THE LEVEL OF NEUROCOGNITIVE FUNCTIONING AT EARLY FIRST PSYCHOTIC EPISODE ONSET

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Keywords: neurocognitive deficiencies, first psychotic episode, schizophrenia **Abstract:** Neurocognitive deficiencies are a fundamental trait of schizophrenia and the studies have shown the occurrence of such deficiencies in the first psychotic episode, both in the case of adults and of early onset psychosis. Twenty-seven children and adolescents (n=27) at their first psychotic episode were enrolled and they represent the study group. They were assessed during their hospitalization in the Clinic of Pediatric Psychiatry, Cluj-Napoca. The control group was set of thirty two (n=32) healthy children and adolescents, students in public schools, volunteers. The neurocognitive functioning was assessed with Trail Making A and Trail Making B, with verbal fluency tests, with the Wisconsin Card Sorting Test and with Rey Auditory Verbal Learning Test. Our results show weaker global cognitive performances with adolescents at their first psychotic episode than the healthy subjects and specific cognitive deficiencies in the area of verbal fluency, attention, processing speed and executive function.

Cuvinte cheie: deficite neurocognitive, primul episod psihotic, schizofrenie **Rezumat:** Deficitele neurocognitive sunt o caracteristică de bază în schizofrenie și studiile au arătat prezența acestor deficite încă de la primul episod psihotic, atât la adulți, cât și în psihozele cu debut precoce. Douăzeci și șapte de copii și adolescenți (n=27) aflați la primul episod psihotic au fost înrolați și reprezintă lotul de studiu. Aceștia au fost evaluați în timpul spitalizării în Clinica Psihiatrie Pediatrică, Cluj-Napoca. Grupul de control a fost alcătuit din treizeci și doi (n=32) copii și adolescenți sănătoși, elevi în școala de masă, voluntari. Funcționarea neurocognitivă a fost evaluată cu Trail Making A și Trail Making B, cu teste de fluență verbală, cu Wisconsin Card Sorting Test și cu Rey Auditory Verbal Learning Test. Rezultatele noastre arată performanțe cognitive globale mai slabe la adolescenții aflați la primul episod psihotic, decât la subiecții sănătoși și deficite cognitive specifice în aria fluenței verbale, atenției, vitezei de procesare și funcției executive.

INTRODUCTION

Early onset psychosis means psychosis which starts prior to the age of 18, and very early onset psychosis starts prior to the age of 13 and it is one of the most devastating disorder affecting children and adolescents.

Neurocognitive deficiencies (regarding the executive function, the learning and the verbal and space memory, the visual processing and the attention) are a fundamental trait of schizophrenia (1) and the studies have shown the occurrence of such deficiencies in the first psychotic episode, both in the case of adults and of early onset psychosis, with children or adolescents, as compared to healthy subjects.(2) They are more severe in early onset psychosis than in psychosis starting in adulthood. These affected cognitive functions have been integrated as "executive functions" and seem to be mediated by the prefrontal cortex.(3)

In recent years, the interest in the occurrence of neurocognitive deficiencies from the early phases of the disorder has increased. Some studies have been carried out, including nonpsychotic adolescents and young adults, but with family risk for schizophrenia or bearing high risk to develop psychosis.

The questions arising thereof are whether these deficiencies are primary, that is whether they occur from the start of the disorder or they are influenced by certain clinical or medication features, whether they are global or specific, whether they aggravate or they stagnate during disorder evolution and which are the factors which influence such evolution. The studies have pointed out the occurrence of such cognitive deficiencies with risk patients prior to the first clear episodes of psychosis, some authors believing that such deficiencies could help to identify individuals with very high risk of developing psychosis.(4,5)

PURPOSE

The main aim of this study is to assess the bneurocognitive function in children and adolescents at their first psychotic episode and to identify possible cognitive deficiencies.

The secondary aim is to analyze whether the cognitive deficiencies are global or specific.

METHODS

This study was granted the notification of the Commission of Ethics within "Iuliu Hatieganu" University of Medicine and Pharmacy of Cluj-Napoca.

Twenty-seven children and adolescents (n=27) at their first psychotic episode were enrolled and they represent the study group. They were assessed during their hospitalization in the Clinic of Pediatric Psychiatry, Cluj-Napoca. The enrolment period was February 2012 – March 2014.

The inclusion criteria were as follows: the age under 18, patients hospitalized for their first psychotic episode and their parent's or tutor's consent.

The exclusion criteria were as follows: mental retard

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(IQ below 70), psychosis due to medicine or drugs consumption or secondary to some somatic/neurologic disorders, severe ocular or hearing disorders, which could have caused difficulty in tests administration or impossibility of completing tests.

The diagnosis was established based on DSM-IV TR criteria.(6) All the patients were assessed psychiatric, pediatric, neurological by specialist physicians and laboratory investigations were carried out, which were necessary in order to exclude some organic causes of psychotic symptoms. Also screening tests were carried out so as to detect drugs in the urine.

The control group was set of thirty two (n=32) healthy children and adolescents, students in public schools, volunteers. They did not have first degree relatives suffering from any psychotic disorder.

The patients and subjects in the control group were aged between 10 and 17. No significant differences were recorded between the two groups regarding gender and age. All the patients were assessed in terms of their intelligence level using the Raven progressive matrices test.

The neurocognitive functioning was assessed with Trail Making A (TMA) and Trail Making B (TMB), with verbal fluency tests, with the Wisconsin Card Sorting Test (WCST) and with Rey Auditory Verbal Learning Test. TMA and TMB assess the executive function, the processing speed and the attention, they are against time and they are measured in seconds. There were two types of verbal fluency (VF) tests: with animals (categorical and semantic) and words staring with letter p (phonemic) and they consist in listing as many words of each category, within one minute. For the assessment of verbal memory, the Rey test was used, which consists of 4 parts: 3 of reproducing some sets of words they could hear and one of recognizing the words heard in a written text. WCST is a psychological instrument used to assess the executive function and it consists in four stimulus cards and 128 response cards (2 identical sets of 64 cards each), which represent geometrical figures, colours and numbers. It may be applied between the age of 6.5 and 89.

Statistical analysis. The processing of the data obtained was carried out using the SPSS 20 statistical package. In the beginning, the distribution of the data was analyzed using the Shapiro-Wilk test, which showed the fact that the distribution is not normal and as a conclusion, some non-parametrical statistical methods were used. All the data were reported as average \pm standard deviations. The Mann Whitney test was carried out and a significance threshold of p<0.05 was considered to be statistically significant.

The results presented in this article are part of a longitudinal study, where the cognitive evolution of pediatric psychotic patients is pursued and they represent the data obtained following the first assessment.

RESULTS

The performances in all the cognitive assessment tests were lower in the patients group, but there were no statistically significant differences between the two groups in all the tests.

There were no statistically significant differences (p=0.917) regarding the intelligence quotient (IQ) between patients and controls (table no. 1).

In the case of Trail Making A (TMA), patients obtained an average of 40.62 ± 19.35 , significantly lower (U=289.00, p=0.029) than the adolescents in the control group (330.84±10.74).

In the case of Trail Making B (TMB), patients obtained an average of 92.22 ± 50.23 , and the control group 68.31 ± 33.77 , also reporting statistically significant differences

(U=285.5, p=0.026) (table no. 2).

Table no. 1. Results of the intelligence quotient assessed with Raven test

	Psychosis group Average ± DS	Control group Average ± DS	Mann- Whitne y (U)	P value
IQ	102.0 ± 10.29	102.21 ±	406.50	.917
		11.53		

Table no. 2. Results on Trail Making A and B

Applied Test	Psychosis group (N=27)	Control group (N=32)	Mann- Whitney (U)	p value
	Average ±	Average + DS		
ТМА	40.62 ±	30.84 ±	289.00	.029
TMB	19.35 92.22 ±	10.74 68.31 ±	285.50	.026
	50.23	33.77		

In the case of semantic verbal fluency test (with animals), the group of patients accomplished an average of 10.55 ± 3.14 , and the control group reported a statistically significant difference (U=719.00, p<0.001), with an average of 15.12 ± 3.58 . The same situation occurred in the second verbal fluency test, the phonemic test (words starting with the letter p), where p was 0.026 (table no. 3).

Table no. 3. Results of verbal fluency tests

Applied Test	Psychosis group (N=27) Average ± DS	Control group (N=32) Average ± DS	Mann- Whitney (U)	p value
VF animals	$ \begin{array}{r} 10.55 \\ 3.14 \end{array} $	15.12 ± 3.58	719.00	<.001
VF letter p	9.03 ± 3.6	$ \begin{array}{r} 11.00 \\ 4.72 \end{array} $	577.50	.026

In the case of Rey Auditory Verbal Learning Test (the 4 elements), no statistically significant differences were reported between the two groups (table no. 4).

Table no. 4. Results of the Rey Verbal Memory Test assessments

Applied Test	Psychosis group (N=27) Average ± DS	Control group (N=32) Average ± DS	Mann- Whitney (U)	p value
Rey 1	7.77 ± 2.99	7.96 ± 1.99	474.50	.514
Rey 2	7.48 ± 2.56	7.46 ± 1.88	444.50	.847
Rey 3	12.40 ± 5.17	$ \begin{array}{r} 14.75 \\ 4.00 \end{array} $	552.00	.067
Rey recognition	$ \begin{array}{r} 11.18 \pm \\ 3.12 \end{array} $	11.53 ± 2.48	440.50	.896

In the case of WCST, some statistically significant differences were reported between the two groups regarding the total number of correct answers (NC) and the total number of non-perseverative errors (NPE). In the case of NC, the group of patients had an average of 66.42 ± 5.22 , and the control group 71.65 \pm 9.62; thus there is a statistically significant difference between the two groups. (U=561.5, p=0.023). In the case of NPE, the group of patients had an average of 10.19 \pm 6.34,

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whereas the control group 12.03 ± 5.37 ; thus, there is a statistically significant difference between the two groups (U=550.5, p=0.035).

With all the other items assessed in the WCST, namely: the number of administrative trials (TA), the total number of errors (TNE), the perseverative errors (PE), perseverative answers (PR), the number of completed categories, no statistically significant differences were reported between the two groups (table no. 5).

Test WCST	grou (N=2'	p 7)	group (N=32)		Whitney (U)	value
	Average ± DS		e Average ± DS			
ТА	88.50 22.52	±	86.18 22.83	±	470.00	.398
NC	66.42 5.22	±	71.65 9.62	±	561.50	.023
TNE	19.00 16.15	±	17.03 11.96	±	442.00	.684
PR	10.53 16.19	±	5.78 8.93	±	315.50	.114
PE	9.23 13.98	±	5.00 7.31	±	854.50	.159
NPE	10.19 6.34	±	12.03 5.37	±	550.50	.035
CC	5.61 1.16	±	5.90 0.39	±	440.5	.431

Table no. 5. Results in the Wisconsin Card Sorting Test

DISCUSSIONS

Cognitive dysfunction has been mentioned since the beginning of schizophrenia description and subsequently, studies have shown its occurrence both upon the start of the disorder and throughout its evolution, fact which determined patients' surveillance through follow-up studies (8) and the attempt to relate the cognitive evolution to the positive or negative symptoms or to the medication used. Some studies in literature have pointed out generalized cognitive deficiencies (2,7,9), whereas others have highlighted specific deficiencies, either in the executive function (10) or at the memory (11) or attention (12) level upon initial assessment, from the start of the disorder. The follow-up studies have shown persistence in time of cognitive deficiencies with psychotic adolescents as compared to healthy adolescents, whose performances improved with age.(2) This study has pointed out the fact that ever since the first psychotic episode, adolescents manifest neurocognitive performance alteration in several tests applied. In the group of psychotic patients, there occurred statistically significant differences upon initial assessment at the start of the disorder, both in the tests assessing the processing speed, the executive function, the attention and in those assessing verbal fluency, in the sense of deficiencies occurrence in such areas, as compared to healthy subjects assessed.

Still, there were no significant differences regarding verbal memory and in the case of Wisconsin test, there were some differences between groups only regarding the number of correct answers and the numbers of errors. The results showed that there are no significant differences in the capacity of making decisions and changes when they are wrong, fact which could be proved by the preservative answers and errors.

The limitations of this study mainly consist of the relatively low number of psychotic patients enrolled, but also of

patients' assessment upon their first hospitalization and there are differences between the actual occurrence of the psychotic symptoms, prior to the first coming to the psychiatry clinic.

CONCLUSIONS

So as to sum up, our results show weaker global cognitive performances with adolescents at their first psychotic episode than healthy subjects and specific cognitive deficiencies in the area of verbal fluency, attention, processing speed and executive function.

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