

Study of the Combined Effect of Sensory Integration Therapy with Cognitive Behavioural Therapy on Children with ADHD at Sohag University Hospital, Egypt

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Abstract

Background: ADHD is a neurobehavioral developmental disorder that is primarily characterized by, attention deficit, hyperactivity, and impulsivity that interfere with functioning and daily activities; method of treatment often involves medical treatment and a combination of behavioural and occupational modifications.

Aim: The present study aimed to assess the combined effect of sensory integration with cognitive behavioural therapy on children with ADHD.

Materials and methods: This single-blinded study was carried out from January 2019 to December 2019, at Paediatric Neurology Clinic, Sohag University Hospital. Sixty ADHD children were diagnosed by DSM 5, with age range between 4 and 6 years old of both genders, were included in the study. The participants were randomly divided into two groups. Group A, all patients included in this group were treated only by cognitive behavioural therapy. Group B patients included in this group were treated by combined cognitive behavioural therapy and sensory integration therapy. The session was for one hour per day for 3 days per week. Both groups were received intervention as per their group allotment for 6 months. All selected subjects in both groups were assessed with Conner's teacher rating scale before and after the intervention. Data were analysed by IBM SPSS version 20.0 using Chi-Square, Fisher's Exact Test, and the Mann-Whitney U Test.

Results: The mean of the total Conner's™ teacher scores in ADHD children treated with CBT before treatment and after treatment was respectively ($56.1 \text{ } \hat{A} \pm 6.76 \text{ } \hat{A}$) and ($33.67 \text{ } \hat{A} \pm 8.6 \text{ } \hat{A}$) with highly significant difference ($p \leq 0.001$). The mean of the total Conner's™ teacher scores in ADHD children treated with Combined therapy before treatment and after treatment was respectively ($54.33 \text{ } \hat{A} \pm 7.97 \text{ } \hat{A}$) and ($24.3 \text{ } \hat{A} \pm 8.53 \text{ } \hat{A}$) with highly significant difference ($p \leq 0.001$). The comparison between the post-treatment results among ADHD children included in both groups of the study as regard attention deficit and total Conner's™ scores showed a highly significant difference ($p < 0.001$).

Conclusion: Cognitive behavioural therapy is effective in reducing ADHD manifestations. However, combination therapy gives a better improvement in comparison to individual therapy in ADHD.

Keywords: Cognitive behavioural therapy • Sensory integration therapy • ADHD

Introduction

Attention Deficit Hyperactivity Disorder (ADHD) is a neurobehavioral developmental disorder that is primarily characterized by, attention deficit, hyperactivity, and impulsivity that interfere with functioning and daily activities [1]. ADHD affects around 5% of children worldwide with symptoms starting before 12 years of age and it is more common in males than females. Genetic factors, environmental factors, brain injuries, diet habits including food additives, and some potential toxins may be included as causes for ADHD [2,3].

The Diagnostic and Statistical Manual of Mental Disorders (DSM-V) is commonly used for ADHD diagnosis. DSM-V criteria have different symptoms for inattention, hyperactivity, and impulsivity. For ADHD diagnosis, at least 6 of the 9 symptoms in each category must be included. Persistence of symptoms for at least 6 months must appear before age of 12 years and present in 2 or more settings. Significant impairment in academic, social, and/or occupational functions must be observed inpatient. Symptoms don't occur during another mental disorder [4].

Method of treatment often involves a combination of behavioural modification, lifestyle changes, counselling, and medication. A study in 2005 found that the most effective ADHD management is combined management between medical & behavioural treatment, followed by medication alone, and behavioural treatment, while medication has not been shown to alter long-term outcomes as regard behaviour but give an effect when taken over a short term [5].

Psychological therapies used to treat ADHD include psych educational input, behaviour therapy, Cognitive Behavioural Therapy (CBT), interpersonal psychotherapy, family therapy, parent management training, school-based intervention, and social skills training. The most cost-effective treatment was medication, followed by behavioural treatment and combined treatment [6].

The neural organization of sensory information for functional behaviour is studied by different professions on diverse levels, such as occupational therapists and psychologists as a foundation for occupational performance and participation. It is used as a reference for the evaluation and treatment of people who have a disturbance in sensory processing. Patients with sensory consolidative dysfunction would face many problems regarding their special senses (vision, hearing, smell, taste, and touch), coordination, and motion against gravity [7]. The present study aimed to assess the combined effect of sensory integration with cognitive behavioural therapy on children with ADHD.

Materials and Methods

Patients and study design

Sixty cases with age range between 4 and 6 years old of both genders, were included in this Single blinded study, were diagnosed with ADHD at Paediatric Neurology Clinic at Sohag University Hospital, this study was carried in the period from January 2019 to December 2019 with the following criteria were excluded from the study, patients with ADHD on medical

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Received: 28-Jan-2022, Manuscript No. CSRP-22-52840; **Editor assigned:** 31-Jan-2022, PreQC No. CSRP-22-52840(PQ); **Reviewed:** 14-Feb-2022, QC No CSRP-22-52840; **Revised:** 21-Feb-2022, Manuscript No. CSRP-22-52840(R); **Published:** 28-Feb-2022, Doi:10.3371/CSRP.OAAS.022822.

treatment, patients with IQ below 85, physical disability including hearing or vision, hypothyroidism, mental retardation. Associated psychological disorders: Conduct disorder, mood disorder, bipolar and anxiety. Oral and written consent was taken from parents of patients included in the study and the study was approved by the ethics scientific committee at Sohag University hospital.

Methods of the study

The subjects were diagnosed with ADHD with DSM-V Criteria [8]. Intelligence Quotient (IQ) was evaluated by use of Stanford-Binet intelligence scales V all selected subjects were assessed with Conner's teacher rating scale before and after the intervention [9,10]. The participants were randomly divided into two groups. The randomization was done by using the closed envelop method at the first author setting. All selected subjects were randomly divided into two groups. Group A, all patients included in this group were treated only by cognitive behavioural therapy which includes self-instruction training and a problem-solving approach with dialogs, games, and activities [11].

Group B patients included in this group were treated by combined cognitive behavioural therapy and sensory integration therapy which include tactile (brushing), vestibular (swing, rolling), proprioception (pushing activities, playing with weights), Auditory (sing-song, loud and slow noise) and visual (focusing, following and tracking) input review [12].

The session was for one hour per day for 3 days per week. Both groups were received intervention as per their group allotment for 6 months. All selected subjects in both groups were assessed with Conner's teacher rating scale before and after the intervention [10].

Data were analysed using IBM SPSS Statistics for Windows version 20.0. Quantitative data were expressed as mean ± standard deviation, median and interquartile range. Qualitative data were expressed as numbers and percentages. The data were tested for normality using the Shapiro-Wilk test. The nonparametric Mann-Whitney test and Wilcoxon Signed Ranks Test were used for data that were not normally distributed. Chi-square (X2) test and Fisher's Exact Test were used for comparison regarding qualitative variables as appropriate. A 5% level was chosen as a level of significance in all statistical tests used in the study.

Results

Sixty ADHD children were included in this single-blinded study and divided into two groups. In Group A, 30 ADHD children received cognitive behavioural therapy and Group B, 30 ADHD children received combined therapy with comparable age and sex with no significant difference, respectively (p=0.802, p=0.706). The percentage of consanguinity among both groups (A and B) was respectively (50% and 40%) with no significant difference (p=0.604). Most of the children of both groups (A and B) had no history of NICU admission, respectively (23.3%, 20%) with no significant difference (p=0.686). The mean of IQ among the children treated with CBT was (92.5 ± 7.43) and that of children treated with "Combined therapy" (93.7 ± 6.79) with no significant difference (p=0.476) (Tables 1 and 2).

Table 1. Comparison between the study groups characteristics.

Characteristics	Group A (N=30)	Group B (N=30)	P-value	Significance
Gender	3 (10%)	5 (16.7%)	0.706	Non-significant
Female	27 (90%)	25 (83.3%)		
Male				
Age (year)	5.17 ± 0.69	5.12 ± 0.75	0.802	Non-significant
Mean (SD)	5 (4.5 – 6)	5 (4.5 – 6)		
Median (IQ range)				
Perinatal History			0.686	Non-significant
NICU	7 (23.3%)	6 (20%)		
Normal	23 (76.7%)	24 (80%)		

Note: P-value was calculated by Wilcoxon Signed Ranks Test.

Table 2. Comparison between the study groups regarding IQ.

IQ	Group A (N=30)	Group B (N=30)	P-value
Mean(SD)	92.5 ± 7.43	93.7 ± 6.79	0.476
Median(IQ range)	89.5 (88 – 97.5)	90.5 (88 – 101)	

Note: P-value was calculated by Wilcoxon Signed Ranks Test.

The mean of Conner's teacher scale among ADHD children treated with CBT as regard hyperactivity, impulsivity and attention deficit before treatment was respectively (21.37 ± 2.86), (16.47 ± 2.89) and (18.27 ± 3.72) in comparison to results as regard hyperactivity, impulsivity, and attention deficit after treatment was respectively (13 ± 4.09), (10.33 ± 2.95) and (10.63 ± 3.89) with highly significant difference (p ≤ 0.001). The mean of the total Conner's teacher scores in ADHD children treated with CBT before treatment and after treatment was respectively (56.1 ± 6.76) and (33.67 ± 8.6) with highly significant difference (p ≤ 0.001) (Table 3).

Table 3. Comparison between Conner's teacher scale measures of the Group A before and after treatment (No=30).

	Before	After	P-value
Hyperactivity	19.83 ± 3.33	10.03 ± 3.98	<0.001
Impulsivity	17.33 ± 2.79	7.73 ± 2.48	<0.001
Attention-deficit	17.17 ± 4.15	6.17 ± 3.67	<0.001
Total score	54.33 ± 7.97	24.3 ± 8.53	<0.001

Note: P-value was calculated by Wilcoxon Signed Ranks Test.

The mean of Conner's teacher scale among ADHD children treated with Combined therapy as regard hyperactivity, impulsivity and attention deficit before treatment was respectively (19.83 ± 3.33), (17.33 ± 2.79) and (17.17 ± 4.15) in comparison to results as regard hyperactivity, impulsivity and attention deficit after treatment were respectively (10.03 ± 3.98), (7.73 ± 2.48) and (6.17 ± 3.67) with highly significant difference (p<0.001). The mean of the total Conner's teacher scores in ADHD children treated with Combined therapy before treatment and after treatment was respectively (54.33 ± 7.97) and (24.3 ± 8.53) with highly significant difference (p ≤ 0.001) (Table 4).

Table 4. Comparison between Conner's teacher scale measures of the Group B before and after combined therapy (No=30).

	Before	After	P-value
Hyperactivity	19.83 ± 3.33	10.03 ± 3.98	<0.001
Impulsivity	17.33 ± 2.79	7.73 ± 2.48	<0.001
Attention-deficit	17.17 ± 4.15	6.17 ± 3.67	<0.001
Total score	54.33 ± 7.97	24.3 ± 8.53	<0.001

Note: P-value was calculated by Wilcoxon Signed Ranks Test.

The comparison between the pre-treatment means of Conner's teacher scale among ADHD children treated with CBT and means of Conner's teacher scale among ADHD children treated with combined therapy as regard hyperactivity, impulsivity, attention deficit, and Total score didn't show any significant difference, respectively (p=0.069, p=0.198, p=0.148 and p=0.424) (Table 5).

Table 5. Comparison between the study groups regarding pre-treatment Conner's teacher scale measures.

	Cognitive Behavioural Therapy (No=30)	Combined Therapy (No=30)	P-value
Hyperactivity	21.37 ± 2.86	19.83 ± 3.33	0.069
Impulsivity	16.47 ± 2.89	17.33 ± 2.79	0.198
Attention-deficit	18.27 ± 3.72	17.17 ± 4.15	0.148
Total score	56.10 ± 6.76	54.33 ± 7.97	0.424

Note: P-value was calculated by Mann-Whitney U Test.

The comparison between the post-treatment means of Conner's teacher scale measures among ADHD children included in both groups of the study as regard hyperactivity and impulsivity showed a significant difference, respectively ($p=0.018$, $p=0.001$) and a highly significant difference was observed in the post-treatment means of both groups as regard attention deficit and total Conner's scores ($p<0.001$) (Table 6).

Table 6. Comparison between the study groups regarding post-treatment Conner's teacher scale measures

	Cognitive Behavioural Therapy (No=30)	Combined Therapy (No=30)	P-value
Hyperactivity	13.00 ± 4.09	10.03 ± 3.98	0.018
Impulsivity	10.33 ± 2.95	7.73 ± 2.48	0.001
Attention-deficit	10.63 ± 3.89	6.17 ± 3.67	<0.001
Total score	33.67 ± 8.60	24.3 ± 8.53	<0.001

Note: P-value was calculated by Mann-Whitney U Test.

Discussion

Attention Deficit Hyperactivity Disorder (ADHD) is a neurobehavioral developmental disorder and has been conceptualized as a chronic multifactorial disorder characterized by symptoms of inattention, hyperactivity, and impulsivity [13].

ADHD is strongly associated with poor academic performance; a pattern of conflictual and often unsatisfactory relations with peers, family members, and teachers; and low self-esteem [5]. ADHD is the most commonly studied and diagnosed psychiatric disorder in children affecting about 3% to 5% of children and is diagnosed two to four times as frequently in boys as in girls though studies suggest this discrepancy may be due to subjective bias of referring teachers [14].

The pathophysiology of ADHD is unclear and there are several competing theories. The neurotransmitters Dopamine (DA) and Norepinephrine (NE) are implicated in the pathophysiology of ADHD. Brain studies on individuals with ADHD suggest a defect in the dopamine D4 (DRD4) receptor gene and overexpression of Dopamine Transporter-1 (DAT1) [3]. In one study a delay in the development of certain brain structures by an average of three years. The delay was most prominent in the frontal cortex and temporal lobe, which are believed to be responsible for the ability to control and focus thinking. In contrast, the motor cortex in ADHD patients was seen to mature faster than normal, suggesting that both slower development of behavioural control and advanced motor development might be required for the fidgetiness that characterizes ADHD [3].

The most commonly used diagnostic criteria are the Diagnostic and Statistical Manual of Mental Disorder (DSM-V). DSM-V criteria have different symptoms for inattention and hyperactivity. All symptoms must be at least 6 of the 9 criteria in the category. Symptoms present for at least 6 months [15-17]. The symptoms may start up to 12 years of age [18]. ADHD can continue throughout adulthood [19]. Around 5% of American adults are estimated to live with ADHD [20].

Many treatment modes have been developed in the form of behaviour modification, lifestyle changes, counselling, medication, family therapy, school-based interventions, social skills training, parent management training, and sensory integration therapy [21].

The objective of this study is to assess the effect of sensory integration therapy in combination with cognitive behavioural therapy on children with ADHD compared to the effect of cognitive behavioural therapy alone.

In our study, the mean age of patients and control was comparable, respectively with males more than females in both groups with no significant difference (Table 1). This was similar to the study done by Sciutoo, et al.

as regard sex with more males than females and in our study; there was no significant difference between both groups as regard history of NICU admission and degree of consanguinity [22].

In our study, the mean IQ among ADHD patients in both groups was (92.5 ± 7.43) and (93.7 ± 6.79) (Table 2). That was inconsistent with Frazier, et al. that reported ADHD children tend to have an approximately 9 points lower intelligence quotient score than children without the diagnosis [23].

In this study, there was a significant improvement in the mean of Conner's scale as regard hyperactivity, impulsivity, attention deficit, and total Conner's teacher scale score among the Group A that treated with cognitive behavioural therapy ($p \leq 0.001$) (Table 3). Our findings were inconsistent with Park, et al. study that found the presence of a significant effect of cognitive behavioural therapy on the main symptoms of school-aged ADHD children [24]. There is also some evidence to support the use of CBT approaches in children with ADHD in a randomized study on ADHD children aged 7-13 year, in which CBT improve the parent perception of hyperactivity in the home and child-related self-esteem compared with a supportive therapy control group [25].

In our study, the mean of Conner's rating scale of ADHD children Group B whose received combined therapy as regard hyperactivity, impulsivity, attention deficit, and total score after treatment revealed a significant improvement in comparison to the mean of Conner's score before treatment ($p<0.001$) (Table 4). The post-treatment means of Conner's scale in the Group B that received a combined therapy was better than the Conner's scale mean among ADHD children Group A, who received CBT with a significant difference (Table 6). These findings were inconsistent with Rathod, et al. who proved that use of sensory integration therapy and cognitive behavioural therapy separately had an equal effect on ADHD symptoms but combined therapy gives better results than single therapy in the treatment of children with ADHD when given with proper dosage [26].

Our findings were inconsistent with Hemant, et al. which found a marked improvement among children with ADHD suffering from sensory processing disorder by use of Ayres Sensory Integration programs. Children included in the study received occupational therapy with either protocol. The children in ASI Group made gains that were significantly greater than the children in the other group [27]. However, our study differs from this study in that the affected patients were not examined in terms of sensory integration defects before applying the treatment to them.

Conclusion

In conclusion, cognitive behavioural therapy is effective in reducing ADHD manifestations as regard, inattention, hyperactivity, and impulsivity. However, combination between cognitive behavioural therapy and sensory integration therapy gives a better improvement when given with proper dosage, in comparison to individual therapy. Since drug therapy is not recommended under the age of five years in children with ADHD, we recommend the use of sensory integration therapy with cognitive-behavioral therapy in this age group.

Study Limitation

- Age group: we conduct only the paediatric age group.
- Several patients: we conduct only 60 patients in our study.
- Study duration: only one year.

Declaration of Competing Interest

The authors declare no conflict of interest.

References

1. Biederman, Joseph, Eric Mick and Stephen V. Faraone. "Normalized Functioning in Youths with Persistent Attention-deficit/hyperactivity Disorder." *J Pediatr* 133 (1998): 544-51.
2. Faraone, Stephen V. and Eric Mick. "Molecular Genetics of Attention Deficit Hyperactivity Disorder." *Psychiatr Clin North Am* 33 (2010): 159-80.
3. Faraone, Stephen V., Roy H. Perlis, Alysa E. Doyle and Jordan W. Smoller, et al. "Molecular Genetics of Attention-deficit/hyperactivity Disorder." *Biol Psychiatry* 57 (2005): 1313-23.
4. Marshall, Paul, James Hoelzle and Molly Nikolas. "Diagnosing Attention-Deficit/Hyperactivity Disorder (ADHD) in Young Adults: A Qualitative Review of the Utility of Assessment Measures and Recommendations for Improving the Diagnostic Process." *Clin Neuropsychol* 35 (2021): 165-98.
5. Jensen, Peter S., L. Eugene Arnold, James M. Swanson and Benedetto Vitiello, et al. "3-year Follow-up of the NIMH MTA Study." *J Am Acad Child Adolesc Psychiatry* 46 (2007): 989-1002.
6. Cunill, Ruth, Xavier Castells, Ana González-Pinto and Manuel Arrojo, et al. "Clinical Practice Guideline on Pharmacological and Psychological Management of Adult Patients with Attention Deficit and Hyperactivity Disorder and Comorbid Substance Use." *Adicciones* 2021 (2021): 1569.
7. Wallace, Mark T. and Barry E. Stein. "Development of Multisensory Neurons and Multisensory Integration in Cat Superior Colliculus." *J Neurosci* 17 (1997): 2429-44.
8. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-5TM)*. Washington, DC: American Psychiatric Association, USA, (2013).
9. Twomey, Conal, Helen O'Connell, Mary Lillis and Sarah Louise Tarpey, et al. "Utility of an Abbreviated Version of the Stanford-binet Intelligence Scales in Estimating 'Full Scale' IQ for Young Children with Autism Spectrum Disorder." *Autism Res* 11 (2018): 503-8.
10. Conners, C. Keith. "Attention-deficit/hyperactivity Disorder-Historical Development and Overview." *J Atten Disord* 3 (2000): 173-91.
11. Sprich, Susan E., Steven A. Safren, Daniel Finkelstein and Jocelyn E. Remmert, et al. "A Randomized Controlled Trial of Cognitive Behavioral Therapy for ADHD in Medication-treated Adolescents." *J Child Psychol Psychiatry* 57 (2016): 1218-26.
12. Schaaf, Roseann C., Rachel L. Dumont, Marian Arbesman and Teresa A. May-Benson. "Efficacy of Occupational Therapy using Ayres Sensory Integration®: A Systematic Review." *Am J Occup Ther* 72 (2018): 7201190010p1-7201190010p10.
13. Biederman, Joseph, Ronna Fried, Carter Petty and Laura Mahoney, et al. "An Examination of the Impact of Attention-deficit Hyperactivity Disorder on IQ: A Large Controlled Family-based Analysis." *Can J Psychiatry* 57 (2012): 608-16.
14. Coles, Erika K., Janine Slavec, Melissa Bernstein and Elizabeth Baroni. "Exploring the Gender Gap in Referrals for Children with ADHD and Other Disruptive Behavior Disorders." *J Atten Disord* 16 (2012): 101-8.
15. Morey, Leslie C., Donna S. Bender and Andrew E. Skodol. "Validating the Proposed Diagnostic and Statistical Manual of Mental Disorders, Severity Indicator for Personality Disorder." *J Nerv Ment Dis* 201 (2013): 729-35.
16. Haass-Koffler, Carolina L. and George A. Kenna. "Bacchus by Caravaggio as the visual Diagnosis of Alcohol Use Disorder from the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5)." *Front Psychiatry* 4 (2013): 86.
17. Ghanizadeh, Ahmad. "Agreement between Diagnostic and Statistical Manual of Mental Disorders, and the Proposed DSM-V Attention Deficit Hyperactivity Disorder Diagnostic Criteria: An Exploratory Study." *Compr Psychiatry* 54 (2013): 7-10.
18. Bálint, Sára, Pál Czobor, Agnes Mészáros and Viktória Simon, et al. "Neuropsychological Impairments in Adult Attention Deficit Hyperactivity Disorder: A Literature Review." *Psychiatr Hung* 23 (2008): 324-35.
19. Stern, H. Patrick, Asha Garg and Thomas P. Stern. "When Children with Attention-deficit/hyperactivity Disorder Become Adults." *South Med J* 95 (2002): 985-92.
20. Barkley, Russell A., Deborah L. Anderson and Markus Kruesi. "A Pilot Study of the Effects of Atomoxetine on Driving Performance in Adults with ADHD." *J Atten Disord* 10 (2007): 306-16.
21. Emilsson, Brynjar, Gisli Gudjonsson, Jon F. Sigurdsson and Gisli Baldursson, et al. "Cognitive Behaviour Therapy in Medication-treated Adults with ADHD and Persistent Symptoms: A Randomized Controlled Trial." *BMC Psychiatry* 11 (2011): 1-10.
22. Sciutto, Mark J., Cara J. Nolfi and Carla Bluhm. "Effects of Child Gender and Symptom type on Referrals for ADHD by Elementary School Teachers." *J Emot Behav Disord* 12 (2004): 247-53.
23. Frazier, Thomas W., Heath A. Demaree and Eric A. Youngstrom. "Meta-analysis of Intellectual and Neuropsychological Test Performance in Attention-deficit/hyperactivity Disorder." *Neuropsychology* 18 (2004): 543-55.
24. Park, Wan-Ju, Shin-Jeong Park and Sung-Dong Hwang. "Effects of Cognitive Behavioral Therapy on Attention Deficit Hyperactivity Disorder among School-aged Children in Korea: A Meta-analysis." *J Korean Acad Nurs* 45 (2015): 169-82.
25. Melby-Lervåg, Monica and Charles Hulme. "Is Working Memory Training Effective? A Meta-analytic Review." *Dev Psychol* 49 (2013): 270-91. (Crossref) (Google Scholar) (pubmed)
26. Rathod, Vandana J., Vyoma Shah, Jagatheesan Alagesan and Poongundran Paranthaman, et al. "Effect of Sensory Integration Therapy and Cognitive Behavioral Therapy on Attention Deficit Hyperactivity Disorder: Single Blinded Study." *Int J Physiother Res* 3 (2015): 947-54.
27. Nandgaonkar, Hemant P. and Zarine D. Ferzandi. "Ayres Sensory Integration for the Children with Attention Deficit and Hyperactivity Disorder (ADHD): A Randomized Controlled Trial." *Int J Adv Res* 6 (2018): 103-12.

How to cite this article: Othman, Amr Ahmed, Hebat Ahmed Abdelmol and Abdelrahim Abdrabou Sadek. "Study of the Combined Effect of Sensory Integration Therapy with Cognitive Behavioural Therapy on Children with ADHD at Sohag University Hospital, Egypt." *Clin Schizophr Relat Psychoses* 16S (2022). Doi:10.3371/CSRP.OAAS.022822.