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RELATIONSHIP OF COGNITIVE DISORDERS WITH CLINICAL FEATURES OF ALCOHOL DEPENDENCE

The aim of the study is to identify the relationship between indicators of cognitive functioning and clinical features of the formation and course of alcohol dependence.

Materials and methods: the study was conducted in a group of patients with alcohol dependence (n=94) after detoxification and a control group of mentally and somatically healthy individuals (n=30). As clinical data were age of first alcohol samples, age of onset of alcohol abuse, disease duration, numbers of hospitalizations, the scale of the Hamilton anxiety scale General clinical impressions scale assessment of alcohol withdrawal. Cognitive functioning was assessed using Go/No-go, Corsi, and Stroop computer tests.

Results: it was found that alcohol dependence causes a heterogeneous change in the level of cognitive functioning: violation of inhibitory control, decrease in the volume of spatial working memory, attention and cognitive flexibility. Statistically significant correlations were found between clinical data and the degree of cognitive impairment.

Conclusion: the earlier age of the first sample of alcohol significantly affects the reduction of brake control, which increases the risk of forming alcohol dependence at a young age. The age of alcohol dependence and the associated number of hospitalizations leads to impaired cognitive functioning in the form of reduced spatial working memory and cognitive flexibility. The severity of alcohol dependence primarily determines the degree of cognitive flexibility decline.

Keywords: alcohol dependence, cognitive functioning, clinic, memory, inhibitory control.

Introduction. Cognitive disorders observed in patients with alcohol dependence who do not show any other neurological complications are increasingly becoming the subject of attention of drug specialists because of their impact on treatment [8]. According to various studies, patients, suffering from alcohol dependence, from 50 to 80% have cognitive disorders [8, 10]. A number of researchers associate the inability to abstain from alcohol consumption with a decrease in the ability to cognitive control (in particular, inhibition of automatic reaction), a systematic error of attention (attention bias), a violation of the processes of processing and storing new information, which in combination with some psychological characteristics of the individual corresponds to the ideas about the mechanisms of addictive behavior [4, 5, 13]. Early studies have shown that all patients with alcohol dependence have deviations in the results of neuropsychological tests from the accepted standards [2]. Qualitative analysis of cognitive disorders indicates the predominance of control function disorders and visual-spatial disorders in the neuropsychological status [2, 7].

However, despite the active development of research on cognitive functioning in mental and behavioral disorders abroad, domestic research remains scarce. Also, the question of the influence of clinical and dynamic features of alcohol dependence on higher mental functions is still open.

The **objective** of the study is to identify the relationship between indicators of cognitive functioning and clinical features of the formation and course of alcohol dependence.

Materials and methods. The study was conducted in a group of patients with alcohol dependence (age 44 [38; 50] years; n=94) after detoxification and a control group of mentally and somatically healthy individuals (age 39 [35; 46] years; n=30). Group formation and clinical verification of the diagnosis is made on the basis of the Department of addictive States Institute of mental health Tomsk National Research Medical Center (NRMC) of the Russian Academy of Sciences. The study was conducted in accordance with the principles of the Helsinki Declaration of the world medical Association. All patients gave written informed consent to participate in the study and data processing, which was approved by the local ethics Committee at the research Institute of Mental health (Protocol No. 114). Inclusion criteria: verified diagnosis of alcohol dependence according to ICD-10 (F10. 2), informed consent to participate in the study, age 25-50 years. Exclusion criteria: the presence of severe organic brain disorders, traumatic brain injuries of any severity, mental retardation, refusal to participate in the study.

Data on the age of the first sample of alcohol, the age of the beginning of alcohol abuse, the duration of the disease and the number of hospitalizations were taken from patient histories. Additionally, the Hamilton Anxiety Racing Scale was used as psychometric tools. HARS), the scale of General clinical impression (the Clinical Global Impression - severity, CGI-s) and the alcohol withdrawal assessment scale (Clinical Institute Withdrawal Assessment - Alcohol revised, CIWA-Ar).

Cognitive functioning was assessed using Go/No-go, Corsi, and Stroop computer tests. The study of the level of attention and cognitive control was conducted using the Go/No-go test [6]. You need to press the button when presenting the Go stimulus and hold (sup-

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press) this reaction when presenting the no-go stimulus. The time of presentation of the Go stimulus is 500 MS, the interval between stimuli is 800 MS. The level of spatially working memory was evaluated using the Corsi Block-Tapping test [9]. On the computer screen, 9 cubes appear, which in turn light up in yellow. The task of the study participant is to remember and reproduce this sequence. The test begins with a sequence of two cubes, and if the answer is correct, the length of the sequence increases. The test is terminated in the case of two consecutive erroneous reproductions of the sequence. A modified Stroop effect color test was used to assess cognitive flexibility [11]. The study participant chose the color that the words were written with, regardless of the meaning of these words. The number of words is 20. The time spent by each participant to complete the test was estimated.

Statistical data processing was performed using the Statistica 10 program. The data is presented in the form of Median [Q1; Q3]. Verification of compliance with the normal distribution law was performed using the Shapiro - Wilk test. The data obtained did not follow the normal distribution law. The nonparametric Mann-Whitney U-test was used to evaluate differences in cognitive functioning between two independent samples (control versus patients). The analysis of correlations of clinical and cognitive parameters in patients with alcohol dependence was carried out using the Spearman rank correlation coefficient. The differences were considered statistically significant at a significance level of p<0.05.

Results. The clinical characteristics of patients with alcohol dependence are presented in Table 1.

According to the anxiety scale (HARS), patients had symptoms of anxiety, a moderate disorder was diagnosed on the CGI-s scale, and the average severity of alcohol abstinence on the CIWA-Ar scale.

When comparing the results of cognitive testing between the control group and patients with alcohol dependence, statistically significant differences were obtained (Table 2).

Patients with alcohol dependence made a statistically significantly higher number of errors in the Go/No-go task (for both signals), had less of the most correct reproduced sequence in the Corsi test, and patients needed more time to complete the Scab test compared to the healthy control group.

The analysis of the obtained data revealed statistically significant correlations between cognitive functioning and a number of clinical parameters of alcohol dependence (Table 3).

Discussion. In our work, we conducted a study of cognitive functioning in patients with alcohol dependence, and also identified statistically significant correlations between cognitive deficits and clinical features of the formation and course of alcohol dependence.

The results showed that alcohol dependence results in a heterogeneous change in the level of cognitive functioning: a violation of inhibitory control, a decrease in the volume of spatial working memory, attention, and cognitive flexibility. According to neuroimaging studies, cognitive dysfunction in patients with alcohol dependence occurs due to atrophy of the hippocampus and prefrontal cortex [12]. In addition, cognitive impairment is accompanied by electrophysiological changes in patients with alcohol dependence [1, 3, 14]. All this points to the multifactorial effect of chronic alcohol consumption, which significantly worsens the quality of life of a person.

As for the clinical features of the formation and course of alcohol dependence, statistically significant correlations were found with the level of cognitive functioning. An inverse correlation was found between the age of the first alcohol sample and errors in the "No-go" signal (r = -0.4206, p = 0.006). Thus, early initiation of alcohol use has a significant effect

Table 1

Clinical features of patients with alcohol dependence

Parameter	Me [Q1; Q3]
age of the first sample of alcohol	16 [15; 18]
age of onset of alcohol abuse	24 [20; 28]
disease duration	12 [5; 21]
number of hospitalizations	1 [1; 3]
HARS	18 [11; 24]
CGI-s	4 [4; 5]
CIWA-Ar	12 [7; 18]

Table 2

Results of cognitive testing of the study groups

Tests		Control	Patients	p
Go/No-go	Errors Go	1 [0; 5]	7 [3; 13]	0.00014
	Errors No-go	0 [0; 1]	1 [1; 2]	0.00057
Corsi	max. sequence	5 [5; 7]	4 [4; 6]	0.00135
t. Stroop	time (s)	62 [56; 76]	97 [84; 121]	0.00023

Note. Me [Q1; Q3]. p is the level of statistical significance when comparing groups using the Mann-Whitney U-test.

Table 3

Spearman correlation coefficients of clinical parameters and cognitive functioning in patients with alcohol dependence

Parameter	Tests			
	Go/No-go		Corsi (max. sequence)	Stroop (time)
	errors Go	errors No-go		
Age of the first sample of alcohol	0.2948 p = 0.058	-0.4206* p = 0.006	-0.2022 p = 0.205	0.1205 p = 0.061
Age of onset of alcohol abuse	0.1413 p = 0.079	-0.1827 p = 0.253	0.1630 p = 0.241	0.0226 p = 0.89
Disease duration	0.2285* p = 0.04	-0.1825 p = 0.103	-0.2216* p = 0.049	0.0955 p = 0.409
Number of hospitalizations	0.1672 p = 0.154	-0.0311 p = 0.793	-0.2508* p = 0.034	0.2602* p = 0.029
HARS	-0.0697 p = 0.529	-0.0255 p = 0.818	-0.0022 p = 0.984	0.0358 p = 0.751
CGI-s	0.1321 p = 0.229	-0.0036 p = 0.974	0.0491 p = 0.657	0.2209* p = 0.046
CIWA-Ar	0.3572 p = 0.057	-0.1177 p = 0.543	-0.1311 p = 0.498	0.6131* p = 0.0004

Note. p - level of statistical significance of Spearman's rank correlation coefficient.

on inhibitory control (reducing it), which leads to the inability to abstain from alcohol consumption at a young age. A direct correlation with the number of errors on the activation signal "Go" (r = 0.2285, p = 0.04) and an inverse correlation with the level of spatial working memory (r = -0.2216, p = 0.049) was found between the duration of the disease (the experience of alcohol dependence). This detection is quite logical and is consistent with previously obtained data [4, 14]. In addition, patients with a high number of hospitalizations for alcohol dependence treatment were characterized by a lower amount of working memory (r = -0.2508, p = 0.034) and difficulty overcoming the Stroop effect (level of cognitive flexibility), as a result of which they spent much more time performing the test (r = 0.2602, p = 0.029). Similarly, according to the cgi-s and CIWA-Ar clinical scales, patients with a more severe course of alcohol dependence have significant violations of cognitive flexibility in the Stroop test (r = 0.2209, p = 0.046 on the cgi-s scale and r = 0.6131, p = 0.0004 on the CIWA-Ar scale, respectively).

Conclusion. Thus, we can draw a number of conclusions. First, the earlier age of the first sample of alcohol significantly affects the reduction of brake control, which increases the risk of forming alcohol dependence at a young age. Second, the age of alcohol dependence and the associated number of hospitalizations leads to impaired cognitive functioning in the form of reduced spatial working memory and cognitive flexibility. Third, the severity of alcohol dependence primarily determines the degree of reduced cognitive flexibility.

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