Children with attention deficit-hyperactivity disorder and comorbid depression: a descriptive study

Ghada A.M. Hassan[a], Abeer M. Eissa[a], Doaa Hwedi[a], Dalia Hegazy[a] and Aml Essam[b]

[a]Department of Neuropsychiatry, Institute of Psychiatry, Ain Shams University and [b]Abassia Mental Hospital, Cairo, Egypt

Correspondence to Ghada A.M. Hassan, MD, Department of Neuropsychiatry, Ain Shams University, Cairo, Egypt
Tel: +01092543525; fax: +01203730736; e-mail: ahmedsaeed20042010@yahoo.com

Received 8 June 2012
Accepted 19 February 2013

Middle East Current Psychiatry
2013, 20:140–145

Background
ADHD is a major clinical and public health problem in children because of its associated morbidity and disability. Depression is one of the most common comorbidities among ADHD which may have its impact on clinical symptoms, management and treatment response. So our objectives to detect major depression whether as a disorder or as symptoms among patients with ADHD. Subjects and method; 70 patient with ADHD selected from child psychiatry clinic of Abassia mental hospital with age range between 6-16 years, we excluded cases with MR, ASD and Psychotic disorders. Diagnosis of ADHD and comorbidities according to DSMIV criteria via history taking and KSAD-PL and determining ADHD clinical profile via CONNER'S rating scale.

Results
Twenty three (32.9%) patients had depressive symptoms while 19 (27.1%) patients had MD. Depression and depressive symptoms were significantly more among females and more among combined and inattentive type but with no significance.

Conclusion
ADHD and comorbid depression was a major health problem need proper assessment and hence tailoring of treatment plan to improve outcome.

Keywords:
attention deficit-hyperactivity disorder, depression, in children

Middle East Curr Psychiatry 20:140–145

2090-5408

Introduction

Attention deficit-hyperactivity disorder (ADHD) is a common psychiatric disorder in children, adolescents, and adults, with good treatment responses (i.e. medication, psychosocial, and educational interventions). Approximately 8–10% of boys and 3–4% of girls younger than 18 years of age have ADHD, and about 80% of children with ADHD continue fulfilling the diagnostic criteria for ADHD into adolescence [1].

Patients with ADHD are significantly more likely to have mood disorders (major depression: three times; dysthymia: seven times; bipolar disorder: seven times), anxiety disorders (generalized anxiety disorders, post traumatic stress disorder and panic disorder: three times), and substance use disorders (alcohol dependence: three times and drug dependence: eight times) [2].

Furthermore, youth with ADHD also have up to a four times higher risk of developing depressive disorders than the general adolescent population [3]. Most studies indicate prevalence rates of 9–38% for depressive disorders in children with ADHD [4–6]. Major depression (MD) often exacerbates the symptoms and dysfunctions of ADHD. Patients who have ADHD and who later develop MD may present with more severe dysfunctions than those who have MD alone; this may also worsen treatment outcome [6]. Such comorbid major depressive disorder (MDD) is distinct from demoralization in youths with ADHD and is associated with higher levels of impairment and rates of hospitalization when compared with ADHD alone [7]. Previously, depression in patients with ADHD was considered to be situational and it was assumed that the depression was a result of constant failure or the inability to compensate for symptoms of ADHD in daily life. Because of this, depression was often ignored and ADHD was treated, assuming that the depression would disappear when the ADHD was controlled and treated. Research has now shown that ADHD and depression are separate diagnoses and both should be treated [8].

However, depression in youths with ADHD may be more challenging to diagnose, given that some symptoms such as restlessness and problems with concentration may overlap between the two disorders [9,10]. Moreover, medications used to treat ADHD may cause side effects such as insomnia, appetite changes, sleepiness, tearfulness, and moodiness that resemble symptoms of MDD [3]. Because of these challenges, total scores on a well-validated depressive measure are significantly less accurate when screening for MDD in children with ADHD compared with those without ADHD [11].

Hypothesis and objectives

We tested the hypothesis that children with ADHD had comorbid depression.

2090-5408 © 2013 Institute of Psychiatry, Ain Shams University DOI: 10.1097/01.XME.0000430428.98481.45

Our objectives were

(1) To search for depression as a symptom or a disorder in a group of children with ADHD.
(2) To compare patients with ADHD with and without comorbid depression in terms of sociodemographic data and the clinical profile of ADHD.

Patients and methods

Design and site of the study

The current study was a cross-sectional descriptive study. It was carried out in Abassia Mental Health Hospital in Cairo, Egypt. All patients were recruited from the outpatient clinics of child psychiatry in the period between December 2011 and May 2012. The hospital is one of the largest mental health hospitals in Cairo, with a catchment area including the Eastern region of Greater Cairo and the nearby Governorates. The outpatient clinic of child psychiatry operates 3 times/week.

Ethical issues

The design and methods for this study were approved by the ethical and scientific committee of Department of Psychiatry, Faculty of Medicine, Ain Shams University. All patients and their legal guardians were informed about the details of the study and provided an informed consent.

Patients

Patients were selected according to the following inclusion criteria: age range between 6 and 16 years (6 years to establish better validity of the diagnosis and the applied scale, whereas 16 years was the upper age limit of our child psychiatry clinic) and patients fulfilling the *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed. (DSM-IV) diagnostic criteria for ADHD.

Patients were excluded if they were beyond our age limit; had comorbid chronic medical illness that may affect diagnosis; had comorbid mental retardation; and had autistic spectrum disorder or psychotic disorders.

Procedures and tools

Tools

(1) Assessment of history including sociodemographic data, data on psychiatric history, and family history.
(2) Psychiatric examination using the Schedule for Mood Disorders and Schizophrenia for School-Age Children – Present and Lifetime Version (K-SADS-PL), which is a semistructured interview that was translated and validated for the Arabic culture and has been used previously in many Arabic studies [12,13].
(3) Conner's Rating Scale: this tool is used by parents and teachers in order to assess the profile and severity of symptoms. It has been designed specifically for ADHD testing; an Arabic version was used [14].

Study proper

After ethical approval and consent, all patients and their parents underwent separate, detailed semistructured interviews to determine mental health diagnoses using the K-SADS-PL [15]. All interviews were conducted under the supervision of the senior child psychiatrist and by a senior registral with adequate training in child psychiatry; there was good inter-rater reliability between the supervisors and the interviewers ($\kappa = 0.72$ and 0.81). The diagnosis of ADHD and MD was made according to the DSM-IV criteria for research. Depressive symptoms were recorded as positive if there were more than two symptoms of depression according to the DSM-IV criteria; one of them had to be depressed/irritable mood or loss of interest for at least 1 week. Ninety-eight patients were recruited within the determined period; 70 of these patients fulfilled our inclusion and exclusion criteria and completed the required tools. Conner's Scale for assessment of the severity and symptoms profile of the patients was used by a clinical psychologist with good experience with the scale.

Statistical analysis

Data obtained were analyzed by an expert statistician using the statistical package for social science, version 15 (SPSS Inc., Chicago, Illinois, USA). Numerical data were represented in the form of means and SD. Categorical data were presented as numbers and frequencies and were tested for statistical associations using χ^2-tests and cross-stab. An independent group t-test was used for comparison of numerical data between two groups; κ was used to assess inter-rater reliability. Spearman's rank correlation was also used for nonparametric correlation to identify the factors associated with depression among patients with ADHD.

Table 1 Demographic and clinical characteristics of the sample

	N (%)	Test	*P*
Sex			
Male	45 (64.3)	1	0.017*
Female	25 (35.7)		
Age	10.27 ± 2.1		
Diagnosis			
Combined	36 (51.4)	2	0.003**
Hyperactive	13 (18.6)		
Inattentive	21 (30)		

*Significant.
**Highly significant.

Table 2 Comparison between patients with depressive symptoms versus those without depressive symptoms in terms of sociodemographic and clinical variables

	With	Without	*P*
Age	10.74 ± 2.1	10.04 ± 2.1	0.194
Sex [*N* (%)]			
Male	7 (15.6)	38 (84.4)	0.000***
Female	16 (64)	9 (36)	
Diagnosis [*N* (%)]			
Combined	9 (39.1)	27 (57.4)	0.074
Hyperactive	3 (13)	10 (21.3)	
Inattentive	11 (47.8)	10 (21.3)	
Drugs [*N* (%)]			
Stimulant	13 (56.5)	21 (44.7)	0.352
No stimulant	10 (43.5)	26 (55.3)	

***Very highly significant.

Results

Descriptive results

Analysis of data of 70 patients, 45 boys (64.3%) and 25 girls (35.7%), was carried out. The mean age of the patients was 10.27 years, with age range between 7 and 14 years. The most prevalent diagnostic subtype in our sample was combined, found in 51.4% of the patients, as shown in Table 1.

Depression as a symptom and as a disorder

Overall, 23 (32.9%) patients had depressive symptoms, whereas 47(67.1%) patients were negative for depressive symptoms. Depressive symptoms were significantly more among female patients. The most common diagnostic subtype was combined, followed by the inattentive subtype, although it did not reach significance. Similarly, the use of a stimulant did not affect the presence or absence of depressive symptoms as can be seen in Table 2.

In addition, 19 (27.1%) patients had depression, whereas 51(72.9%) did not have depression. MD was significantly more common among female patients. Similarly, it was more among combined and inattentive subtype but with no statistical significance. Again, no significant difference was found between patients with and without MD in terms of stimulant use. Furthermore, the correlation between stimulant use-related depressive symptoms and disorder was not significant as $r = 0.111$, $P = 0.359$ and $r = 0.114$, $P = 0.348$.

The correlation between depressive symptoms and Conner's scale subitems was not significant, except for a negative correlation with hyperactivity symptoms in the parent and teacher scale. A similar result was found for the Conner ADHD index score (teacher), the Conner global index total (parent and teacher) DSM impulsive (parent and teacher), and finally with DSM-IV impulsive (parent and teacher) as can be seen in Table 3. The correlation between Conner's scale subitems and depression disorder was significant only with the Conner ADHD index parent.

Discussion

In community samples, estimates of the prevalence of depression among patients with ADHD range from 13 to 27%, whereas clinical sample reports have found estimates as high as 60% [16,17]. Conversely, among children and adolescents with depression, various studies have reported widely varying rates of ADHD (from <5 to $>50\%$) [18,19]. Furthermore, many children and adolescents with ADHD describe the presence of depressive symptoms even when they do not fulfill all the diagnostic criteria for MD. The sense of 'chronic unhappiness', a common complaint of individuals with ADHD, may reach the severity level of a dythymic disorder (DD) [1]. In this study, 23 (32.9%) patients had depressive symptoms whereas 47(67.1%) patients were negative for depressive symptoms. At the same time, 19 (27.1%) of our sample had MD. This result was higher than that of the National Comorbidity Survey, which reported that 18.6% of patients who fulfilled the criteria of ADHD also fulfilled the criteria for MDD within the previous year [3–20]. More interestingly, if we include dysthymia, which is a milder but more chronic depressive disorder, the percentages are larger. Of individuals who fulfilled the criteria for dysthymia, 22.6% also fulfilled the criteria for ADHD [21]. This difference may be related to different inclusion and exclusion criteria of our sample as our patients were younger; in addition, it was a hospital based rather than community based. However, Rasim *et al.* [22] reported that in his final sample of 111 ADHD youths (age range: 5.2–17.8 years old), 18 also had current MDD (MDD/ADHD) and 93 had no mood disorder (non-MDD/ADHD). In the study of Turgay *et al.* [23], ADHD was the most common comorbidity in their sample of children and adolescents with MD as 125 (34.24%) patients were diagnosed with ADHD (65% had combined type) as well. These results were higher than ours; the different results may be because of the different criteria of the sample as we used different tools of assessment or may be related to cultural differences.

Age and sex

Our sample included 45 boys and 25 girls, mean age 10.27 ± 2.1 years. There was no significant difference in age among patients who had depressive symptoms or disorder versus those who did not have depressive symptoms or disorder (Tables 2 and 4); this result was different from that of Turgay *et al.* [24], who reported that the frequency of DD and mood disorder (MD) increased with age, as they did not report any cases of MD in children younger than 5 years of age in his sample of 2902 children. The different results may be related to the older age of our sample as the age range was 7–14 years. Although there were significantly more male patients in our sample, depression and depressive symptoms were significantly more among female patients (Tables 2 and 4), which was similar to the result of Turgay *et al.* [24], who found that DD and mood disorder were higher in female patients with ADHD rather than their male counterparts. Similarly, Gavin *et al.* [25] reported that depression increases with age and the rate of increase is greater in girls than in boys. Girls older than 10 years generally have higher levels of depression than boys. However, Biederman *et al.* [26] found that boys with ADHD have higher rates of depression than girls. Thus, these contradictory results may be attributed to age of the sample as older age was associated with more depression in female patients, in addition to the subtype of ADHD, as some have studies reported that children and adolescents with the ADHD-combined (ADHD-C) subtype generally have higher levels of depression than do youth with ADHD-I [25].

ADHD symptoms' profile and depression

In order to determine which symptoms of ADHD may be significantly associated with depression or may predict comorbid depression, the Spearman correlation coefficient was calculated, which indicated that MD was

Table 3 Correlation between Conner's items and depressive symptoms and disorder

	Depressive symptoms		Depression	
Conner	*r*	*P*	*r*	*P*
Hyperactivity (parent)	−0.284	0.017*	−0.156	0.198
Hyperactivity (teacher)	−0.313	0.008**	−0.187	0.198
Conner ADHD (teacher)	−0.369	0.002**	−0.250	0.037*
Conner total (parent)	−0.263	0.028*	−0.159	0.190
Conner total (teacher)	−0.249	0.038*	−0.143	0.236
DSM impulsive (parent)	−0.324	0.006**	−0.164	0.174
DSM impulsive (teacher)	−0.245	0.041*	−0.104	0.393
DSM-IV total (parent)	−0.306	0.010*	−0.162	0.181
DSM-IV total (teacher)	−0.225	0.062	−0.110	0.365

ADHD, attention deficit-hyperactivity disorder; DSM-IV, *Diagnostic and Statistical Manual of Mental Disorders*, 4th ed.
*Significant.
**Highly significant.

Table 4 Comparison between patients with depression versus those without depression in terms of sociodemographic and clinical variables

	With	Without	*P*
Age	10.58 ± 2.3	10.16 ± 2	0.458
Sex [*N* (%)]			
Male	6 (13.3)	39 (86.7)	0.000***
Female	13 (52.0)	12 (48)	
Diagnosis [*N* (%)]			
Combined	9 (47.4)	27 (52.9)	0.741
Hyperactive	3 (15.8)	10 (19.6)	
Inattentive	7 (36.8)	14 (27.5)	
Drugs [*N* (%)]			
Stimulant	11 (27.9)	23 (45.1)	0.341
No stimulant	8 (42.1)	28 (54.9)	

***Very highly significant.

significantly associated with lower scores of the Conner ADHD index, parent version, that is, with less severe symptoms of ADHD. Furthermore, depressive symptoms were associated with less severe symptoms of hyperactivity, impulsivity, and total symptoms of ADHD and less with the hyperactive/impulsive subtype. In this study, although depression and depressive symptoms were found more among the combined and inattentive type, it still did not reach significance.

In previous studies, such a correlation was not determined, but some studies have suggested that comorbidity is more common in children with the predominantly inattentive and combined subtypes of ADHD [25]. In this study, the most common diagnostic subtype of ADHD was combined, followed by inattentive, which may explain many findings of an association of age and sex with depressive symptoms and disorder. As the symptoms and subtypes of ADHD and associated comorbid disorders change significantly throughout the life cycle, hyperactivity and impulsivity often decrease as patients become older; however, the demands on attention and other cognitive skills may increase. The ratios of ADHD/ADD cases will become smaller as predominantly the inattentive-type ADHD is the most common subtype in adulthood [6]. Meanwhile, there was no significant difference in stimulant use between patients with and without depression and, similarly, depressive symptoms and disorder were not related to stimulant use as found in some studies [3].

Strengths and limitations

This study provides the few data available on the comorbidity of ADHD and depression in Egypt and Arab counties. We searched not only for MD but also attempted to detect subthreshold disorder, which may be more prevalent and need same concern in management and treatment. The study used valid tools for diagnosis and assessment such as K-SADS-PL and Conner's scale, which has been used previously in many studies, with good validity and reliability. All interviews and scales were conducted by experts and under the supervision of a senior child psychiatrist, with good interrater reliability. Furthermore, we attempted to detect which ADHD symptoms were more associated with depression in order to predict depression. However, we cannot generalize our results as our sample was hospital based and not representative of the entire community. In addition, we had a small sample size relative to previous studies as it was a single-center study. Finally, after the diagnosis of depression and detection of depressive symptoms with K-SAD and assessment of history, we did not use any scale for more in-depth assessment of severity of depression and correlation with ADHD, although the primary aim of this study was to detect comorbidity between depression and ADHD, and further studies may be required to overcome these limitations.

Conclusion and clinical implications

ADHD is one of the most prevalent childhood psychiatric disorder symptoms that may continue into adulthood, especially in cases of comorbidity. Patients with ADHD and comorbid MD often present a major challenge in terms of treatment. In this study, 32.9% of patients with ADHD had depressive symptoms and 27.1% had MD. Both depressive symptoms and disorder were significantly more among female patients. Although depression was more among patients with the combined and inattentive subtypes of ADHD, it still did not reach significance. Depressive symptoms were less associated with hyperactivity, impulsivity, and total symptoms of ADHD. Screening of all children with ADHD for depressive disorder is highly recommended for better tailoring of treatment plans in order to improve management.

Acknowledgements

Conflicts of interest

There are no conflicts of interest.

References

1 Turgay A, Ansari R. Major depression with adhd in children and adolescents. Psychiatry (Edgmont) 2006; 3:20–32.

2 Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Demler O, *et al*. The prevalence and correlates of adult ADHD in the United States: results from the National Comorbidity Survey Replication. Am J Psychiatry 2006; 163:716–723.

3 Pliszka SR. Comorbidity of attention-deficit/hyperactivity disorder with psychiatric disorders: an overview. J Clin Psychiatry 1998; 59 (Suppl 7): 50–58.

4 Bird HR, Canino G, Rubio-Stipec M. Estimates of prevalence of psychiatric maladjustment in a community survey in Puerto Rico. Arch Gen Psychiatry 1988; 45:1120–1126.

5 Biederman J, Newcorn J, Sprich S. Comorbidity of attention deficit hyperactivity disorder with conduct, depressive, anxiety, and other disorders. Am J Psychiatry 1991; 148:564–577.

6 Turgay A. Diagnosing and treating ADHD in adults. Can J CME 2001; 2:182–190.

7 Biederman J, Mick E, Faraone SV. Depression in attention deficit hyperactivity disorder: true depression or demoralization? J Affect Disord 1998; 47:113–122.

8 Bailey E. *ADHD and depression*. Health Center; 2010.

9 Jensen JB, Burke N, Garfinkel BD. Depression and symptoms of attention deficit hyperactivity disorder with hyperactivity. J Am Acad Child Adolesc Psychiatry 1988; 27:742–747.

10 Milberger S, Biederman J, Faraone S, Murphy J, Tsuang MT. Attention deficit hyperactivity disorder and comorbid disorders: issues of overlapping symptoms. Am J Psychiatry 1995; 152:1793–1799.

11 Daviss WB, Birmaher B, Melhem NA, Axelson DA, Michaels SM, Brent DA. Criterion validity of the mood and feelings questionnaire for depressive episodes in clinic and non-clinic subjects. J Child Psychol Psychiatry 2006; 47:927–934.

12 Bishery Z, Hassan G, Taha G, Hassan Yasser, Abd El Hady Mona, Abd El Azim Khaled. Early onset non affective psychosis: clinical and developmental perspectives. Arab J Psychiatry 2009; 20:109–122.

13 Hassan GAM, Taha GRA. Long term functioning in early onset psychosis: two years prospective follow-up study. Behav Brain Funct 2011; 7:28.

14 Mona E, Omer AE, Adel S. Psychiatric morbidity in parents of ADHD children [MD thesis]. Cairo, Egypt: Ain-Shams University; 2003.

15 Kaufman J, Birmaher B, Brent DA, Ryan N, Rao U. K-SADS-PL. J Am Acad Child Adolesc Psychiatry 2000; 39:1208–1211.

16 Kessler RC, Adler L, Barkley R, Biederman J, Conners CK, Demler O, *et al*. Patterns and predictors of attention-deficit/hyperactivity disorder persistence into adulthood: results from the national comorbidity survey replication. Biol Psychiatry 2005; 57:1442–1451.

17 Furman L. What is attention-deficit hyperactivity disorder (ADHD)? J Child Neurol 2005; 20:994–1002.

18 Angold A, Costello EJ, Erkanli A. Comorbidity. J Child Psychol Psychiatry 1999; 40:57–87.

19 Luby JL, Heffelfinger AK, Mrakotsky C. The clinical picture of depression in preschool children. J Am Acad Child Adolesc Psychiatry 2003; 42:340–348.

20 Weiss L. *Attention deficit disorder in adults*. Dallas, TX: Taylor Publishing Co.; 1992.

21 Thakkar Vatsal, Adler Lenard. Depression and ADHD: what you need to know: ADHD and depression. Medscape Psychiatry 2006; 11.

22 Diler RS, Daviss WB, Lopez A, Axelson D, Iyengar S, Birmaher B. Differentiating major depressive disorder in youths with attention deficit hyperactivity disorder. J Affect Disord 2007; 102 (1–3): 125–130.

23 Turgay A, Blanchard J, Ng D. Comorbidities in child and adolescent major depression. Annual Meeting of the American Psychiatric Association, San Francisco, CA, 2003; pp. 270.

24 Turgay A, Ansari R, Schwartz M. Comorbitiy differences in ADHD throughout the life cycle, Paper. Scientific and clinical report session, American Psychiatric Association Annual Scientific Meeting, Atlanta, GA, 2005; pp. 66–67.

25 Brunsvold GL, Oepen G, DeYoung CG, af Klinteberg B. Comorbid depression and ADHD in children and adolescents. Psychiatric Times 2008; 25(10). Available at: *http://www.psychiatrictimes.com/adhd/article/10168/1286863*.

26 Biederman J, Mick E, Faraone SV, Martelon M, Westerberg D, Spencer TJ, *et al*. Influence of gender on attention deficit hyperactivity disorder in children referred to a psychiatric clinic. Am J Psychiatry 2002; 159:36–42.

الملخص العربى

يعد نقص الأنتباه وفرط النشاط الحركى من أكثر الأمراض شيوعا وسط الأطفال0 وكذلك يعد الأكتئاب أحد أخطر الأمراض التى يتعرض لها الأطفال خاصة فى وجود مرض نقص الأنتباه 0وكيفية تشخيص وعلاج المرضين تعتبر أحد النقاط التى تحتاج إلى البحث0

الوسيلة: لذا يبحث هذا البحث عن الأكتئاب كمرض أو عرض لدى عينة من الأطفال الذين يعانوا من مرض فرط الحركة ونقص الأنتباه وحاول الباحثون إيجاد عوامل ومظاهر تساعد على تشخيص الأكتئاب لدى هؤلاء الأطفال

النتائج: وقد توصل الباحثون أن 27,1 % من عينة البحث تعانى من مرض الأكتئاب بالأضافة لفرط النشاط الحركى وقد اتضح أن المرض أكثر فى مرضى نقص الأنتباه وعند الأناث أكثر من البنين ويتفق هذا مع نتائج الأبحاث السابقة0

وقد أتضح من خلال البحث مدى انتشار الأكتئاب عند هؤلاء المرضى ومن ثم أهمية البحث عن المرض وإدراجه فى خطة العلاج عند هؤلاء الأطفال0