



Clinical Correlates of Restrictive Type Attention Deficit Hyperactivity Disorder in Adolescents

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Abstract

Introduction: Clinical correlates of the proposed restrictive type attention deficit hyperactivity disorder (ADHD/R) is not well established in adolescents. There is still controversy on the validity of ADHD/R as a distinct entity from ADHD predominantly inattentive (ADHD/I). This study aims to define the clinical symptoms of ADHD/R and compare of ADHD/R with other subtypes of ADHD in adolescents.

Methods: A total of 87 adolescents (mean: 143 months, 73.5% male) with a DSM-V ADHD diagnosis were included in the study. ADHD subtypes, including the proposed ADHD/R, were diagnosed based on clinical interview, parental reports, and teacher reports. Study measures included the Turgay DSM-IV based ADHD rating Scale (T-DSM-IV-S) parent and teacher forms, conners' parent rating scale (CPRS), and Conners' teacher rating scale revised.

Results: Thirty-nine adolescents (44.8%) had ADHD combined (ADHD/C), 33 (37.9%) had ADHD/I, and 15 (17.2%) had ADHD/R subtype. Regarding gender, no significant difference was found between ADHD/I and ADHD/R. Regarding the parent-rated scales; the total, hyperactivity, conduct problems, and oppositional scores of T-DSM-IV-S; and the total, hyperactivity and learning problems scores of CPRS were found to be higher in adolescents with ADHD/I when compared to those with ADHD/R ($p<0.05$). Among the teacher-rated scores; no significant difference was found between ADHD/I and ADHD/R, except for the T-DSM-IV-S inattentiveness score. Several scores of the study scales, including the total and hyperactivity scores, were found to be higher in adolescents with ADHD/C when compared to ADHD/R ($p<0.05$).

Discussion and Conclusion: When compared to those with ADHD/R, adolescents with ADHD/I had higher scores on most of the parent-rated externalized behavioral problem scores. Our findings suggest that the differences between ADHD/R and ADHD/I are mainly based on the presence and severity DSM symptom dimensions. Future studies are needed to clarify the correlates of ADHD/R in adolescents with ADHD.

Keywords: Adolescents; attention deficit hyperactivity disorder; conduct; hyperactivity; restrictive.

Attention deficit hyperactivity disorder (ADHD) is among the most common neurodevelopmental disorders of childhood with an estimated prevalence of 3–6% in school-age children and adolescents^[1]. At present, there are three main subtypes of ADHD; combined (ADHD/C), ADHD predominantly inattentive (ADHD/I), and ADHD predom-

inantly hyperactivity-impulsivity (ADHD/H) subtypes^[2]. ADHD subtypes are used for two main reasons in the field of child psychiatry; the definition of the clinical characteristics of patients and ADHD follow-up studies. However, there is also growing evidence that subtypes do not have sufficient stability on the long-term and may be best defined as clini-

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cal specifics of each individual case in a specific period^[2,3]. Most of the researchers argue on the validity of subtypes indicating the direct relationship between subtypes and the DSM symptom dimensions^[3,4]. It has been suggested that subtypes only reflect the number of positive symptoms in the DSM-V ADHD criteria^[3,4]. Beyond this debate, most of subtype studies have been conducted in children and studies in adolescents are largely lacking.

In 2010, the DSM-5 ADHD work group proposed a new diagnostic subgroup, defined as restrictive ADHD (ADHD/R)^[5]. It has been hypothesized that children with ADHD-I and no or very few symptoms of hyperactivity-impulsivity may have a different clinical profile than those with ADHD-I and three to five hyperactivity-impulsivity symptoms^[6]. Children with ADHD/R are characterized as having at least six symptoms of the nine inattentiveness symptoms and fewer than two of the nine hyperactivity-impulsivity symptoms of DSM-V ADHD criteria^[6]. Despite the body of literature showing positive results, there is still controversy about the validity of ADHD/R as a distinct entity from ADHD/I.

This study aims to define the clinical correlates of ADHD/R and compare ADHD/R with ADHD/I and ADHD/C in a clinical sample of adolescents.

Materials and Methods

Participants

Eighty-seven adolescents with ADHD who were consecutively assessed in the child and adolescent psychiatry clinic of the University of Health Sciences Erenkoy Research Hospital between November 2017 and January 2018 were included in the study. The inclusion criteria were as follows: (1) Age of 12–18 years; (2) no known chronic medical or neurological disease diagnosis; (3) diagnosis of primary ADHD according to DSM-V; (4) Conners' parent rating scale (CPRS) and Conners' teacher rating scale revised (CTRS-R) scores suggestive of ADHD; (5) no other psychiatric diagnosis (only comorbid oppositional defiant disorder and anxiety disorder were allowed); (6) no autism spectrum disorder diagnosis according to DSM-V; and (7) normal intelligence based on either a WISC-R full scale IQ score above 80 or the average/above average academic performance documented with the past year's final school grades. Normal intelligence was confirmed by at least one faculty member of child psychiatry. The adolescents with developmental delay, motor and visual handicaps, uncontrolled seizure disorder, and other chronic diseases were excluded from the study. Informed consent was provided from parents. The Ethics Committee of the Erenkoy Research Hospital approved the study protocol.

Instruments

Study measures included the Turgay DSM-IV Disruptive Behavior Disorders Rating Scale (T-DSM-IV-S), CTRS-R, and CPRS. ADHD subtypes were diagnosed according to the DSM-V criteria and the evaluation of each case included a structured psychiatric interview and parent- and teacher-rated tools. For the diagnosis of ADHD-R, the proposed criteria of previous studies are used^[6]. The definitions of subtypes were as follows:

ADHD-C is defined as having six or more symptoms on both inattention and hyperactivity-impulsivity dimensions. ADHD-I is defined as having six or more symptoms on inattention and between three to five symptoms on hyperactivity-impulsivity dimension. ADHD-R is defined as having six or more symptoms on inattention and no or less than two symptoms on hyperactivity-impulsivity dimension.

Turgay DSM-IV Disruptive Behavior Disorders Rating Scale Parent and Teacher Forms

Turgay DSM-IV disruptive behavior disorders rating scale parent and teacher forms (T-DSM-IV-S) was developed by Turgay^[7] and translated by Ercan et al.^[8] into Turkish. The T-DSM-IV-S is based on DSM-IV diagnostic criteria and assesses hyperactivity-impulsivity, inattention, opposition-defiance, and conduct disorder. Symptoms are scored on a 4-point Likert scale (0 = not at all; 1 = just a little; 2 = quite a bit; and 3 = very much). The subscale scores on the T-DSM-IV-S were calculated by summing the scores on the items of each subscale. In the present study, hyperactivity-impulsivity (nine items), inattention (nine items), and ADHD total (18 items) scores of the scale were used.

CPRS

CPRS is a 48-item Likert-type scale used to assess problematic behaviors in children^[9]. In addition to a total score, there are five subscale scores: Conduct problems, Impulsivity and Hyperactivity, learning problems, anxiety, and psychosomatic problems. Dereboy et al.^[10] reported that the CPRS-Turkish Version is valid and reliable for use in the Turkish population.

CTRS-R

CTRS-R is a commonly used teacher rating scale for diagnosing behavioral problems in children^[9]. The 28-item CTRS-R provides a total score and 3 subscale scores: Cognitive Problems/Inattention, Hyperactivity and Conduct problems. Sener et al.^[11] reported that the CTRS-R-Turkish Version is valid and reliable for use in the Turkish population.

Table 1. The comparison of parent-rated scale scores between adolescents with ADHD/R and ADHD/I

Psychiatric scale results	ADHD/R n=15 Mean (SD)	ADHD/I n=33 Mean (SD)	p
Parent T-DSM-IV-S			
Total	8.2 (3.9)	11.6 (7.1)	0.04
Inattentiveness	5.2 (1.8)	5.5 (2.7)	0.6
Hyperactivity	0.9 (1.4)	2.4 (2.5)	0.01
Oppositional problems	1.8 (1.8)	3 (2.5)	0.1
Conduct problems	0.2 (0.5)	0.5 (0.9)	0.05
CPRS			
Total	33.3 (13)	44.3 (24.6)	0.05
Learning problems	6.2 (1.8)	7.7 (4.2)	0.1
Hyperactivity	2.8 (2.7)	4.4 (3.2)	0.05
Conduct disorder	6.4 (6.9)	9.5 (8.2)	0.2
Anxiety	7 (3.3)	8.6 (5)	0.2
Psycho-somatic	3 (2.3)	3.4 (2.6)	0.6

CTRS-R: Conners' teacher rating scale revised; ADHD: Attention deficit hyperactivity disorder; T-DSM-IV-S: Turgay DSM-IV Disruptive Behavior Disorders Rating Scale.

Table 2. The comparison of teacher-rated scale scores between adolescents with ADHD/R and ADHD/I

Psychiatric scale results	ADHD/R n=15 Mean (SD)	ADHD/I n=33 Mean (SD)	p
Teacher T-DSM-IV-S			
Total	8.4 (4.3)	7.6 (5)	0.7
Inattentiveness	5.9 (2.8)	3.8 (2.9)	0.05
Hyperactivity	0.8 (1)	1.5 (2.7)	0.4
CTRS-R			
Total	23.5 (8.9)	30.5 (18.3)	0.2
Inattention	8.9 (4.1)	10.7 (5.8)	0.3
Hyperactivity	5 (4.2)	6.3 (4.6)	0.4
Conduct problems	4.1 (3.6)	3.8 (3.6)	0.8

CTRS-R: Conners' teacher rating scale revised; ADHD: Attention deficit hyperactivity disorder; T-DSM-IV-S: Turgay DSM-IV Disruptive Behavior Disorders Rating Scale.

Statistical Analysis

The collected data were analyzed using the SPSS version 21.0. Demographic variables were presented using descriptive statistics. χ^2 and likelihood ratio tests were used for the comparison of normally distributed categorical variables. For the comparison of categorical variables which were not normally distributed, Fisher's exact probability test was used. Normally distributed parametric variables were compared between groups using independent samples t-test. The Mann-Whitney U-test was used for the comparison of continuous variables which

Table 3. The comparison of parent-rated scale scores between adolescents with ADHD/R and ADHD/C

Psychiatric scale results	ADHD/R n=15 Mean (SD)	ADHD/C n=39 Mean (SD)	p
Parent T-DSM-IV-S			
Total	8.2 (3.9)	15.8 (6.4)	0.001
Inattentiveness	5.2 (1.8)	6 (2.3)	0.2
Hyperactivity	0.9 (1.4)	5.3 (2.6)	0.001
Oppositional problems	1.8 (1.8)	3.6 (2.6)	0.010
Conduct problems	0.2 (0.5)	0.8 (1.1)	0.015
CPRS			
Total	33.3 (13)	52.3 (21.1)	0.002
Learning problems	6.2 (1.8)	8.6 (3.3)	0.01
Hyperactivity	2.8 (2.7)	25 (111.7)	0.4
Conduct disorder	6.4 (6.9)	11.9 (7.9)	0.019
Anxiety	7 (3.3)	7.6 (4.3)	0.6
Psycho-somatic	3 (2.3)	3.4 (2.9)	0.6

CTRS-R: Conners' teacher rating scale revised; ADHD: Attention deficit hyperactivity disorder; T-DSM-IV-S: Turgay DSM-IV Disruptive Behavior Disorders Rating Scale.

were not normally distributed. $P < 0.05$ was accepted to be statistically significant.

Results

The mean age of the total sample was 143 months (SD:16.05) and 73.5% (n: 65) were males. 39 adolescents (44.8%) had ADHD combined (ADHD/C), 33 (37.9%) had ADHD/I, and 15 (17.2%) had ADHD/R subtype diagnosis. Table 1 shows the comparison of parent-rated scale scores between adolescents with ADHD/R and ADHD/I. As seen in the table; the total, hyperactivity, conduct problems, and oppositional scores of T-DSM-IV-S were found to be higher in adolescents with ADHD/I when compared to those with ADHD/R. Similarly, the total, hyperactivity, and learning problems scores of CPRS were also found to be higher in adolescents with ADHD/I.

The comparison of teacher-rated scale scores between adolescents with ADHD/R and ADHD/I is shown in Table 2. As seen in the table, the only significant difference between the groups was T-DSM-IV-S inattentiveness score which was higher in those with ADHD/R.

Tables 3 and 4 show the comparisons of study scale scores between adolescents with ADHD/R and ADHD/C. As seen in the tables, certain scores of the parent-rated and teacher-rated scales including the total, hyperactivity, conduct problems scores of parent and teacher T-DSM-IV-S, CPRS, and CTRS-R were found to be higher in adolescents with ADHD-C ($p < 0.05$).

Table 4. The comparison of teacher-rated scale scores between adolescents with ADHD/R and ADHD/C

Psychiatric scale results	ADHD/R n=15 Mean (SD)	ADHD/C n=33 Mean (SD)	p
Teacher T-DSM-IV-S			
Total	8.4 (4.3)	12.7 (7)	0.03
Inattentiveness	5.9 (2.8)	5.1 (2.2)	0.4
Hyperactivity	0.8 (1)	4.5 (2.9)	0.001
CTRS-R			
Total	23.5 (8.9)	29.4 (13.6)	0.2
Inattention	8.9 (4.1)	8.9 (4.2)	0.9
Hyperactivity	5 (4.2)	8.6 (5.4)	0.04
Conduct problems	4.1 (3.6)	5.7 (5.3)	0.3

CTRS-R: Conners' teacher rating scale revised; ADHD: Attention deficit hyperactivity disorder; T-DSM-IV-S: Turgay DSM-IV Disruptive Behavior Disorders Rating Scale.

Discussion

In the present study based on parent- and teacher-rated scales, certain differences were found between ADHD-R and other ADHD subtypes. These differences were mainly on the hyperactivity–impulsivity and externalizing behavior problem scores while internalizing symptoms were found to be in similar severity among the subtype groups. Using both the parent- and teacher-rated scales may be considered as one of the strengths of the study. Several factors, including the mean age of our sample, must be taken into account when interpreting the findings.

Since ADHD-R is largely considered as a subcategory of ADHD-I, the comparison of these two subtypes is important to understand the meaning of hyperactivity–impulsivity symptoms in ADHD-I population^[12]. In this study, regarding the parent-rated scales; the total, hyperactivity, conduct problems, and oppositional scores of T-DSM-IV-S; and the total, hyperactivity and learning problems scores of CPRS were found to be higher in adolescents with ADHD/I when compared to those with ADHD/R. On the other hand, anxiety and psychosomatic scores were not found to be different between groups. Our findings suggest that the marked presence of hyperactivity–impulsivity symptoms in ADHD-I, despite not being sufficient for an ADHD-C diagnosis, is associated with more externalizing behavior symptoms. When the risk of conduct problems in ADHD subtypes is taken as a spectrum, ADHD-R may be considered as having the lower risk among the three subtypes. In contrast, the frequency of internalizing symptoms appears not to be different in ADHD-R. A previous study by Schitzm et al.^[13] who focused on the clinical correlates of ADHD subtypes

has shown that there was no significant difference between children with ADHD-R and ADHD-I, but certain anxiety symptoms were more evident in those with ADHD-R. To the best of our knowledge, no previous study has compared conduct problems between ADHD-R and ADHD-I.

It is widely known that both parent and teacher reports are crucial in the ADHD diagnosis and there are usually discrepancies between the ratings of parents and teachers^[14]. Our findings showed that teacher-rated scales, which revealed generally similar scores in ADHD-R and ADHD-I, were not in correlation with parent-rated scales. According to teachers, the only difference between groups was the T-DSM-IV-S inattention score which was higher in ADHD/R. In line with this finding, a previous study by Ünsel-Bolat et al.^[15] who used a global neurocognitive index reported that children with ADHD-R had the worst overall performance compared with the other ADHD subtypes^[15]. Nevertheless, our finding of higher IA scores in ADHD-R still should be interpreted with caution since it was only reported by teachers. Teachers, as they only observe the children in school setting, may have some distinct observations than the parents. In case of an adolescent with ADHD-R, the presence of only inattention symptoms without hyperactivity–impulsivity may be somehow unusual for the teachers and may affect their opinions negatively. On the other hand, teachers' expectations may be higher from these youngsters since they do not have behavioral problems. And when these expectations are not met academically, teachers may rate them as having more inattention problems. And finally, since these adolescents usually do not have difficulties to follow the classroom rules, they may be less recognizable than those with ADHD-I. For this reason, teachers may not have detailed observations of them, and in turn, may have biased ratings for ADHD.

As may be expected, several scores of the study scales, including the total and hyperactivity scores, were found to be higher in adolescents with ADHD/C when compared to ADHD/R. Surprisingly, anxiety and psychosomatic scores were not different between these two groups. Many previous studies have shown that the frequency of internalizing symptoms is higher in ADHD-I when compared to ADHD-C^[2]. We speculate that the relatively small sample size in the present study may be responsible for our findings on internalizing symptoms. Of note, the above-mentioned discrepancies between the ratings of parents and teachers were not evident on the comparison of ADHD-R and ADHD-C. Although the exact reason for this difference is largely unknown, it may be partly explained by the overt behavioral symptoms in adolescents with ADHD-C which might make them more recognizable by teachers.

This study has several noteworthy limitations mainly the small sample size and the cross-sectional design. For measuring anxiety and internalizing symptoms, more specific tools may be used to increase to validity of our findings. The lack of self-reports of adolescents is also a limitation especially on the investigation of anxiety and psychosomatic problems.

This study, which is among the limited number of studies on the clinical correlates of proposed ADHD-R in adolescents, suggests that the differences between ADHD-R and valid DSM-V ADHD subtypes are generally associated with the symptom dimensions. Our findings may be interpreted as another evidence on the debate questioning the necessity of subtypes to define the cases with ADHD. Future studies with large sample sizes are needed to clarify the clinical validity and correlates of ADHD-R.

Ethics Committee Approval: The Erenköy Mental and Neurological Diseases Training and Research Hospital Clinical Research Ethics Committee granted approval for this study (number: 2019-3-14).

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