Linguistic Disabilities in Children with Attention Deficit Hyperactivity Disorder

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The main objective of this work was to study the linguistic disabilities in a sample of children presented to psychiatric clinics with diagnosis of ADHD. A group of 24 children with ADHD was compared to a sex-and-age matched group of normal controls (n = 24). Both groups were subjected to psychiatric interview using DSM-IV criteria, assessment of intelligence using Stanford Binet Test. Assessment of severity of ADHD was done using ADHD Rating scale and Swanson, Nolan and Peham - SNAP-Rating Scale. sComprehensive assessment of language development was done using, the Arab Linguistic Test (ALT).

Results showed that children with ADHD had significant delay in language development and this delay was correlated with the severity of the disorder. The children. The results were discussed in the light of previous reports on the subject.

Conclusion: Developmental language delay is highly associated with ADHD. The cause of this association is still unknown. The language assessment of children with ADHD is recommended.

(Egypt.J.Psychiat., 2000, 23 : 63-70).

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is currently a popular diagnosis, constituting the largest single reason for referral of children to psychiatric clinics. Its prevalence ranges from 2% to 10% in school aged children (Sandberg, 1996).

ADHD is characterized by age-inappropriate levels of inattention, impulsiveness and hyperactivity (DSM-IV, 1994). The symptoms may be mild, moderate or severe. ADHD is commonly associated with or complicated with other social and psychiatric disorders. Conduct disorder, impairment in social relationships and academic underachievement are the most common and significant problems in children with ADHD. (Roberts, 1994). Association of learning disabilities especially reading disability, with ADHD is now a focus of interest and research.

Children of ADHD do poor performance in schools not only because of their inattention and misconduct, but also because of the associated learning disabilities especially reading disorder. Different studies had been reported the link between ADHD and reading disorder. Different studies had been reported the link between ADHD, reading disorder and conduct disorder. (Barkley, et al 1991, Taylor et al., 1991, Taylor et al, 1991, and Stevenson, 1996).

Language plays crucial role in the cognitive and emotional development of the children. Children with delayed lan-

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guage development are supposed to develop other deficits in the development of attention, motor control, self esteem and learning abilities (Hogan and Quay, 1984, and Rutter, 1987).

Association or comorbidity of ADHD and language disorders is not well studied as the case in comorbidity of ADHD, conduct disorder and reading disorder.

Our point of view is that the study of language development in children with ADHD is of importance for the research of detection of common neural substrate for the both neurodevelopmental disorder. It may also provide the lost ring between ADHD and reading disorder. This kind of studies is also of significance for those preparing the rehabilitation programmers for children with ADHD.

The authors hypothesized that children with ADHD would show linguistic disabilities as detected by a standardized test for language development. These disabilities may be correlated with the severity of ADHD and its core symptoms.

SUBJECTS AND METHODS

Two groups of children were included in this study. The first group was the experimental group and consisted of 24 children with ADHD. The age range was 6-8 years. They were recruited from some private clinics of psychiatry in Cairo city. Diagnosis was confirmed by another psychiatrist using DSM-IV criteria. Neurological examination was done to exclude children with associated neurological diseases such as epilepsy. Both boys and girls were included. Boys were 17 and there were 7 girls.

The second group was the control group and consisted of 24 normal children with the same age range of experimental group (6-8 years) and boy to girl distribution (17 boy and 7 girl). They were collected from some schools in Cairo city. The children in control group were interviewed by the same psychiatrist to exclude any mental or neurological diseases such as epilepsy. Both boys and girls were included. Boys were 17 and there were 7 girls.

The two group were subjected to the following

1. **Intelligence testing:** using Stanford Binet test which is very suitable for children. It provides verbal IQ which is a measure for verbal reasoning, abstraction, visual reasoning, quantitative reasoning and short term memory.

2. **The ADHD Rating Scale:** This scale was developed by DuPaul (1991). It lists the 14 DSM-III-R criteria of ADD. Respondents (parents) are asked to rate the severity of these characteristics on a scale ranging from not at all to very much. The scale can be completed by parents or teachers. In our work it was completed by the parents.

3. **The SNAP Rating Scale:** This is Swanson, Nolan and Peham (SNAP) Rating Scale (1992). It contains items which evaluate core symptoms of ADD, namely inattention, impulsivety, and hyperactivity as well as additional items to assess peer-related aggression. SNAP has advantage over ADHD Rating scale of giving separate scores for each core symptom.

4. **Arab Linguistic Test (ALT) (Kotby et al, 1994):** This is a test that is originally designed to provide a pervasive diagnostic tool for all language modalities that can be used to diagnose the subtle language deficits in the children with delayed language development. Thus the test is developed to provide a broad picture of the child's comprehension and production of language. The

test is suitable for age range two to eight years.

Standardization, reliability, validity and normative scores were done on an Egyptian children in an extensive work by Kotby et al (1994). The test includes five scales, namely receptive language scale, expressive language scale, semantics scale, pragmatics scale, and prosody scale. Scores are transformed into linguistic age and from the all scales we get the total linguistic age. Now this test is applied broadly in many phoniatric clinics, governmental and non governmental in Egypt.

Statistical analysis

Statistical analysis was done using an IBM compatible computer programme Statistical for windows 97. Significance level of 0.05 was used throughout all statistical tests within the study. Statistical analysis was done according to Knapp and Miller (1992) and Ingelfinger et al (1994).

RESULTS

Both patients' group and control group were matched as regards sex distribution and age. Among patients' group, the boy, girl ration was 3:1 and mean age was 6.5 ± 2.6 years Among normal control group the boy to girl ratio was 3:1 and mean age was 6.5±2.6 years Among normal control group the boy to girl ratio was 3:1 and mean age was 6.4 ± 1.9 years

Psychometric assessment (table 1)

Patients' group showed significantly lower IQ scores on Stanford Binet test than normal control children. The IQs of patients group fell in the range of dull average to borderline.

Results on ADHD rating scale (DuPaul 1991) as completed by parents of both groups showed significantly higher scores of patients' group.

Results of item of SNAP rating scale showed significantly higher scores on every scale in patients' group than normal control group.

Linguistic assessment (tables 2,3)

Table (2) shows statistically significant differences between patients' group and normal control group on all scales of ALT except the expressive speech scale. This means that children with ADHD show younger linguistic ages than their chronological ages except for the expressive language age.

Table (3) shows that, the most frequently affected linguistic ability in patient's group is the receptive speech (100%), followed by pragmatics and prosody (75%) and semantics (66%) and the least affected is expressive speech (44%). This table shows also that nearly two thirds of the patients with ADHD show delayed language development in general.

Correlative analysis (table 4)

The results of correlative analysis showed that the severity of ADHD as neared globally by the ADHD scale (DuPaul, 1991) is correlated negatively to the all linguistic ages of patients group (except pragmatics and prosody ages). SNAP items (except inattention) showed significantly negative correlation with nearly all linguistic ages. Both IQ and inattention are not correlated with linguistic ages.

DISCUSSION

The importance of identification of cognitive and linguistic impairment in the children with ADHD is not doubtful. It helps both the research in the etiology and the plans of treatment programmers

Table 1
Scores of Patient Group and Normal Control Group on the Psychometric Tests. (Stanford Binet, ADHD Rating Scale, and SNAP

	Patients group		Control group		
	Mean	±S.D	Mean	±S.D	P
IQ (Stanford Binet)	79.1	6.6	88.0	3.9	0.0001*
Inattention	2.0	0.4	1.2	0.2	0.0001*
Impulsively	1.8	0.4	1.05	0.1	0.0001*
Hyperactivity	1.9	0.5	1.0	0.14	0.0001*
Peer aggression	1.1	0.2	0.58	0.12	0.0001*
ADHD scale score	26.4	6.04	11.5	2.5	0.0001*

* Statistically Significant

Table 2
Age of Patients Group and Normal Control Group on ALT

	Patients group (n = 24)		Control group (n= 24)		
	Mean	±S.D	Mean	±S.D	P
Receptive speech (years)	4.3	1.3	6.5	1.3	0.0001
Expressive speech (years)	6.3	1.8	6.9	0.8	0.08
Semantics (years)	5.1	1.4	7.05	1.07	0.0001*
Pragmatics (years)	4.5	2.0	7.5	0.7	0.0001*
Prosody (years)	5.2	1.7	7.1	1.0	0.0001*
Total linguistic age (years)	5.08	1.6	7.1	0.88	0.0001*

* Statistically Significant

Table 3
Incidence of Delayed Language Ages in the Patients Group (n = 24)

	Delayed age	
	No	%
Receptive speech	24	100
Expressive speech	8	44
Semantics	16	66
Pragmatics	18	75
Prosody	18	75
Total linguistic	16	66

Table 4
Monovariate Correlations of ALT Results of Patient Group

	Linguistic age	Receptive Speech	Expressive speech	Semantics	Pragmatics	Prosody
Age	0.39*	0.21	0.41*	0.31	0.43*	0.40*
IQ	-0.21	-0.01	-0.28	-0.21	-0.22	-0.31
ADHD	-0.38*	-0.42*	-0.39*	-0.50*	-0.22	-0.31
Inattention	-0.09	-0.19	-0.05	-0.27	-0.16	-0.11
Impulsivity	-0.52*	-0.50*	-0.35*	-0.69*	-0.32	-0.38*
Hyperactivity	-0.40*	-0.44*	-0.44*	-0.39*	-0.53*	-0.62*
PeerAggression	-0.46*	-0.47*	-0.16	-0.39*	-0.51*	-0.50*

Critical value is±0.34
*Statistically Significant
- Ve sign indicates negative correlation

of this disorder. Our study was designed to detect the deficit both in intelligence quotient and linguistic abilities of those children.

The results of this study showed that the group of children with ADHD exhibits significantly lower IQ Performance than normal matched children. This is in agreement with previous works using other tests of intelligence. (Goodman and Stevenson, 1989., Anderson et al, 1989, and Taylor et al, 1991).

The results on ALT showed that the children with ADHD have significant delay of their total language age, receptive language age, semantic language age, pragmatics and prosody ages. This means that these children have delayed abilities of comprehension of rules of syntax (receptive language)., delayed abilities to recognize different semantic groups e.g. opposites (semantic language), delayed abilities to respond to sentences carrying pragmatic intentions, initiating dialogue, continuing and maintaining a topic (pragmatic language)., and delayed abilities to use tonic units (prosody). There is only one scale which did not show difference between both groups, that is the expressive language. This may explain why parents of those children did not observe the linguistic delay in their children with ADHD.

Our findings in children speaking Arabic are in agreement with the findings of the extensive study of Taylor et al (1991) in children speaking English and using other tools to assess the cognitive and language functions. Taylor et al (1991) used WISC-R subsets., reading test, continued performance task, central incidental learning test, matching familial figures test and the paired associate learning test. They reported significantly lowered cognitive and speech functions in the children with attention deficit disorder. The hyperkinetic type of attention deficit disorder was more associated with the cognitive impairment than the inattentive type. This finding of Taylor et al (1991) was found in our results, in the correlative study. We found high correlation between hyperkinesia scores and impaired linguistic abilities and no correlation between inattention scores and impaired linguistic abilities.

The high association between ADHD and delayed language development has at least three possible explanations from our point of view and needs some details in their discussion.

The first explanation is that delayed language development is caused by the pathology of ADHD. The ADHD is a disorder that affects the attention, thinking, learning processes, play activities, and social interaction (Hogan and Quay 1984). All these processes are essential in the development of language. (Rutter, 1987). So it is possible that ADHD impairs language development via these processes. Another way of negative influence of ADHD on language development is through the negative parenting style (Cunningham and Siegel, 1987). The child with ADHD is neglected and so does not have proper stimulating environment for proper language development.

The second explanation for the high association between ADHD and delayed language development is that delayed language disorder can produce or is complicated by symptoms and signs of ADHD. Delayed language disorders especially the receptive type impairs the social interaction of the affected child and impairs his control over himself, so he may be hyperactive, impulsive, and inattentive. (Baker and Cantwell, 1982). In such condition, the parents are not aware of the deficits of their child until he becomes hyperactive. The hyperactivity draws the attention of the parents,

that is why the child is usually presented to psychiatric clinic.

The third explanation of the high association between ADHD and delayed language development is that both of them arise from common pathological basis whether it is psychosocial or neurological or combined. Psychosocial factors such as disorganized environment, abnormal parenting styles, neglect, and less opportunities offered to the child are claimed to have roles in the pathogenesis of both delayed language disorder and ADHD. (Gillberg and Rusmussen, 1982., Hartsough and Lambert, 1982). On the other hand, frontal lobe and basal ganglia pathology were claimed to be underlying both disorders in a way or another (Richardson, 1989, and Kado and Takagi, 1996).

In conclusion, there is high association between ADHD and delayed language disorder. The delayed language is associated with the severity of ADHD. The association is not attributed to the low. IQ Performance because of the absence of significant correlation between IQ Performance and linguistic ages. This study needs to be replicated in a larger sample using more comprehensive tests for cognitive functions, and academic achievement tests to understand how the different cognitive deficits in ADHD interact with each other. In clinical practice it is recommended to assess the cognitive and linguistic abilities of the children with ADHD. This will help in tailoring the treatment programme for every child.

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عسر اللغة فى الأطفال المصابين باضطراب فرط النشاط وقصور الانتباه

تهدف هذه الدراسة إلى تقييم القدرات اللغوية لعينة من الأطفال المصابين باضطراب فرط النشاط وقصور الانتباه، وقد أجرى البحث على مجموعة تتكون من أربعة وعشرين طفلاً مصاباً بهذا الاضطراب ومجموعة ضابطة من الأطفال الطبيعيين من نفس السن والنوع، تم إجراء المقابلة الإكلينيكية النفسية للمجموعتين باستخدام الدليل الرابع الأمريكى للتشخيص والإحصاء لتأكيد التشخيص. تم عمل اختبار الذكاء بتطبيق اختبار ستانفورد بينيه. وقد تم تقييم أعراض الاضطراب باستخدام مقياس اضطراب فرط النشاط وقصور الانتباه، ومقياس سوانسن ونولان وبيهام، أما التقييم الشامل للنمو اللغوى فقد أجرى باستخدام اختبار اللغة للناطقين بالعربية.

أوضحت نتائج الدراسة أن الأطفال ذوى اضطراب فرط النشاط وقصور الانتباه يعانون من تأخر واضح فى النمو اللغوى وأن هذا التأخر له علاقة قوية بازدياد حدة الاضطراب النفسى. أظهرت النتائج أيضاً أن أداء هؤلاء الأطفال على اختبارات الذكاء أقل من الأطفال العاديين.

كما أمكننا التوصل إلى أن اضطراب اللغة فى الأطفال الذين يعانون من فرط النشاط وقصور الانتباه ذو أهمية إكلينيكية وبحثية وإن كنا لا نستطيع حتى الآن تحديد أسباب هذا الارتباط.