ORIGINAL PAPER

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Antecedents of opioid dependence and personality disorder: attention-deficit/hyperactivity disorder and conduct disorder

■ **Abstract** Both attention-deficit/hyperactivity disorder (ADHD) and conduct disorder (CD) were explored as possible antecedents of opioid dependence and personality disorder. One hundred adult opioid-dependent, treatment-seeking male inpatients were explored; an extended clinical semistructured interview to collect sociodemographic, drug use related, and clinical data and the Structured Clinical Interview for DSM-IV personality disorders SCID-II were carried out. Four groups of patients, namely ADHD alone (4 patients), ADHD + CD (7 patients), CD alone (47 patients) and no ADHD/no CD (42 patients) were identified and compared with each other. The results indicate that ADHD alone does not predispose to the development of opioid dependence in male inpatients. Childhood ADHD may nevertheless be found more frequently in male opioid addicts due to its comorbidity with CD, which was identified in more than half of our sample. Patients with ADHD history seemed to go through the drug abuse career earlier and to develop more frequently histrionic and obsessive-compulsive personality disorder. Over half of the CD patients developed borderline and/or antisocial personality disorder; both ADHD and CD predispose significantly to the PD development. Early substance use preventive measures are necessary in children and adolescents suffering from CD and from ADHD comorbid with CD.

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Introduction

The prevalence of childhood attention-deficit/hyperactivity disorder (ADHD) is estimated at 3 % to 5 % and prevalence of conduct disorder (CD) for males under the age of 18 years at 6 % to 16 % (APA, 1994). A follow-up study of a cohort of ADHD children suggested a marked decline of ADHD symptoms from adolescence to adulthood (Manuzza et al. 1993), yet in a proportion of subjects symptoms continue to persist. The rate of adult ADHD is not clear. On the one hand, it was predicted to be less than 1 % (Hill and Schoener 1996); on the other hand, it was estimated to be 2 to 6 % (Wender 2000). CD antedates the occurrence of antisocial personality disorder (PD). In fact, the diagnosis of antisocial PD can only be given in the presence of the previous CD (APA 1994), in spite of the fact that there are patients with adult antisocial behaviors who did not have CD (Cottler et al. 1995). The national comorbidity survey yielded life-time prevalence of antisocial personality at 6 % in the male general population (Kessler et al. 1994).

On the one hand, there is a considerable comorbidity between childhood ADHD and CD which has been shown to increase the risk for alcohol and drug dependence in children (Biederman et al. 1996). On the other hand, in 35 % of adult cocaine abusers childhood ADHD was identified. It was speculated that these patients might use cocaine to self-medicate ADHD residual symptoms (Carroll and Rounsaville 1993). However, 93 % of them also met criteria for CD. Thus, the issue of ADHD and CD, each separately and both in combination, as antecedents of later drug dependence is not without importance and this also includes opioid dependence; many drug dependent patients abuse both opioids and cocaine. The issue of ADHD and CD as predictors of the later development of personality disorders, recently described as an "important question for research" (Sachdev 1999), deserves the same attention. Impulsivity-hyperactivity and behavioral problems are frequent in personality disorders, the traits of which

may appear in childhood (APA 1994). The exploration of the relationship between ADHD/CD and individual PD types could contribute to elucidate the etiology of the latter. In some PDs, and depending on sex, environmental factors such as paternal relationships or traumatic experiences correlate with PD pathology (Modestin et al. 1998). In contrast, a borderline PD subtype, a "disorder on an organic brain dysfunction continuum" was claimed to exist mainly in men, characterized by a history of attention deficit disorder and learning disabilities and a frequent association with drug/alcohol abuse (Andrulonis et al. 1982).

The present study addressed the issues of ADHD and CD as possible antecedents of opioid dependence and PD. In a homogeneous sample of adult opioid-dependent men, supposed to comprise a considerable proportion of patients with PD (Franques et al. 2000), the occurrence of childhood ADHD and CD was investigated.

Methods

■ Participants

The participants were 100 adult men suffering from opioid dependence and admitted for inpatient treatment in three different psychiatric hospitals in the Canton of Zurich. The patients were included into the study provided they had been hospitalized between August 1998 and December 1998, had received the ICD-10 (WHO 1991) main diagnosis F11.21 (opioid dependence, at present abstinent in a protective milieu), were 18 to 65 years old, were not given any diagnosis of comorbid psychotic (including bipolar) disorder according to ICD-10 (WHO 1991) by their treating psychiatrists, and were able to speak German well enough to complete a self-report questionnaire and to participate in an interview. At the time of the assessment the patients no longer suffered from withdrawal symptoms.

■ Instruments

A clinical questionnaire (not a self-report questionnaire) developed by the authors was completed during a semistructured clinical interview by the interviewer. It contained 111 items and covered broad areas of sociodemographic, drug use-related and clinical topics. Among others, the questionnaire also contained questions covering DSM-IV (APA 1994) criteria for ADHD (including presence of symptoms before age 7 years and their persistence for at least 6 months) and for generalized anxiety disorder (GAD) which had to be met to reach the diagnoses. The severity of suicide attempts was evaluated according to the recommendation by Motto (1965).

The Structured Clinical Interview for DSM-IV personality disorders (SCID-II) was used in its German version (Wittchen et al. 1997). The SCID-II covers all 10 of DSM-IV PDs (including early items of antisocial PD = CD items) as well as of negativistic and depressive PD. It adheres closely to DSM-IV diagnostic criteria and the items are grouped together by diagnosis. A SCID-II self-report personality questionnaire (SCID-II PQ) is available which can be, and in fact was, used as a screening tool. The subjects are required to rate each item as true or false and the ratings may be used to score each personality criterion as present or absent. SCID-II PQ allows the clinician to inquire in the subsequent interview only about those items screened positive and to check individual negative responses when deemed necessary or when the number of items rated as positive approach the threshold required for making the diagnosis. False negative diagnoses in PD self-reports are extremely rare (Modestin et al. 1998 a). SCID-II PQ scales are relatively stable over time, median 2 to 3 months test-retest correlation was .69 (Ouimette and Kleine 1995). Regarding

SCID-II 1 to 14 days test-retest reliability study yielded an overall weighted κ .53 (First et al. 1995) indicating a fair agreement. Although these reliability studies were carried out with DSM-III R SCID-II versions, there are only minimal differences between the DSM-III R and DSM-IV SCID-II versions (Wittchen et al. 1997).

■ Procedure

The study design had been approved by the appropriate local ethics committee. After a written informed consent had been obtained from all participants, the patients completed the self-report questionnaire (SCID-II PQ; Wittchen et al. 1997) and were interviewed by one of the authors (BM), a psychiatrist with over 6 years of professional experience, well trained in DSM. An extended semistructured interview provided the data which enabled the completion by the interviewer of the above mentioned clinical questionnaire. Following this, the Structured Clinical Interview for DSM-IV Personality Disorders (SCID-II; Wittchen et al. 1997) was administered. Thus, all diagnoses which were studied in detail (ADHD, CD, GAD, PD) were DSM-IV criteria-based and interview-based. In some participants the interview required two sessions. The interviewer was also given some additional data by the psychiatrists treating the patients, such as ICD-10 (WHO 1991) clinical diagnoses of all comorbid conditions (including depressive disorder), and the results of HIV and hepatitis tests. Nevertheless, the majority of data including data on childhood ADHD and CD symptoms were provided by the patients themselves during the interview. A recent study has demonstrated that adults can give a true account of their childhood and current symptoms of ADHD (Murphy and Schachar 2000).

■ Statistical evaluation

The entire sample was divided into four groups (ADHD alone, ADHD + CD, CD alone, and no ADHD/no CD) which were compared with each other with regard to the individual variables. χ^2 test and Freeman-Halton test (Fisher's exact test) were used to evaluate the categorical variables. Regarding continuous variables, Bartlett test yielded unequal variances in some of them; therefore, Welch-Anova was calculated allowing non-equality of variances. Following omnibus statistics pairwise comparisons were carried out with the help of χ^2 test (with continuity correction) or Fisher's exact test (two-sided) in the case of categorical variables and Games-Howell test in the case of continuous variables.

Results

Overall, childhood ADHD was diagnosed in 11 of 100 opioid dependent treatment-seeking male inpatients (4 patients had ADHD alone, 7 patients ADHD + CD). CD alone was diagnosed in 47 patients. Of 100 patients 42 had no ADHD and no CD. Differences between the 4 patient groups (ADHD alone, ADHD + CD, CD alone, and no ADHD/no CD) with regard to the sociodemographic and clinical variables including drug-related variables are presented in Table 1.

The age range was 18 to 48 years. ADHD patients (with and without comorbid CD) were on average 4 years younger (n. s.) and they achieved significantly less frequently a professional qualification in terms of completed, approved professional training than non-ADHD patients (Fisher's exact test, p=.004). Apart from the data presented in Table 1 no significant differences between the 4 groups were found with regard to other sociodemographic variables such as marital status (82 patients

Tab. 1 Comparison of four groups of opioid-dependent men with regard to some sociodemographic and clinical variables

	ADHD alone $n_1 = 4$	ADHD and CD $n_2 = 7$	CD alone $n_3 = 47$	No ADHD, no CD $n_4 = 42$	Significance		
					F ratio*	df	p
Age [years]: MN ± SD	26.2 ± 7.4	26.0 ± 8.4	30.2 ± 5.7	30.1 ± 6.1			NS
Professional qualification	1 (25)	2 (29)	35 (74)	30 (71)		FHt	0.024
Age at 1st drug use [years]: MN ± SD	11.7 ± 4.6	12.1 ± 2.3	14.6 ± 3.1	16.1 ± 4.6	4.01	3	0.038[1]
Age at 1st opioid use [years]: MN ± SD	16.7 ± 1.7	17.4 ± 3.5	18.6 ± 4.1	21.5 ± 5.2	5.44	3	0.011[2]
Age at 1st regular opioid use [years]: MN ± SD	17.5 ± 2.1	18.6 ± 3.7	20.1 ± 5.8	23.0 ± 5.5	5.61	3	0.009[3]
Age at 1st inpatient treatment [years]: MN ± SD	23.7 ± 7.0	23.6 ± 7.3	25.0 ± 6.1	26.4 ± 6.5			NS
Number of inpatient treatments: MN ± SD	3.5 ± 0.6	4.6 ± 5.7	7.0 ± 6.7	4.7 ± 4.0	4.38	3	0.014[4]
Drug law violations	2 (50)	6 (86)	40 (85)	22 (52)		FHt	0.002
Partner loss because of drug use	2 (50)	3 (43)	37 (79)	26 (62)		FHt	0.087
Accidents while intoxicated	2 (50)	5 (71)	24 (51)	13 (31)		FHt	0.095
Additional alcohol abuse	2 (50)	3 (43)	5 (11)	14 (33)		FHt	0.011
Present depression	2 (50)	0 (0)	3 (6)	10 (24)		FHt	0.016

Percentages are given in parentheses. * = Welch Anova test. *FHt* Freeman-Halton test
[1] Significant difference (p < .05) between n_2 and n_4
[2] Significant difference (p < .05) between n_1 and n_4 and between n_3 and n_4
[3] Significant difference (p < .05) between n_1 and n_4
[4] Significant difference (p < .05) between n_1 and n_3

were single), living situation (71 patients lived alone or with a partner) and the job situation in the three months preceding the index admission (87 patients had no regular job).

As Table 1 further shows, patients with ADHD (alone or with comorbid CD) seem to have started their psychoactive drug use in general and their opioid use and regular opioid use in particular at a significantly younger age than no ADHD/no CD patients and to have been admitted for the first inpatient treatment earlier (n. s. for the last of these variables). Patients with the ADHD alone had the lowest number of hospitalizations for substance use disorder whereas the patients with CD alone had the highest. No significant differences were found in the number of job losses related to drug use (noted in the 67 patients) and in the rate of the overall criminal record (79 patients). Patients with CD (alone or with comorbid ADHD) violated drug laws more frequently than non-CD patients (χ^2=11.37, df=1, p=.0007) and there was a trend for patients with CD alone to experience drug use related partner loss more frequently than all other patients did (χ^2= 3.80, df=1, p=.051). In ADHD and/or CD patients, accidents while intoxicated were noted more frequently than in the no ADHD/no CD group (χ^2=4.13, df=1, p=.042).

Patients with CD (alone or with comorbid ADHD) received significantly less often the additional clinical diagnosis of present depressive episode than non-CD patients (χ^2=6.68, df=1, p=.010), whereas there were no differences between the four groups with regard to the history of past depressions (41 patients reported to have suffered from at least one depressive episode which required treatment). There were no significant differences between the groups with regard to history of suicide attempts (42 patients), severe suicide attempts of grade 4 (32 patients), and repeated suicide attempts (22 patients). Furthermore, no significant differences were

found with regard to the lifetime prevalence of DSM-IV generalized anxiety disorder (identified in 21 patients) and with regard to the HIV positivity (9 patients) and hepatitis B/C positivity (27 patients).

All 100 men suffered from opioid dependence. However, the majority of them were, in fact, polydrug users. Additional alcohol abuse was indicated less frequently by patients with CD (alone or with comorbid ADHD) than by non-CD patients (χ^2=4.39, df=1, p=.036). In contrast, no significant differences between the four groups were found with regard to the additional cocaine (75 patients), cannabis (40 patients), and benzodiazepines abuse (32 patients).

Table 2 compares the four groups with regard to the DSM-IV Axis II personality disorders. Histrionic and obsessive-compulsive PD was significantly (Fisher's exact test, p=.0003 and p=.028) more frequently diagnosed in patients with ADHD (alone or with comorbid CD) than in non-ADHD patients, whereas borderline (χ^2=10.21, df=1, p=.0014) and, by definition, antisocial (χ^2=23.10, df=1, p < .0001) PD was significantly more frequently diagnosed in patients with CD (alone or with comorbid ADHD). In patients with ADHD and/or CD, PDs in general and PDs of cluster B in particular were more frequently diagnosed than in patients without ADHD and CD: PD was diagnosed in 47 (81 %) of 58 patients suffering from ADHD and/or CD but in only 20 (48 %) of 42 patients without these disorders (χ^2=10.84, df=1, p=.001).

Discussion

We studied a group of 100 opioid dependent treatment-seeking male inpatients. In 11 patients of the sample childhood ADHD was identified, however, in only 4 of these inpatients without concurrent CD. In contrast, CD

Tab. 2 Comparison of four groups of opioid-dependent men with regard to the DSM-IV Axis II disorders

	ADHD alone $n_1 = 4$	ADHD and CD $n_2 = 7$	CD alone $n_3 = 47$	No ADHD, no CD $n_4 = 42$	Significance (FHt) p
Paranoid PD	1 (25)	2 (29)	7 (15)	4 (10)	NS
Schizotypal PD	0 (0)	0 (0)	9 (19)	3 (7)	NS
Schizoid PD	0 (0)	1 (14)	3 (6)	0 (0)	NS
Any PD Cluster A	1 (25)	2 (29)	13 (28)	7 (17)	NS
Histrionic PD	2 (50)	4 (57)	4 (9)	2 (5)	0.0007
Narcissistic PD	0 (0)	0 (0)	2 (4)	0 (0)	NS
Borderline PD	2 (50)	5 (71)	31 (66)	13 (31)	0.003
Antisocial PD	0 (0)	3 (43)	20 (43)	0 (0)	< 0.0001
Any PD cluster B	4 (100)	6 (86)	35 (74)	14 (33)	< 0.0001
Avoidant PD	0 (0)	1 (14)	4 (9)	2 (5)	NS
Dependent PD	0 (0)	0 (0)	0 (0)	3 (7)	NS
Obsessive-compulsive PD	2 (50)	1 (14)	2 (4)	2 (5)	0.029
Any PD Cluster C	2 (50)	2 (29)	6 (13)	5 (12)	NS
Negativistic PD	0 (0)	1 (14)	4 (9)	2 (5)	NS
Depressive PD	0 (0)	1 (14)	2 (4)	4 (10)	NS
Any PD	4 (100)	7 (100)	36 (77)	20 (48)	0.002

Percentages are given in parentheses
FHt Freeman-Halton test

alone was identified in 47 patients. Important to underline in this context, that both diagnoses, the ADHD and the definite CD diagnosis, were established using the same method of the direct interview carried out by the same investigator. In this study, childhood and not adult ADHD symptoms were explored; incidentally, in adults the diagnostic attribution of particular symptoms to ADHD or to PD is ambiguous (Sachdev 1999) and we know little about the validity of DSM-IV symptom thresholds for diagnosing the current status of ADHD in an adult (Faraone et al. 2000). In any case, the rate of the adult ADHD should not be higher than the rate of the childhood ADHD by definition and we found the rate of the latter alone (4 %) not to be higher in our sample than in the general population with 3 – 5 % (APA 1994). In contrast, the rate of CD in our sample highly exceeded the CD rate in the general population, estimated to be 6–16 % (APA 1994). Thus, on the one hand, studying opioid male addicts we could not confirm the conclusion by Wilens et al. (1994) that there is a considerable overlap between ADHD and psychoactive substance use disorder (PSUD); according to these authors adolescents and adults with PSUD suffer from ADHD at a mean rate of 23 % and 9–30 % of adults with ADHD manifest drug abuse or dependence. Nevertheless, our sample was restricted to opioid addicts and indeed, it is possible that there is a closer relationship between ADHD and cocaine dependence (Lambert and Hartsough 1998, Carroll and Rounsaville 1993) than between ADHD and opioid dependence. On the other hand, our findings are in agreement with findings by those authors, who indicated that the increased rate of ADHD/PSUD association is mediated by CD (Biederman et al. 1997, Disney et al. 1999). Early aggressive behavior (Halikas et al. 1990) and conduct problems (Lynskey and Fergusson 1995) but not early attention deficit behaviors predicted later substance abuse.

The association between CD and PSUD is well estab-

lished: The diagnosis of antisocial PD is based on the previous diagnosis of CD, even though there seem to be adults presenting antisocial behavior without a history of CD (Cottler et al. 1995). Based on a review of the literature Verheul et al. (1995) estimated a prevalence of antisocial PD in 24 % of opioid abusers which is consistent with the 23 % we have identified. The latter figure indicates that in more than half of our CD patients, CD did not develop into antisocial PD; this is in contrast to the sample of Schubiner et al. (2000), where all but one CD patient developed antisocial PD.

There is a comorbidity with depressive and anxiety disorders in the majority of adolescents with CD (Burket and Myers 1995). By contrast, there were no differences in our sample between the groups with regard to history of depression and generalized anxiety disorder. Beyond that, a diagnosis of comorbid depressive episode was significantly less frequently given to the CD patients. Perhaps, antisocial behavior and drug abuse represent in at least some of the former CD patients compensatory behaviors for coping with emotional problems.

ADHD was associated with an earlier onset of PSUD (Milberger et al. 1997, Horner and Scheibe 1997). It has been argued that an earlier onset of substance abuse may be a consequence of a more negative self-image in ADHD subjects and that drugs may have been used by them for self-medication (Horner and Scheibe 1997). Allowing for the very small number of our ADHD patients and the comorbid CD in the majority of them our results confirm the earlier onset of drug, opioid and regular opioid use in the ADHD group. As Biederman et al. (1998) reported, it was the early alcohol use which increased the risk for subsequent drug use in ADHD patients. In our study, additional alcohol abuse was less frequent in patients with a history of CD than ADHD.

As the literature indicates, ADHD seems to increase the likelihood of CD – adolescent boys with ADHD had

earlier age of CD onset and more CD symptoms than CD adolescents without ADHD (Thompson et al. 1996). Subjects who had had disruptive disorders (including ADHD and CD) during adolescence showed high rates of all types of PD (Rey et al. 1995) and there is a well-known high excess of PD comorbidity in patients with PSUD in general and with opioid dependence in particular (Verheul et al. 1995). For example, Rounsaville et al. (1998) found Axis II disorders in 70 %, PDs of cluster A in 22 %, PDs of cluster B in 61 %, and PDs of cluster C in 34 % of patients with different substance use disorders. Our own figures (67 %, 23 %, 59 % and 15 %, respectively) are very similar except for less frequent PDs of cluster C; this might be due to a high proportion of women (56 %) in their sample. In our study, the possibility of substance-related PD symptoms was not considered; excluding possibly – but not necessarily – substance-related PD symptoms, PD prevalences decreased by nearly 20 % in the study by Rounsaville et al. (1998). Nevertheless, their findings do not clearly support the strategy of excluding substance-related PD symptoms (Verheul and van den Brink 2000) and in a recent study (Verheul et al. 2000) the recovery from substance use disorders did not correlate with the improvement of Axis II pathology.

Regarding the overall PD prevalence in our sample, PD was diagnosed in 67 % of all patients; significantly more frequently in patients suffering from ADHD and/or, as could have been expected, in patients with CD than in patients without these disorders. Regarding the prevalence of the individual types of PD in our sample, the rates are comparable with other studies carried out in opioid abusers (Malow et al. 1989), even though in some samples substantially fewer patients with borderline PD (Verheul et al. 1995) and in other samples even a higher proportion of borderline PD along with a much higher overall PD prevalence (DeJong et al. 1993) were identified, which is quite obviously dependent on the exact composition of the sample, setting, sex rate, etc. A good half of our ADHD patients (with or without comorbid CD) developed histrionic PD at a later age; the pattern of excessive attention seeking, central to this PD, could indeed be viewed as a reaction to their assumed negative self-image (Horner and Scheibel 1997). Similarly, the obsessive-compulsive pattern in some of the ADHD patients could be viewed as a reaction to their difficulties organizing tasks and activities, and their easy distraction and forgetfulness.

Conclusions

ADHD alone does not seem to predispose to the development of opioid dependence in male subjects. Nevertheless, compared with the general population, we found a history of ADHD to be more frequent in male opioid addicts, this due to its comorbidity with CD, which was identified in more than half of our sample. Opioid addicts with a history of ADHD seem to start their sub-stance abuse at a younger age and to pass earlier through the individual stages of their drug abuse career. Therefore, ADHD children and adolescents require special attention in respect to substance use prevention when there is a comorbidity with CD. ADHD seems to be more frequently an antecedent of histrionic and obsessive-compulsive PD. Incidentally, the development of these PDs in ADHD patients could serve compensatory purposes. As expected, a high proportion of patients with CD developed borderline and, of course, antisocial PD and they may be more difficult to treat as the higher average number of their inpatient treatments indicates. Only a proportion of our CD patients developed antisocial PD. A study of salutogenic factors preventing the development of antisocial PD in children and adolescents with CD could be rewarding. All these conclusions, however, must be handled with caution regarding the limitations of our study: its retrospective design, the inclusion of a highly selected group of treatment-seeking opioid abusers, the inequality of observations in each group and the limited number of probands in half of the groups. Therefore, the results cannot be extended to all adults diagnosed with childhood ADHD and/or CD.

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