

# Measurement of Impairment among Children with Attention Deficit Hyperactivity Disorder as Part of Evaluating Treatment Outcome

Ahmed M. Al-Ansari

## قياس درجة الاعتلال عند الاطفال ناقصي الانتباه وفرطى الحركة كجزء من عملية تقييم مخرجات العلاج

أحمد مال الله الانصاري

**المخلص:** الهدف: هذه الدراسة تقيم الاعتلال ومخرجات العلاج للأطفال ناقصي الانتباه وفرطى الحركة (ADHD) في العيادة الخارجية لوحدة الاطفال النفسية باستعمال عدة مصادر منها مقياس التقييم الشامل للأطفال (C-GAS). الطرق: تم إختيار عشرين طفلاً من سن (4-16) سنة بنظام تسلسلي في عام 2010 في عيادة وحدة الطب النفسي للأطفال - مستشفى الطب النفسي، المنامة، البحرين. تم تشخيص جميع الأطفال باضطراب نقص الانتباه وفرط الحركة حسب الدليل التشخيصي والإحصائي للاضطرابات النفسية (DSM-IV-TR) المرجعي الرابع. طبق مقياس التقييم الشامل للأطفال (C-GAS) على هؤلاء الأطفال بواسطة باحث محايد - لا يعرف الأطفال - مرهفي بداية العلاج ومرة أخرى بعد مرور سنة عليه. النتائج: لاحظ أولياء أمور الأطفال حدوث تحسن لدى جميع الأطفال. أظهرت نتائج قياس درجة الاعتلال بعد مرور سنة على العلاج باستخدام (C-GAS) حدوث تحسن ذو دلالة إحصائية لجميع الحالات ( $P = 0.001$ ) بينما لم يكن التحسن بنفس الدرجة عند الأطفال ذوي الاضطرابات المصاحبة الأخرى ( $P = 0.07$ ). الاستنتاج: يعتبر قياس التحسن باستخدام مقياس التقييم الشامل للأطفال (C-GAS) طريقة مناسبة للحصول على المعلومات وعليه فإن البحث ينصح باستخدامه في الأطفال المصابين باضطراب نقص الانتباه وفرط الحركة كجزء من العمل السريري العادي سواء في مرحلة التشخيص أو قياس مسار الحالة ومخرجات العلاج.

**مفتاح الكلمات:** اضطراب نقص الانتباه وفرط الحركة: تقييم المخرجات (الرعاية الصحية): البحري.

**ABSTRACT:** This study assesses the impairment and treatment outcome of children with attention deficit hyperactivity disorder (ADHD) in an outpatient child psychiatry clinic, using multiple sources, including the Children Global Assessment Scale (C-GAS). Methods: A total of 20 children, aged 4 to 16 years, were recruited serially in 2010 from the Child Psychiatric Unit of the Psychiatric Hospital, Manama, Bahrain. The children received a diagnosis of ADHD using the Diagnostic and Statistical Manual of Mental Disorders Text Revision (DSM-IV-TR). The children were assessed with the C-GAS by a blinded investigator, initially at the beginning of the treatment and then one year later. Results: The parents of the patients reported improvement in all cases; the improvement in impairment after one year, assessed using the C-GAS, was significant for all of the cases ( $P = 0.001$ ) and low for those with comorbidity ( $P = 0.07$ ). Conclusion: Measurement of improvement using the C-GAS was a suitable method of collecting data, and hence should be included in routine clinical practice for both ADHD diagnosis and outcome measurement.

**Keywords:** Attention Deficit Disorder with Hyperactivity; Outcome Assessment (Health Care); Bahrain.

**A**TTENTION DEFICIT HYPERACTIVITY Disorder (ADHD) has proved to be the most common disorder during childhood among the disruptive behaviour disorders.<sup>1-2</sup> The diagnostic criteria for ADHD in the Diagnostic and Statistical Manual of Mental Disorders, 4<sup>th</sup> edition, Text Revision (DSM-IV-TR), is based on the identification of symptoms and level of impairment. The factors significantly associated

with impairment, as measured by clinicians, were the severity of ADHD symptoms, peer relationship problems and comorbidity with conduct disorders.<sup>3</sup> Symptomatology and impairment are moderately related but not identical; they are likely to have distinct correlations and importance in the diagnosis and assessment of ADHD.<sup>4-6</sup> In addition, impairment may be more of a universal notion, as opposed to the potentially culturally biased

measurement of symptomatology.<sup>7</sup>

The measurement of functional impairment, in addition to symptomatology, is the focus of recent child psychiatric epidemiological studies. The findings of these studies add emphasis to impairment, measured using a multidimensional approach, in the daily activities essential to success in school and interpersonal relationships.<sup>8</sup> Such interest has contributed to the identification of a true prevalence rate by reducing the number of false positive cases and determining community needs. Impairment can be measured either by a diagnostic interview linked to individual symptoms, case vignettes, or by global ratings.<sup>2</sup> Global ratings have many advantages over other methods, as it is time-efficient, links impairment to clinical judgment, and forecasts service utilisation and community needs. The disadvantages of a global ratings system lie in its lack of specificity in linking impairment with individual symptoms.<sup>4,8</sup> Global rating scales, such as the Child and Adolescent Psychiatric Assessment (CAPA), Children's Global Assessment Scale (C-GAS), Global Assessment of Function (GAF) and Children's Problems Checklist (CPC), were used in several studies to assess the severity of functional impairment in preschool and school-aged children.<sup>9-12</sup> Both GAF and C-GAS rate the severity of impairment on a scale of 1-100, where lower scores indicate greater impairment. The prevalence rate of ADHD, using the C-GAS score of <61, varied in different studies. In the USA, figures were low (1.85%), medium (6%) or high (10%).<sup>2,13,14</sup> In Europe, the rate of ADHD using the same global rating scale was 7.9%; in the Netherlands, it was 5.6% and in the UK, 11.1%.<sup>15</sup>

Data on the rate of ADHD in Bahrain are not available; however, it is estimated that in 2011, 66 out of 348 new referrals received a diagnosis of ADHD at the Child and Adolescent Psychiatric Unit (CAPU) of the Bahrain Psychiatric Hospital. The CAPU is the main facility for children with psychological and behavioural problems in Bahrain. It has a busy outpatient clinic as well as an inpatient/day-care programme for 12 children. The unit programme utilises structured behavioural modification principles with a reward system within a token economy system. It provides a living and learning environment in which staff present the opportunity for modelling behaviour and counselling the family.

Global rating scales are not used routinely in clinical practice; the clinician comes to a clinical judgment by assessing the degree of impairment. This study aimed to examine the use of C-GAS in measuring initial functionality and treatment outcomes.

## Methods

The design of the study was to carry out a prospective analysis of events, by measuring both pre- and post-treatment variants one year apart.

The sample consisted of 20 children aged between 4 and 16 years who attended the CAPU outpatient clinic at the Psychiatric Hospital, Bahrain in 2010, who received a DSM-IV-TR diagnosis of ADHD, and who were supported by Conner's parent/teacher scale ratings. Children who were diagnosed with intellectual disabilities or seizure disorders in addition to ADHD were excluded from the study.

Children who met the criteria for admission into the study were recruited serially up to a total of 20 cases. The process of confirming the diagnosis took up to 6 weeks. C-GAS was used to assess the baseline of general functioning at the beginning of the treatment (Score 1) and was then repeated after one calendar year (Score 2). In addition, the investigator filled out a form specifically designed for the study, which evaluated the biodemographic data and treatment received. A psychiatrist who did not know the patients, but was familiar with the structure and functions of the CAPU, was used as a blind investigator for data collection. The investigator completed the initial and follow-up C-GAS assessments. Before deciding on the degree of impairment, the investigator collected information from multiple sources, such as: 1) clinical notes, and 2) parent, school teacher and therapist reports. The social class variable in the study was defined following a modified Hollingshead and Redlich five-point Likert-type scale, where 1 is the highest and 5 is the lowest social class.<sup>16</sup> The parents consented to their children's participation in the study, and the study was approved by the Ministry of Health's Research Ethical Committee. Psychiatric Hospital, Bahrain.

The C-GAS was published in 1983 by Shaffer *et al*, based on the Global Assessment Scale (GAS) with the anchor points adapted for children.<sup>17</sup> The

C-GAS allows the scorer to assimilate and synthesise their knowledge about many different aspects of the patient's social and psychiatric functioning, and subsequently condense this information into a single, clinically-meaningful index of the severity of the disturbance. The C-GAS is brief and easy to use, has clear instructions, substantial inter-rater reliability, and is a better measure of change and predictor of outcomes.<sup>12</sup> The C-GAS was used in this study to assess general function regarding the treatment or programme for the most impaired function, for one month in children between 4–16 years.<sup>17</sup> The cut-off point of 60 on a scale of 100 was considered to be a significant clinical disturbance.<sup>18</sup>

The Statistical Package for the Social Sciences (SPSS), Version 17 (IBM, Chicago, Illinois, USA) was used to analyse the data. A paired t-test was used to assess the differences between Score 1 and Score 2.

## Results

The sample biodemographic data is shown in Table 1. The male to female ratio was 4:1, the age range was 4–16 years and the mean age 7.9 years. More mothers had a college education compared to the fathers, 8 (40%) and 5 (25%) respectively. One father (5%) was unemployed while 12 (60%) of the mothers were homemakers. The majority of the cases were middle class (point 3, 13 [65%]); none of the cases were high class (point 1) or low class (point 5). The majority of the cases (95%) were from intact families. One fifth of cases (20%) were below grade-level in academic assessments. Comorbidity was present among 6 of the cases (30%). Out of the patients, 4 (20%) had specific learning difficulties and 2 (10%) exhibited conduct disorders. Five of the cases (25%) received medication only, while 6 (30%) underwent behaviour therapy and 9 (45%) received combined therapy.

Table 2 shows the pre- and post-intervention C-GAS scores. All children showed improvement in the degree of impairment after one year ( $P = 0.001$ ). Significant improvement was recorded among all three types of interventions; however, the difference between pre- and post-intervention scores for comorbid cases was not significant ( $P = 0.07$ ) in comparison to non-comorbid cases ( $P = 0.001$ ).

**Table 1: Sample biodemographic data**

Items	n	%
<b>Sex</b>		
Male	16	80
Female	4	20
<b>Father's education</b>		
Grades 7–12	15	75
College and above	5	25
<b>Mother's education</b>		
Grades 7–12	12	60
College and above	8	40
<b>Father's occupation</b>		
Middle management	7	35
Clerical job	4	20
Skilled/non skilled	8	40
Retired/unemployed	1	5
<b>Mother's occupation</b>		
Middle management	2	10
Clerical job	5	25
Skilled/non-skilled	1	5
Homemaker	12	60
<b>Social Class*</b>		
Point 2	3	15
Point 3	13	65
Point 4	4	20
<b>Family structure</b>		
Intact	19	95
Non-intact	1	5
<b>Patient academic level</b>		
At or above grade standard	6	30
Below grade standard	14	70
<b>Comorbidity</b>		
Present	6	30
Absent	14	70
<b>Treatment received</b>		
Medication	5	25
Behavioural therapy	6	30
Combined	9	45
<b>Total</b>	<b>20</b>	<b>100</b>

\* = Calculated using a modified Hollingshead and Redlich five-point Likert-type scale.

## Discussion

The cases studied here had similar characteristics to the reported data in terms of gender distribution, presence of learning problems and co-morbidity.<sup>19</sup> However, the social class representation of the cases seemed to be different, as middle class parents were more prevalent in comparison to the usual clinical population. Nearly half of the mothers had completed college education compared to 25% of fathers. Nine cases, (45%) received medication combined with behaviour therapy, while 6 (30%)

**Table 2:** Pre- and post-intervention (scores 1 and 2) Children's Global Assessment Scale scores

Items	n	C-GAS	C-GAS	P Value
		Score 1†	Score 2†	
All interventions	20	45.7	60.8	0.001
Medication only	5	43.2	63.8	0.02
Behavioural therapy	6	53.17	69.16	0.05
Medication & behavioural therapy	9	42.11	53.55	0.01
Comorbid	6	41.67	55	0.07
Non-comorbid	14	47.43	63.28	0.001
Non-comorbid	14	47.43	63.28	0.001

C-GAS = Children's Global Assessment Scale.

† = Mean scores used.

received only behavioural therapy and 5 (20%) medication alone. All cases attended their follow-up appointments a year later. The high level of compliance with treatment might be due to the high level of education and low level of divorce or separation among the parents.

The clinical improvement, as indicated by the application of C-GAS pre- and post-intervention scores, was in accordance with the improvement reported by parents and therapists. The improvement in impairment was not related to the type of intervention. The presence of complicating factors, such as comorbidity, had a negative effect on the effectiveness of the intervention; the presence of comorbidity complicates the list of problems and therefore expands the treatment objectives.

The use of C-GAS in the clinical practice proved to be an easy and appropriate measure of impaired function, as well as an indicator of outcomes, in addition to clinical assessment and the reports of parents and teachers.

There were limitations to this study, particularly 1) the small sample size did not allow for further analysis and evaluation of each type of intervention, and 2) the cases were not randomly assigned from the beginning of the study according to the severity or treatment received.

## Conclusion

The use of a global rating scale such as C-GAS is an appropriate method of collecting data with regards to measuring functional impairment on a longitudinal basis. C-GAS is easy to administer

and can be included in general clinical practice for the diagnosis and evaluation of outcomes in children with ADHD. Using C-GAS in addition to the usual clinical skills will add to the strength of data collection. Furthermore, a larger study with a strict protocol for the random assignment of cases according to their severity or the treatment received is recommended in future.

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