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ORIGINAL ARTICLE

Prevalence and effect of attention-deficit hyperactivity disorder on the pattern and severity of substance use disorders

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Background The links between attention-deficit hyperactivity disorder (ADHD) and substance use disorder (SUD) have been the subject of many studies, showings a high prevalence rate of ADHD in substance-abusing population as well as an increased risk of SUD in patients with ADHD that may be independent of other psychiatric conditions.

Objectives We tried to estimate the frequency of adult and childhood ADHD in patients with SUDs attending Minia Hospital for Mental Health and Addiction Treatment.

Results We included 119 patients diagnosed with SUDs. Three-quarters of our sample were polysubstance users, the most common substance used as reported by patients was tramadol (68.9%), and the most severely affected domains according to Addiction Severity Index among subjects of the study were drug use, family/social, and psychiatric problems. Overall, 10.1% had alcohol dependence/abuse diagnosis in addition to their substance use. The duration of substance uses in the whole sample ranged from 1 to 27 years, with a mean of 10±5.5 years. The mean age for the first-time drinking alcohol was 18.7±4.9 years, ranging from 9 to 40 years, and for using drugs was 19.2±6.2 years, with a range from 6 to 43 years. Childhood ADHD was diagnosed in 30(25.2%) patients, whereas adulthood ADHD was diagnosed in 28(23.5%) patients of our sample as measured by Conner's Adult ADHD Diagnostic Interview for DSM-IV.

Conclusions Adulthood ADHD and childhood ADHD were frequently co-occurring conditions among patients with SUDs. ADHD diagnosis contributed to an increased addiction severity among adults with SUD.

Keywords Attention-deficit, Hyperactivity, Substance use.
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INTRODUCTION

Special consideration should be given to the high degree of co-occurrence and comorbidity of attention-deficit hyperactivity disorder (ADHD) and substance use disorder (SUD). The high degree of co-occurrence proposes that it is not due to mere chance (Galán and Humphreys, 2017). Persistent ADHD may lead to an increased vulnerability and/or reduced access or tolerance to interventions leading to significantly higher SUDs (Hechtman *et al.,* 2016).

The definite mechanisms underlying the increased risk of SUD in individuals with a history or current diagnosis of ADHD are not well understood (Hechtman *et al.,* 2016).

Several hypotheses were suggested in an effort to explain the link between ADHD and substance use.

ADHD and SUD have been identified as disinhibition disorders including an underlying susceptibility shared by both conditions; ADHD symptoms like impulsivity may result in patients trying a new drug or substance without considering its consequences (Galán and Humphreys, 2017). When asked about their experience with drugs, some patients with ADHD reported using or trying them as a result of their own impulsive behavior (Kalbag and Levin, 2005).

Persistent ADHD symptoms may cause interpersonal, occupational, and academic dysfunction; these impairments may trigger depression or low self-esteem with a tendency to use alcohol or other substances in a way to deal with these problems (Kalbag and Levin, 2005).

Another explanation is that patients with ADHD try to self-medicate their symptoms by using substances increasing synaptic dopamine levels (Wonnacott *et al.,* 1989); that is why, cocaine may be used by these patients with ADHD in a trial to treat symptoms of hyperactivity and inattention (Hoffman and Lefkowitz, 1996; Wilens and Decker, 2007; Zulauf *et al.,* 2014).

Research studies involving both children and adults have found multiple genes involved in the etiology of ADHD that may have a role in SUD etiology: examples of these genes are dopamine D2 and D4 receptor, dopamine transporter, dopamine β-hydroxylase, t gene, SNAP-25 gene, and others (Faraone *et al.,* 2007).

AIM

We tried to estimate the frequency of adult and childhood ADHD in patients with SUD attending Minia Hospital for Mental Health and Addiction Treatment.

PATIENTS AND METHODS

Setting and patients of the study and size of the sample:

The patients of the study were recruited from patients attending the addiction 'Hotline' clinic of Minia Hospital for Mental Health and Addiction Treatment and inpatient department in 6 months.

Design

Stratified randomization was used to select cases from the Hotline outpatient clinic, so patient numbers 1, 10, and then 20 were selected and included in the study. All inpatients who have spent at least 7 days in the detoxification department along with all inpatients in the rehabilitation department were included in the study.

Inclusion criteria were as follows:

(1) Age range 18–60 years.

(2) Patient numbers 1, 10, and then 20 attending the Hotline outpatient clinic.

(3) All inpatients in the addiction ward after 7 days of admission.

(4) Both sexes.

(5) Patient consent to participate in the study.

Exclusion criteria were as follows:

(1) Intoxication at the time of the interview.

(2) Active episode of comorbid psychiatric disorder 'bipolar or psychotic.'

The total number of participants who met the eligibility criteria for the study was 125 (four refused to participate in the study, and two did not want to continue the interview). The total number of patients included in the study was 119, and of those, 115 were males and four were females.

Tools of the study

Urine screening for substances of abuse

The analysis was done in the Minia Hospital of Mental Health and Addiction Treatment laboratory by an experienced technician using two types of urine kits: the first was specific only for tramadol (DiaSpot Rapid One-step Test Device), and the second (ACON Urinalysis Reagent Strip) test for six different substances: THC (Cannabis), BAR (Barbiturate), COC (Cocaine), AMP (Amphetamine), MOP (Morphine), and BZO (Benzodiazepines).

Mini Neuropsychiatric International Interview plus

Substance dependence/abuse and other psychiatric disorders were assessed with the Mini Neuropsychiatric International Interview (M.I.N.I.) Plus, the Arabic version (Ghanem, 1999).

The M.I.N.I. Plus (Sheehan *et al.,* 1998) contains 120 questions and screens 17 axis I DSM-III-R/IV disorders and ICD-10. It features questions on rule-outs, disorder subtyping, and chronology (e.g. age at onset). All questions are dichotomic having a 'yes' or 'no' answer. Each diagnostic section (except psychotic syndromes) has one or two screening questions screening mandatory criteria. The algorithms are integrated in its structure so that diagnoses are reached within the interview.

Addiction severity index

The Addiction Severity Index (ASI) (McLellan *et al.,* 1980) is a semistructured interview designed to offer a multidimensional assessment of problems in patients with SUD to help in developing the initial treatment plan and to allow the follow-up of improvement in those patients over time. It collects data on seven functional areas that are frequently affected by substance use: medical status, employment and support, drug use, alcohol use, legal status, family and social status, and finally, psychiatric status (McLellan *et al.,* 1980).

Each section targets the frequency, duration, and severity of problems over the patient's lifetime and in the past 30 days (McLellan *et al.,* 1980). Question format varies, with yes or no questions, multiple choice questions, and open-ended questions in each section. Patients are asked to rate how troubled are they by these problems over the past 30 days and the extent to which they think they need treatment plus any treatment they may be offered currently. These ratings are made on a 0–4 scale. For each functional area, the interviewer reports severity ratings (0–

9) that indicate the degree to which the he/she thinks the patient needs additional treatment (McLellan *et al.,* 1980).

Conners' adult attention-deficit hyperactivity disorder diagnostic interview for DSM-IV

Childhood ADHD and adult ADHD were diagnosed using the Conner's Adult ADHD Diagnostic Interview for DSM-IV (CAADID) (Conners *et al.,* 2001), CAADID is one of the most frequently used semistructured diagnostic interviews for the assessment of adult ADHD (Epstein and Kollins, 2006; Medori *et al.,* 2008; El Asrs, 2009; Fatséas *et al.,* 2016). The CAADID is divided into two parts: part I is intended to collect information about (a) demographic history, (b) developmental course, (c) risk factors for ADHD, and (d) short comorbid psychopathology screen, and is completed by the patient, whereas part II of the interview is conducted by a trained clinician and is implemented to assess the first four criteria of DSM-IV for ADHD. Based on the informants' answers, the interviewer determines the presence or absence of each ADHD symptom and DSM criterion (Epstein and Kollins, 2006). However, in this study, both parts were administered by the researcher. Comorbidity and ruling out other disorders as being the cause of any ADHD symptomatology (DSM-IV ADHD Criterion E) was done using the M.I.N.I. Plus as mentioned earlier.

Data analysis and statistical methods

The data collected were recorded on a separate file for each participant and was given a code. Data analysis was done by the Statistical Package for the Social Sciences (SPSS) (IBM SPSS Statistics for Windows, IBM Corp. Released 2013, Version 22.0.; IBM, Armonk, New York, USA).

Descriptive statistics

Frequencies and percentages were calculated for categorical variables, whereas mean and SDs were calculated for continuous variables.

Statistical Analysis

(1) Mann–Whitney tests were used to compare the group with ADHD and the non-ADHD group on continuous variables.

(2) χ^2 tests were used in comparing the two groups on categorical variables.

(3) Spearman tests were used in correlating variables in the same group.

(4) Level of significance was set as follows:

P value more than 0.05: nonsignificant.

P value less than 0.05: significant.

P value less than 0.01: highly significant.

Ethical aspects

Before taking part in the study, the researcher provided the potential participant with sufficient information about the nature and the aim of the research, in addition to the anticipated benefits to him/her and the community, to ensure a fully informed, and freely given decision about whether to join the study, without practicing any pressure or coercion.

All participants in the study had to provide informed oral and written consent before taking part in the study, with an emphasis that they have the right to withdraw from the study at any stage without a need to explain why and if so their information/data will also be withdrawn from the study.

Participants were not subjected to harm in any way during the study, the protection of the privacy of participants and their anonymity was of paramount importance, and arrangements were done to ensure it, for example, the participants were not required to give their names and their data were kept nonidentifiable through the application of code to protect the individual identity.

RESULTS

The total sample of the study was 119 patients with SUD. The mean age of the studied sample was 30.1±6.7 years, ranging from 18 to 56 years. Most of the samples were male [96.6% (*n*=115)]. More than half the sample were married [57.1% (*n*=68)], and the rest were single [35.3% (*n*=42)]. The most common education level was technical secondary school [37% (*n*=44)] followed by illiteracy [26.1% (*n*=31)]. Most of the sample were manual workers [62.2% (*n*=74)] followed by being unemployed 15.1% (*n*=18). Finally, the residence in the studied sample was almost equally distributed between rural [54.6% (*n*=65)] and urban areas [45.4% (*n*=54)] (Table 1).

Table 2 shows the duration of substance use in the whole sample; the substance use duration ranged from 1 to 27 years, with a mean of 10±5.5 years.

Regarding the number of substances used by our patients, about a quarter of the sample [24.4% (*n*=29)] used one substance, whereas the rest three-quarters were polysubstance users, where most used three substances 21% (*n*=25), followed by two substances 18.5% (*n*=22) and four substances 16.8% (*n*=20) (Table 3).

The most common substance used currently/frequently as reported by patients was tramadol 68.9% (*n*=82) followed by heroin 18.5% (*n*=22), whereas the least substances used were equally tramadol with synthetic cannabis and biperiden 0.8% (*n*=1) (Table 4).

The prevalence of childhood ADHD in our sample was 25.2% (*n*=30) and 23.5% of patients (*n*=28) continued to have the disorder during adulthood. In other words, ADHD persisted in 93.3% of those with childhood ADHD (Table 5).

According to the M.I.N.I. Plus, the prevalence of current and lifetime ADHD in the sample was 27.7% (*n*=33) (Tables 6 and 7).

The comparison between ADHD subtypes regarding ASI parameters revealed that patients with inattentive subtype of ADHD scored more on medical problems (2.0±4.0), employment/support status problems (5.0±2.2), and family and social relationship problems (5.3±2.6) than patients with hyperactive/impulsive or combined subtypes of ADHD as measured by ASI. Patients with hyperactive/impulsive subtype of ADHD scored more on alcohol (2.3±2.3) and psychiatric (5.8±1.7) problems than those with inattentive or combined subtypes of ADHD as measured by ASI. Patients with combined subtype of ADHD scored more on drug (7.38±1.2) and legal (2.5±2.7) problems than those with inattentive or hyperactive/impulsive subtypes of ADHD as measured by ADI. However, these differences were not statistically significant (Table 8).

Table 1: Sociodemographic data of the studied sample (*N*=119):

Descriptive statistics	*n* (%)
Age	
Range	18–56
Mean±SD	30.1±6.7
Sex	
Male	115(96.6)
Female	4(3.4)
Marital state	
Married	68(57.1)
Single	42(35.3)
Divorced	8(6.7)
Widower	1(0.8)
Educational level	
Technical secondary school	44(37)
Illiterate	31(26.1)
Preparatory school	17(14.3)
Secondary school	10(8.4)
University	11(9.2)
Read and write	3(2.5)
Primary school	3(2.5)
Occupation	
Manual worker	74(62.2)
Unemployed	18(15.1)
Semiprofessional/clerk	10(8.4)
Driver	8(6.7)
Student	6(5)
Professional	3(2.5)
Residence	
Rural	65(54.6)
Urban	54(45.4)

Read and write means primary, preparatory school graduates, and literate.
Manual worker included builders, farmers, bakers, and waiters.
Skillful worker included employees, teachers, and lawyers.

Table 2: Duration of substance use in the whole sample:

Duration of substance use	
Range (years)	1–27
Mean±SD	10.87±5.5

Table 3: Number of substances used in the whole sample:

Number of substances	*n*(%)
One substance	29(24.4)
Polysubstance	90(75.6)
Two substances	22(18.5)
Three substances	25(21)
Four substances	20(16.8)
Five substances	10(8.4)
Six substances	10(8.4)
Seven substances	2(1.7)
Eight substances	1(0.8)

Table 4: The main substance/s used currently/frequently according to patients' reports in the whole sample:

Main substance/s used	*n* (%)
Tramadol	82(68.9)
Heroin	22(18.5)
Cannabis/hashish	8(6.7)
Cocaine	2(1.7)
Tramadol and clonazepam	2(1.7)
Alprazolam	1(0.8)
Tramadol and synthetic cannabis 'strox'	1(0.8%)
Biperiden	1(0.8)

Table 5: Prevalence of childhood and adulthood attention-deficit hyperactivity disorder in the studied sample as measured by Conner's Adult ADHD Diagnostic Interview for DSM-IV:

ADHD by CAADID	*n* (%)
Childhood ADHD	
No	89(74.8)
Yes	30(25.2)
Adulthood ADHD	
No	91(76.5)
Yes	28(23.5)

ADHD, attention-deficit hyperactivity disorder; CAADID, Conner's Adult ADHD Diagnostic Interview for DSM-IV.

Table 6: Frequency of current and lifetime attention-deficit hyperactivity disorder in the studied sample as measured by the Mini Neuropsychiatric International Interview Plus:

ADHD by M.I.N.I. Plus	*n* (%)
Adulthood ADHD by 'M.I.N.I. PLUS'	
No	86(72.3)
Current and lifetime	33(27.7)

ADHD, attention-deficit hyperactivity disorder; M.I.N.I., Mini Neuropsychiatric International Interview.

Table 7: Comparison between attention-deficit hyperactivity disorder and non-attention-deficit hyperactivity disorder groups regarding addiction severity as measured by Addiction Severity Index (*N*=119):

	Lifetime ADHD		
	No (total number 89)	Yes (total number 30)	
Addiction severity index	**Mean±SD**	**Mean±SD**	***P* value**
Medical status	0.5±1.6	1.3±2.7	0.000*
Employment/support status	2.5±2.6	2.6±2.5	0.899
Alcohol status	1.5±1.9	2.1±2.1	0.342
Drug status	6.8±0.95	7.0±1.05	0.278
Legal status	1.2±1.7	1.4±2.3	0.016*
Family and social relationship status	4.1±2.7	4.4±2.1	0.568
Psychiatric status	3.4±2.8	5.3±2.5	0.078

ADHD, attention-deficit hyperactivity disorder. Indented samples *t* test parametric quantitative data (addiction severity index) between the two groups (lifetime ADHD and none). 0= no real problem. 1= treatment not indicated. 2= slight problem. 3= treatment probably not necessary. 4= moderate problem. 5= some treatment indicated. 6= considerable problem. 7= treatment necessary. 8= extreme problem. 9= treatment absolutely necessary. *Significant difference at *P* value less than 0.05. **Highly significant difference at *P* value less than 0.01.

Table 8: Comparison between attention-deficit hyperactivity disorder subtypes regarding the addiction severity index:

	Lifetime ADHD subtypes (*N*=30)			
ASI domains/status	**Inattentive (mean±SD) (*N*=4)**	**Hyperactivity/impulsivity (mean±SD) (*N*=18)**	**Combined (mean±SD) (*N*=8)**	***P* value**
Medical	2.0±4.0	1.3±2.8	1.0±1.9	0.841
Employment /support	5.0±2.2	1.8±1.9	3.0±3.3	0.060
Alcohol	1.0±1.2	2.3±2.3	2.3±1.9	0.518
Drug	6.75±1.5	6.88±0.9	7.38±1.2	0.710
Legal	1.0±2.0	1.1±2.1	2.5±2.7	0.320
Family and social relationships	5.3±2.6	4.13±2.2	4.3±1.8	0.713
Psychiatric	4.8±3.4	5.8±1.7	4.6±3.4	0.496

ADHD, attention-deficit hyperactivity disorder; ASI, Addiction Severity Index. *Significant difference at P value less than 0.05. **Highly significant difference at P value less than 0.01.

DISCUSSION

IThe total number of the study sample was 119 patients. This was higher than the number in previous Egyptian studies such as Abdelkarim *et al.,* (2015) and Salama *et al.,* (2015), which recruited 102 patients, and Abdelazim *et al.,* (2015), which included 100 patients in their study. However, this number was less than other Egyptian studies, such as Khalil *et al.,* (2008) who examined the risk factors associated with comorbid Axis I and Axis II disorders in a sample of 158 patients with substance use, and other non-Egyptian studies like Fatséas *et al.,* (2016), who included 217 patients, and Umar *et al.,* (2017) in Nigeria, who recruited 233 patients.

It could be argued that this study sample was relatively small (119 patients) to give a generalizable clue to the effect of ADHD on substance use patterns in patients with SUDs. Nevertheless, this study is not an epidemiological one. It was meant to draw attention and explore the way to more extensive studies.

M.I.N.I. Plus was used to assess substance use and other psychiatric disorders. This was similarly used by other studies conducted in Egypt, such as Eshak (2019), who studied mental health disorders and their relationship with work-family conflict in Upper Egypt (One Year Prevalence of Common Mental Disorders, 2019), along with other non-Egyptian studies, such as Fatséas *et al.,* (2016), who studied substance use profile and severity associated with ADHD diagnosis among patients with one or more substance use. Substance use severity index was used to detect drug/alcohol problems. This tool was previously used by many previous Egyptian studies (Abdelazim *et al.,* 2015; Bassiony *et al.,* 2017) to detect drug and alcohol problems, along with other non-Egyptian studies (Jaffee *et al.,* 2009; Padyab *et al.,* 2018).

Sociodemographic characteristics

Regarding age, our results agreed with the results of a cross-sectional community-based survey by Hamdi *et al.,* (2016), which concluded that substance abuse is more common in the age group 26–35 years old. Our results were slightly higher than Mohamed *et al.,* (2013), with a mean age of 28 years and range from 18 to 55 years.

Regarding sex, the significant male predominance in our sample could be explained by the Egyptian customs and traditions, giving more freedom to males while putting restrictions on the movement of women, and being slightly more tolerant toward male substance use as compared with the females, where it is associated with social stigma, which could also cause the female substance users to be more reluctant to go to public hospitals (where our study was conducted) and prefer private clinics, as mentioned in other Egyptian studies (Khalil *et al.,* 2008).

Regarding occupation, in our sample, 74(62.2%) patients were manual workers, 18(15.1%) were unemployed, whereas 10(8.4%) patients were clerks at the time of interview. These findings are in agreement with previous Egyptian studies (El Wasify *et al.,* 2018), which found that most of their sample were manual workers, probably owing to their belief that specific drugs can help them overcome fatigue and hardship of their work.

Descriptive data related to substance use

The mean age of first-time drug use was 19.2±6.2 years, with a range from 6 to 43 years. The mean age of first-time alcohol drinking was 18.7±4.9 years, ranging from 9 to 40 years. Finally, the mean age for smoking cigarettes for the first time was 15.6±4.4 years, ranging from 6 to 41 years.

These results were similar to the results of Abd El-Azim (2001), as most of their sample started abusing cannabis and alcohol around the age of 15–17 years. However, the results were lower than AbddelMoneim *et al.,* (2020), who included 80 male patients admitted to Addiction Management Unit of Neurology and Psychiatry Hospital at Assiut University. According to their results, the mean age for starting substance use was 21.46±6.13 years. This difference from our results might be because the setting of their study was not the only and main facility for treating substance use in the governorate but rather there was a governmental psychiatric hospital; hence, the patients of AbddelMoneim *et al.*, (2020) might have been on the less severe spectrum of substance use with later onset. Moreover, this sample had a higher percentage of university students (30%) compared with ours (9.2%) which is also associated with a less severe addiction, as mentioned in previous studies (Johnston *et al.,* 2019).

The duration of substance uses in our sample ranged from 1 to 27 years, with a mean of 10±5.5 years. This was slightly longer than the duration of substance use reported by El-Sawy *et al.,* (2010), who studied sex differences in patterns of substance use and found the duration of substance use to be 8.67±3.15 years among males compared with 5.60±1.74 years in females.

Three-quarters of our sample (75.6%, 90 patients) were polysubstance users, whereas about one-quarter of our sample (24.4%; 29 patients) used only one substance. These results agreed with results obtained by El-Awady *et al.,* (2017), as they found that the majority of the studied SUD sample was using more than one drug (92%), whereas the rest were using one substance (8%).

The most common substance used in our sample was opiates 'tramadol' [*n*=82 (68.9%)] followed by heroin [*n*=22 (18.5%)] and then cannabis/hashish [*n*=8 (6.7%)]. Tramadol is considered the most prevalent substance in many studies because it is cheaper, available in many forms, and different illegal forms present in the market, so it is easy to be obtained.

Frequency of adult and childhood attention-deficit hyperactivity disorder

According to CAADID results, the prevalence of childhood ADHD in our sample was 25.2% (30 patients), whereas adulthood ADHD represented 23.5% (28 patients). Current and lifetime prevalence of ADHD in our sample was 27.7% (33 patients) according to the M.I.N.I. Plus. Prevalence of ADHD in our sample is slightly higher than the lifetime prevalence of ADHD reported by Umar *et al.,* (2017), which was 21.5%.

However, the results were lower than a similar Egyptian study by Abdelkarim *et al.,* (2015) who included 102 male inpatients with SUD from the Addiction Treatment Center at El Maamoura Psychiatric Hospital and reported that 64(%63.7) patients had a positive history of childhood ADHD according to the Arabic version of WURS, 44(43.1%) patients had positive results for adult ADHD symptom by applying the ASRS-v1.1 Symptom Checklist, and 36(35.3%) patients were diagnosed as having adult ADHD according to the DSM-IV-TR. Moreover, other non-Egyptian studies such as Clure *et al.,* (1999) assessed the prevalence of ADHD in cocaine/alcohol users and reported that 32% met the criteria for ADHD. Rad *et al.,* (2020) also investigated the presence of ADHD symptoms in a group of adult patients admitted to psychiatric services with chronic substance abuse and concluded that 46% met the criteria for the diagnosis of ADHD in adults using DIVA 2.0 structured interview (Kooij and Francken, 2010).

These varied ADHD prevalence rates could be due to the differences in diagnostic criteria, instruments used, primary substance used, and the treatment setting (inpatient, outpatient, or both).

When we compared patients with SUD with ADHD and patients with SUD without ADHD regarding addiction severity as measured by ASI, we found that patients with lifetime ADHD showed more severe addiction severity parameters in all domains of ASI such as medical status, employment/support status, alcohol status, drug status, legal status, family and social relationship status, and psychiatric status. These differences were statistically significant in the domains of medical status (*P*=0.000) and legal status (*P*=0.016).

Our ASI scores were higher in patients with ADHD and SUD than those with SUD only, with significant intergroup differences in alcohol and medical and legal status.

These findings agreed with other studies that ADHD increases the severity of substance use and affects other related aspects of life, in Fatséas *et al.,* (2016) study, diagnosis with ADHD was associated with a higher severity pattern in the legal and employment parameters of the ASI. Furthermore, Moura *et al.,* (2013) reported that ASI scores in adults with comorbid ADHD and SUD were higher in employment, family, and legal status when compared with patients with SUD only.

Moreover, our results were similar to the results of Fatséas *et al.,* (2016). where ADHD diagnosis was associated with a higher severity profile in the legal and employment sections of the ASI and Moura *et al.,* (2013) where ASI summary scores in patients with comorbid ADHD and SUD were higher than those with SUD only in employment, family, and legal status.

In our study, the comparison between ADHD subtypes regarding ASI parameters revealed that patients with hyperactive/impulsive subtype of ADHD scored more on alcohol and psychiatric problems, patients with inattentive subtype of ADHD scored more on medical problems, employment/support status problems and family and social relationship problems, whereas patients with combined subtype of ADHD scored more on drug and legal problems.

These findings suggest that patients with hyperactive/impulsive and combined subtypes of ADHD had more severe ASI parameters that are directly related to substance use (alcohol, drug, and legal problems) than those with inattentive type who had more severe ASI parameters related to medical problems, employment/support status problems, and family and social relationship problems.

The reckless behavior and more experimentative nature of patients with hyperactive/impulsive and combined subtypes of ADHD as reported in other studies may explain these findings (Ohlmeier *et al.,* 2008).

Moreover, these findings agreed with data on ADHD symptoms from the National Epidemiologic Survey of Alcohol and Related Conditions (NESARC), which showed that patients experiencing hyperactive-impulsive symptoms were associated with lifetime substance use and SUDs more consistently than patients experiencing inattentive symptoms (De Alwis *et al.,* 2014).

Although we had promising and positive results regarding the link between SUD and ADHD in our study, it is an area that needs future extensive studies to reach a better understanding of the link between these disorders and to have more potentially generalizable findings from different research settings in a way to implement future recommendations for our patients.

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CONFLICTS OF INTEREST

There are no conflicts of interest.

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