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Research Article

The Effectiveness of Rehabilitation Programs of Learning Disabilities on Children with Attention Deficit Hyperactivity Disorder

Abstract

Objective: The aim of this work is to evaluate the role of rehabilitation programs of learning disabilities on children with attention deficit hyperactivity disorder (ADHD) children, and compare the effect of pharmacological treatment, rehabilitation program of learning disabilities, and both together on children with attention deficit hyperactivity disorder (ADHD) children.

Design: A prospective study.

Setting: Zagazig University Hospitals.

Patients and methods: This study was conducted on a sample of 30 ADHD children between the ages of 6.5 to 8.5 years, attending the Units of Phoniatics in Ain Shams University Hospital and Zagazig University Hospital. These children demonstrated skills below the performance range expected for their age on pretest measures and school assessments.

Results: After testing the control groups with age ranged (5.5-8.5y) (mean =7) with dividing them in to 3 equal groups in age , and recording their testing as normal, the ADHD children tested per/ post study. The 1st group exposed for pharmacological treatment; their pretest was low in comparison for same age groups. There were increased result of posttest by about 10-30% (mean=20) in their tests in group 2 children remediated by rehabilitation program and pretests were done and were low for normal control group in same age. The posttests were elevated by about 20-30% (mean=25%) In group 3 children remediated by rehabilitation program and pretests were done and were low for normal control group in same age.

The posttests were elevated by about 30-40% (mean=30%) After comparing the results of 3 groups; there were no significant deference in pretests result. There was high significant difference in posttests result except in Stanford Binnet Intelligence Scale "4th Arabic version". There were no significant deference between male and female children.

Conclusion: ADHD affects learning globally and compromises all cognitive functions, rather than just one or two. There were good the role of rehabilitation programs of learning disabilities on children with attention deficit hyperactivity disorder (ADHD) children, and by adding pharmacological treatment the better results were produced.

Introduction

ADHD is considered to be a disorder that interfere with a child's ability to do well at school. The National Institute of Mental Health indicates that 20%–30% of children with ADHD have a learning disability. Learning Disabilities can appear in preschool children as problems in understanding sounds or words or having a hard time using words to express

themselves. School age children with learning disabilities can have difficulty in reading, spelling, writing and/or arithmetic. One of the most well-known learning disability is dyslexia, a reading disability [1].

A student with a learning disability has a deficit in one or two areas while performing at or above average in other areas. For example, a student with a reading disability will usually

have no trouble with mathematics unless they have a disability in that area. In schools, students are diagnosed with a learning disability when there is a significant discrepancy between their IQ and performance on achievement tests. These tests are usually given by the school psychologist and are different from the standardized tests that are given to the entire school [2].

In contrast, ADHD affects learning globally and compromises all cognitive functions, rather than just one or two. This is not measurable on tests, unless the tests were given incorrectly (for example, if the tests were done while the student was distracted). Although learning disabilities are diagnosed by the school system, ADHD cannot be. ADHD is a medical condition and the diagnosis can only be made by medical professionals [3].

The best explanation of the differences between the two, Darcy, 2008, has found is this: Imagine the "normal" brain as a room with all the lights on. A learning disability will turn off one or two of the lamps in the room, leaving some areas dark while others are still bright. However, ADHD dims all the lights in the room; it affects the person all the time not just when they performing specific cognitive functions (like reading). A student with both ADHD and a learning disability will have the lights dim throughout the room, with one or two areas significantly darker. Students with ADHD should always be screened for learning disabilities, if for no other reason that an undiagnosed learning disability can mimic the symptoms of ADHD. Knowing what exactly is going on is essential in order to decide on an effective course of action [3].

Patients and Methods

This study was conducted on a sample of 30 ADHD children between the ages of 6.5 to 8.5 years, attending the Units of Phoniatrics in Ain Shams University Hospital and Zagazig University Hospital. These children demonstrated skills below the performance range expected for their age on pretest measures and school assessments.

A group of 30 children in the same age range was served as a normal comparison group. These children had normal cognitive abilities, average literacy development, and no history of speech or language difficulties. They were divided as 10 children in the age range 5.5 to 6.5 years, 10 children in the age range 6.5 to 7.5 years, and 10 children in the age range 7.5 to 8.5 years.

The ADHD children were divided as follows:

- 10 children were received pharmacological treatment.
- 10 children were received the language-based training program.
- 10 children were received both the language-based training program and pharmacological treatment.

They were trained or treated or both for 6 months then the result was compared.

Patients meet the DSM-IV criteria for ADHD (American Psychiatric Association, 1994)

Methods

*The research approach was a pre/posttest study. Every case was subjected to the following protocol of assessment:

Elementary diagnostic procedures

Complete history taking, including the latest score of Arabic exam for school students.

General, Vocal tract, Ear and nose and Neurological examination.

Clinical diagnostic aids

- Psychometric evaluation using:
 - Stanford Binnet Intelligence Scale "4th Arabic version" (Melika, 1998), for determination of mental age. Only children with an IQ 90 or more participated in the study.
 - Vienland social maturity scale (Doll, 1965) for determination of social age.
 - Conner's test of ADHD.
- Audiological assessment to exclude patients with hearing impairment.
- The following assessment measures were used at both pre- and post-test: Language assessment using the Standardized Arabic Language Test [4].
- Dyslexia Screening Test "Arabic version" [5] was applied for the suitable age. The test was composed of eleven items. These are:
 - Rapid naming test.
 - Bead threading.
 - One minute reading.
 - Postural stability.
 - Phonemic segmentation.
 - Two minute spelling.
 - Backward digit span.
 - Nonsense passage reading.
 - One minute writing.
 - Verbal fluency.
 - Semantic fluency.
- Illinois test of psycholinguistic abilities "Arabic version" (El-Sady et al., 1996). It includes the following subtests:
 - At the represental level:
 - *Auditory reception.

*Visual reception.

*Auditory association.

*Visual association.

*Verbal expression.

*Manual expression.

-At the automatic level:

*Grammatical closure.

*Visual closure.

*Auditory sequential memory.

*Visual sequential memory.

*Auditory closure.

*Sound blending.

- Phonological awareness assessment.
- Sound production assessment was done by applying Mansoura Arabic Articulation Test [6] in addition to testing the production of multisyllabic words.
- Word finding difficulty was outlined in a quasi-objective way through the results of the following subtests of the Dyslexia Screening Test [7] and Illinois test [6]: Rapid naming, backward digit span, Semantic fluency and Verbal fluency subtests of Dyslexia Screening Test. Auditory association and Grammatical closure subtests of Illinois test.
- Assessment of semantics at both the receptive and expressive levels can be obtained from the Standardized Arabic Language Test [5]. A more detailed assessment of semantics was constructed and was applied on normal comparison group prior to its application on the patients.
- Assessment of syntax at both the receptive and expressive levels can be obtained from the Standardized Arabic Language Test [5].
- The memory state of the patients was evaluated through the results of the auditory sequential memory and visual sequential memory subtests of the Illinois test.

*The above mentioned protocol of assessment was administered to each child prior to undergoing twice weekly 40 minutes training sessions for 6 months. The training program is an Arabic language-based program developed [8]. It focuses on remediation of both lower order and higher order process disorders in addition to attention and memory training, as follow:

A-Remediation of lower order process disorders:

1-Remediation of phonological awareness deficit:

*Segmenting tasks:

Sentence division into words.

Bisyllabic word division.

Monosyllabic word division.

*Rhyming tasks:

Rhyme knowledge.

Rhyme detection.

Rhyme production.

*Blending tasks:

Blending words.

Blending syllables.

Blending sounds.

*Phoneme grapheme correspondence.

2-Remediation of sound production deficit: mainly through syllable by syllable attack and consonant exaggeration.

B-Remediation of higher order process disorders:

1-Remediation of vocabulary deficit: by condensed repetitive semantic training under hold attention to yield automatic retrieval.

2-Remediation of semantic and syntactic deficits:

For semantic deficit: synonyms, antonyms and hyponyms are taught.

For syntactic deficit: morphology, surface and deep structures are taught.

C-Remediation of attention and memory deficits:

Mainly through improving auditory and visual sequential memories, using different activities that are graduated in difficulty. Attention control will follow the developmental stages of attention.

*The treatment plan was tailored according to each child's deficit, based on his/her performance in the pretests.

Upon completion of sessions, post testing would be administered using the post-test assessment measures. In addition, the student's score of scholastic monthly Arabic exam would be used as indicator to the progress in academic achievement.

Results

After testing the control groups with age ranged (5.5-8.5y) (mean =7) with dividing them in to 3 equal groups in age , and recording their testing as normal , the ADHD children tested per/ post study.

The 1st group exposed for pharmacological treatment; their pretest was low in comparison for same age groups.

There were increased result of posttest by about 10–30% (mean=20) in their tests (Figure 1).

In group 2 children remediated by rehabilitation program and pretests were done and were low for normal control group in same age.

The posttests were elevated by about 20–30% (mean=25%) (Figure 2).

In group 3 children remediated by rehabilitation program and pretests were done and were low for normal control group in same age.

The posttests were elevated by about 30–40% (mean=30%) (Figure 3).

After comparing the results of 3 groups; there were no significant deference in pretests result. There was high significant defference in post–tests result except in Stanford Binnet Intelligence Scale “4th Arabic version” (Figure 4).

There were no significant deference between male and female children.

Discussion

Attention Deficit/Hyperactivity Disorder (ADHD) is a common developmental disorder in childhood with an estimated prevalence of up to 6.4% in school age children [9]. The population affected is rather heterogeneous and shows considerable variation in the degree of symptoms, as well as the frequent presence of associated comorbidities [10]. The DSM has divided ADHD into three subtypes: Predominantly Inattentive subtype (ADHD-I), Predominantly Hyperactive-

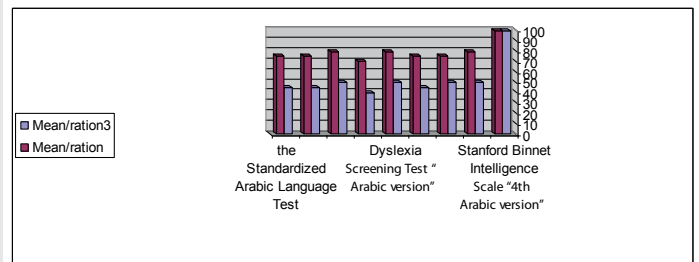


Figure 3: Pretest and posttest of 3rd group under rehabilitation program and pharmacological treatment (n=10).

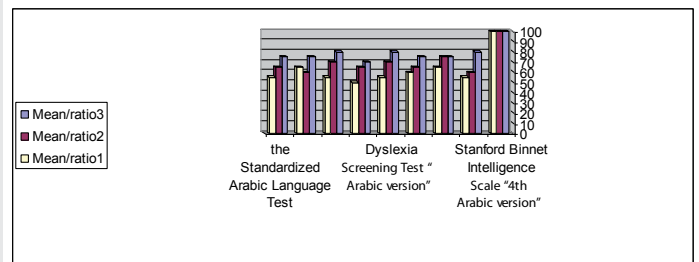


Figure 4: Posttest of 3 groups (n=30).

Impulsive (ADHD-H/I) and Combined Subtype (ADHD-C). In addition to the impairment caused by the core symptoms, researchers and clinicians have suggested that ADHD may also affect children's sensory processing, particularly sensory modulation [11].

Attention-deficit/hyperactivity disorder (ADHD) is the most common behavioral disorder in children, and the prevalence is increasing. Physicians should evaluate for ADHD in children with behavioral concerns (e.g., inattention, hyperactivity, impulsivity, oppositionality) or poor academic progress using validated assessment tools with observers from several settings (home, school, community) and self-observation, if possible. Physicians who inherit a patient with a previous ADHD diagnosis should review the diagnostic process, and current symptoms and treatment needs. Coexisting conditions (e.g., anxiety, learning, mood, or sleep disorders) should be identified and treated. Behavioral treatments are recommended for preschool-aged children and may be helpful at older ages. Effective behavioral therapies include parent training, classroom management, and peer interventions. Medications are recommended as first-line therapy for older children. Psychostimulants, such as methylphenidate and dextroamphetamine, are most effective for the treatment of core ADHD symptoms and have generally acceptable adverse effect profiles. There are fewer supporting studies for atomoxetine, guanfacine, and clonidine, and they are less effective than the psychostimulants. Height, weight, heart rate, blood pressure, symptoms, mood, and treatment adherence should be recorded at follow-up visits [12].

A major research challenge pertaining to the treatment of ADHD is the development and evaluation of new treatments for this condition. The 2 current treatments (stimulant medication and behavior therapy) reduce the symptoms and functional consequences of ADHD, but only for as long as

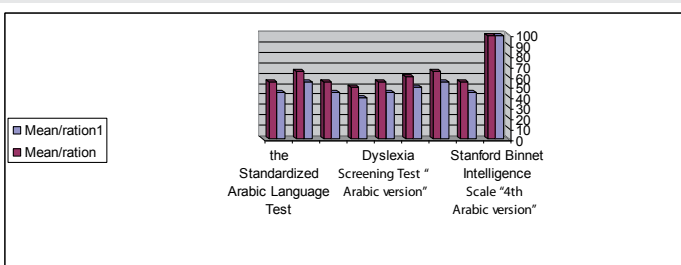


Figure 1: Pretest and posttest of 1st group under pharmacological treatment (n=10).

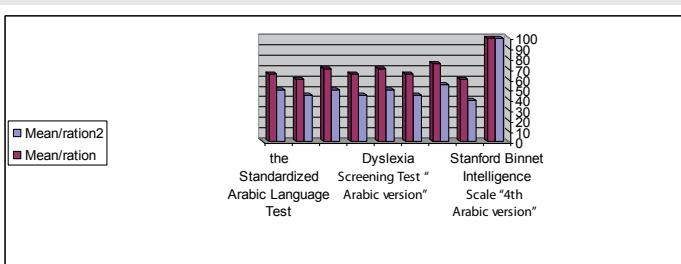


Figure 2: Pretest and posttest of 2nd group under rehabilitation program (n=10).

they are administered. Treatments with more lasting or even curative effects are needed. A significant number of children do not respond to stimulant medications or have severe side effects. Some families cannot implement behavioral programs. Expanding the available medical and behavioral treatment regimens with additional safe and effective options would be useful for such a prevalent chronic condition where not all children respond to current treatments or adhere to them. Studying common-sense approaches, such as decreasing environmental distraction, should be done. There is also the need for well-designed rigorous studies of currently promoted but less well-established therapies such as occupational therapy, biofeedback, herbs, vitamins, and food supplements. These interventions are not supported by evidence-based studies at the present time [13].

Most studies about ADHD and its treatment have been short-term. The long-term outcome of children with ADHD with or without coexisting conditions has not been well studied. Furthermore, there is minimal information about the role of stimulant medication and/or behavior therapy in the natural history of the disorder. Future research should correct these deficits. For this chronic condition, efficacy and safety studies must be extended from weeks or months to years. Long-term outcome studies must be prospective in design and consider changes over time in core symptoms of ADHD, coexisting conditions, and functional outcomes such as occupational successes and long-term relationships [14].

Intervention techniques for students with ADHD have traditionally included medication and behavioral management techniques. Therapeutic interventions are also being provided in the areas of education, communication, social-emotional interactions, and physical difficulties [15]. One of the teaching programs applied for hyperactive children is the whole word method. The whole-word approach is a method to teach reading by introducing words to children as whole units without analysis of their subword parts [16]. The whole-word method involves teaching children to "sight read" words, that is, to be able to pronounce a whole word as a single unit [17].

Two basic approaches are used to document effectiveness of treatment programs: the between-groups strategy and the within-subject strategy [18].

The between-groups strategy is based on the concept of group comparisons. The basic idea in this approach is that patients who are treated will change while those who are not treated remain unchanged. The method requires two groups of subjects. One group is the experimental group, which receives treatment; the other is the control group, which does not. It is very important to make sure that the subjects in the two groups are indeed similar in all of the relevant variables. Such a similarity can be achieved either by the random procedure or by matching. One of the limitations of the between-groups strategy is that it does not give a total perspective of changes in patient behaviors across treatment sessions, since only two measures are obtained (once before and once after the treatment) [19].

The within-subject strategy is an alternative to the group strategy. Most of the single-subject designs do not require matching and there is no control group that does not receive treatment. Instead, each patient serves as his/her own control. The patients receive treatment in one condition, and do not receive treatment in another condition. Another characteristic of this method is that the patients' behaviours are measured continuously. The most frequently used single-subject designs are: the ABA, the ABAB, and the multiple baseline designs [20].

The strategy that was applied in this study is the between-groups strategy.

Main findings

This study was comparative cross sectional study, done at Ain Shamish, and Zagazig University hospitals; phoniatrics units. Of total 300 children, 30 children selected for control normal group, and 30 children study groups (ADHD children). The age range were 5.5-8.5 years (mean=7).

The 30 children divided in to 3 groups; 10 were received mical treatment, 10 were received rehabilitation programs and 10 were received both medical treatment and rehabilitation program. Children with ADHD may present sensory processing impairments, which may contribute to the inappropriate behavioral and learning responses displayed by children with ADHD (Vitoria T et al. 2014).

Strength of the study

In this study pretests done for all children in study and control groups and there results were low performance of study groups in about 30-60% below normal in comparison of control groups.

The 1st group were treated medically only and there were improvement of posttest by about 20%

The 2nd group were remediated by rehabilitation program of learning disabilities and there were improvement by about 30%

The 3rd group were treated medically in addition to remediation by rehabilitation program of learning disabilities and there were improvement by about 40 %

Limits of the study

Psychopedagogical interventions in children with ADHD must include personalized treatment within a multidisciplinary methodology that takes into account all the contexts in which the child is developing, his or her cognitive performance and the appropriate pharmacological intervention in each case (Abad-Mas L et al. 2013).

Conclusions

In conclusion, the rehabilitation programs of learning disabilities on children with attention deficit hyperactivity disorder (ADHD) children produce better result in treatment especially after adding pharmacological treatment. The rehabilitation programs of learning disabilities on children

with attention deficit hyperactivity disorder (ADHD) children produce better result in treatment especially after adding pharmacological treatment.

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