increase activity of delta and theta ,asymmetrical focal theta or delta, generalized intermixed theta and delta activity, sharp waves or phase reversal); 3=severe abnormality (spike discharges or spike-and-wave activity, either alone or with the characteristics of moderate abnormality). (5)

**Data Analysis**

was done using SPSS version 23. frequencies and percentages were used to present the categorical variables. Continuous variables were presented as (Means ± SD). to compare means between two groups Student t-test was used. to compare means between three groups or more ANOVA test was used. to find the association between categorical variables Chi-square test and Fisher-exact test were used. A *p*-value of ≤ 0.05 was considered as significant.

**Result**

The prevalence of patients who were living in urban area was (52.9%),While the prevalence of the study participants who were single was (57.1%),most of the study participants were unemployed (58.6%), read and write was the most common educational level of the study participants (38.6%), Most of the study participants were schizophrenic (38.6%),The study also included (35.7%) bipolar 1 disorder,(25.7%) patients with psychotic depression. Figure 1. shows the distribution of patients according to type of psychosis including (Bipolar 1 disorder, Psychotic depression and schizophrenia).

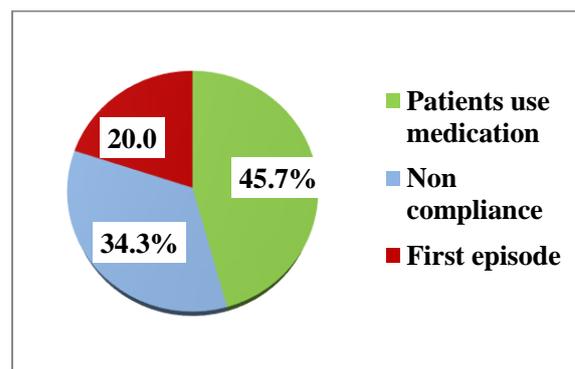


**Figure 1:** The distribution of patients according to type of psychosis

**The distribution of patients according to medications use**

The frequency of patients who were not using medication was 54.3% (including 34.3% noncompliance,20.0% first episode), whereas that of using medication was 45.7%.

Figure2 shows the distribution of patients according to use of medication including (Patients use medications, non-compliance and first episode).

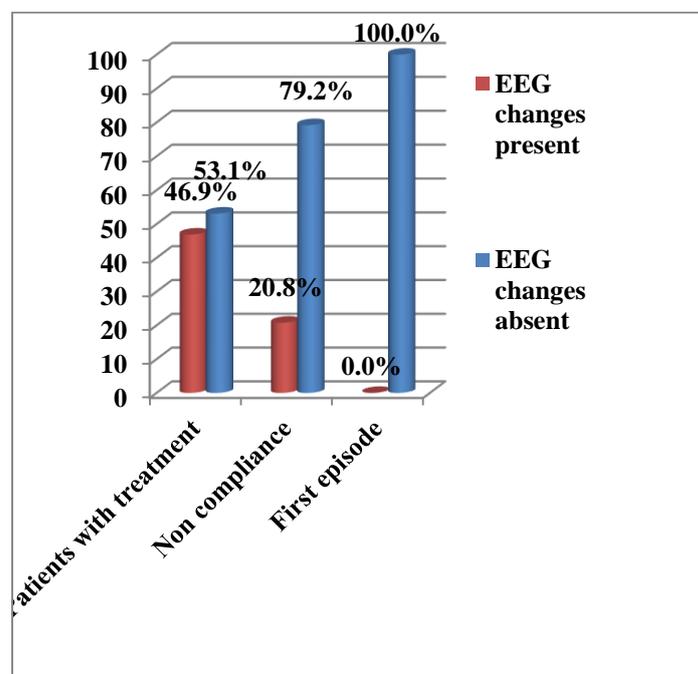


**Figure 2:** The distribution of patients according to use of medication

**The association between medication use and EEG changes**

The study showed a significant association between medication use and EEG changes.

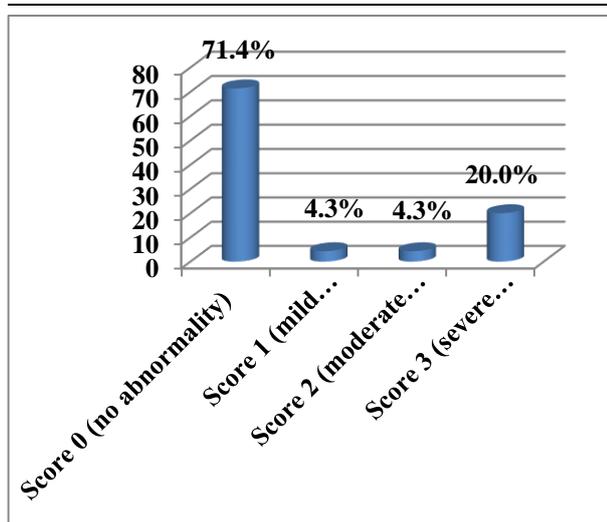
Figure 3 shows the association between medication use and EEG changes including (present and absent). There was significant association between medication use and EEG changes. ( $\chi^2=11.557, P=0.003^*$ ).



**Figure 3:** The association between medication use and EEG changes

**Electroencephalographic assessments (The distribution of patients according to EEG findings)**

The prevalence of EEG abnormalities was 28.6% while those without EEG changes was 71.4%, among our study participant 71.4% had normal EEG, only 4.3%had mild EEG changes, moderate changes were found in 4.3% of participants, sever were found in 20.0% of participants.

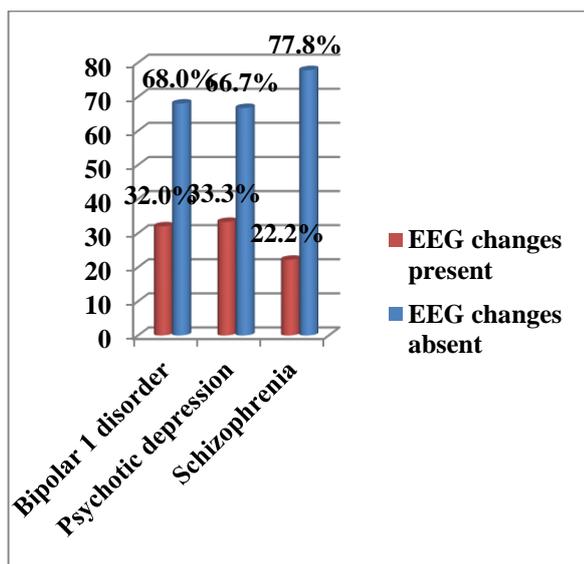


**Figure 4:** The distribution of patients according to scores of EEG changes

**The association between type of psychosis including (Bipolar 1 disorder, Psychotic depression and Schizophrenia) and EEG changes**

The study showed no association between the type of psychosis and EEG changes

Figure 5 shows the association between type of psychosis including (Bipolar 1 disorder, Psychotic depression and Schizophrenia) and EEG changes including (present and absent). There was no significant association between type of psychosis and EEG changes. ( $X^2=0.877, P=0.645$ ).



**Figure5:** The association between type of psychosis and EEG changes

**Discussion**

The mean age of the current study participants was  $40.44 \pm 9.88$  with a range (18-50) yrs. This is consistent with other studies by (6, 7,8),and against other study by (9).the reason behind that in this study could be that elderly and adolescent patients were already excluded from the study.

The study participants were predominantly male (64.3%), this goes with the fact that being a male increase the risk of psychosis as other studies revealed. (10, 11,9)

in the study the prevalence Participants who were single was (57.1%), this goes with these studies. (12,13,14) and against a study by (15). This can be explained by that psychotic patients had difficulties in getting life partner in our society. also, The prevalence of the study participants who had Lower educational attainment (read and write) was 38.6%, this goes with a study by(16) ,This may be explained by that low level of education turned out as a risk-increasing factor for psychosis(17),or the psychosis itself had led to low education .

The prevalence of the study participants who were (unemployed) was 58.6%. this is consistent with a study by. (8, 9,15) the explanation for this is that Patients with psychiatric disorders already have intrinsic difficulties with employment, with the presence of aggressiveness worsening their chances of maintaining a job. (18)

**The frequency of each type of psychosis (schizophrenia, mania, psychotic depression)**

The prevalence of schizophrenia and bipolar 1 disorder in the current study was approximately the same ,in bipolar 1 disorder was 35.7% and in schizophrenia was 38.6% ,their prevalence in the general population approximately the same also, the prevalence of MDD in this study was lower than schizophrenia and major depression, while the prevalence of MDD in the general population which is 7% is higher than that of schizophrenia and bipolar 1 disorder. the explanation for this is that the prevalence MDD might be significantly affected by geographical region, study design , the explanation for this is that those who are functional, receiving treatment in the community rather than in care homes were included, which possibly contain more patients who are severely disabled. This may explain the low prevalence of MDD. (19)

**The distribution of patients according to medications use**

The frequency of patients not using medication was 54.3% (including 34.3% noncompliance,20.0% first episode), whereas that of using medication was 45.7%. this is consistent with a study by. (20,21) this may be explained by that in patients with psychiatric disorders adherence is lower than among patients with physical disorders. (26,27;28,29;30)

**The association between medication use and EEG changes**

The study showed a significant association between medication use and EEG changes. ( $X^2=11.557, P=0.003^*$ ). This goes with a study by e.g. (22,23)

This could be explained by that antipsychotic drugs cross the blood-brain barrier and influence many parameters of brain function, it is possible that these medications contribute or lead to resting EEG abnormalities observed in psychotic patients. (22,23)

**Electroencephalographic assessments (The distribution of patients according to EEG findings**

The prevalence of EEG abnormalities was 28.6% while those without EEG changes was 71.4%, among our study participant 71.4% had normal EEG, only 2.9%had mild EEG changes, moderate changes were found in 3.4% of participants, sever were found in 21.4 %of participants. The explanation for this is that the abnormal finding may be non-specific or may indicate an underlying pathological condition or due to medication, or due to psychiatric disorders itself and also due to psychotropic drugs with fugue symptoms between psychiatric disorders and neurological disorders. (24) other studies

showed that EEG abnormalities in functional psychosis indicates a good prognosis.<sup>(25)</sup>

### The association between type of psychosis including (Bipolar 1 disorder, Psychotic depression and Schizophrenia) and EEG changes

There was no significant association between type of psychosis and EEG changes. ( $X^2=0.877$ ,  $P=0.645$ ). this is against a study by Mostafa *et al.*, 2016 in which there was significant association between EEG changes and schizophrenia.

In this study the prevalence of EEG changes in major depression was higher than that of schizophrenia or bipolar 1 disorder 33.3%

And this has a concordance with a study by *et al.*<sup>(24)</sup> the EEG changes can be explained by that in MDD there was a considerable reorganization of the composition of brain oscillations in a broad frequency range: 0.5–30 Hz in major depression with maximal effect of depression in the posterior cortex of the brain and left frontal hypo activation in depression.<sup>(31)</sup>

### Conclusion

1. The prevalence of abnormal EEG changes in psychotic patients was 28.6%, which is high compared to other studies

2. The most common abnormality was score 3 (severe) with prevalence of 21.4 %

3. The most common disorder with an abnormal EEG finding was Psychotic depression with a prevalence of 33.3%

4. There was significant association between the EEG changes and chronicity of the disorder and medication use

5. There was significant association between EEG changes and psychological trauma.

**Financial Disclosure:** There is no financial disclosure.

**Conflict of Interest:** None to declare.

**Ethical Clearance:** All experimental protocols were approved under the College of Medicine-Babylon University, Iraq, and all experiments were carried out in accordance with approved guidelines.

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