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THE BRIEF ASSESSMENT OF COGNITION IN AFFECTIVE DISORDERS - NOVEL TOOL IS THE NEUROPSYCHOLOGICAL ASSESSMENT IN MOOD DISORDERS - POLISH TRANSLATION

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SUMMARY

Mood disorders are chronic disorders accompanied by cognitive impairment. They impair the adaptability and daily functioning of patients, also during remission and justify implementing pharmacological treatment and psychotherapeutic interactions in these patients to improve their quality of life.

The recommended method for assessing the charcter of cognitive deficits in affective disorders is the BAC-A (Brief Assessment of Cognition In Affective Disorders) test battery. This scale is a short, simple instrument of the "paper-and-pencil test" type, based on the BAC (Brief Assessment of Cognition) inventory and the Short Scale for Assessment of Cognitive Functions in Schizophrenia (BAC-S). The BAC-A consists of eight subtests measuring: verbal memory and learning, affective control, working memory, motor functions, verbal fluency, executive functions.

This paper presents the Polish version of the BAC-A along with instructions about its use and interpretation. The BAC-A scale is a method designed to monitor the cognitive functioning of people with mood disorders, enabling early detection of existing deficits to improve the effectiveness of the diagnostic and treatment process.

Key words: *Brief Assessment of Cognition In Affective Disorders (BAC-A test battery) - mood disorders - psychometrics*

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INTRODUCTION

Mood disorders are chronic disorders accompanied by cognitive impairment (Chang et al. 2012) that affects the adaptive abilities and functioning of patients with major depressive disorder (MDD) and bipolar disorder (BD). Cognitive functions include processes such as attention, memory, reasoning, problem-solving and decision-making, understanding and semantic representation of language, visual spatial processes, and a multitude of subfunctions that allow us to understand the surrounding environment. Cognitive impairment is a term encompassing all those traits that are obstacles to the cognitive process (Bauer et al. 2014).

It is now widely accepted that patients with schizophrenia have marked cognitive deficits, and many new studies have focused on their treatment (Goff et al. 2011). On the other hand, many, if not most, patients with MDD and BP also show cognitive deficits (Bora et al. 2009) that affect their daily functioning (Martínez-Arán et al. 2004a). Recent studies (Reichenberg et al. 2009, Bowie et al. 2010) suggest an overlapping of cognitive deficits observed in MDD and BD with similar deficits observed in schizophrenia and their influence on functional impairment. The BAC-A (Brief Assessment of Cognition In Affective Disorders) battery is based on the Brief Assessment of Cognition In Schizophrenia (BAC-S). The BAC-S battery has been verified both linguistically and psychometrically in many psychiatric populations (Segarra et al. 2011). Thus, one of the methods of studying the fluctuations of cognitive functions in affective disorders is to adapt the already widely used methods which aim is to capture cognitive deficits in schizophrenia, with modification to capture the scope of deficits in mood disorders (Bauer et al. 2014).

The methodological limitation of the current scales assessing cognitive functions in BD is the use of tests that differ in content, duration, psychometric properties, and administrative procedures. Compared to other instruments used in clinical trials (e. g. the CANTAB battery), the BAC-A is short, simple (paper and pencil are required) and designed to assess the specificity of cognitive deficits in MDD and BP (Bauer et al. 2014).

The short scale for the assessment of cognitive functions in affective disorders (BAC-A) is a newly developed tool for patients with MDD and BD (Bauer et al. 2014). The BAC-A consists of eight subtests measuring: verbal memory and learning, affective control, working memory, motor functions, verbal fluency, executive functions. Recent studies conducted in many centers have shown that BAC-A is a tool of high accuracy for patients with MDD and BD, as compared to healthy people (Bauer et al. 2014).

The aim of this paper is to present the Polish language version of the BAC-A battery (translation with the consent of the Authors), prepared using the 'back-translation' methodology recommended by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) and approved by regulatory agencies such as the FDA and the European Medicines Agency (EMA).

COGNITIVE DEFICITS IN BIPOLAR DISORDER

Cognitive deficits are one of the basic features of mood disorders (Chang et al. 2012). Deterioration in the area of cognitive functions is observed in all phases of mood disorders, especially in the area of executive functions and verbal memory, compared to healthy subjects. Some studies suggest a deeper impairment of cognitive functioning in mania and in a mixed episode compared to that observed in episodes of depression (Sweeney et al. 2000). Cognitive deficits, particularly those related to verbal memory, are an element that impairs the daily functioning of patients, also in remission. Therefore, they are an important target of pharmacological treatment and psychotherapeutic interventions in affective disorders (Martínez-Arán et al. 2004b). Scientific reports indicate that the profile of cognitive disorders in BD disorder is similar to the deficits in the course of schizophrenia (Reichenberg et al. 2009), with the existing differences being mostly quantitative (Daban et al. 2006). The modification and then adaptation of the methods used to detect cognitive disorders in schizophrenia seems to be justified to improve the effectiveness of their treatment in bipolar disorder (Bauer et al. 2011). The profile of cognitive impairment characteristic of BD takes a milder form compared to that observed in the course of schizophrenia (Daban et al. 2006).

A meta-analysis showed that patients with BD obtained worse results in most of the studied indicators of cognitive functioning compared to healthy people in the control group (Bora et al. 2009). Among the most disturbed areas of cognitive functioning in these patients, the most frequently mentioned are: attention, the ability to learn verbal material, memory and executive functions, with the severity of these deficits being assessed as moderate or severe (Kurtz & Gerraty 2009).

Among patients with bipolar disorder, a diversity of their functioning can be observed, which may depend on the internal variability characteristic for this diagnosis, as even 60% of patients complain of cognitive dysfunction, and these symptoms are heterogeneous (Solé et al. 2017). A comparative study of patients in the phases of mania, hypomania, depression and euthymia showed that the patients in the first group that had the weakest cognitive profile among all the respondents. In the *California Verbal Learning Test* (CVLT), these subjects had lower scores on verbal retrieval of memory material; they were also worse at executive functions and verbal fluency (Sweeney et al. 2000). Generally speaking, patients with mania show the greatest difficulties in the area of cognitive assessment compared to those with depression or euthymia (Dixon et al. 2004). Researchers seem to agree that although cognitive impairment in the course of BD is observed at all its stages, their greatest intensity occurs during acute episodes of the disease (Kurtz & Gerraty 2009, Solé et al. 2017).

The studies conducted so far indicate the undeniable influence of cognitive deficits in the course of BDr on the functioning of people with this diagnosis. The limitations in the ability to set goals and plan actions described in the literature were considered to be a significant factor of unemployment and difficulties in fulfilling family responsibilities and coping with stress (Martínez-Arán et al. 2004a, Kaser et al. 2017). Importantly, the negative impact of cognitive dysfunctions can be observed even after the resolution of mood disorders, which shows that the improvement of the therapeutic possibilities in order to capture the range of cognitive deficits is justified to improve the quality of life of patients with BD (Kaser et al. 2017).

POLISH ADAPTATION OF THE BAC-A

The BAC-A battery is based on the basic tests of the BAC (Brief Assessment of Cognition) screening scale and tests of the scale for testing cognitive functions in schizophrenia, the Brief Assessment of Cognition in Schizophrenia (BACS), with specially designed subtests to assess the impact of emotional states on the cognitive functioning of people diagnosed with affective disorders. These include the Emotional Stroop Test, the Emotional Inhibition Test and the Interference Test, which assesses a person's ability to process non-emotional information in the presence of emotionally relevant information. In comparison to the BAC and BAC-S, the advantage of the BAC-A is dedicated cognitive psychometrics per regulatory instruction for research and development in mood disorders.

The BAC-A tests and the manual describing their execution and evaluation were translated into Polish in accordance with the procedure based on back translation and with the participation of the review team. The translation includes the following steps, according to the translation and linguistic validation methodology recommended by the International Society for Pharmacoeconomics and Outcomes Research (ISPOR) and approved by regulatory agencies such as the FDA and the European Medicines Agency (EMA) and guidelines for the translation process of linguistic verification and verification results. The BAC-A battery consists of 8 subtests: Verbal Memory Test, Affective Interference Test, Emotional Inhibition Test, Number Sequence Test, Motor Token Test, Symbol Coding, Semantic and Letter Fluency Test, and the Tower of London. The battery contains alternative forms to tests that may be amenable to a learning effect and takes an average of 35 minutes to complete (Table 1).

Table 1. Tests included with the BAC-A battery

Cognitive function	Test	Description
Verbal memory and learning	Verbal Memory test	A test in which the participant is presented with a list of 15 words and then asked to recreate as many words as possible after each of the five learning attempts.
Affective Control	Affective Interference test	The participant is presented with a list of 20 affective and non-affective words, and then asked to recreate as many words as possible in three free recall and two guided attempts. After 20 minutes, an attempt is made to delay recognition of previously presented words.
	Emotion Inhibition Test	The participant is presented with lists with four columns of words (neutral and affective) and with black or colored symbols. The subject is asked either to read the word or to name the color of the symbol.
Working memory	Digit Sequencing Task	The participant is read a series of numbers of increasing length and then asked to repeat them in order from lowest to highest.
Motor functions	Token Motor Task	The participant is given 100 plastic tokens and is then asked to put them in the container as quickly as possible within 60 seconds.
	Symbol Coding	On the basis of the key received, the participant is asked to enter the appropriate digits below the series of symbols as quickly as possible within 90 seconds.
Verbal fluency	Semantic Fluency Test	The participant is asked to enter as many words from a specific category as possible within 60 seconds.
	Letter Fluency Test	In two separate samples, the respondent is to enter as many words starting with the indicated letter within 60 seconds.
Executive functions	The Tower of London	The participant is presented with two different pictures, showing different colored balls placed on three pins. The respondent is to provide the smallest number of moves needed to move the balls so that they are arranged identically, as in the reference picture.

CALCULATION OF SCORES

The performance indicator in the scope of individual scales is the sum of points obtained by the examined person in a given task, and the total test result is the sum of partial results converted into a standardized result. Standardized results are compared to the results obtained in the population of healthy people. The obtained BAC-A results are a measure of eight dimensions of cognitive functions: visual-spatial efficiency, short-term affective memory, short-term non-affective memory, affective memory after delay, non-affective memory after delay, fluency, inhibition and problem-solving skills.

RECOMMENDATIONS FOR CLINICIANS

Although further research is required, the current data suggest that the BAC-A is a valuable source of cognitive function measure in mood disorders, especially in the depressive phase. The advantages of the BAC-A battery are the ease of carrying it out, the short time needed to complete it and focusing on the cognitive processes recommended by the Canadian guidelines (CANMAT) such as motor functions (Token Motor Task), executive functions (The Tower of London), verbal memory and operating memory (Digit Sequencing Task). A potential limitation of BAC-A is the lack of measurement of reaction times for tasks of motor and executive functions (Bauer et al. 2014, Kurtz & Gerraty 2009). Despite the promising results of the BAC-A test, further studies are necessary, also among the Polish population.

CONCLUSION

The Brief Assessment of Cognitive Functions in Affective Disorder (BAC-A) is a tool enabling the assessment of cognitive deficits in patients with mood disorders. The implementation of BAC-A in psychopharmacological research allows for the systematic assessment of cognitive symptoms in clinical conditions along with the acquisition of results that allow for systematic comparison with data available in the literature.

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