

Screening for ADHD in a Sample of Egyptian Adolescent School Students

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Abstract

Objective: To screen for ADHD in a sample of Egyptian adolescent students, and study the distribution of different subtypes of ADHD, associated comorbidities, and sociodemographic correlates. **Method:** A total of 925 adolescents were randomly selected and screened by the Conners-Wells' Adolescent Self-Report Scale–Short form (CASS:S), and potential cases were further assessed by the Kiddie Schedule for Affective Disorders and Schizophrenia–Present and Lifetime versions (K-SADS-PL). **Results:** A total of 87 students (9.4%) had potential ADHD diagnosis with evident preponderance in boys (13.8%, $n = 58$) than in girls (5.8%, $n = 29$) with a ratio of 2:1 ($p = .000$, $\chi^2 = 17.328$). The hyperactive-impulsive subtype comprised the majority of cases (54.7%, $n = 41$). Psychiatric comorbidity was invariably present (85.1%, $n = 74$). Nearly half the cases had poor academic achievement (43.7%, $n = 34$). Positive correlates included family history of psychiatric disorders, the order of birth, and parental disharmony. **Conclusion:** ADHD is prevalent in Egyptian adolescents and is associated with high psychiatric comorbidity and a pronounced effect on academic performance. (*J. of Att. Dis.* XXXX; XX(X) XX-XX)

Keywords

adolescence ADHD, screening, comorbidity, CASS:Short, K-SADS

Introduction

Adolescents with ADHD are commonly faced with substantial challenges, especially in the middle school years because of a myriad of causes; as the increased cognitive demands in schools, the struggle for social independence and problems in peer relationships (Wolraich et al., 2005).

The recognition of ADHD symptoms in adolescence is difficult as symptoms tend to be more subtle with less evident hyperactivity, and the associated high rates of psychiatric comorbidity may surface and mask the disorder. Hence, screening for ADHD in adolescence is of significant importance (Barkley, Anastopoulos, Guevremont, & Fletcher, 1991).

Studies on adolescent ADHD in Egypt are scarce; hence, we aimed to study the prevalence of ADHD in both male and female adolescent students, and its associated psychiatric comorbidities and sociodemographic correlates.

Participants and Method

One thousand five students aged between 12 and 15 years were selected by multistage random sampling from preparatory schools from two educational districts in Eastern Cairo representing both high (Heliopolis) and low social

classes (Mataria). Written informed consents were signed by the students' guardians. Eighty students dropped out because of not completing the interview or refusal of either the participant or guardian.

The study was conducted in two stages. In the first stage, students were assessed by a devised semi-structured interview covering the sociodemographics, and the psychiatric and family history, and incorporating the social class assessment scale (Fahmy & El-Sherbini, 1983). We conducted a free-style diagnostic interview based on the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*; American Psychiatric Association [APA], 1994) criteria to reach preliminary psychiatric diagnosis. The academic achievement and school performance for students during a 3-month period were estimated by schoolteachers and subsequently recorded by researchers. The authors thoroughly revised students' medical files at students' health insurance clinics. Participants were

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further assessed by the Conners-Wells' Adolescent Self-Report Scale–Short form (CASS:S; Conners, 2002).

In the second stage, those who scored 65 or above on CASS:S were considered potential cases of ADHD (Conners, 2002). They were subjected to the Kiddie Schedule for Affective Disorders and Schizophrenia–Present and Lifetime version (K-SADS-PL; Kauffman et al., 2000) and the Conners-Wells' Adolescent Self-Report Scale–Long Form (CASS:L; Conners, 2001).

The administration of both the CASS:S and CASS:L (Conners, 2001), and K-SADS-PL (Kauffman et al., 1997), was carried out by a trained bilingual psychiatrist.

Data collected were analyzed using the Statistical Package for the Social Sciences (SPSS version 15.0).

Results

The studied sample comprised of 925 students, 421 boys (45.51%), and 504 girls (54.48%). The mean age of participants was 12.9 ± 0.85 years, with an age range of 11 to 13 years. The mean number of sibs was 2.29 ± 1.22 .

On screening with the CASS:S, 87 students (9.4%) had a potential ADHD diagnosis (Figure 1). They were significantly older in age ($T = -2.706, p = .007$). They were commonly boys ($\chi^2 = 17.328, p = .000$); were higher in order of birth, being 4fourth or more ($\chi^2 = 13.947, p = .000$); experienced more natal or early postnatal problems ($\chi^2 = 8.027, p = .045$); came from disharmonious families with parental discord ($\chi^2 = 12.113, p = .001$); and have family history of psychiatric diagnosis ($\chi^2 = 6.621, p = .01$). There were no statistical significant differences between high (10.4%, $n = 44$) and less affluent (8.5%, $n = 43$) education zones ($\chi^2 = .95, p = .33$). Other psychosocial factors were not significantly different as described in Table 1.

To adjust for potential confounding factors, we used multiple step regression analysis to determine putative risk factors for ADHD in the current sample (Table 2). In order of significance, three risk factors were identified: family history of psychiatric disorders (beta coefficient = .252, $t = 3.514, p = .000$), higher order of birth, being the fourth or more (beta coefficient = .099, $t = 3.019, p = .003$), and having parental discord (beta coefficient = .077, $t = 3.317, p = .04$).

We used the K-SAD-PL to confirm the diagnosis of ADHD. Twelve students (13.8%) had significant scores on CASS:S, but had only subthreshold diagnosis of ADHD according to K-SAD-PL. The gender difference within this group was statistically significant, where 11 boys compared with 1 girl had subthreshold symptoms ($\chi^2 = 3.915, p = .04$).

On the K-SAD-PL, the hyperactive-impulsive subtype was the most commonly recorded (54.7%, $n = 41$),

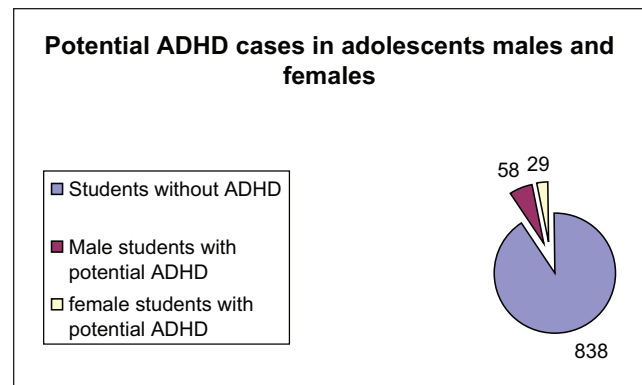


Figure 1. Number of potential ADHD cases in the sample of adolescents.

followed by the combined subtype (30.7%, $n = 23$), and finally, the inattentive subtype (14.7%, $n = 11$). Gender differences featured significantly in ADHD subtyping ($\chi^2 = 21.7, p = .000$). Compared with girls, the boys showed more hyperactive-impulsive subtype (72.3%, $n = 34$ vs. 25%, $n = 7$), and less inattentive (2.2%, $n = 1$ vs. 35.7%, $n = 10$) and combined subtypes (25.5%, $n = 12$ vs. 39%, $n = 11$). There were no statistically significant differences among the subtypes between high and less affluent areas ($\chi^2 = 1.38, p = .501$).

Psychiatric comorbidity (Figure 2) was present in 74 (85.1%) of students with potential ADHD. Anxiety- and stress-related disorders were the commonest seen (36%, $n = 32$). Other diagnoses encountered were conduct and oppositional defiant disorders, mood disorders, adjustment disorders, enuresis, substance abuse disorders, eating disorders, and Tic disorders.

The assessment of ADHD severity by the CASS:L revealed that the majority of cases were in the mild range (83.9%, $n = 73$). Severe cases comprised 10.3% ($n = 9$), and barely 5.7% ($n = 5$) were in the moderate range.

Nearly half of the students with potential ADHD (43.7%, $n = 34$) had poor academic achievement, while the performance of 39% ($n = 38$) was described by their teachers as “fair,” and 17.2% ($n = 15$) as high. Poor scholastic achievement was observed in 8 (88.9%), 4 (80%), and 22 (30.1%) in severe, moderate, and mild ADHD, respectively ($\chi^2 = 15.58, p = .004$).

Discussion

Although the prevalence of ADHD in younger children has received extensive interest, adolescents and adults were relatively neglected (Cuffe et al., 2001; Skounti, Philalithis, & Galanakis, 2007; Skounti et al., 2010). This poses an urgent need to address adolescents, who were out of focus

Table 1. The Socio Demographic Data of Students With ADHD Described in Comparison With the Rest of the Group.

Sociodemographic variables	Students without potential ADHD (n = 838)	Students with potential ADHD (n = 87)	Statistical test
Age in years (<i>M</i> ± <i>SD</i>)	12.88 ± 0.866	13.4 ± 0.7	$t = -2.706^*$, $p = .007$
Sex (male/female)	363/475	58/29	$\chi^2 = 17.328$, $p = .000$
Number of sibs	2.26 ± 1.18	2.54 ± 1.5	$t = 1.69$, $p = .095$.
Sibling size			
Equal or less than three	731 (87.2%)	74 (85.1%)	$\chi^2 = 0.33$, $p = .566$
More than three	-107 (12.8%)	13 (14.9%)	
Order of birth			
Third or less	762 (90.9%)	68 (78.2%)	$\chi^2 = 13.947$, $p = .000$
Fourth or more	76 (9.1%)	19 (21.8%)	
History of consanguinity			
Negative	- 790 (85.4%)	-75 (86.2%)	$\chi^2 = 3.4$, $p = .45$
Second or third grade	-135 (14.5%)	-12 (13.8%)	
Social class			
High and high middle	-:627 (74.8%)	-58 (66.7%)	$\chi^2 = 3.3$ 12, $p = .346$
Middle	-88 (10.5%)	-14 (16.1%)	
Low	-68 (8.1%)	-8 (9.2%)	
Very low	- 55 (6.6%)	-7 (8%)	
Parental separation	-96 (11.5%)	-13 (14.9%)	$\chi^2 = .922$, $p = .337$
Parent disharmony	-81 (9.7%)	-19 (21.8%)	$\chi^2 = 12.113$, $p = .001$
Family history of psychiatric disorders	-116 (13.8%)	-21 (24.1%)	$\chi^2 = 6.621$, $p = .01$
ADHD symptoms in family	68 (8.1%)	14 (16.1%)	$\chi^2 = 6.2$, $p = .013$
Perinatal problems			
No prenatal problem:	438 (52.3%)	50 (57.5%)	$\chi^2 = 8.027$, $p = .045$
Natal problem	264 (31.5%)	16 (18.4%)	
Postnatal problem	115 (13.7%)	17 (19.5%)	
Natal and postnatal problems.	21 (2.5%)	4 (4.6%)	
Developmental delay	-190 (22.7%)	-27 (31%)	$\chi^2 = 3.069$, $p = .08$

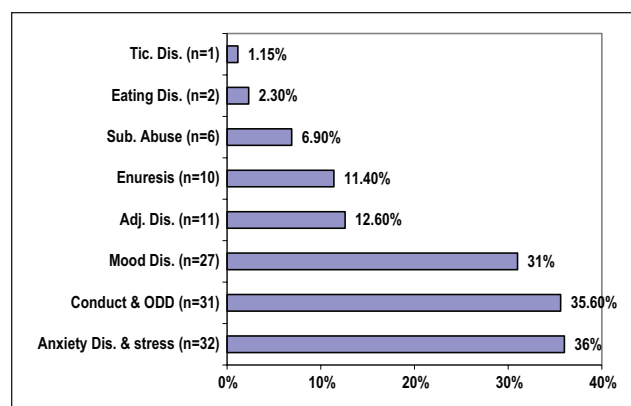
Table 2. Putative Risk Factors for Potential ADHD in Adolescents Described Using Regression Analysis.

Variables	Beta coefficient	t	p value
Family history of psychiatric problems	.252	3.514	.000
Being fourth or more in order of birth	.099	3.019	.003
Parental troubles	.077	3.317	.021

in many studies. As far as we know, we are the first to address screening of ADHD in adolescents in Egypt.

Prevalence of ADHD

On screening by CASS:S, the prevalence of ADHD was 9.5% ($n = 87$), which expectedly decreased to 8% ($n = 75$) on the K-SAD-PL. These rates do not deviate from some regional and international studies. Studies in the Arab countries reported rates between 7.4% (Attia, Tayel, &

**Figure 2.** The psychiatric comorbidity encountered in potential cases with ADHD.

Mounier, 2000) and 9.4% (Bener, Al Qahtani, & Abdelaal, 2006) in Egypt and Qatar, respectively. Similar were the rates in some western studies ranging from 7.4% to 9.9%

(Barbarelli et al., 2002; Froehlich et al., 2007; Graetz, Sawyer, Hazell, Arney, & Baghurst, 2001; Hudziak et al., 1998; Smalley et al., 2007).

Literature Analysis Shows Heterogeneity in the Prevalence Rates of ADHD

Much lower prevalence rates of ADHD in adolescents were reported by some studies. These ranged between 2.2% and 4.1% (Costello, Mustillo, Erkanli, Keeler, & Angold, 2003; Ford, Goodman, & Meltzer, 2003; Orvaschel, Rosenberg, & Keid, 1989; Simonoff et al., 1997). On the contrary, higher prevalence rates between 16.1% and 11.3% were reported in international literature (Nolan, Gadow, & Sprafkin, 2001; Pineda, Lopera, Palacio, Ramirez, & Henao, 2003; Rowland et al., 2001). High regional prevalence of 14.8% was detected by Bu-Haroon, Eapen, and Bener (1999) in the United Arab Emirates.

In systematic review, Polanczyk, de Lima, Horta, Biederman, and Rohde (2007) reached the conclusion that rate variability was only detected between studies conducted in the west and those conducted in the Middle East (Nikapota, 1991). However, this seems to be an artifact because of the small number of studies in those regions. It appears that the aforementioned heterogeneity is a product of the methodological differences across studies, characteristics of the participants, criterion differences between the current International Classification of Diseases, 10th revision (ICD-10) and *DSM-IV* resulting in higher prevalence with the latter, and the different cut-off points of screening and diagnostic scales (Baumgaertel, Wolraich, & Dietrich, 1995; Skounti et al., 2007; Wolraich et al., 1996; Wolraich et al., 2005).

Another influential factor in rate variability may be the source, reliability, and validity of data. The reliability of diagnostic information from children increases with age, whereas the reliability of the parent's report decreases (Barkely et al., 1990; Edelbrock, Costello, Dulcan, Kalas, & Conover, 1985). Moreover, there is a decline in the amount of agreements, and hence the validity, between adolescents and their parents with increasing age (Kazdin, 1989; Lewinsohn, Hops, Roberts, Seeley, & Andrews, 1993).

ADHD prevalence might be exaggerated in some environments and that cultural factors could play a role in yielding higher prevalence rates (Kuruppuarachchi & Wijeratne, 2004). For example, families and teachers in Egypt are usually overprotective and authoritative, with strong emphasis on obedience and discipline. This may skew response rates toward high prevalence.

Moreover, higher reports may be a result of the undue emphasis on studying, where Egyptian children are given more homework, and tend to spend more time receiving after-school tutoring, than those in the West. This may

decompensate subthreshold cases and impose huge challenges on those with ADHD and subsequently increasing reported rates. This is relatively similar to that reported in the Chinese culture (Ho, et al., 1996; Lam & Ho, 2010).

Research consistently reported gender differences in the prevalence of ADHD and its subtypes, where expression of ADHD is more common in males than in females (Cuffe et al., 2001; Erşan, Doğan, Doğan, & Sümer, 2004; Pineda et al., 2003; Rowland et al., 2001). Similarly, in the current study, the prevalence rate in boys was 13.8%, while that in girls was 5.8% with a ratio of 2:1. Boys may be more vulnerable to ADHD due to the possible expression of different genes in boys as compared with girls (Todd et al., 2003). Some argue that the difference may be due to the lower rates of comorbid disruptive behavior (Barkely, 2004; Ruchkin, Lorberg, Kuposov, Schwab-Stone, & Sukhodolsky, 2008) and the less overt manifestations of inattentive type of ADHD in girls (Biederman et al., 2002). Moreover, females in some settings are underrepresented and rates may be profoundly affected by referral bias, especially in the conservative Middle Eastern cultures.

With regard to the subtypes of ADHD, we found higher distribution of hyperactive-impulsive over the inattentive subtype. Studies reported varied results in this respect. While the same finding was replicated by some studies (Cuffe et al., 2001; Lahey et al. 2001; Dong, Oakland, Jackson, & Glutting, 2008; DuPaul et al., 2001; Erşan et al., 2004; Pineda et al., 2003; Rowland et al., 2001). Other studies reported higher prevalence of the inattentive type (Froehlich et al., 2007; Pineda et al., 2003; Smalley et al., 2007), whereas some reported the preponderance of the combined type (Byun et al., 2006).

Inattentiveness usually influences academic achievement to a greater extent than hyperactivity (Lahey et al., 1994; McBurnett, Pfiffner, & Frick, 2001).

Similarly, it was speculated that the hyperactive-impulsive type is more representative in our sample, because many of ADHD children with the inattentive type failed to join high school (Yang, Jong, Hsu, & Tsai, 2007).

Our results revealed that boys with ADHD are rated more hyperactive-impulsive, while girls are rated more inattentive and combined subtype. This is nearly similar to data obtained from Dong et al. (2008), Montiel-Nava et al. (2002), and Pineda et al. (2003).

Psychosocial Correlates of ADHD

ADHD appears to be associated with considerable psychosocial adversity. This includes marital discord, low social class, large family size, paternal criminality, and maternal mental disorder (Rutter, Cox, Tupling, Berger, & Yule, 1975). Some of these factors were observed in the current study using multiple regression analysis that highlighted three psychosocial variables: the presence of family history

of psychiatric illness, the order of birth, and the presence of marital disharmony (Table 2).

International studies noted the higher prevalence of psychopathology in the parents and other relatives of children and adolescents with ADHD (Chronis et al., 2003). In particular, higher rates of ADHD, conduct problems, substance abuse, and depression were repeatedly observed in these studies. On the regional level, a Lebanese study reported that 42.1% of participants with ADHD had at least one biological parent with symptoms of ADHD (Fayyad, Sadek, & Cordahi, 2001). Furthermore, in Iran, Ghanizadeh, Mohammadi, and Moini (2008) found high rates of major depressive disorders in parents of ADHD cases. Moreover, parental psychopathology may contribute to the severity of ADHD and worsen the prognosis (Chazan et al., 2011).

Psychiatric illness within the family has its bearing on ADHD. Distressed parents or those with psychopathology often lack the motivation or organization to help their ADHD children and adolescents in the proper intervention, or to complete tasks of parental training or behavioral management techniques (Chronis, Jones, & Raggi, 2006). Hence, it is important to extend screening to parents and carers to address their psychopathology and support them in pursuing their role.

Pressman et al. (2006) described a strong link between impairment in ADHD and parental conflict and disharmony. This link was interpreted in the context of insecure attachment with caregivers (Counts, Nigg, Stawicki, Rappley, & von Eye, 2005; Kreppner, O'Connor, Rutter, & English and Romanian Adoptees Study Team, 2001), and was found to be related to a poor response to behavioral modification and pharmacological treatment (Burt, McGue, Iacono, & Krueger, 2006). It is hypothesized that the family dysfunction can serve as a risk factor for the development and exacerbation of the symptoms (Pheula, Rohde, & Schmitz, 2011).

Egypt is a heavily populated country of more than 92 million. Higher order of birth usually reflects lower psychosocial status, higher parental age at birth, and possible less parental attention (Lam & Ho, 2010). These factors can contribute to higher prevalence of ADHD in this group (Bishry et al., 2013).

Thus, the interactions of these factors robustly suggest that multiple causal pathways, which include genetic and environmental factors, interact in several ways producing the behavioral phenotype of ADHD (Biederman, 2005).

Psychiatric Comorbidity

Seventy-four (85.1%) of ADHD students had psychiatric comorbidity. This figure closely resembles results of 85.1%, 68.3%, and 76.2% obtained from Byun et al. (2006), Jensen et al. (2001), and Wilens et al. (2002), respectively. The most common diagnoses encountered were as follows:

anxiety- and stress-related disorders in 32 (36%), disruptive behavior disorder in 31 (35.6%), and mood disorders in 27 (31%) students with ADHD. It seems that about one third of students with ADHD have one form or another of these three disorders. Reports about psychiatric comorbidities of ADHD support that the most common comorbidity is disruptive behavior disorder (Byun et al., 2006), anxiety-related disorders (Pineda et al., 2003), or affective disorders (Cuffe et al., 2001).

Scholastic Achievement

Poor scholastic achievement was strongly associated with ADHD students. Thus, ADHD participants are at greater risk of underachievement, school dropout, and lower grade points (Lam & Ho, 2010). An explanation for the poor academic achievement may be due to their inattentive, impulsive, and restless behavior in the classroom (Dong et al., 2008; Frazier et al., 2004; Mostafa, El-Shahawi, & Mokhtar, 2009; Samuelsson, Lundberg, & Herkner, 2004). It is noteworthy to say that we found that scholastic achievement decreased with the increased severity of ADHD.

Limitations

Although this study came out with significant findings, it is not without limitations. We depended solely on adolescents in rating ADHD; the use of more than one informant like parents, private tutors, and schoolteachers would be more accurate. More detailed information about the family function and peer relationships would make us understand more the dimension of adolescents' problems with ADHD. Therefore, other researchers need to increase the size of their sample to include urban, rural, and different ethnic subgroups.

Declaration of Conflicting Interests

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