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# DIAGNOSIS OF ATTENTION DEFICIT AND HYPERACTIVITY DISORDER AMONG PATIENTS WITH SUBSTANCE USE DISORDER AND ASSOCIATION WITH SOCIODEMOGRAPHIC AND CLINICAL CHARACTERISTICS: A RETROSPECTIVE STUDY

## MADDE KULLANIM BOZUKLUĞU OLAN HASTALARDA DİKKAT EKSİKLİĞİ VE HİPERAKTİVİTE BOZUKLUĞU TANISI VE SOSYODEMOGRAFİK VE KLİNİK ÖZELLİKLERLE İLİŞKİSİ: RETROSPEKTİF BİR ÇALIŞMA

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## Abstract

**Objective: Substance use disorders (SUD) are chronic, relapsing disorders in which compulsive behaviors persist despite severe negative consequences. SUD is frequent among patients with ADHD and ADHD is frequent among patients with SUD. The aim of this study was to investigate the prevalence of ADHD among patients with substance abuse/dependence according to DSM-IV TR retrospectively, and to demonstrate whether the diagnosis of ADHD is associated with sociodemographic and clinical characteristics of these patients. Method:We analyzed the medical records of 485 patients. All participants were diagnosed as having alcohol or substance abuse/dependence.Socio-demographic and data regarding clinical characteristics were derived from patient records. Results: Of the included 395 participants, 37 (9.4%) were female and 358 (90.6%) were male. The mean age was 31.53±10.44 years. Comorbid ADHD was diagnosed among 82 (20.8%) of all participants. The mean age in ADHD group was significantly lower than that of the group without ADHD (27.10± [7.87] versus 32.69± [10.73], p<0.05).Also, rate of remission was significantly lower in the group without ADHD (%48.8 vs. %33.2, p<0.05). Cannabis and derivatives abuse/dependence were found to be higher in the group with ADHD, whereas alcohol or multidrug abuse/dependence were higher in the group without ADHD comorbidity (p<0.05). Conclusion: In conclusion, we found that in the majority of the participants with ADHD had their diagnosis after the substance use problems had developed. This finding suggests that ADHD can be underdiagnosed in adults and we should be aware of this diagnosis**

**Keywords:** ADHD, Comorbidity, Addiction

## *Özet*

***Amaç: Madde Kullanım Bozukluğu (MKB), olumsuz sonuçlarına karşın kompulsif madde kullanımının devam ettiği yineleyen, kronik bir hastalıktır. MKB, DEHB'si olan bireylerde, DEHB de MKB'si olan bireylerde daha sıktır. Bu araştırma, DSM-IV TR'ye göre madde bağımlılığı/kötüye kullanımı olan bireylerde DEHB sıklığının ve sosyodemografik ve klinik özellikleri ile ilişkisinin araştırmayı amaçlamıştır. Yöntem: Bu araştırmada 485 hastanın tıbbi kayıtları incelenmiştir. Hastaların hepsi alkol veya madde kötüye kullanımı/bağımlılığı tanısını almıştır. Sosyo-demografik ve klinik özellikleri ile ilgili veriler tıbbi kayıtlardan elde edilmiştir. Bulgular: Araştırmaya dâhil edilen 395 hastanın 37 (%9.4)'si kadın, 358 (%90.6)'sı erkek olduğu ve ortalama yaşlarının 31.53 ±10.44 olduğu tespit edilmiştir. DEHB komorbiditesi 82 (%20.8) hastada tespit edilmiştir. DEHB komorbiditesi olan grupta ortalama yaş DEHB komorbiditesi olmayanlara göre daha düşük olduğu tespit edilmiştir (27.10± [7.87] ile 32.69± [10.73], p<0.05). DEHB'si olmayan grupta remisyon oranı daha düşük bulunmuştur (%48,8 ile %33,2, p<0.05). Esrar ve türevleri DEHB'si olan grupta daha fazla kullanılıyor iken, alkol ve çoğul madde kullanımı DEHB'si olmayan grupta daha sık olduğu tespit edilmiştir (p<0.05). Sonuç: DEHB'si olan hastaların büyük bir kısmının tanısı madde kullanımına başlandıktan sonra konduğu tespit edilmiştir. Bu bulgular, erişkinlerde DEHB tanısının yeterince bilinmediği ve bu konuda daha dikkatli olmamız gerektiğini akla getirmektedir.***

***Anahtar Kelimeler:*** *DEHB, Komorbidite, Bağımlılık*

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## 1. Introduction

Substance use disorders (SUD) are chronic, relapsing disorders in which compulsive behaviors persist despite severe negative consequences. Substance use usually begins during adolescence and has a worse progress in the presence of accompanying psychiatric disorders such as attention deficit hyperactivity disorder (ADHD), mood disorders or conduct disorder. ADHD is a common, childhood-onset neurodevelopmental disorder with adverse consequences during adulthood. Prevalence of ADHD in children varies between 3 to 12% and the disorder persists through adolescence and adulthood in the 75% of these subjects. Although symptom severity is lower in adults with ADHD, functionality is affected at almost a similar level to children's (Polanczyk et al., 2007; Rappley, 2005; Biederman & Faraone, 2005; Adler, 2004; Matthys et al., 2014). There is a significant and clinically relevant overlapping between ADHD and SUD (Arias et al., 2008). SUD is frequent among patients with ADHD and ADHD is frequent among patients with SUD. ADHD and SUD have common neurobiological alterations that may predispose an individual to develop both conditions. The dopaminergic dysfunction in the dopaminergic circuits in basal and frontal cortex with consequent defects in executive function and reward system have been found in ADHD and SUD patients (Seidman et al., 2005). In recent years, studies conducted in clinical samples revealed that adolescents and adults with substance use disorder showed ADHD more frequently than healthy individuals and the mean occurrence rate in this group varies between 15-50% (Biederman et al., 2011; Wilson, 2007; Oortmerssen et al., 2012; Szobot et al., 2007; Wilens & Morrison, 2012). There are studies reporting that, ADHD occurs in 17-45% of patients with alcohol use disorder and in 9-30% of the patients with SUD (Oortmerssen et al., 2012; Wilens, 2006; Wilens, 2004; Wilens & Upadhyaya, 2007). It has been stated that the risk of substance use problems in adults with ADHD is four times higher than in the general population (Fayyad et al., 2007).

Whereas some of the authors have stated that the diagnosis of ADHD in adulthood is difficult and ADHD is underdiagnosed, the others have stated that ADHD is overdiagnosed among adults. In fact there are limited materials for the screening, diagnosis and treatment of adult ADHD among SUD. Age-specific and strict criteria of ADHD in the DSM IV-TR and cognitive deficits associated with substance abuse is making difficult to diagnose ADHD among adults with SUD regarding underdiagnoses. On the other hand, SUD symptoms may mimic ADHD symptoms, which can lead to an overdiagnosis of ADHD in the SUD population (Matthys et al., 2014).

Most of the studies investigating comorbidity of ADHD and substance use disorder were conducted in adolescents, and reported that the age onset of substance use was younger in the presence of ADHD comorbidity. The presence of ADHD also impacts the characteristics of substance usage. In this group, progression from "use" to "abuse" and addiction is faster and compliance to treatment is worse with frequent relapses. It is also more difficult for these patients to maintain sobriety (Oortmerssen et al., 2012; Wilens, 2011; Wilens, 2006). Comorbid ADHD has a negative effect on the course of SUD. Patients with both ADHD and SUD become addicted at a younger age, use more substances and are hospitalized more often than SUD patients without ADHD (Arias et al., 2008).

The treatment of ADHD should be integrated into the treatment of addiction, thus symptoms of ADHD as impulsivity, hyperactivity, inattention and disturbed planning and organization can interfere with the addiction treatment (Matthys et al., 2014; Mariani & Levin, 2007). It has been noticed that the treatment of the ADHD symptoms can make the addiction easily treatable. Early treatment for ADHD decreases the risk for subsequent SUD in adolescence and adulthood (Wilens et al., 2003). In some other studies report that treatment of childhood ADHD with stimulants results in a 50–70 % reduction in the symptoms of SUD. Goksøyr and Nøttestad (2008) showed that occurrence of substance abuse and tendency to crime were higher in untreated adult ADHD patients. The aim of this study was to investigate the prevalence of ADHD among inpatients with substance abuse/dependence according to DSM-IV TR retrospectively, and to demonstrate whether the diagnosis of ADHD is associated with sociodemographic and clinical characteristics of these patients.

## 2. Method

We analyzed the medical records of 485 patients who were hospitalized in Neuropsychiatry Istanbul Hospital Addiction Treatment Center between January 2013 and December 2014. Medical records of 90 patients were excluded due to lack of sufficient data or other Axis-I comorbidity. All participants were diagnosed as having alcohol or substance abuse/dependence, based on DSM-IV TR, by two psychiatrists separately. The ADHD diagnosis was also made due to and confirmed with the Adult Attention Deficit Disorder/Attention Deficit and Hyperactivity Disorder (ADD/ADHD) Scale scores. Socio-demographic data including sex (male/female), age, marital status, employment status, duration of education (years) and data regarding clinical characteristics such as the age at first substance use, number of hospitalizations, presence of criminal records, rates of remission and rate of drop out were derived from patient records. The study was approved by Ethics Committee of Uskudar University. Information about remission and adherence to treatment was obtained via self-reports through outpatient visits and telephone interviews after discharge. Remission was defined as staying sober at least 12 months after admission. Patients who could not be followed up longer than six months were accepted as dropped out the treatment.

### *2.1. Statistical analysis*

Obtained data were analyzed using Statistical Packet for Social Sciences (SPSS) version 15.0. Descriptive analysis included means and standard deviations. Intergroup comparisons were made by Chi-square and t-test. Statistical significance was adjusted to $p<0.05$. Descriptive statistics were also calculated as frequency or percent.

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### 3. Results

Of the included 395 participants, 37 (9.4%) were female and 358 (90.6%) were male. The mean age was 31.53±10.44 years. Among the participants, 272 were (68,9%) single and 123 (31.1%) were married. The mean of the duration of education were 11.34±2.79 years among participants. Comorbid ADHD was diagnosed among 82 (20.8%) of all participants due to DSM-IV TR. Participants with substance abuse/dependence were grouped into two groups based on the presence of ADHD and compared in terms of sociodemographic characteristics such as age, gender, marital status, employment, duration of education, and characteristics of substance use such as age of the first substance use, number of hospitalizations, lifetime legal problems, rates of remission and drop out. The mean age in ADHD group was significantly lower than that of the group without ADHD (27.10± [7.87] versus 32.69± [10.73], $p<0.05$). Also, rate of remission was significantly lower in the group without ADHD (%48.8 vs. %33.2, $p<0.05$). A Table 1 summarizes sociodemographic variables and clinical characteristics of the participants.

We also compared the sociodemographic and clinical characteristics of participants who had the diagnosis of ADHD before or after the onset of substance abuse/dependence. Patients who had the diagnosis of ADHD prior to the onset of substance use had lower mean age and higher rate of unemployment. This group also had the diagnosis of substance abuse/dependence at a younger age and their lifetime legal problems were at a lower level ($p<0.05$). A table 2 summarizes the sociodemographic variables and clinical characteristics of the participants in terms of association with ADHD comorbidity and the time of diagnosis.

The groups with and without ADHD comorbidity were also compared in terms of preference of substance that was abused. Cannabis and derivatives abuse/dependence were found to be higher in the group with ADHD, whereas alcohol or multidrug abuse/dependence were higher in the group without ADHD comorbidity ($p<0.05$). Assosciation of ADHD comorbidity and preference of the substance abused are presented in Table 3.

### 4. Discussion

There is growing evidence that ADHD is seen among adolescents and adults with substance use disorders more frequently, and the mean of prevalence in this group varies between 15-50% (Wilens & Morrison, 2011). In this study 82 (20.8%) of all participants with a substance use disorder met DSM-IV TR criteria for comorbid ADHD. This finding is supported by the findings of Oortmerssen et al. (2012), who have reported that the estimated

**Table 1:** Sociodemographic variables, clinical characteristics of the participants

| | | ADHD (+) (n=82) | ADHD (-) (n=313) | t/ $\chi$2 | p |
|---|---|---|---|---|---|
| Age (mean±SD) | | 27.10±(7.87) | 32.69±(10.73) | -4.421 | 0.003* |
| Sex | Female n (%)<br>Male n (%) | 3 (3.7)<br>79 (96.3) | 34 (10.9)<br>279 (89.1) | 3.972 | 0.046* |
| Duration of education (years) | (mean ± SD) | 10.7±(2.60) | 11.51±(2.81) | -2.367 | 0.597 |
| Marital Status n (%) | Single<br>Married | 56 (68.3)<br>26 (31.7) | 216 (69)<br>97 (31) | 2.970 | 0.227 |
| Occupation n (%) | Inoccupied<br>Occupied | 31 (37.8)<br>51 (66.2) | 159 (50.8)<br>154 (49.2) | 5.526 | 0.063 |
| Age at first substance use | (mean±SD) | 17.29 ±4.23 | 18.16±4.052 | -1.709 | 0.736 |
| Lifetime legal problems n (%) | No<br>Yes | 39 (47.6)<br>43 (52.4) | 120 (38.3)<br>193 (61.7) | 5.330 | 0.021* |
| Number of hospitalizations | (mean±SD) | 1.24±1.65 | 1.93±2.11 | -2.747 | 0.713 |
| Remission (n,%) | Yes<br>No | 40 (48.8)<br>42 (51.2) | 104 (33.2)<br>209 (66.8) | 8.830 | 0.009* |
| Drop out n (%) | Yes<br>No | 29 (35.4)<br>53 (64.6) | 133 (42.5)<br>180 (57.5) | 1.364 | 0.243 |

* Statistically significance level is <0.05

**Table 2:** Comparison of sociodemographic variables and clinical characteristics of participants with comorbidity in terms of diagnosis antecedence

| | | Diagnosed ADHD before SUD diagnosis (n=15) | Diagnosed ADHD after SUD diagnosis (n=67) | t/ $\chi$2 | p |
|---|---|---|---|---|---|
| Age (mean±SD) | | 21.73±(5.93) | 28.3±(7.78) | 0.193 | 0.003* |
| Sex | Male | 15 (100) | 64 (95.5) | 0.697 | 1,000 |
| | Female | 0 (0) | 3 (4.5) | | |
| Duration of education (years) | (mean ± SD) | 10.6±(2.59) | 10.6±(2.59) | -0.156 | 0.877 |
| Marital status (n, %) | Single | 12 (80) | 44 (64.7) | 2.485 | 0.289 |
| | Married | 3 (20) | 23 (34.3) | | |
| Occupation n (%) | Inoccupied | 11 (73.3) | 20 (29.9) | 9.953 | 0.007* |
| | Occupied | 4(26.7) | 47 (70.1) | | |
| Age at first substance use | (mean±SD) | 16.13±1.55 | 17.55±4.59 | -1.177 | 0.243 |
| Lifetime legal problems n (%) | No | 11 (73.3) | 28(41.8) | 4.889 | 0.044* |
| | Yes | 4 (26.7) | 39 (58.2) | | |
| Number of hospitalizations | (mean±SD) | 1.00±1.25 | 1.30±1.73 | -0.630 | 0.530 |
| | | 16.13±1.55 | 17.55±4.59 | -1.177 | 0.243 |
| Time of SUD diagnosis (in age) | (mean±SD) | 19.20±3.61 | 22.87±6.08 | -2.242 | 0.028* |
| Remission (n,%) | Yes | 8 (53.3) | 32 (47.8) | 0.152 | 0.779 |
| | No | 7 (46.7) | 35 (52.2) | | |
| Drop out n (%) | Yes | 5 (33.3) | 24 (35.8) | 0.033 | 1.000 |
| | No | 10 (18.9) | 43 (64.2) | | |
| Adult ADD/ADHD subscales (mean ± SD) | Total score | 70.80±19.38 | 72.13±22.87 | -0.209 | 0.835 |
| | Attention deficit | 13.00±6.08 | 13.03±5.54 | -0.019 | 0.985 |
| | Hyperactivity/Impulsivity | 12.07±5.27 | 14.61±6.11 | -1.492 | 0.140 |
| | Related features | 45.07±13.28 | 44.58±14.05 | 0.122 | 0.903 |

* Statistically significance level is <0.05

**Table 3:** Association of ADHD comorbidity and preference of the substance abused

| | ADHD (+) (n=82) | ADHD (-) (n=313) | t/ $\chi$2 | p |
|---|---|---|---|---|
| Alcohol use disorder (n, %) | 12 (14.6) | 99 (31.6) | 31.075 | 0.000* |
| Cannabis use disorder (n, %) | 39 (47.6) | 72 (23,0) | | |
| Heroin use disorder (n, %) | 2 (2.4) | 14 (4.5) | | |
| Cocaine use disorder (n, %) | 7 (8.5) | 7 (2.2) | | |
| Polisubstance use disorder (n, %) | 22 (26.8) | 121 (38.7) | | |

* Statistically significance level is <0.05

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overall prevalence of ADHD among those with a SUD has been found 23%.

Although ADHD is a well-known disorder by child psychiatrists, adult ADHD is not well-known and can be underdiagnosed and undertreated in clinical practices (Buitelaar, 2001). An important reason for missed diagnosis of ADHD among adults is alterations in symptomatology of the disorder. Another factor is comorbid psychiatric disorders such as substance use disorder which is not rare and also can mimic or mask the diagnosis of ADHD (Wender et al., 2001; Wilens & Upadhyaya, 2007).

Furthermore, unrecognized ADHD symptoms may be consequences of poor treatment in the comorbid disorders. It has been stated that SUD patients are more likely to have a previous or current diagnosis of ADHD. Screening for adult ADHD is not a routine practice in many clinical conditions (McAweeney et al., 2009). However, in this study, 82 patients had ADHD comorbidity and only 15 of them were diagnosed with ADHD prior to their diagnosis of substance use disorder. The remaining patients had their ADHD diagnosis after admission due to alcohol/substance use disorder.

When the sociodemographic and clinical data of the groups with or without ADHD comorbidity were examined, there was no significant difference in the age of first substance use, but patients with ADHD comorbidity had an attempt to have a treatment for substance use disorder at an earlier age. This may suggest that, in the presence of ADHD, symptoms and problems according to substance use may be more severe and the progression of substance use may be faster. Also parental awareness might be increased with presence of ADHD. Thus, the need for treatment occurs at an early age. In fact, the study of Wilens (2004), verified this explanation.

In our study, prevalence of remission was lower in the group without ADHD comorbidity. This finding is not supported by the literature. Wilens (2004) reported that the remission rate was around 80% in SUD either with or without ADHD comorbidity. This contradictory finding may be due to the fact that, in our sample most of the ADHD diagnosed patients were treatment naive for ADHD, and subsequent treatment was given immediately after the admission. In our study, better remission rates among individuals with ADHD may be associated with effects of pharmacological treatment of ADHD. Therefore by virtue of treating their ADHD we might have provided a protective effect in terms of abstinence. Muld et al. (2015) indicated that pharmacological treatment of ADHD may improve the long-term outcomes of individuals with SUD and comorbid ADHD. Initiation of pharmacological treatment to improve daily functioning and facilitate a treatment after stabilization of SUD may decrease the risk for relapse and may ensure the recovery through increasing motivation and a well-structured treatment compliance. Existence of this putative effect needs further verification through studies with prospective designs with treatment and control outputs for ADHD.

The groups with or without an ADHD comorbidity were compared in terms of preference among substances that have abused. Some studies have reported that individuals with ADHD use mixed substances more prevalent compared to individuals without ADHD. It has been proposed that individuals with ADHD prefer stimulants due to the relieving effects on symptoms of ADHD (Lee et al., 2011). Cannabis and derivatives have been preferred to be used more prevalently in the group with ADHD, whereas alcohol or polysubstance use have seen in the group without ADHD more often. This finding is not surprising, when we consider that participants with ADHD comorbidity may be more impulsive and have higher risk taking behaviors. On the other hand, higher rates of cocaine dependence in ADHD group suggest that cocaine might be used as a self-medication in this group. Another important finding was prevalent lifetime legal problems in the group whose diagnosis of substance abuse/dependence was prior to the ADHD diagnosis. This finding is supported by the findings of Goksøyr and Nøttestad (2008). This suggests that early diagnosis and treatment of ADHD may prevent legal issues in individuals with substance use disorder.

All treatment seeking SUD patients should be screened for ADHD and, after confirmed diagnosis they should have a treatment for ADHD. Thus the current literature indicates poor prognosis of patients with SUD and comorbid ADHD.

## 5. Conclusion

In conclusion, we found that in the majority of the participants with ADHD had their diagnosis after the substance use problems had developed. This finding suggests that ADHD can be underdiagnosed in adults and we should be aware of this diagnosis. At the same time, a delayed ADHD diagnosis may increase the risk of legal issues. In addition, substance preference can differ between the patients with or without ADHD comorbidity in patients with SUD.

Limitations of this study include retrospective design, insufficient number of female patients, and lack of severity scales for addiction. Further studies should be focused on the effect of ADHD on severity of addiction. Prospective, large-scaled, comparative studies should be conducted about this comorbidity.

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