

## EXECUTIVE FUNCTIONING AND SOCIAL COGNITION IN ADULT PATIENTS WITH SUBSTANCE USE DISORDER

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**BACKGROUND AND AIM:** Substance use disorder is a chronic and relapsing disorder characterized by constant preoccupation with substance use, compulsive access to and use of substances, difficulty in limiting substance use, and negative affect when access to substances is prevented (Evren et al. 2019). Executive functioning is a term that encompasses the set of high-level cognitive abilities required to evaluate and accomplish a goal. These functions enable us to understand complex or abstract concepts, solve problems we have never encountered before, plan the next goal, and manage our relationships (Cristofori et al. 2019). Social cognition is defined as representing the relationship between oneself and others and directing this representation through social behaviors. Perceiving, interpreting and responding to the goals, tendencies and behaviors of others are included in social cognitive functions (Grady et al. 2002). Deficits in executive functions have been found to be effective in the development and maintenance of addiction as well as in the treatment of addiction. Deficits in executive functions are associated with early relapses and difficulties in treatment compliance (Rolland et al. 2019). In various studies and meta-analyses, deficits in executive function and social cognition have been shown in patients with substance use disorders. In this study, we aimed to determine whether executive functions and social cognition are impaired in patients with substance abuse compared to healthy controls and the factors associated with the duration of remission in follow-up. Since impairment in these areas may be effective in patients social relations, functionality, cessation of substance use and retention in treatment, our study was aimed to contribute to the literature. As far as we have searched, there is no study in the literature comparing all of these functions and including two different substance groups and controls.

**METHODS:** Our study was conducted with 35 patients diagnosed with methamphetamine use disorder (MUD) according to DSM-5, 38 patients diagnosed with heroin use disorder (HUD) and 30 healthy controls (HC) without a diagnosis of substance use disorder who were treated in the AMATEM outpatient clinic and AMATEM service of Pamukkale University and who agreed to participate in the study. Sociodemographic data form, Hamilton Anxiety Scale (HAMA), Hamilton Depression Scale (HAMD), Adult Attention Deficit Hyperactivity Disorder Scale (ASRS), Barratt Impulsivity Scale (BIS), and Childhood Trauma Scale (CTS) were applied to the participants. Stroop Test (ST),

Wisconsin Test (WT), Go/NoGo Test and Mind Reading Through Eyes Test (MRT) for social cognition were applied as neuropsychological tests to evaluate executive functions. Early remission status of the patients was evaluated three months after the tests and scales were performed. Sociodemographic data, initial scales and tests were evaluated in the remission and non-remission groups. Ethics committee approval was notified to us by Pamukkale University Ethics Committee with the petition numbered E-60116787-020-228479.

**RESULTS:** Heroin, methamphetamine and control groups were similar in terms of age, gender, years of smoking and alcohol use, alcohol use status, presence of chronic disease, family history of alcohol/substance abuse and psychiatric illness ( $p>0,05$ ). Statistically significant differences were found between the groups in marital status, region of residence, employment status, smoking and educational status of the participants included in the study. ( $p=0,043$ ;  $p=0,004$ ;  $p<0,0001$ ;  $p<0,0001$ ;  $p<0,0001$ ). On the HAMA and HAMD; HUD and MUD scores were significantly higher compared to HC ( $p<0,050$ ). In the total score, emotional abuse, physical abuse, sexual abuse, physical neglect and emotional neglect sub-dimensions of the CTS, HUD and MUD scores were higher compared to HC ( $p<0,0001$ ). In terms of the total score and inability to make a plan sub-dimension of the BIS, the scores of HUD and MUD were higher than HC. ( $p<0,0001$ ). The total and motor impulsivity score, ASRS total score and hyperactivity/impulsivity subscale of MUD were higher than the scores of HUD and HC ( $p<0,0001$ ;  $p=0,001$ ;  $p=0,004$ ;  $p<0,0001$ ). No significant relationship was found between the groups with the ST, which examines executive functions. In the WT, the number of completed categories, correct responses and conceptual level responses were lower in HUD and MUD compared to HC; the total number of incorrect responses and perseverative errors were higher in HUD and MUD compared to HC and a significant difference was found between the groups ( $p=0,004$ ;  $p<0,0001$ ;  $p<0,0001$ ;  $p=0,005$ ). In the Go/NoGo test, the total number of correct answers in HUD and MUD was lower than in K ( $p=0,035$ ). The MRT score was significantly higher in controls than in substance users ( $p=0,017$ ). Years of substance use was significantly higher in HUD than in MUD ( $p=0,037$ ). The ST test part C/D (high interference sensitivity) was significantly higher in substance users who were not in early

remission compared to those who were ( $p=0.040$ ). The substance used and VSTC/D which were evaluated as significant in the basic analyses, and Go/NoGo test scores in terms of age, gender, education, marital status, employment status, years of substance use and impulsivity, which are defined as risk factors for relapse in substance use in the literature, were evaluated with logistic regression model as independent variables. Staying in remission for three months was included in the analysis as the dependent variable. Accordingly, staying in early remission was affected by education, employment status, substance used and VSTC/D scores. Failure to remain in early remission was approximately 7,5 times lower in primary school graduates than in high school and university graduates, and 8 times lower in non-workers than in workers. It was found that each unit increase in interference sensitivity increased the inability to stay in remission 14 times and methamphetamine use 9 times more than heroin use.

**CONCLUSIONS:** Scores in the HAMA, HAMD, CTS, BDI, ASRS scales were found to be higher in substance users compared to healthy controls. It was found that people with HUD and MUD showed lower performance in social cognition and executive functions compared to healthy individuals. It is

suggested that the type of substance used is effective in the case of early remission, MUD are in less early remission and executive functions may be related to their deficiencies, especially in the field of cognitive flexibility. Considering the results of our study, it is thought that it may contribute to the literature in terms of planning pharmacological and cognitive treatment interventions that can be applied and staying in treatment in people with substance use.

## REFERENCES

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**Keywords:** executive functions, heroin, methamphetamine

<b>Table.</b> Investigation of independent variables that may be negative risk factors for early remission with logistic regression model				
Age	Early remission status OR	Early remission status 95% CI	Early remission status 95% CI	Early remission status p
Age	0,934	0,829	1,051	0,256
Gender*	2,246	0,392	12,886	0,364
Education**	0,168	0,031	0,917	0,039
Marital status**	0,598	0,145	2,467	0,477
*Working status****	0,191	0,042	0,877	0,033
Year of substance use	1,101	0,872	1,390	0,420
VST C/D (high interference susceptibility)	14,039	2,123	92,850	0,006
Substance used+	8,976	2,236	36,026	0,002
Go no Go - total true	0,951	0,900	1,006	0,081

\*Based on being male compared to being female, \*\*Based on having primary education compared to having high school and higher education \*\*\*Based on being single/divorced compared to being married \*\*\*\*Based on not working compared to being working  
 +Methamphetamine use compared to heroin use  
 OR: Odd's ratio, 95% CI: 95% Confidence interval  
 Model Fit: Overall Percentage=74%; -2 Log likelihood=72.886; Nagelkerke R Square=0.411