Originals

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Adult ADHD Self-Report Scale (ASRS-v1.1) symptom checklist in patients with substance use disorders

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Aim. Diagnosing attention deficit/hyperactivity disorder (ADHD) in patients with substance use disorder (SUD) is a complicated process in which a screening tool may be useful. We analyzed the ASRS-v1.1 validity in patients with SUD, considering the addiction severity and co-morbidity with depressive disorders, antisocial and borderline personality.

Methods. Eighty outpatients with SUD were evaluated with the following instruments: ASRS-v1.1, CAAD-II, EuropASI, SCID-I, SCID-II. A factor analysis was performed with Varimax rotation to determine the structure of the intercorrelations among the items. Accuracy of ASRS-v1.1 was also analyzed.

Results. The diagnostic interview CAADID used as a gold standard indicated that 20% (95% confidence interval [CI]: 11-29) meet the criteria for ADHD. The ASRS-v1.1 factor structure is marked by two factors related to inattention and hyperactivity / impulsivity that account for 67.7% of the variance. ASRS-v1.1, with a 4 cut-off, showed an 87.5% sensitivity and 68.6% specificity.

Conclusions. ASRS-v1.1 is a simple screening tool that is useful and has acceptable validity for the identification of ADHD among addicted patients.

Key words:
ASRS-v1.1. ADHD. Attention deficit/hyperactivity disorder. Substance use disorder. Addiction. Screening.

Cuestionario autoinformado de cribado de TDAH ASRS-v1.1 en adultos en tratamiento por trastornos por uso de sustancias

Objetivo. Diagnosticar el trastorno por déficit de atención con hiperactividad (TDAH) en pacientes con trastorno por uso de sustancias (TUS) es un proceso complejo, en el cual un instrumento de cribado puede ser de gran utilidad. Se ha analizado la validez del cuestionario autoinformado de cribado de TDAH en adultos ASRS-v1.1 en pacientes con TUS, considerando la gravedad de la adicción y la comorbilidad con los trastornos depresivo, antisocial y límite de la personalidad.

Método. Se evaluaron 80 pacientes en tratamiento ambulatorio por dependencia de sustancias mediante los siguientes instrumentos: ASRS-v1.1, CAADID-II, EuropASI, SCID-I, SCID-II. Se realizó un análisis factorial con rotación Varimax para determinar la estructura de las intercorrelaciones entre los ítems y se analizó la exactitud del ASRS-v1.1.

Resultados. La entrevista diagnóstica CAADID utilizada como patrón de oro, indica que el 20% (intervalo de confianza [IC] del 95%: 11-29) cumple criterios para TDAH. La estructura factorial del ASRS-v1.1 está marcada por dos factores referentes a inatención e hiperactividad/impulsividad que explican el 67,7% de la varianza. El ASRS-v1.1 con punto de corte 4, presenta una sensibilidad del 87,5% y una especificidad del 68,8%.

Conclusiones. El ASRS-v1.1 es un instrumento de cribado sencillo, útil y de aceptable validez para identificar TDAH entre pacientes con TUS.

Palabras clave:
ASRS-v1.1. TDAH. Trastorno por déficit de atención con hiperactividad. Dependencia de sustancias. Adiciones. Cribado.

INTRODUCTION

Co-occurrence of adult attention deficit/hyperactivity disorder (ADHD) and of substance use disorder (SUD) has received special attention in the scientific literature in recent years. Both disorders interact in a variety of aspects, including overlapping of symptoms and evolution of both conditions.

The data from the National Comorbidity Survey Replication indicate that ADHD prevalence in adults is approximately 4.4%,[1] while it is known that prevalence of SUDs is 3.8%[2]. It has been observed that the prevalence of substance and abuse dependence is higher in ADHD subjects than in the general population.[3,4] Inversely, ADHD is frequently co-

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morbid among patients with SUD.[5] Studies performed in the United States indicate a 15 to 30% prevalence of ADHD in adult patients with SUD.[6] Regarding the type of drug consumed, no significant differences have been observed between adults with ADHD and the general population, the most common illegal drug being marijuana (67%), followed by cocaine (23%) and other stimulants (18%).[7]

Recent research works have revealed that ADHD is a risk factor for the development of SUD.[8-10] Adult patients with ADHD have twice the risk of having drug dependency compared to the general population, even when the effects of other associated psychiatric disorders are controlled.[11] If the comorbid presence of a behavioral disorder during childhood or an antisocial personality disorder is considered, the risk of developing SUD is significantly greater.[12]

The evidence indicates that SUD may be more severe with an associated ADHD. ADHD significantly increases the risk of SUD becoming chronic, increasing the risk of recurrences during the treatment.[13] Patients who have both ADHD and SUD have to cope with the interrelated consequences of both disorders. Substance-dependent subjects experience alterations in their lives in the personal, family and social spheres and have greater health, economic, work, and legal problems.[14] The consequences of ADHD in adults are also seen in different areas. These patients have a greater risk of having low performance and school failure, of being fired from work or of not adapting to the work requirements. They have poor social adjustment, poor social skills, and greater marital and parental difficulties. They have more traffic accidents, these being more serious, and greater difficulties with the law.[15,16]

Diagnosis of ADHD in adults with SUD

Diagnosing ADHD in adults in the presence of SUD is difficult because a retrospective diagnosis must be made because no diagnostic criteria have been specifically designed for adults in the DSM-IV and because of the important need to make a differential diagnosis as many symptoms are shared with another psychopathology.[17,18] Furthermore, it is not common for clinical specialists in drug dependencies to investigate regarding ADHD symptoms either because they lack knowledge regarding the disorder or because they consider that other psychiatric disorders have priority.[19] On the other hand, some factors have been described that may lead to overdiagnosis: 1) Medical and psychiatric conditions that have similar symptoms and that may be minimized with ADHD. 2) The symptoms associated to substance intoxication or withdrawal that may be similar to ADHD symptoms. 3) The use of screening instruments without subsequent clinical diagnosis. 4) Although limited, cases have also been identified in which the patient has exaggerated their symptoms in order to obtain secondary benefits or stimulant medication.[19]

Due to the diagnostic difficulties, a valid ADHD screening procedure in the adult population with SUD could be useful for the development of adequate diagnostic services and treatment.[20] The 6-question self-report screening questionnaire ASRS-v1.1 (Adult ADHD Self-Report Scale, available at: http://www.hcp.med.harvard.edu/ncs/asrs.php) was developed jointly by the WHO and doctors Kessler, Adler and Spencer in 2005 (Figure 1).[25] ASRS-v1.1 is a subgroup of the symptoms checklist of the 18-question WHO questionnaire. It is based on the diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR) of the

Name of the Patient			Date		
Please answer the questions below, rating yourself on each of the criteria shown using the scale on the right side of the page. As you answer each question, place an X in the box that best describes how you have felt and conducted yourself over the past 6 months. Please give this completed checklist to your healthcare professional to discuss during today's appointment.	Never	Rarely	Sometimes	Often	Very often
1. How often do you have trouble wrapping up the final details of a project, once the challenging parts have been done?					
2. How often do you have difficulty getting things in order when you have to do a task that requires organization?					
3. How often do you have problems remembering appointments or obligations?					
4. When you have a task that requires a lot of thought, how often do you avoid or delay getting started?					
5. How often do you fidget or squirm with your hands or feet when you have to sit down for a long time?					
6. How often do you feel overly active and compelled to do things, like you were driven by a motor?					

Figure 1 | *Adult ADHD Self-Report Scale (ASRS-v1.1).*
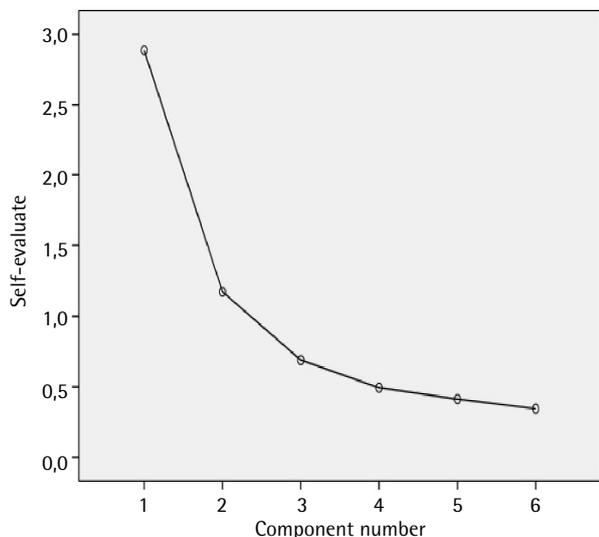
Figure 2 | *Graft showing the Sedimentation of the ASRS-v1.1 factors.*

American Psychiatric Association. The psychometric properties found in the American version, performed in a representative sample of the general population were the following: sensitivity 68.7%, specificity 99.5%, total classification accuracy 97.9% and Kappa 0.76. A study on the tool performed in Spain has been published. It concluded that the ASRS-v.1.1 is an effective tool for the initial screening and that its items measure a nonspecific dimension of compulsiveness/impulsiveness.[22]

As mentioned, when ADHD is measured in a drug-dependent population, a differential diagnosis of the comorbid psychopathology must be made. This takes on greater importance when the frequent association of ADHD with the major depressive disorder (16-31%) and the personality borderline and antisocial disorders (20%) are taken into consideration,[6,23] since they are disorders that share symptoms regarding attention, hyperactivity and impulsiveness problems.

Considering that put forth until now and to contribute to the ADHD diagnostic process in patients with SUD, it is aimed to analyze the validity of the ASRS-v1.1 screening test in substance-dependent patients, considering their utility and accuracy. Together with this, in order to provide validity to the process, it is considered important to use a diagnostic interview designed to evaluate all the symptoms and diagnostic criteria described in the DSM-IV on ADHD as a gold standard. Evaluation of the severity of the addiction and the most frequently comorbid psychopathology by interviews with accepted validity such as the SCID-I and II also take on importance. The present study is the first one in Spain to include the last two considerations in the validation process of the ASRS-v1.1 in patients under treatment for SUD.

METHODOLOGY

A descriptive, prospective, psychometric type study was conducted. A total of 80 patients under treatment for SUD participated between March 2007 and May 2008. Inclusion criteria were age over or equal to 18 years and under 65 years, ability to fill out the research questionnaire (for example, due to limited literacy), signing the corresponding informed consent. Exclusion criteria were intoxication at the time of the interview, being in a detoxification process, inability of the patient due to severe psychiatric and/or somatic problems.

Participants

The sample composition in regards to gender and age was the following: men (80%), women (20%); average age 36.15 (standard deviation [SD] = 10.43). A total of 91.3 % were Spanish and 36.6% reported work activity as the main source of income. The principal diagnosis regarding SUD, obtained with the SCID-I interview, was opiate dependence in 18.8% of the patients, cocaine dependence in 46.3%, amphetamine dependence 1.3%, alcohol dependence 25%, and cannabis dependence 8.8%. A total of 32% of the patients were diagnosed of two or more substance dependence disorders at the time of their evaluation.

Instruments

ASRS-v1.1: the characteristics of this questionnaire were described in the introduction. CAADID-II[24] (Conners' adult ADHD diagnostic interview for DSM-IV™): an interview that permits the evaluation of the ADHD symptoms in childhood and adult age described in DSM-IV to diagnose ADHD. EuropASI[25] (European version of the Addiction Severity Index): it is a semi-structured interview that informs on different vital areas: general medical condition, work and financial situation, alcohol consumption, other drug use, legal problems, family and social relationships, psychological condition. The severity of the problems in each one of these areas is recorded on a 10-point scale (Bobes, González, Sáiz, Bousoño, 1996). SCID-I[26] (Structured Clinical Interview for DSM-IV® Axis I Personality Disorders): the sections regarding major depressive disorder and substance use disorders, except tobacco, were used. SCID-II[27] (Structured Clinical Interview for DSM-IV® Axis II Personality Disorders): the sections regarding borderline personality and antisocial disorder were used.

Procedure

The evaluation process was conducted using 3 interviews, each one lasting approximately 1 h. The following were systematically performed during the interviews: explanation of this study purpose and signing of the informed

consent, evaluation of the addiction severity (EuropASI), administration of the ASRS-v1.1, diagnostic interview CAA-DID for the evaluation of ADHD and performance of diagnostic interviews SCID-I and II in regards to the SUD, major depressive disorder, borderline and antisocial personality disorders.

Data analysis

In order to calculate the ADHD prevalence in the adult population under treatment for SUD in Outpatient drug Center (CAS), the proportion of persons with a positive result in the diagnostic examination and the corresponding confidence interval (CI) were calculated. In order to determine the construct validity of the scale, the factorial analysis was performed with Varimax rotation, in order to determine the adjustment of the inter-correlation structure between the items in regards to the starting theoretical model and the internal consistency of the factors examined. To determine the concurrent validity of the ASRS-v1.1, a study of sensitivity, specificity, positive predictive value and negative predictive value was made of the different cut-off points examined. The cut-off point proposed was that which optimized all the previous epidemiological parameters. The proportions of the different variables were compared with the Chi square.

RESULTS

Regarding the severity of the addiction, the following means of the scores given by the clinicians in the different areas evaluated by the EuropASI were: medical 2.10 (SD = 2.52), employment 4.25 (SD = 2.67), alcohol 3.26 (SD = 2.51), drugs 4.84 (SD = 3.24), legal 1.04 (SD = 2.30), familiar/social 4.29 (SD = 2.19), psychological 4.51 (SD = 2.47). When these scores were compared based on gender, it was observed that there were statistically significant differences regarding severity of drug consumption (t = 4.7, p < 0.05) and legal situation (t = 3.5, p < 0.05), the men having the highest or most serious scores. When relationship to age was analyzed with the EuropASI

scores, a positive correlation was found with severity on the medical level (r = 0.265, p < 0.05) and a negative one with drug consumption severity (r = - 0.486, p < 0.05).

Regarding ADHD, of the 80 patients evaluated the results of the CAADID interview, the results indicated that 20% (95% CI: 11-29) fulfilled the criteria foreseen in the DSM-IV for the diagnosis in the adult age. Of these, attention deficit predominated in 68.75%, 25% had the combined type and hyperactivity predominated in 6.25%. No statistically significant differences were observed regarding the type of drug consumed, when the patients were compared with and without ADHD diagnosis. When the comorbidity associated to SUD was compared, we found that the patients with ADHD had greater prevalence of major depressive disorder, 29.7% vs. 56.3% (χ^2 = 4.99, p < 0.05) and of background of childhood dissocial disorder, 12.5 % vs. 43.8% (χ^2= 11, p < 0.05). It was found that 10.9% of those without ADHD and 18.8% of the patients with ADHD had personality borderline disorder and 9.4% vs. 6.3% had personality antisocial disorder.

Psychometric characteristics of the ASRS-v1.1

A factorial analysis was made to contrast the existence of a conceptual and empiric structure consistent with the starting theoretical model. This proposed 6 variables that should be expressed in regards to 2 relevant clinical factors such as the hyperactive component and the inattentive component of the disorder. To determine if the application of a factorial analysis is feasible, a correlations matrix among all the items was made. In table I, it was observed that most of the items correlated among themselves with homogeneous values, except for item 6 that had the least association with the others, except in regards to item 5. Both the Kaiser-Meyer-Olkin (KMO) test (0.75) and the Barlett test (p = 0.005) indicated that the application of a factorial analysis is adequate.

The factorial structure, according to the sedimentation figure (Figure 2), makes the clear presence of a potent first factor manifest. A second dimension is less clear, sin-

Table 1	Pearson's Correlation between the ASRS-v1.1 items

	ASRS_1	ASRS_2	ASRS_3	ASRS_4	ASRS_5	ASRS_6
ASRS_1	1	0.602*	0.544*	0.472*	0.360*	0.139
ASRS_2	0.602*	1	0.480*	0.520*	0.297*	0.173
ASRS_3	0.544*	0.480*	1	0.538*	0.390*	0.011
ASRS_4	0.472*	0.520*	0.538*	1	0.372*	-0.047
ASRS_5	0.360*	0.297*	0.390*	0.372*	1	0.356*
ASRS_6	0.139	0.173	0.011	-0.47	0.356*	1

* The correlation is significant at the 0.01 level (bilateral).

Table 2	Factorial and communality weights of the items of ASRS-v1.1

	Component		h^2
	1	2	
Ítem 1	0.777	0.205	0.646
Ítem 2	0.759	0.201	0.617
Ítem 3	0.808	0.047	0.655
Ítem 4	0.815	- 0.038	0.655
Ítem 5	0.443	0.642	0.609
Ítem 6	- 0.075	0.928	0.868
% varianza explicada	48.1	19.6	

Table 3	Sensitivity, specificity, positive predictive value, negative predictive value and kappa index of the ASRS-v1.1								
Cut-off (≥)	S	95% CI	E	95% CI	PPV	95% CI	NPV	95% CI
3	93.8	71.7 – 98.9	54.70%	42.6 – 66.3	34.1	21.9 – 48.9	97.2	85.8 – 99.5
4	87.5	64 – 96.5	68.8	56.6 – 78.8	41.2	26.4 – 57.8	95.7	85.5 – 98.8
5	50	28 - 72	85.9	75.4 – 92.4	47.1	26.2 - 69	87.3	76.9 – 93.4

ce the inflection point between the second and third factor is not very intense. In quantitative terms, it was observed that the first two factors have values over 1. The first factor contributed 48.1% of the variance, the second factor provided 19.6% of the variance. Between both, it ascended to 67.7% total of the variance explained.

Assuming that the solution of two factors is the most adjusted one in terms of construct validity, the factorial and communality weights of the 6 items under this bifactorial condition are presented in table 2. It can be observed that the first 4 items had an elevated weight in the first factor while their weights in the second factor were clearly inferior. Items 5 and 6, on the other hand, had higher factorial scores in the second component. However, item 5 presented a score greater than 0.4 in the first factor. When the internal consistence of the test was analyzed following the bifactorial solution, it was found that Cronbach's α coefficient of the first 4 items was 0.82 and of the last 2 items, 0.52.

The concurrent validity of the ASRS-v1.1 was measured, considering the results of the CAADID diagnostic interview as the gold standard. Table 3 examines several cut-offs for the scale, specifically that proposed for the original version and cut-offs 3 and 5 to determine if it is possible to propose an alternative cut-off score that optimizes the discriminating capacity of the scale. As can be seen in that table, the cut-off of 4 units generates a sensitivity of 87.5% (95% CI: 64 - 96.5), a specificity of 68.8% (95% CI: 56.6 - 78.8, a positive predictive value of 41.2% (95% CI: 26.4 - 57.8) and a negative predictive value of 95.7% (95% CI: 85.5 - 98.8).

DISCUSSION

It was found that 20% of the patients fulfill the criteria for ADHD, which agrees with the results from other studies.[6] The confidence interval of this value, distributed in a range of prevalence between 11% in 29% is important. This amplitude of values is probably a consequence of a sample that is still too small for the precise calculation of this parameter. The percentage distribution of the clinical subtypes of ADHD found adjusts to that expected. Predominance of attention problems versus hyperactivity predominates

among patients under treatment for SUD, which is associated to the fact that the motor hyperactivity decreases with years.[28]

Greater comorbidity has been found with depressive disorder and background of dissocial disorder in childhood in patients ADHD. This agrees with the results from other studies.[29] The statistical significance was not studied for borderline and antisocial personality disorders since the limited number of patients affected did not allow for this. However, it is interesting that 18.8% of the patients with ADHD had personality borderline disorder versus 10.9% of the non-ADHD, it being feasible that the high comorbidity between both disorders could be explained because impulsiveness is understood as a very relevant symptom in the diagnostic criteria of the DSM-IV.

The score obtained with the European Addiction Severity Index indicates that men have greater severity and more legal problems. This is coherent with the literature that suggests that men have greater prevalence in drug consumption and antisocial behavior. Equally, it is to be expected that younger patients would have more problematic substance consumption and the older patients more medical difficulties.[30]

Regarding the psychometric characteristics of ASRS-v1.1, and although the authors of the original version[21] did not propose a specific factorial structure, this should be used as one more item within the instrument validation process, providing important information regarding the internal validity and, as a last resort, its construct validity. Based on the factorial analysis, it was found that 2 factors explained 67.7% of the variable. This is adequate and coherent for a simple tool instrument such as that studied, which is made up of 2 important clinical factors that refer to inattention and hyperactivity/impulsiveness.

The analysis of internal consistency shows that the first factor presents an elevated alpha. This implies that it is evaluating the same clinical concept in a combined way. However, the second factor is made up of items whose results are must less satisfactory, which may be due to the fact that it is only made up of two questions, it being more difficult to find high consistency when few items are analyzed. The study of the convergent validity

manifests that this instrument optimizes its behavior when it uses the 4-point cut-off. The values obtained for sensitivity (87.5%) and specificity (68.8) indicate that it is a useful test and that it achieves its objective as a screening tool in a drug-dependent population. It should be mentioned that considering a cut-off equal to or greater than 3 results in greater sensitivity (93.8%), which could be clinically relevant when identifying patients with ADHD under treatment with SUD. In this case, it is necessary to take into consideration that there would be more false positives that would require a thorough diagnostic interview. On the contrary, when the cut-off is considered to be greater than or equal to 5, we gain in specificity, but the sensitivity of the test drastically decreases, deviating it from its objective as a screening test.

In comparison with the data published by the team that has constructed and validated the instrument in the general population, [21] in our sample, a greater percentage of sensitivity (87.5% vs. 68.7%) and lower percentage of specificity (68.8% vs. 99.5%) was found. If can be observed in table 3 that the sensitivity percentage found in the original study is located within the confidence interval that was identified in this sample of patients with SUD, it being possible that this sensitivity does not dramatically differ when patients are evaluated with and without SUD with the ASRS-v1.1. However, the confidence interval for specificity that has been observed (56.6% – 78.8%) is far from the 99.5% that has been identified in the population without SUD. This stresses the need for the clinician to make an adequate differential diagnoses when evaluating ADHD in addictive patients. Along these same lines, the higher number of false positives can be explained because the symptoms of ADHD tend to be minimized with those of other psychiatric disorders due to the cognitive deficits associated to the chronic consumption of substances and also due to the lack of inclusion of criteria B, C, D, E described in DSM-IV.

Considering these results, it is important to stress that the screening instruments only serve as a guide tool and can never replace clinical evaluation when making the diagnosis. In the case of the ASRS-v1.1, this statement takes on greater importance when working with drug dependent patients because of the elevated probability of finding false positive cases.

It was not possible to extract data regarding the discriminant validity of the ASRS-v1.1 for the present work in relationship with associated psychopathology because of the sample size. However, it is considered that this aspect is critical for future contributions. Furthermore, it would be of great interest to analyze how the test functions in different groups of subjects, for example, based on drug dependence, since it cannot be assumed without previous verification that the ASRS-v1.1 behaves the same among alcohol and cocaine dependent subjects.

In conclusion, ASRS-v1.1 is a useful instrument for the detection of ADHD in drug-dependent treatment sites, and whe-

re, as has been suggested, the clinician often does not integrate ADHD into the diagnostic protocol.[19] This is a simple questionnaire, which is easy to administer and has low burden for the patient. The factorial analysis indicates that the best solution is to identify 2 factors, the first referring to inattention and the other hyperactivity, which provides construct validity to the test. The analysis of accuracy indicates that the percentage of sensitivity is adequate and specificity only moderate, so that the fact that more false positives are generally found in the drug-dependent population than in the general population should be taken into account. In regards to the 20% of the prevalence of ADHD found in this study, it is observed that it agrees with the findings made in the USA. However more studies that adequately evaluate comorbid psychopathology and that have larger samples in this context are needed to obtain precise calculations. Finally, its contribution towards the detection of ADHD in drug dependent populations is considered important since patients with both disorders generally have worse prognosis in the treatment and should be treated in an integrated manner. [23]

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