

Original Article

Psychiatry

Visual Evoked Potential (VEP) in schizophrenia and psychotic depression

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ABSTRACT [ENGLISH/ANGLAIS]

Schizophrenia and psychotic depression are two psychiatric disorders having (in common) the presence of psychotic features, delusion, hallucinations and severe occupational dysfunction. Severe psychomotor retardation, which is not uncommon in psychotic depression, is quite similar to negative symptoms of schizophrenia. This study aims at assessing Visual Evoked Potential both diagnosis though similar in symptoms but different in outcome, treatment response and prognosis. 20 psychotic depression patients and 20 schizophrenic patients were recruited randomly from Alexandria University Hospital. They scored 4 or higher on the Clinical Global Impression Scale for Severity (CGI-S). Visual Evoked Potential (VEP) was done for them and compared to healthy control group. In the right eye the mean P100 was 104.55, 95 and 94.15 msec in schizophrenic, psychotic depression patients and healthy control group respectively with statistical significant difference. A finding that has been replicated in the left eye where the mean P100 was 105.8, 95.85 and 94.55 msec in the same respective groups. P100 in both right and left eyes are more prolonged in schizophrenic patients compared to psychotic depression and control groups.

Keywords: Schizophrenia, psychotic depression, VEP, evoked potential, electrophysiology, visual processing

RÉSUMÉ [FRANÇAIS/FRENCH]

La schizophrénie et la dépression psychotique sont deux troubles psychiatriques ayant (en commun) la présence de caractéristiques psychotiques, idées délirantes, des hallucinations et des troubles graves du travail. Un retard psychomoteur sévère, qui n'est pas rare dans la dépression psychotique, est tout à fait semblables aux symptômes négatifs de la schizophrénie. Cette étude vise à évaluer évoqués visuels potentiels tant pour le diagnostic des symptômes similaires mais différentes, mais dans les résultats, la réponse au traitement et le pronostic. 20 patients dépression psychotique et 20 patients schizophrènes ont été recrutés au hasard à partir de l'Université d'Alexandrie hôpital. Ils ont marqué 4 ou supérieure sur l'échelle Clinical Global Impression de gravité (CGI-S). Potentiel évoqué visuel (PEV) a été faite for them et par rapport au groupe témoin sain. Dans l'œil droit la moyenne était de 104,55 P100, 95 et 94,15 ms dans la schizophrénie, la dépression psychotique patients et le groupe témoin sain respectivement différence statistique significative. Une constatation qui a été reproduit dans l'œil gauche, où la moyenne était de 105,8 P100, 95,85 et 94,55 ms dans les mêmes groupes respectifs. P100 dans les deux yeux droit et gauche sont plus prolongée chez les patients schizophrènes par rapport à la dépression psychotique et les groupes de contrôle.

Mots-clés: La schizophrénie, la dépression psychotique, VEP, potentiels évoqués, l'électrophysiologie, traitement de l'image

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INTRODUCTION

The prevalence of major depression in primary care practice is 4.8% to 9.2% rendering mood disorders to be the most important psychiatric illness in primary care settings [1]. Though some psychiatrists believe that psychotic depression is uncommon, studies continue to demonstrate that 16% to 54% of depressed patients have psychotic symptoms, delusions occur without hallucinations in about half to two thirds in adults with psychotic depression, while hallucinations are

unaccompanied by delusions in 3% to 25% of those patients [1].

Psychotic depression seems to present a distinct disorder from major depression without psychotic features, the presence of psychosis, independent of depression or level of general psychopathology is predictive of response to antidepressants monotherapy, supporting such distinction [2].

The continuous performance test has been used to demonstrate deficits in core attentional functioning in schizophrenia, mania and major depression [3]. Some

authors have demonstrated attentional performance to be poor particularly in psychotic depression and schizophrenia rather than in depression lacking psychosis, providing another asset to strengthen the similarity of psychotic depression with schizophrenia rather than non psychotic depression [4].

Deficit in sustained attention in continuous performance test are shown to represent stable vulnerability indicators for schizophrenia, and state dependant indicator for major depression [5].

Schizophrenia is associated with deficits in higher order processing of visual information, steady state visual evoked potential responses recorded over the occipital cortex in patients with schizophrenia suggest a dysfunction of lower level visual pathways, which was more prominent for magnocellular than parvocellular biased stimuli. The magnocellular pathway helps in orienting towards salient stimuli [6].

A magnocellular pathway deficit could contribute to higher level visual cognitive deficits in schizophrenia dysfunction of the magnocellular pathway may also account for other well described aspects of neurophysiological dysfunction in schizophrenia, for example, the magnocellular pathway projects predominantly to dorsal cortical stream (i.e. parietal lobe), which codes motion perception and spatial localization [7].

Though the performance on VEP in Major depression has been evoked by authors, literature in the specific subtype of severe major depression with psychotic features is lacking. This study, therefore, aims at exploring the utility of Visual Evoked Potential as a differentiating electrophysiological marker helping in differentiating between both diagnosis.

MATERIALS AND METHODS

Patients, aged between 18 and 50 years, were randomly recruited from the outpatient psychiatric service of Alexandria University Hospitals. Diagnosis was done by structured interview in conformity with criteria of Diagnostic and Statistical Manual of Mental Illness, 4th edition (DSM-IV) [8]. Only patients scoring 4 or higher on the Clinical Global Impression scale for Severity (CGI-S) [9] were recruited. Patients having chronic debilitating diseases, mental retardation and handicap rendering assessment unreliable were excluded.

All the subjects were classified into three Groups. Group I (n=20) consisted of patients with severe major depression with psychotic features. Group II (n=20) consisted of patients with schizophrenia. And Group III (n=20) consisted of Healthy control. Patients from both groups I and II were subjected to the Brief Psychiatric Rating Scale (BPRS) [10] and systemically questioned to assess duration of illness.

Visual Evoked Potential VEP measurement Preparation

cleansing patients' heads particularly points of electrodes placement by cleansing gel and ethanol, electrodes were cleaned up using cleansing gel with a piece of cotton, electrodes were then checked for impedance.

Technique

Patients were subjected to examination by Visual evoked potential utilising NY sets, applying a unipolar montage technique where reference electrode (surface gold electrode) was placed 5 - 9 cm above the nasion point on the sagittal line between the nasion and Cz point, the active electrode was placed 2 - 4 cm above the posterior external protuberance on the line between the latter and Cz, while the ground surface electrode was placed on the chin to reduce artifacts.

The pattern used was alternate pattern, each evoked potential recorded right and left eyes was recorded and processed, then the evoked potential was recorded from both eyes, and processed to calculate P100 latency. Recording was repeated 3 times for each patient and the mean was taken for recordings measured for each patient to minimise recording artifacts.

Statistical Methods

Data were analyzed using PC with Statistical Package for Social Sciences version 13, the 0.05 was used as cut off value for statistical significance. Due to small sample size we opted for student's t-test for independent groups and F test for comparison between the three groups.

RESULTS

Age of participants was 36.9 ± 7.98 , 35.2 ± 8.01 and 34.9 ± 7.29 yrs in depressed patients, schizophrenic patients and control groups respectively with no statistical difference. Groups were balanced in terms of age.

Both groups of psychotic depression and schizophrenic patients were balanced in terms of illness duration and severity as assessed by BPRS and CGI-S scales. (Table 1)

As regards P100 in the right eye, the mean was 95 ± 5.27 , 104.55 ± 5.62 and 94.15 ± 5.21 msec in groups I (psychotic depression), II (schizophrenic patients) and III (Healthy control) respectively with a significant difference ($p < 0.0001$) among the three groups. Separate comparison between different groups showed the tendency of group II (schizophrenic patients) to have a significantly statistical longer P100 in relation to both other groups. On the other hand, for the P100 in the left eye, the mean was 95.85 ± 5.4 , 105.8 ± 5.41 and 94.55 ± 6.04 msec in groups I, II and III respectively with a significant difference ($p < 0.0001$) among the three groups. Separate comparison between different groups showed the tendency of group II (schizophrenic patients) to have a significantly statistical longer P100 in relation to both other groups (Table 2) (Figure A).

TABLE 1

Table 1 shows comparison between psychotically depressed, schizophrenic as regards illness duration, BPRS and CGI-S scores

	Psychotic depression patients (n=20)	Schizophrenic patient (n=20)	test Student's t test
Illness duration (yrs)	5.10 ± 2.83	3.85 ± 2.01	1.61 ($p > 0.05$)
BPRS score	47.85 ± 4.07	49.45 ± 3.05	0.19 ($p > 0.05$)
CGI-S scale	4.6 ± 0.5	5.1 ± 0.55	0.89 ($p > 0.05$)

TABLE 2

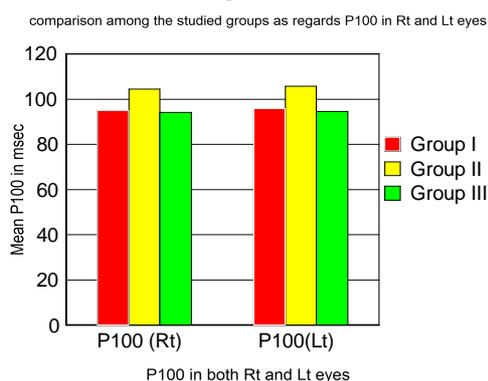
Table 2 shows comparison between psychotically depressed, schizophrenic and control groups as regards P100 on the right and left sides as measured by the Visual Evoked Potential.

P100 (msec)	Group I (n=20) Psychotic depression	Group II (n=20) Schizophrenic	Group III (n=20) Healthy Control
P100 Rt	95 ± 5.27	104.55 ± 5.61	94.15 ± 5.21
P100 Lt	95.85 ± 5.4	105.8 ± 5.41	94.55 ± 6.04

DISCUSSION

Visual evoked potential measured in the left and right eyes in the three groups, in the present study has shown that P100 was delayed on both right and left eyes in schizophrenic patients with a statistical significant difference in relation to both psychotically depressed patients and healthy groups in which the latter two were not significantly different.

Figure A



Patients with schizophrenia show severe neurophysiological deficits in brain information processing not only at cognitive levels but also at perceptual levels. Perceptual deficits have been particularly well-documented in the visual system and have been shown to predict community outcome. Further, the human visual system has been exquisitely characterized both functionally and anatomically, permitting detailed examination of the brain mechanisms underlying dysfunction [11].

Over the past decade, deficits in early visual processing in patients with schizophrenia have become increasingly well-documented, although underlying mechanisms remain obscure. Deficits are particularly prominent in processes, such as motion detection or backward masking, that depend mainly upon magnocellular input to the dorsal visual stream and in detection of low contrast and low spatial frequency stimuli [12]

However, deficits have been observed as well even in processing of parvocellular-biased stimuli. One study demonstrates that deficits in contrast gain, a form of neural amplification, may be critically involved in early cortical dysfunction in schizophrenia. Diffusion tensor imaging results support the hypothesis that deficits in the generation of magnocellular-biased ssVEPs are related to dysfunction at low levels of the visual system. In addition,

deficits in behavioral detection of simple magnocellular-biased stimuli correlate with deficits in magnocellular-biased ssVEPs, confirming a critical role of early cortical dysfunction in visual behavioral deficits [12,13].

Although the etiology of visual processing dysfunction in schizophrenia is yet to be defined, results from the present study help constrain potential etiologies. Recent theories of schizophrenia proposed that symptoms reflect impaired neurotransmission at NMDA-type glutamate receptors. This theory is supported by studies showing that NMDA antagonists such as phencyclidine or ketamine induce cognitive deficits closely resembling those of schizophrenia and that positive NMDA modulators such as glycine ameliorate specific signs and symptoms [14].

CONCLUSION

Visual Evoked Potential VEP shows different results in schizophrenia and psychotic depression with a more prolonged P100 in schizophrenic patients. Our study is limited by the small number of cases and fact that patients assessed with VEP were non medication naïf patients. We do recommend further research to assess a cut off score for P100 that may be utilized as electrophysiological marker differentiating between both diagnosis.

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CONFLICT OF INTEREST

No conflict of interest was declared by authors.