

Socio-Demographic and Clinical Profiles of Adult Attention Deficit Hyperactivity Disorder Patients in a University Hospital in Oman

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ABSTRACT: *Objectives:* Although attention deficit hyperactivity disorder (ADHD) is typically considered a condition affecting children, there is evidence that children diagnosed with ADHD continue to suffer from this condition after the age of 18. This study aimed to describe the socio-demographic and clinical characteristics of adult ADHD patients in Oman and evaluate their association with the disorder's different subtypes. *Methods:* This retrospective study included adult patients with ADHD from the outpatient clinic at Sultan Qaboos University Hospital, Muscat, Oman. Data from medical records from January 2018 to April 2020 were collected. Socio-demographic characteristics, clinical profiles and psychiatric comorbidities were examined. *Results:* This study included 100 adults who fulfilled the standard diagnosis of ADHD, with 54.0% (n = 54) and 46.0% (n = 46) from the inattentive and combined subtypes, respectively. It was found that ADHD was more prevalent among males (64.0%) than females (36.0%), with the inattentive subtype being more predominant among females. The ADHD patients with the inattentive subtype were associated with comorbid substance use disorders (odds ratio [OR] = 11.29; P = 0.049), personality disorders (OR = 7.96; P = 0.017) and major depressive disorder (OR = 15.94; P = 0.002) compared to patients predominantly with the combined subtype. *Conclusion:* This study echoes the findings from the current literature that adult patients with ADHD commonly have comorbid psychiatric disorders, leading to significant functional impairment. Psychiatric comorbidities must be identified and urgently treated for better clinical and functional outcomes in adult patients with ADHD.

Keywords: Neurodevelopmental Disorder; Attention Deficit Hyperactivity Disorder; Adult; Comorbidity; Psychiatry; Oman.

ADVANCES IN KNOWLEDGE

- This is the first report from Oman and the Gulf Cooperation Council region focusing on attention deficit hyperactivity disorder (ADHD) among adults.
- This study compares the clinical characteristics of patients from the Middle East to those from the West.
- Furthermore, this study explores a new area of research and encourages further studies among similar cohorts.

APPLICATION TO PATIENT CARE

- As Sultan Qaboos University Hospital is a new and adult-only ADHD service in Oman, this study raises awareness of this condition among patients and clinicians.
- Further expansion of services, as a result of this study, have clearly indicated the complexity of the comorbidities presenting in those with adult ADHD.

ATENTION DEFICIT HYPERACTIVITY DISORDER (ADHD) is a common childhood neurodevelopment disorder, which manifests as inattention, hyperactivity and impulsivity and persists for at least six months in at least two settings (e.g. school, home or social situations).¹ These clinical symptoms must have an impact on social, academic or occupational functioning to warrant a clinical diagnosis of ADHD. According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5),¹ the symptoms of inattention are evident in children in their schoolwork, as the child fails to pay close attention to details, makes repetitive careless mistakes, gets easily distracted and has

difficulty sustaining attention. Whereas the symptoms of hyperactivity and impulsivity include difficulty remaining seated in the classroom, fidgeting, blurting out answers before questions have been completed and difficulty waiting their turn in activities or games. However, the presentation of ADHD symptoms among adults differs from that in children as the cluster of symptoms related to hyperactivity reduces over time and manifests as restlessness. Moreover, inattention as a symptom in adults with ADHD may manifest as difficulty meeting deadlines at college or work or forgetting appointments.^{2,3} The DSM-5 outlines three subtypes of ADHD: (1) primarily hyperactive and impulsive, (2) primarily inattentive and (3) combined.

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Each of these subtypes is distinguished by a set of clinical symptoms in the diagnostic criteria.

Research has shown that 30–50% of those diagnosed with ADHD in childhood continue to experience the core symptoms of the condition after the age of 18.⁴ In the USA, the prevalence of adult ADHD is estimated to be more than 4%.⁵ Moreover, males are generally more likely to be diagnosed with ADHD than females, with a male-to-female ratio of approximately 3:1 in clinical samples and females predominantly presenting with the inattentive subtype.⁶ As with children with ADHD, many adults with ADHD are diagnosed with comorbid psychiatric disorders such as mood and anxiety disorders, personality disorders and substance use disorders (SUD).⁷ Many undiagnosed ADHD cases in adults present when they come into contact with mental health services due to other psychiatric disorders and treating the comorbid condition requires treatment independent from that of ADHD.⁸

The adult ADHD clinic at the Sultan Qaboos University Hospital (SQUH) began as a pilot project to cater to the needs of the adults with symptoms of ADHD and help those using the service aimed at younger individuals' transition to the adult ADHD services.⁹ This study sought to address the current gap in the literature as no studies from Oman, or its neighbouring countries, have compared the clinical characteristics of patients from the Middle East to those from the West or examined the psychiatric comorbidities among adult ADHD patients. Examining potential associations is essential for diagnostic precision and accuracy and better clinical and functional outcomes.

Methods

This retrospective cohort study included adult patients diagnosed with ADHD in an outpatient clinic at Sultan Qaboos University Hospital (SQUH), Muscat, Oman. This adult ADHD clinic is the only ADHD clinical service in the country. All patients between the ages of 18 and 60, who attended the clinic over a period of two years from January 2018 to April 2020, had a full psychiatric evaluation and fulfilled the diagnostic criteria of adult ADHD based on the DSM-5 were included.¹⁰ This diagnosis requires the presence of a set of clinical symptoms for a specific period and an impact on social, academic or occupational function. The cohort of patients in this study was a mixture of those who were either diagnosed for the first time before the age of 18 but continued to experience symptoms into adulthood, or accessed the service for the first time after turning 18. Similarly, some adults

with ADHD were parents or first-degree relatives of children with ADHD who were never diagnosed due to a lack of awareness. Patients who had comorbidities of intellectual disability, epilepsy and autism spectrum disorders were excluded from the study.

The following variables were obtained from each patient: age, gender, marital status (single, married and divorced), educational level, occupation, history of substance misuse, family history of ADHD, history of self-harm/suicidal attempt and forensic history. The psychiatric comorbidities were classified as bipolar affective disorder, schizophrenia, obsessive-compulsive disorder, major depressive disorder, anxiety disorder and personality disorder. The presenting symptoms were explored to determine the subtype of ADHD: predominantly inattentive presentation, predominantly hyperactive-impulsive presentation or a combined presentation.

Descriptive statistics were used to explore the profiles of the patients with ADHD, according to their demographic and clinical variables. First, a univariate comparison was carried out between the ADHD subtypes (inattentive/hyperactive and impulsive versus combined), evaluated using a Chi-squared test, Fisher's exact test and Mann-Whitey U test to reveal the association and differences between the demographic and clinical variables. Following this, the bivariate (unadjusted) and multivariate (adjusted) regression analyses were used. In the regression model, the following significant variables were used in an attempt to identify the risk factors associated with ADHD subtypes while adjusted by each other: gender, age of diagnosis, comorbid SUD, personality disorders, major depressive disorder, anxiety disorder, sleep-wake disorders and history of self-harm/suicidal attempt. Data were analysed using the Statistical Package for the Social Sciences (SPSS), Version 23.0 (IBM SPSS Inc., Chicago, IL, USA). The level of significance was set at $P < 0.05$.

Ethics approval was granted by the College of Medicine and Health Sciences at Sultan Qaboos University, Muscat, Oman (MREC 2260). The study was conducted as per the Declaration of Helsinki and the American Psychological Association with regards to ethical human research, including confidentiality, privacy and data management.

Results

A total of 100 adult patients who had ADHD were included in this study, of which 54 (54.0%) were classified as the inattentive subtype and 46 (46.0%) the combined subtype. Of this sample, ADHD was noted to be more prevalent among males (64.0%) than females

Table 1: Demographic and clinical characteristics of adult attention deficit hyperactivity disorder in Oman (N = 100)

Characteristic	n (%)
Gender	
Female	36 (36.0)
Male	64 (64.0)
Marital status	
Single	92 (92.0)
Married	8 (8.0)
Job	
Unemployed	5 (5.0)
Employed	19 (19.0)
Student	76 (76.0)
Educational level	
School drop-out	21 (21.0)
High school diploma	66 (66.0)
Higher education	13 (13.0)
Age in years	
Median (range)	20.0 (18–47)
Mean \pm SD	22.6 \pm 6.4
Age of diagnosis in years	
Median (range)	13.0 (6–21)
Mean \pm SD	13.8 \pm 3.0
ADHD subtype	
Inattentive	54 (54.0)
Combined	46 (46.0)
Comorbidity	
Substance use disorders	10 (10.0)
Psychosis	1 (1.0)
Bipolar affective disorder	3 (3.0)
Personality disorders	18 (18.0)
Major depressive disorder	28 (28.0)
Anxiety disorder	23 (23.0)
Obsessive-compulsive disorder	3 (3.0)
Sleep-wake disorders	15 (15.0)
Family history of ADHD	52 (52.0)
History of self-harm/suicidal attempt	9 (9.0)
History of forensic record	6 (6.0)
History of hospital admission	6 (6.0)
Name of prescribed medication	
Methylphenidate	62 (62.0)
Atomoxetine	19 (19.0)
Other medication	19 (19.0)

SD = standard deviation; ADHD = attention deficit hyperactivity disorder.

(36.0%) and the average age of patients was 22.6 ± 6.4 years. Almost 80% ($n = 79$) of the adult patients with ADHD had a school education; 21% had dropped out of school. The average age of ADHD diagnosis was 13.8 ± 3.0 years. Major depressive disorder was the most commonly associated comorbidity among the ADHD patients (28.0%), followed by anxiety disorder (23.0%), personality disorders (18.0%), sleep-wake disorders (15.0%) and SUD (10.0%). More than 50% ($n = 52$) of the study participants had family members with an ADHD diagnosis. A small percentage of them had a history of self-harm/suicidal attempt (9.0%) and forensic records (6.0%). Over half of the participants (62.0%) had been prescribed methylphenidate stimulant therapy and the remainder (38.0%) had received non-stimulant therapy [Table 1].

The multivariate analysis indicated that some demographic and clinical characteristics demonstrated significant association with adult ADHD, specifically for the inattentive subtype. The model had a good-fit according to the Hosmer–Lemeshow test ($R^2 = 1.934$; $P = 0.963$), Nagelkerke's R^2 was 0.676 and the overall predicting power (sensitivity = 0.852, specificity = 0.848) was 0.850. For adult patients with ADHD, female participants were 14 times ($OR = 14.47$; $P < 0.001$) more likely to be diagnosed with the inattentive subtype than male patients. Patients with the inattentive subtype were significantly associated with comorbid SUD ($OR = 11.29$; $P = 0.049$), personality disorders ($OR = 7.96$; $P = 0.017$) and major depressive disorder ($OR = 15.94$; $P = 0.002$) compared to patients predominantly with the combined subtype [Table 2].

Discussion

The current study evaluated the clinical subtypes of adult patients with ADHD and their association with psychiatric comorbidities in Oman, making it the first report from this region to highlight the clinical characteristics of adult patients with ADHD. In this study, the majority of patients were male, with a male-to-female ratio of approximately 1.8:1; this is in line with the consensus that males are more likely to be diagnosed with ADHD, with higher male-to-female ratios found among clinical than population-based samples.¹¹ This ratio discrepancy tends to decrease with an increase in age.^{12,13} A study among children with ADHD in Oman reported a male-to-female ratio of 3.6:1, further supporting the aforementioned trend.¹⁴

Evidence has shown that there is a gender variation regarding the subtypes of ADHD, with females being diagnosed more often with the inattentive subtype,

Table 2: Analysis of attention deficit hyperactivity disorder subtypes and the association/difference of demographic and clinical measurements (N = 100)

Characteristic	n (%)		Univariate*	Multivariate [§]	
	ADHD subtype		P value	OR	P value
	Inattentive (n = 54)	Combined (n = 46)			
Gender					
Female	30 (55.6)	6 (13.0)	<0.001	14.47	<0.001
Male (ref)	24 (44.4)	40 (87.0)			
Marital status					
Single	51 (94.4)	41 (89.1)	0.465 [†]		
Married (ref)	3 (5.6)	5 (10.9)			
Job					
Unemployed	4 (7.4)	1 (2.2)	0.375 [†]		
Employed	9 (16.7)	10 (21.7)	0.619		
Student (ref)	41 (75.9)	35 (76.1)			
Educational level					
Below high school diploma	11 (20.4)	10 (21.7)	0.728 [†]		
High school	35 (64.8)	31 (67.4)	0.762 [†]		
Higher education (ref)	8 (14.8)	5 (10.9)			
Age in years					
Median (range)	21.5 (18–47)	19.0 (18–47)	0.548 [‡]		
Age of diagnosis in years					
Median (range)	13.0 (6–21)	14.0 (10–20)	0.006 [‡]	1.25	0.05
Mean ± SD	13.0 ± 2.9	14.8 ± 2.9			
Presence of comorbidity					
Substance use disorders	2 (3.7)	8 (17.4)	0.041 [†]	11.29	0.049
Psychosis	0 (0.0)	1 (2.2)	0.460 [†]		
Bipolar affective disorder	1 (1.9)	2 (4.3)	0.593 [†]		
Personality disorders	14 (25.9)	4 (8.7)	0.025	7.96	0.017
Major depressive disorders	25 (46.3)	3 (6.5)	<0.001	15.94	0.002
Anxiety disorders	18 (33.3)	5 (10.9)	0.008	2.6	0.271
Obsessive-compulsive disorders	1 (1.9)	2 (4.3)	0.593 [†]		
Sleep-wake disorders	13 (24.1)	2 (4.3)	0.006	6.28	0.1
Family history of ADHD	26 (48.1)	26 (56.5)	0.404		
History of self-harm/suicidal attempt	1 (1.9)	8 (17.4)	0.011 [†]	0.018	0.146
History of forensic record	2 (3.7)	4 (8.7)	0.410 [†]		
History of admission in a psychiatric unit	4 (7.4)	2 (4.3)	0.684 [†]		
Name of prescribed medication					
Methylphenidate	37 (68.5)	25 (54.3)	0.146		
Atomoxetine	7 (13.0)	12 (26.1)	0.095		

ADHD = attention deficit hyperactivity disorder; OR = odds ratio; SD = standard deviation.

*Using Chi-square test. [†]Using Fisher's exact test. [‡]Using Mann-Whitney U test. [§]Logistic regression (Hosmer-Lemeshow test: chi-square = 1.934; P = 0.963, Nagelkerke's R² = 0.676; sensitivity = 0.852, specificity = 0.848, overall = 0.850).

whereas male patients are usually diagnosed with the hyperactive/impulsive or combined subtype.¹⁵ Findings from the current study were consistent with the existing literature; of the 36 female patients diagnosed with adult ADHD, 83.3% ($n = 30$) were diagnosed with the inattentive subtype ($OR = 14.47$; $P < 0.001$) and 16.7% ($n = 6$) the combined subtype. Although male patients are commonly diagnosed with the combined or hyperactive/impulsive subtype of ADHD during childhood, data derived from a longitudinal study indicated that the natural trajectory of the condition leads to a decline in hyperactivity symptoms over time, with inattention and impulsivity remaining significantly present.¹⁶ Interestingly, in the current study, none of the patients were diagnosed with the predominantly hyperactive/impulsive subtype of ADHD, in agreement with currently emerging evidence that this particular subtype of ADHD is very rare among adults, raising doubts as to its validity.¹⁷

It is known that ADHD impacts the educational and socioeconomic outcomes of those affected.¹⁸ In the current clinical sample, 21.0% did not complete their high school diploma, which supports existing literature from Oman that dropping out of school is one of the negative ramifications of ADHD.¹⁴ Moreover, the presence of psychiatric comorbidity is the rule rather than the exception in patients with ADHD, leading to greater clinical and functional impairment.¹⁹ During childhood, ADHD is highly comorbid with oppositional defiant and conduct disorder, anxiety and mood disorders and specific learning disorder.²⁰ It is estimated that 80% of adults with ADHD have at least one comorbid psychiatric disorder. Despite this, ADHD remains underdiagnosed and undertreated in the adult population.²¹ Comparably, the current study's findings strongly suggest that ADHD in adults is highly comorbid with other mental health disorders. In this study, 10.0% of the adult patients with ADHD had SUD; although its association was significant ($OR = 11.29$; $P = 0.049$), its prevalence was lower compared to the current literature, which can be explained by the modest sample size.²² Personality disorders were reported in 18.0% of the participants in the current study ($OR = 7.96$; $P = 0.017$) which is consistent with another study from this field.²³ Furthermore, depression is highly prevalent among adult ADHD patients, with a prevalence of 16–31%, resulting in increased illness severity and functional impairment.²⁴ The current study's results confirm this as 28.0% of the patients were diagnosed with comorbid major depressive disorder ($OR = 15.94$; $P = 0.002$).

The study's strength is that it examined all adult patients attending the only ADHD clinical service in the country, the first study of its kind in the Arabian Gulf

to explore the clinical profile of adult ADHD and its associated psychiatric comorbidities. The limitations include the relatively small sample size and the chance that adults with milder symptoms of ADHD who may not have accessed the tertiary hospital service might have been missed. In addition, due to the small sample size, the associated factors identified in the logistic analysis were not used to assess determinants.

Conclusion

The main findings of this study showed that female patients were more likely to be diagnosed with the inattentive subtype of ADHD compared to male patients. Patients with the inattentive subtype of ADHD were significantly found to have other comorbid mental health conditions, such as SUD, personality disorders and major depressive disorder, compared to patients with predominantly the combined subtype. Therefore, psychiatric comorbidities must be identified and treated vigilantly for better clinical and functional outcomes in adult patients with ADHD.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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AUTHORS' CONTRIBUTION

HM designed the study and drafted the manuscript. SAH and SAJ collected the data, while SAH and MFC analysed the data and interpreted the results. NAB and FZ critically reviewed the manuscript and AAH revised it. All authors approved the final version of the manuscript.

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