Cocaine and other psychostimulant consumption: their relationship with the childhood hyperactivity syndrome

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Consumo de cocaína y otros psicoestimulantes: su relación con el síndrome de hiperactividad infantil

Summary

Introduction. *We want to know the attention deficit hyperactivity disorder (ADHD) among those subjects who require treatment due to cocaine and other psychostimulant drugs consumption. No previous Spanish studies have been found.*

Methods. *Two groups of male subjects were established out of a total of 109 subjects. Their ages ranged from 16 to 40 years. The groups were «experimental» (patients under treatment) and «control», who underwent a urine analysis for toxic agents. An interview elaborated for this and the E mode SCID-I were used. A total of 21 % of the cocaine consumers had a comorbid history of ADHD in childhood versus 3 % of the control group.*

Conclusions. *The data found overlap with the United States studies. ADHD appears as a new risk factor for the posterior development of cocaine abuse disorder, adding a cocaine addict patient subtype that deserves special diagnostic criteria as well as more complete treatment alternatives for these dual diagnosed patients.*

Palabras clave: *Cocaine. Hyperactivity. Risk factors. Dual diagnosis.*

Resumen

Introducción. *Se trata de conocer la prevalencia del trastorno por déficit de atención con hiperactividad (ADHD) entre aquellos sujetos que demandan tratamiento por consumo de cocaína y otras drogas psicoestimulantes. No se han encontrado estudios españoles previos.*

Métodos. *Entre un total de 109 pacientes se establecieron dos grupos de sujetos varones y rango entre 16 y 40 años: «experimental» (pacientes en tratamiento) y «control», sometidos a análisis de tóxicos en orina. Se empleó una entrevista elaborada al efecto y el módulo E de la SCID-I.*

Resultados. *El 21 % de los consumidores de cocaína tienen una historia comórbida de ADHD en la infancia frente al 3 % del grupo control.*

Conclusiones. *Los datos hallados se solapan con los estudios estadounidenses. El ADHD aparece como un nuevo factor de riesgo para el posterior desarrollo de un trastorno por abuso de cocaína, añadiendo un subtipo de paciente cocainómano que merece especial rigor en el diagnóstico, así como alternativas de tratamiento más completas para estos pacientes duales.*

Palabras clave: *Cocaína. Hiperactividad. Factor de riesgo. Patología dual.*

INTRODUCTION

The relationship between attention deficit hyperactivity disorder (ADHD) in childhood and toxic substances abuse or dependence disorder in the adult age has rarely been described, although it has recent importance in the scientific literature.

The ADHD refers to a persistent pattern of behavioral manifestations that interfere in the capacity to regulate motor activity (hyperactivity), in behavior inhibition (impulsivenes) and in attention maintaining capacity (lack of attention), more frequently and seriously than that usually observed in subjects with a similar degree of maturity. These behaviors are manifested in many contexts and clearly interfere in social, academic or work activity characteristic of the development level. It is estimated that this disorders' prevalence is 3 % to 5 % of school aged children[1-3]. Until recently, it was believed that this disorder decreased in adolescence, disappearing in the adult age, and this really occurs in some of these subjects. However, at present, the term residual syndrome is used to refer to the complete symptomatic picture of this disorder experienced in full adult life of some of the children who were hyperactive. The data of its prevalence in adolescence and adult life are inexact[2], and the few sources speaking about it mention between 1 % and 4 %[1,4] in the general population, this corresponding to

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60%-80% in childhood ADHD. The treatment indicated in hyperkinetic children is multimodal with great weight on drug therapy based on the administration of psychostimulant drugs (amphetamines) that achieve the paradoxical effect of focalization and attention maintenance, reduction of motor activity and greater capacity to anticipate behavioral inhibition and consequences, due to the neurobiological characteristics descriptive of this psychopathology.

These stimulant drugs may reach the market illegally. They are then consumed by persons who have no medical prescription, normally with abusive character, and they are seeking the stimulation that it causes in the nervous system.

Cocaine is a substance that is also a stimulant of the CNS with an incomparable capacity for reward and positive reinforcement. It has several preparation forms for consumption, according to which power and fastness of its action varies.

DSM-IV includes two categories within amphetamine and cocaine consumption disorders: Dependence and abuse.

In the clinical practice with addictive behaviors, we have been able to observe that the expected effects of these drugs are sometimes not found among cocaine and other stimulant consumers. On the contrary to that which is predictable, some patients from our health care unit have described relaxation effects with these substances, as they are more focused, having greater planning capacity, reasons why they maintained their consumption and generated addiction.

This phenomenon called our attention and reminded us of the effect of amphetamines among hyperkinetic children. Thus, we performed a bibliographic review on the subject, finding very few references in the scientific literature. The first article that investigated the relationship between ADHD and cocaine consumption disorder found was in the year 1987 and the following was published 6 years later. Up to date, the total number of studies published is very limited.

Investigations prior to 1995 were mostly contrary to the connection between the two previously described diseases[5], largely due to the methodological weakness of the investigation designs, which prevented them from contributing conclusive answers[6,7]. Since then, the studies in this regards have been gaining consistency in the potential association between both diseases[8,9]. The findings indicate that there is a larger number of ADHD in childhood between all types of drug consumers: alcohol, psychostimulants, hallucinogens, cannabis and cocaine[10], so that it is being demonstrated that this disorder is a significant risk factor for subsequent illicit substance abuse[11], very likely due to the impulsiveness involved in this picture.

In the residual syndrome, the poor control of the impulses provoke exposure to risk situations such as an attempt to find extra pleasing stimuli that can, in some cases, result in a compulsive need to perform something illicit, such as drug consumption. As this disorder subtlety and sustainedly affects all ordinary activities, it evidently deteriorates the quality of life of those suffering it. Thus, with the passage of time, the mood of these subjects goes towards affectivity lability, that they recognize without justifiable cause and that makes them feel increasingly depressed. In this way, they run the evident risk of deciding on drug consumption as a way of combating boredom and lack of pleasant experiences, finding the over-stimulation that the drug supplies them as compensatory[1,4]. This phenomenon, called «sensation seeking» is a widely described factor in the publications as characteristic trait in drug dependent profile[12].

The scientific panorama has recorded cocaine as the most outstanding drug in this correlation[13-17]. The few studies that have been published in this regards coincide in mentioning that the escalation of addictive behavior of cocaine addicts with a positive history of ADHD in childhood occurs more rapidly and intensely compared with those who did not present an attention deficit and/or hyperactivity as children. The aspects where the comparisons are more marked are: *a)* onset age in cocaine consumption, earlier in the first of the groups; *b)* greater severity index in the addiction with higher doses and more intense frequency; *c)* demand for dehabituation in earlier ages, and *d)* greater number of treatments performed for rehabilitation of cocaine addiction. This cocaine use model is constant with clinical descriptions of self-medication of ADHD residual symptoms in subjects with cocaine abuse disorder[18-20].

Thus, in self-medication, we find an explanatory hypothesis between comorbidity of the cocaine abuse/dependence disorder and concomitant symptoms of ADHD in the adult age. The option of cocaine as preferred drug for self-medication of this population has been specifically mentioned in investigations prior to 1994, as described by Kaminer et al. in his thematic review[7]. According to this theory, the choice of drug is the result of an interaction between its pharmacological properties and state experienced by the subject; in this way, consumption would act as symptomatic relief of the dual disease[21]. The neurobiological bases of this hypothesis are based on the fact that cocaine increases dopaminergic tone of the CNS. The residual syndrome of ADHD in adult age has been associated with dopamine deficits, so that this substance acts as an agonist of that neurotransmitter. This drug would produce the paradoxical effect of normalization in the characteristic symptoms of this picture in adults with the mentioned syndrome, with increased attention capacity and decreased motor hyperactivity. This greatly reminds us of the effect of the psychostimulant drugs in these individuals. However, cocaine addicts without a premorbid history of this disorder may temporally experience a hyperkinetic picture induced by the substance, manifested by growing psychomotor activity, impulsiveness, euphoria and quick thought[9,22-23].

Nowadays, there is a demand for specific treatment of the ADHD comorbid picture among some cocaine addict

patients who are participating in drug rehabilitation programs[24].

Almost all of the studies reviewed are performed on United States samples. We have only found one study performed in Taiwan[25]. The results indicate that between 12 % and 35 % of the adults diagnosed of cocaine abuse disorder have criteria for hyperkinetic disorder in childhood, data that are significant (table 1).

The recent and apparent evidence of childhood ADHD as a new risk factor for the later development of a cocaine abuse disorder adds a subtype of cocaine addict patient that merits special strictness and carefulness in its diagnosis as well as more complete treatment alternatives for these dual patients.

The purpose of this cross sectional study is to know the prevalence of attention deficit hyperactivity disorder in a Spanish population among those subjects who require treatment for cocaine and other psychostimulant drug consumption.

METHOD

We designed a descriptive, cross-sectional, retrospective study that we describe here.

Subjects

The subjects who have participated in this study belong to Area 20 of the Valencian Health Agency of the Valencian Autonomous Government (administrative division of the Vega Baja of río Segura), that includes urban and rural population. Two subject groups were formed: experimental and control group.

For the experimental group, a consecutive sampling system between patients who are active in the Addictive behavior unit (ABU) Orihuela (Alicante) and new patients who required treatment was used. All complied with the diagnostic criteria of cocaine and/or amphetamine consumption disorder (F14 and F15 of the DSM-IV, respectively), with an age range from 16 to 40 years.

We completed the data collection with a total of 70 subjects in all. Of this total sample, we only found 3 % of women (n = 2) versus 67 % men. We decided to eliminate the women from the study to avoid possible contamination in the results. Another one of the exclusion criteria was that the mental state of the subject would make it difficult to correctly administer the questionnaires. Thus, one of them was rejected specifically due to a low IQ.

The experimental group was finally formed by a sample of n = 67, male gender, with a mean age of 28 and range between 16 and 40 years.

The control group was formed by out-patients from the Administrative Division of la Vega Baja, in Health Care Area 20. It is aimed to be a representative sample of the general population of the administrative division of Bajo Segura, from the same age range as the study group. Recruitment of participants for the present study took place among those who came to the out-patient traumatology visits for their programmed check-ups and a random sampling system among them was used.

We obtained an initial total of 39 subjects from both genders. A total of 21 % women (n = 8) were included and had to be rejected for study due to the experimental group requirements. One of the clear exclusion criteria was toxic substance abuse or dependence. To prevent the subjects from hiding their drug consumption, if such was the case, a urine sample to detect abuse drugs was requested at the time of the interview. One person's sample was positive to cocaine. In addition, this subject fulfilled DSM-IV diagnostic criteria of «non-alcoholic substance consumption disorder», so that he was rejected for this sample. For the rest, we found the following results: a total of 13,16 % of the subjects did not provide a sample. Drug detection analysis drugs was negative in 73.68% of the cases and 10.53% were positive to cannabis. The other drugs analyzed (cocaine, amphetamine, heroin and methadone) were negative for the whole group.

Finally, the control group was formed by a sample of n = 30, male gender, with a mean age of 27 and a range from 16 to 40 years.

Table 2 briefly shows the inclusion and exclusion criteria that we considered for subject enrollment.

TABLE 1. Childhood ADHD prevalence and residual syndrome between consumers and non-consumers

	ADHD in childhood	*Residual syndrome residual*
Carrol et al. (1993)	35%	Without data
Levin et al. (1998)	12%	10% (79% hyperactives)
Clure et al. (1999)	32%	11% (35% hyperactives)
Schubiner et al. (2000)	24%	Without data
Standardized values in general population	3%-5%	1%-4% (60%-80% hyperactives)

Material

A structured interview designed to collect the demographic data and personal backgrounds was used.

Model E of the SCID-I (structured clinical interview for DSM-IV Axis I disorders) was used to evaluate the drug consumption disorder. This is a semistructured interview, elaborated by the American Psychiatric Association (1994) aimed at establishing the diagnoses of substance consumption disorder. We have used consumption, abuse and dependence evaluation for the non-alcoholic substances.

In order to assess the attention deficit hyperactivity Disorder, a questionnaire developed for it for this investigation, using the DSM-IV criteria for this disorder, was used as has been common in previous studies on the subject in question[10,24]. The nosologic criteria of the

TABLE 2. Inclusion/exclusion criteria in both groups

	Experimental group	*Control group*
Inclusion criteria	Age range: 16-40 years ABU patients-Orihuela with DSM-IV criteria for «cocaine/amphetamine consumption disorder»	Age range: 16-40 years Out-patients of the administrative division hospital in traumatology out-patient clinic
Exclusion criteria	Consent is not given Feminine gender Mental condition that makes it difficult to administer the questionnaires	Consent is not given Feminine gender Mental condition that makes it difficult to administer the questionnaires Diagnostic criteria of «disorder due to consumption of non-alcoholic substances»

mentioned diagnostic manual were adapted to language that could be easily understood by the patients, who were requested to answer «yes» or «no» to each one of the questions.

Procedure

The Addictive Behavior Unit patients who were chosen to form a part of this study answered the complete battery of questionnaires during a standardized interview, taking advantage of the appointments made within the dehabituation program in which 100 % of this sample were included. The approximate duration for each one of these interviews was 30 minutes.

As a source of additional information that contributes greater objectivity to the results, we include the data supplied by a relative through the questionnaire that evaluates the ADHD. To do so, the person interviewed must be a family member who has had close contact with the patient during his childhood. The questionnaire is sent to the relative through the patient, or is directly delivered if he comes to the ABU unit, with some simple instructions, and always with the patient's express authorization.

Family collaboration in the beginning corresponded to 55 % of the total. To increase participation, it was decided to directly telephone those relatives who were previously authorized by the subject and interview them by this means, thus increasing the number of instruments completed to 75 %. Twenty five percent of the relatives did not respond, due to the following reasons: *a)* experimental mortality that occurred during the process by the number of voluntary discharges or treatment drop-outs; *b)* The patient did not authorize the personnel of the ABU to give any information to his relative; *c)* the relatives available did not know the subject during his early childhood or their contact was not sufficiently close to be able to respond, as could be younger siblings or similar age with deceased parents, and *d)* the express refusal of the relative to collaborate in the investigation. The level of family participation, among the different members, is given in detail in the following (fig. 1).

A total of 79 % of the 75 % participation obtained corresponded to the mother, followed by the father with 11% participation; older sisters with 8 % and the rest were performed by the grandmother (2 %).

The control group subjects also answered the complete battery during an interview that took place in an office improvised for this reason in the dressing room attached to the traumatology out-patient clinic unit, so that we easily had access to the Traumatology Service appointment list and to the Dressing Room Unit of that service. Within the age range and by order of arrival to the waiting room, the subjects were named (without interfering in the visit time) and their participation was requested (informed consent). Except for one subject, all agreed to collaborate. At the end of the interview (without the accompanying person present), the subject was asked for a urine sample that they had to provide at that time to avoid possible false negatives due to the bias of the subject who attempts to give a good image. The accompanying relative (if there was one) was given the corresponding questionnaire that they filled out *in situ.*

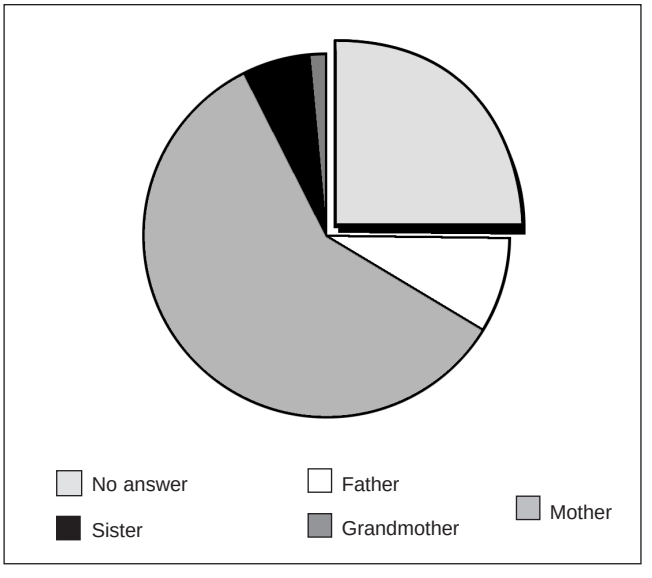

Figure 1. Family participation-experimental group.

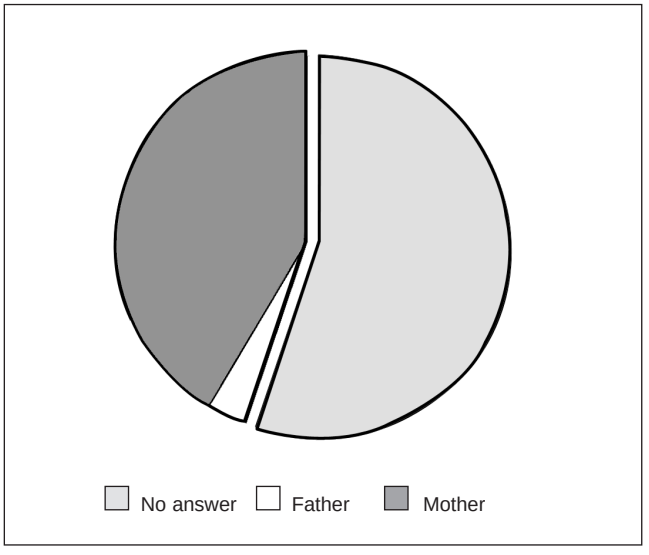

Figure 2. Family participation control group.

Family participation was 45%, of which the mother answered in 41.38% and the father in 3.45%. The rest, 55.17%, did not answer for the only reason that an origin family member did not come as an escort (fig. 2).

RESULTS

Prevalence of the diagnostic criteria for ADHD in childhood of the experimental group was overestimated when only the subject's criterion was taken into account, this reaching 54%. When the information supplied by the relative was contemplated, the rate was reduced to 31%.

The control group did not present any variation in regards to prevalence of ADHD in childhood, it being 3% both if we considered the relative's information as well if we ignored it.

TABLE 3. ADHD and residual syndrome in both groups

	ADHD	*Residual syndrome*
Experimental group	21%	12% total (68% ADHD)
Control group	3%	Without data

The data obtained in this study on the residual syndrome of this disorder in adult age indicates a 12% rate in the total experimental group, that corresponds to 62% of the childhood ADHD (table 3).

The experimental group can be divided into four differentiated subgroups when the data supplied by the subject are crossed with those of the relative, and are the following (fig. 3):

— *Yes* (hereafter «hyperactives») corresponds to the subjects who coincide with their relative in the positive diagnosis of childhood ADHD.
— *No* (hereafter «not hyperactives»), formed by the subjects who clearly indicate the non-existence of diagnostic criteria for this disorder, also coinciding with the relative's criteria.
— *Possible,* corresponds to those subjects whose data do not coincide with those of their relatives and only one of the parties considers that there is the disorder (4 relatives versus 10 patients).
— *Without data,* that includes the subjects who lack family comparison. We also differentiate between the subjects who perceived themselves as hyper-active[10] versus those who consider that they do not fulfill the criteria of the mentioned criteria[4].

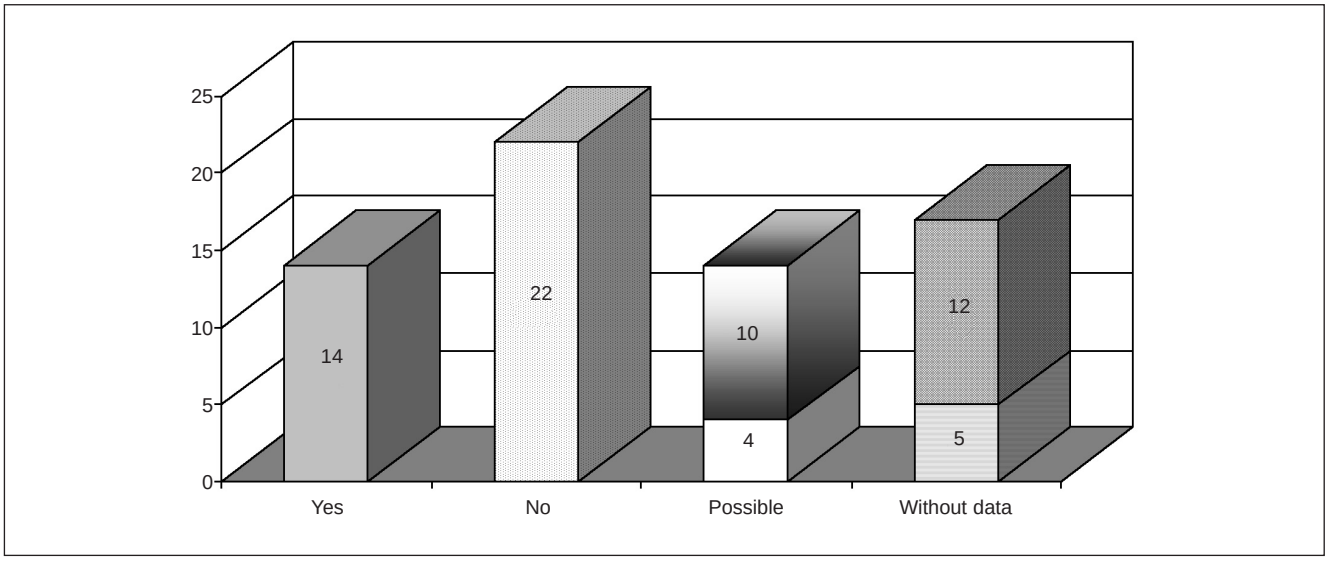

Figure 3. Subgroups within the experimental group.

CONCLUSIONS

This study, performed in the population of the administrative division of Bajo Segura, is the first study on the prevalence of ADHD among cocaine and/or other psychostimulant drug consumers in a Spanish sample, according to the sources that we have access to.

Inclusion of the evaluation supplied by the relative has prevented the self-evaluation of the subjects forming the experimental group from leading to an overestimation in the results, due to two basic reasons. The first is focused on the bias appearing due to the effect of catathymic deformation of the memory. The second is based on the idea that our cocaine addict patients, who request treatment voluntarily, tend to show their worst image to obtain better treatment. That is how we explain the fact that there is a greater number of ADHD criteria among the evaluations of the patients than among their relatives, as shown by the data obtained in the «possible» group.

If we exclude the results found between this latter group and that lacking comparison («without data»), the values found reveal, to a lower amount, that 21 % of the cocaine consumers have a comorbid history of hyperactive disorder in childhood. This value would have been noticeably greater if there had been access to the complete information of all the participants. In addition, we found that the persistence of the childhood symptoms in adult life occurred in 68 % of these cases or, what is the same, that the residual syndrome appeared in 21 % of the general population with cocaine consumption disorder as a coexisting disease.

In studies carried out in the USA and in Taiwan, similar values were found, as we can see in table 4. Because the results of the different papers overlap, a new subpopulation is consolidated between the cocaine and other psychostimulant substance consumers that demand treatment for their addiction, also in our setting.

Due to all the above, we stress the importance of the identification and treatment of the residual symptoms of the hyperkinetic picture among cocaine consumers, which become a very difficult subpopulation to treat if the ADHD goes unnoticed. Once more, we stress the tremendous importance of approaching the dual disease, that should begin with a complete diagnosis. This study makes us consider our role as professionals specialized in addictive behavior faced with the enormous diversity of consumption patterns among our usual patients. Due to the results that are being obtained, it would be desirable, from another perspective, to include specific actions in community prevention that contemplate the attention deficit hyperactivity disorder as a risk factor for the development of drug addiction.

TABLE 4. Hyperactivity prevalence

	ADHD in childhood	*Residual syndrome*
Carrol et al. (1993)	35 %	Without data
Levin et al. (1998)	12 %	10 % (79 % hyperactives)
Clure et al. (1999)	32 %	11 % (35 % hyperactives)
Schubiner et al. (2000)	24 %	Without data
Standardized values in general population	3 %-5 %	1 %-4 % (60 %-80 % hyperactives)
Our data	21 %	12 % (62 % hyperactives)

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