Adult Attention Deficit Hyperactivity Disorder in an Anxiety Disorders Population

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Adult Attention Deficit Hyperactivity Disorder (ADHD) is a life-long, chronic disorder, which has its onset in childhood and is associated with significant functional impairment. ADHD appears to be highly comorbid with other psychiatric disorders, however, literature is lacking concerning ADHD/anxiety comorbidity. To that end, we examined the prevalence of ADHD in an anxiety disorder sample. Consecutive patients referred to an anxiety disorders clinic completed a variety of anxiety disorder self-report measures as well as the Adult ADHD self-report scale and were clinically assessed using the Structured Clinical Interview for DSM-IV, and the ADHD module of the Mini International Neuropsychiatric Interview. Of the 129 patients assessed, the rate of adult ADHD was 27.9%. The mean age of the sample was 33.1 ± 12.5 years, and the mean baseline CGI-S was 4.6 ± 1.1 (moderate to marked severity). The majority of the sample was female (63.6%) and single (49.5%). The most common comorbid disorders associated with ADHD were major depressive disorder (53.8%), social phobia (38.5%), generalized anxiety disorder (23.1%), and impulse control disorders (30.8%). Individuals with ADHD had higher symptom severity scores for obsessive-compulsive disorder, ($P \leq 0.05$) and for GAD ($P \leq 0.05$) and reported a significantly earlier age of onset for depression as compared to those without ($P \leq 0.05$). The prevalence of adult ADHD was higher in our anxiety disorders clinic sample than found in the general population. Clinical implications of these findings are discussed.

Introduction

Attention deficit hyperactivity disorder (ADHD) is the most common childhood psychiatric disorder, accounting for up to 50% of child psychiatric outpatients [1]. It is characterized by symptoms of inattention, distractibility, impulsivity, and hyperactivity. Until recently, it was believed that ADHD was mainly a disorder of childhood that dissipated through adolescence. However, research has shown that a large proportion of children continue to experience symptoms of ADHD through adolescence and into adulthood. In a recent World Health Organization study of adult ADHD in 10 countries, Lara and colleagues reported point prevalence of adult ADHD averaged 3.4% (range: 1.2%–7.3%), while persistence of ADHD symptoms into adulthood averaged 50%

(range: 32.8%–84.1%). Significant predictors of ADHD persistence included: childhood combined type, symptom severity, comorbid major depressive disorder, presence of three or more childhood diagnoses in addition to ADHD and paternal (but not maternal) anxiety, mood or antisocial personality disorder [2].

The prevalence of ADHD into adulthood is estimated to be between 2 and 7%. Clinical presentation of ADHD differs substantially between children and adults. In children, the ratio of males to females is 10:1, while in adults it is 3:2. While children will often be referred due to conduct problems or academic difficulties, adults present with social or work impairments, antisocial behaviors or problems with substance abuse. Relative prevalence of ADHD subtypes also differs between children and adults. The majority of children present as the combined type,

however, this distribution shifts to the inattentive type in adolescence and adulthood [3]. As in children, the presence of ADHD in adults causes substantial functional impairment. Adults suffering from ADHD are more likely to have interpersonal and family problems [4], be involved in a motor vehicle accident (two to four times) [5], have a comorbid psychopathology (75%) [6], drop out of school (35%) [7], have significant employment problems [8], and have legal difficulties [9].

Adult ADHD was extensively examined using the data from the National Comorbidity Survey Replication (NCS-R) [6]. The lifetime prevalence of adult ADHD was found to be 8.1%, and 12-month prevalence was 4.1%. Adult ADHD was also found to highly comorbid with mood, anxiety, substance use, and intermittent explosive disorders.

When ADHD was used as the index disorder, 47.1% also met criteria for a lifetime anxiety disorder (any anxiety disorder), with the three most common anxiety disorders being social phobia (29.3%), specific phobia (22.7%), and PTSD (11.9%). Relatively high levels of comorbidity were also observed with mood disorders and ADHD (38.3%). Moreover, when anxiety disorders were used as the index, the disorders associated with the highest co-occurrence of ADHD were agoraphobia (19.1%), social phobia (14%), and PTSD (13.4%) [6]. Thus, it appears that the prevalence of anxiety disorders is relatively common in those with primary ADHD, but ADHD is less common in those presenting with a primary anxiety disorder. Within the NCS-R sample, while 53% of women and 36.5% of men with ADHD had received treatment for a mental health or substance abuse issue in the last 12 months, only 22.8% of women and 27.7% of men had been treated for ADHD in their lifetime [6].

Based on the NCS-R data, there appears to be a significant correlation between ADHD and comorbid anxiety, mood, and substance abuse disorders. However, few studies have examined the prevalence of ADHD in these populations. Mancini et al. [10] reported that out of 149 consecutive admissions to an anxiety disorders clinic, 19.5% met criteria for childhood ADHD, and 45% continued to meet ADHD criteria as adults. In this sample, childhood ADHD correlated with an earlier onset of anxiety disorder, a greater number of comorbid diagnoses (anxiety, mood, substance use) and higher anxiety & depressive symptom severity. In a retrospective sample of 85 panic disorder patients, 23.5% reported having significant ADHD symptoms in childhood and 9.4% met full DSM-III-R criteria for childhood ADHD. Sixty-five percent of those who had significant ADHD symptomatology in childhood reported persistence into adulthood. Panic patients with a history of ADHD were less likely to be married, less likely to have achieved higher education,

and had a greater incidence of childhood adversity (divorce, physical/sexual abuse) [11]. Safren et al. [12] conducted a study examining a history of childhood ADHD in a sample of 22 patients with primary generalized anxiety disorder (GAD) and 33 with primary social phobia. A significantly greater proportion of patients with primary GAD had a history of childhood ADHD than did patients with primary social phobia ($P = 0.005$).

Given this apparent link between anxiety disorders and ADHD, we evaluated the prevalence of childhood and adult ADHD in sequential referrals to an anxiety disorders clinic.

Method

Participants were 129 consecutive admissions to an Anxiety Disorders Clinic in Hamilton, Ontario, Canada. ADHD was assessed using the clinician-rated ADHD module of the Mini International Neuropsychiatric Interview (MINI) Plus. The MINI Plus is a validated, semi-structured interview designed to be an effective means of diagnosing major psychiatric disorders meeting both DSM-IV and ICD-10 criteria [13]. Comorbid conditions were assessed using the Structured Clinical Interview for DSM-IV (SCID), which is the standard diagnostic screening tool used in this clinic [14]. (The SCID does not contain a module for ADHD, hence our use of the ADHD module from the MINI.) Baseline global severity was assessed by clinicians using the Clinical Global Impression Severity Scale (CGI-S), taking all diagnoses into account. Patients also completed a series of self-report symptom severity measures: Adult ADHD Self-Report Scale (ASRS-v1.1) Symptom Checklist (tallies ADHD symptoms), Padua Inventory-Revised (an obsessive-compulsive disorder [OCD] symptom severity measure), Yale-Brown Obsessive Compulsive Scale-self report (Y-BOCS) (an OCD symptom severity measure), Liebowitz Social Anxiety Scale-self report (LSAS) (a social anxiety symptom severity measure), Panic and Agoraphobia Scale (PAS) (evaluates panic and agoraphobia severity), Anxiety Sensitivity Index (ASI) (measures fear of somatic symptoms of anxiety), Penn State Worry Questionnaire (PSWQ) (a GAD symptom severity measure), Fear Questionnaire (phobia symptom severity measure), Quick Inventory of Depressive Symptomatology (QUIDS) (depressive symptoms severity measure), Davidson Trauma Scale (DTS) (a PTSD symptom severity measure), Traumatic Events Questionnaire (TEQ) (assesses presence and types of traumatic exposure), Childhood Trauma Questionnaire (CTQ) (evaluates childhood physical, emotional and sexual abuse), Sheehan Disability Scale (SDS) (measure of functional impairment), and Quality of Life and

Satisfaction Questionnaire (Q-LES-Q) (evaluates the impact of illness on the quality of life).

Data analysis was performed using SPSS for Windows, version 17 [15]. T-tests and chi-square analyses were used to examine the associations between adult ADHD with and without anxiety disorder and associated variables.

Results

The mean age of the sample was 33.1 ± 12.5 years, while the baseline level of severity as measured by CGI-S was 4.6 ± 1.1 , indicating a moderate to marked level of severity. The majority of the sample was female (63.6%), single (49.5%), and over one-third had at least a high school education (36.4%) (Table 1). Most of the sample had been previously treated with an antidepressant prior to clinic admission (77.8%). Major depression (61.2%), social phobia (56.6%), and OCD (48.8%) were the most common comorbid lifetime psychiatric diagnoses. The mean number of lifetime comorbid diagnoses was 3.2 ± 1.4 .

The prevalence rate of adult ADHD as diagnosed by the MINI-Plus was 27.9% ($N = 129$).

In the individuals meeting criteria for adult ADHD ($N = 36$), 36.1% had been diagnosed as children, 16.7% had been treated in the past for ADHD ($P < 0.01$), and 2.8% were currently receiving treatment for their ADHD. Only 118/129 participants completed the ASRS,

and 31.4% of those, met criteria for adult ADHD according to this measure. Baseline global symptom severity (CGI-S) scores were higher, although not significantly in those with ADHD versus those without (4.8 ± 1.1 vs. 4.5 ± 1.1 , Table 2). The presence of specific comorbid diagnoses did not differ significantly between those with and without ADHD, with the exception of nail biting (Under 'Impulse control disorder NOS' $P \leq 0.05$) and chronic motor tic disorder ($P \leq 0.05$). No significant differences were observed in the number of lifetime comorbid diagnoses. Individuals with ADHD had higher symptom severity scores for OCD symptoms, as measured by the Padua Inventory ($P \leq 0.05$) and for GAD symptoms on the PSWQ ($P \leq 0.05$) and reported a significantly earlier age of onset for depression compared to those without ($P \leq 0.05$) (Table 2). Only 57 subjects completed the TEQ. No significant differences were found between those with and without ADHD in terms of the number or types of traumas experienced (TEQ). Those with ADHD reported exposure to a mean number of 1.64 ± 2.6 events, and those without ADHD reported exposure to 1.81 ± 2.2 events (NS).

All analyses were repeated comparing males ($N = 17$) versus females with ADHD and an anxiety disorder ($N = 19$). Males with ADHD and an anxiety disorder presented with significantly higher scores on the Sheehan Disability Scale ($P \leq 0.05$) and significantly lower scores on the QLESQ ($P \leq 0.05$) indicating a greater level of impairment as compared to females.

Table 1 Demographic characteristics

N = 129		Whole sample N = 129(%)	Anxiety disorder + ADHD N = 36(%)	Anxiety disorder alone N = 93(%)
Gender	Male	36.4	47.2	32.3
	Female	63.6	52.8	67.7
Marital status	Single (never married)	49.5	52.8	48.4
	Married	41.9	44.4	40.9
	Common law	3.1	0.0	4.3
	Separated	1.6	0.0	2.2
	Divorced	3.1	2.8	3.2
	Widowed	0.8	0.0	1.1
Education	Less than high school	14.0	16.7	12.9
	High school diploma/some postsecondary	36.4	41.7	33.4
	College diploma or certificate	25.6	19.4	28.0
	University degree or certificate	24.0	22.2	24.7
Adult ADHD prevalence	MINI-Plus (n = 129)	27.9	100	0.0
		Mean/SD	Mean/SD	Mean/SD
	Mean age	33.1 ± 12.5	33.2 ± 14.6	33.0 ± 11.6

Note: Sample demographic characteristics, divided into three groups: whole sample ($n = 129$), anxiety disorder with adult ADHD ($n = 36$) and anxiety disorder without adult ADHD ($n = 93$).

No significant differences in demographic variables were observed between individuals with and without ADHD.

Table 2 Mean scores and standard deviations of each scale contained within the battery of symptom severity measures

Severity Measure (N)	Anxiety disorder + ADHD (N = 36)	Anxiety Disorder + NO ADHD (N = 93)
Baseline CGI-S	4.8 ± 1.1	4.5 ± 1.1
Padua-Revised (n = 66)	62.9 ± 44.2	33.0 ± 27.3*
Y-BOCS (n = 74)	15.9 ± 9.4	12.7 ± 9.4
PDSS (n = 65)	5.1 ± 3.9	5.6 ± 4.9
LSAS (n = 67)	49.1 ± 31.1	51.4 ± 34.0
PAS (n = 64)	10.1 ± 11.0	12.4 ± 11.1
CTQ (n = 67)	46.8 ± 12.5	43.6 ± 16.5
FQ (n = 67)	72.1 ± 32.8	60.8 ± 37.1
SDS (n = 67)	16.7 ± 6.8	14.8 ± 7.2
QUIDS (n = 67)	12.8 ± 6.6	10.1 ± 5.3
ASI (n = 67)	26.5 ± 14.4	26.8 ± 15.2
Q-LES-Q (n = 67)	46.1 ± 12.0	47.7 ± 13.7
PSWQ (n = 67)	53.8 ± 6.5	48.0 ± 12.1*
DTS (n = 66)	34.5 ± 39.4	20.6 ± 28.9

Note: Some patients did not complete all measures, resulting in a variable n, as noted above.

* $P \leq 0.05$.

Discussion

The sample in this study was reflective of a typical anxiety disorders clinic population, with the majority of participants being female, single with at least high school education. Close to one-third of the sample met criteria for ADHD, which is substantially higher than that in the general population and higher than rates found in two previous anxiety disorder populations [10,11]. Data from the NCS-R reported a rate of comorbid ADHD of 9.5% in individuals with an anxiety disorder—quite a bit lower than the rate found in this study (27.9%). Our sample was comprised of treatment-seeking individuals, referred to a tertiary care sub-specialty clinic. These patients typically have higher rates of comorbidity. ADHD comorbidity has been associated with greater overall severity of illness [16,17], impairment [11] and increased treatment-seeking [6], supportive of the higher rates of anxiety/ADHD comorbidity found in this sample. Major depression, social phobia, and OCD were most commonly associated with ADHD (although not significantly). Impulse control disorder NOS (specifically nail biting) and chronic motor tic disorder were the only comorbid disorders with a significant association to ADHD.

There are a number of potential limitations associated with this study. There is potential bias associated with retrospective recall. As well, collaborative reports from spouses or family members regarding ADHD symptoms were not obtained. In addition, the sample was primarily female, which, although representative of typical anxiety disorders patient samples, is not typical in ADHD samples, where patients are predominantly male [6]. Nevertheless, previous samples of ADHD in anxiety have shown a

similar gender distribution [10,11]. Other limitations include a small sample size, which may not have been large enough to detect differences between the groups.

The temporal relationship between ADHD and anxiety has been examined in childhood populations and it appears that there may be multiple pathways that lead to both conditions. Anxiety may either precede or follow ADHD depending on the developmental pathway [18]. Nigg et al. [19], suggest that there may be two routes to the development of comorbid anxiety and ADHD. The first pathway involves early cognitive regulatory difficulties that result in an inability to effectively regulate anxiety. The other pathway proposes that heightened anxiety leads to regulatory or cognitive dysfunction, that is, executive functioning may be intact but impaired by the presence of high anxiety [18]. The longitudinal relationship between anxiety and ADHD is not yet well understood, and it remains unclear whether the presence of anxiety serves as a protective or exacerbating influence in ADHD [18].

There are several clinical questions raised by the results of this study. Given that adult ADHD and anxiety and mood disorders often co-occur, what are the potential treatment implications, if any? The treatment literature has suggested that children with ADHD and comorbid anxiety to fair better with a combination of cognitive behavioral therapy and medication, as compared to children with ADHD only, who received the same combination treatment [20]. In a further analysis of the MTA study, Jensen et al. [21] suggest that there may be three distinct comorbid subtypes of childhood ADHD, due to their differential response to treatment: (1) ADHD plus anxiety disorder who responded

equally well to medication or CBT; (2) ADHD plus oppositional defiant disorder (ODD)/conduct disorder (CD) who responded equally well to medication, with or without CBT; (3) Multiple comorbidity group (ADHD plus anxiety plus ODD/CD) who responded better to combined medication plus CBT [21]. In another study of ADHD with comorbidity, Adler and colleagues [22] examined atomoxetine treatment of adults with ADHD with social phobia. Efficacy was demonstrated in improving both conditions. Furthermore, there may be potential impact of pharmacological treatment of ADHD adversely impacting the anxiety or mood disorder, or vice versa, which warrants consideration. There have been some reports of stimulants worsening OCD symptoms [23,24], however the literature is equivocal [25]. There does not appear to be any current reports where antidepressant treatment has worsened ADHD. Most studies of adult ADHD have either excluded or not commented on the anxiety comorbidity.

ADHD is increasingly recognized by physicians as a disorder which persists into adulthood and contributes to significant functional impairment, whether it occurs as a primary diagnosis or comorbid to an anxiety disorder diagnosis. However, there is a lack of empirical data to guide treatment of comorbid ADHD and anxiety disorders given the unknown course and prognosis of this comorbidity. Given the high rates of comorbidity between these conditions, more comprehensive screening is warranted in outpatient clinics treating anxiety as well as more active investigation in this area to examine the many unanswered questions to effectively guide clinicians and researchers.

Author Contributions

Dr. Michael Van Ameringen. Concept/design, drafting article, data analysis/interpretation, critical revision of article, approval of article.

Dr. Catherine Mancini. Concept/design, critical revision of article, approval of article.

Mr. William Simpson. Drafting article, data analysis/interpretation, critical revision of article, data collection.

Ms. Beth Patterson. Drafting article, critical revision of article, data analysis/interpretation, data collection, approval of article.

Conflict of Interest

The authors have no conflict of interest.

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