

Sociodemographic and Clinical Factors Associated with Compliance to Methylphenidate Treatment in Children with Attention Deficit Hyperactivity Disorder

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Abstract

Objective: The present study aimed to determine the rate of treatment compliance in children with attention deficit hyperactivity disorder (ADHD) that were newly prescribed methylphenidate, and to evaluate the associated clinical and sociodemographic factors, as well as parental concerns about drug treatment.

Method: The sample of this prospective and observational study consisted of 238 children aged 7-18 years with ADHD diagnosed according to DSM-IV criteria. At the end of the first year, the study sample was splitted into 2 groups; compliant and non-compliant. Parental attitudes toward drug therapy, and clinical and sociodemographic characteristics of the 2 groups were compared. A clinician rated parental concerns about drug treatment 4-6 weeks after the interview that was conducted in order to inform them about methylphenidate therapy. Regarding a minimum requirement of 5 days weekly dosage and drug holidays, cases that took more than 70% of the recommended methylphenidate dose at the end of the first year were described as compliant.

Results: At the end of the first year of treatment, the drug compliance rate was 80.3% (n= 191). The non-compliant group consisted of older children. A significant difference was observed between the compliant and non-compliant groups in terms of parental approach toward drug treatment. Children in the non-compliant group had parents that had doubts about pharmacotherapy and these children were less compliant with methylphenidate treatment.

Conclusion: Parental concerns about methylphenidate treatment in ADHD may influence treatment compliance. Additionally, it is suggested that developmental psychological characteristics associated with adolescence may also be important.

Key Words: Attention Deficit Hyperactivity Disorder, Stimulant Medication, Treatment Adherence

INTRODUCTION

In ADHD which is an early onset neurodevelopmental disorder, pharmacotherapy and behavioral approaches are the basic components of treatment (Swanson, 2003). Psychostimulants, especially methylphenidate (MPH), are the most frequently used medications in Western countries for the treatment of ADHD (Olfson et al., 2003). Until 2005, the only stimulant available for ADHD in Turkey was the short-acting form of MPH.

The therapeutic effects of psychostimulants on ADHD were reported by various short-term controlled studies (Jadad et al., 1999; American Academy of Pediatrics, 2001); however, there are very few studies

of the long-term treatment effects. Placebo controlled studies, which have follow-up periods of one year or more, showed that stimulants are effective in reducing the core features of ADHD; however, these studies did not mention the long-term efficacy of drug treatment to academic and psychosocial functioning (Gillberg et al., 1997; MTA Cooperative Group, 1999). Other studies of children with ADHD, including cases in which drug and other treatment modalities were used, showed that important losses in academic, social, and professional domains continued throughout adolescence and young adulthood (Barkley et al., 1990; Biederman et al., 1996). On the other hand, a new study that followed children with ADHD for 5 years reported significant improve-

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ment in the drug treatment group based on teacher rating scales (Charach et al., 2004).

In a two-year follow-up study conducted with stimulant responsive ADHD children aged between 7 and 9 years, it was reported that long-term psychosocial approaches did not have a positive effect on ADHD, on oppositional defiant disorder symptoms (Abikoff et al., 2004a), or on social behaviors (Abikoff et al., 2004b) in addition to MPH therapy and that the beneficial effects of MPH lasted for 2 years. In a 6-month follow up study conducted with Turkish children with ADHD, the treatment effects of MPH and MPH plus parental training were compared, and the contribution of MPH alone to improvement of symptoms of the disorder and positive changes of the parent-child relationship was higher (Ercan et al., 2005).

These findings show that treatment continuity and drug compliance are very important for long-term academic and social performance in children with ADHD. Currently, delineating the variables that affect drug compliance is beginning to gain importance. There are no studies in Turkey on the possible variables that affect drug compliance in ADHD. Studies conducted in Western countries are also limited. Among these few studies, a review study included only 7 studies conducted between 1981 and 1993 (Hack and Chow 2001). A more recent study reported that compliance to stimulants after one year was 81% (Thiruchelvam et al., 2001). Symptoms exhibited in the school environment, age, comorbid diagnoses, misinformation, and doubts of the parents about drug treatment were reported to be variables that affect drug compliance (Thiruchelvam et al., 2001; Dosreis et al., 2003).

The present study was a prospective and observational study, which aimed to determine the rate of treatment compliance of children with ADHD that were newly prescribed MPH in the first year of the treatment. The study sample was split into 2 groups according to compliance and non-compliance. These 2 groups were compared in terms of associated clinical and sociodemographic factors, and parental concerns about drug treatment. We also aimed to determine the factors that might affect drug compliance.

METHODS

Sample

Children using MPH for the first time due to ADHD who were treated at the Ankara University School of

Medicine, Child and Adolescent Psychiatry Department, ADHD and Learning Disorders Unit between 2004 and 2005 were included in the study. Patients with severe mental retardation or severe neurological/metabolic diseases are not treated in this unit. Among the 283 children, 21 (7.4%) who were using other medications and 7 (2.5%) children who were not using any medication were excluded from the sample. The sample consisted of 255 children aged 7-18 years with ADHD diagnosed according to DSM-IV criteria. Children and their parents were informed about the study and written informed consent of the parents was obtained.

Assessment Tools

In the preliminary assessments, the severity and subtypes of ADHD were evaluated with the Turgay DSM-IV-Based Child and Adolescent Behavior Disorders Screening and Rating Scale (T-DSM-IV-S) (Turgay, 1994; Ercan et al., 2001), and the Conners' Parent and Teacher Rating Scales (Goyette et al., 1978; Şener et al., 1995; Dereboy et al., 1998). T-DSM-IV-S is a Likert-type scale for screening ADHD symptoms according to parents and teachers. Nine items in this scale assess severe hyperactivity-impulsivity, 9 items assess attention deficiency, 8 items assess oppositional behavior, and 15 items assess symptoms of behavioral disorder. The Conners' Teacher Rating Scale (CTRS) was developed in order to assess classroom behavior of students. CTRS is a 28-item scale that includes hyperactivity/impulsivity, attention deficiency/passivity, and behavior disorder subscales. The Conners' Parent Rating Scale (CPRS) is a 48-item scale, which includes hyperactivity, behavior disorder, attention deficiency, and oppositional defiant disorder subscales. Both scales are evaluated with a 4-point Likert-type scale. In addition, when the clinician deemed it necessary, intelligence level was assessed with the Wechsler Intelligence Scale for Children (WISC-R) (Wechsler, 1974; Savaşır and Şahin, 1995).

Side effects and parental approach to drug treatment:

Treatment decisions were made by the physician according to routine clinical procedures. MPH was initiated at 0.3 mg/kg 2-3 times daily. In some cases the daily dosage was increased to 0.6-0.7 mg/kg, while striving to keep the dosage as low as possible to avoid side effects and still decrease ADHD symptoms. The possible side effects of MPH were evaluated in monthly meetings conducted with the parents. Mild side effects that did not affect daily functioning were ignored. Moderate and

Table I. Sociodemographic characteristics of the sample.

	Compliant (Group 1) n = 191	Non-compliant (Group 2) n = 47	
Age (years) X ± SD	11.61 ± 2.5	12.60 ± 2.5	t = -2.35, p = 0.02
Gender n (%)			
Girls	27 (14.1)	12 (25.5)	$\chi^2 = 3.57$, p = 0.06
Boys	164 (85.9)	35 (74.5)	
Parents education (years) X ± SD			
Mothers	10.2 ± 3.8	10.1 ± 3.9	t = 0.06, p = 0.9
Fathers	11.9 ± 3.1	10.9 ± 3.6	t = 1.80, p = 0.08
Mothers' professions (%)			
Housewives	51.9	40.0	$\chi^2 = 7.06$, p = 0.1
Civil servant	37.5	51.1	
Worker	5.8	4.4	
Retired	4.8	4.5	
Fathers' professions (%)			
Unemployed	2.1	8.9	$\chi^2 = 4.9$, p = 0.2
Civil-servant	49.7	46.7	
Worker	44.9	39.0	
Retired	3.3	4.4	
Family structure (n)			
Nuclear	160	39	$\chi^2 = 3.1$, p = 0.3
Extended	17	3	
Single parent	13	6	
Referral source (%)			
Family	57.5	62.5	$\chi^2 = 0.7$, p = 0.8
Teacher	37.3	35.0	
Pediatrics	5.2	2.5	

severe side effects that lasted more than a month during the course of the study were accepted as side effects.

A special interview that informing each parent about the disorder and drug treatment was conducted. At the end of the interview a written document that containing information about MPH prepared by our clinic was given to the parents. The second meeting was conducted 4-6 weeks after that meeting in which the clinician evaluated parents' thoughts and behaviors related to the drug. Parents were placed in groups depending on the results of this evaluation: 1) Parents who believed that the drug treatment was beneficial and necessary; 2) Parents with doubts about the drug treatment due to information from the media or other sources; 3) Parents who thought that the treatment was necessary, but were anxious about side effects.

Drug Compliance

The quantity of medication that was required in the first year of treatment, including the weekends, was

calculated based on daily dosage. The 12-week summer holiday and 2-week semester holiday were not included in the calculation. The prescription quantity was determined, as MPH is a prescription drug that requires a physician report. Based on the least necessary weekly drug quantity, cases that took more than 70% of the proposed medication quantity were accepted as compliant to the treatment and cases that were under this ratio were accepted as non-compliant.

Statistical Evaluations

Statistical analyses were conducted with the SPSS v.11.0 package program. In the comparisons of compliant and non-compliant cases, descriptive statistics for demographic data, chi-square test for categorical variables, and Student's t-test for continuous variables were used. The level of significance was accepted as p < 0.05.

FINDINGS

As 17 (6.6%) of the cases were not followed regularly,

Table II. Parental approaches to drug treatment and drug compliance.

	Parental approaches to drug treatment			$\chi^2 = 28.8$ $p = 0.000$
	Necessary and beneficial	Doubtful	Concerned about side effects	
Group 1 n (%)	153 (80.1)	26 (13.6)	12 (6.3)	
Group 2 n (%)	22 (46.8)	23 (48.9)	2 (4.3)	

Group 1: compliant; Group 2: noncompliant.

the study included 238 cases. The excluded children did not differ from the sample group in terms of age, gender, or ADHD sub-type. Among the sample, 39 were girls (16.4%), 199 were boys (83.6%), and the mean age was 11.8 ± 2.6 years. There were no statistical differences in terms of the mean age of boys and girls ($t = 0.23$, $p = 0.8$). The majority of the children were primary school students ($n = 186$, 78.2%) and 21.8% ($n = 52$) were high school students.

Drug compliance after the first year was 80.3% ($n = 191$). When the sociodemographic characteristics of the compliant (Group 1) and non-compliant (Group 2) groups were compared, they differed only in terms of age. Group 2 included older children. The sociodemographics of the 2 groups are presented in Table I.

Distribution of ADHD subtypes in Group 1 was as follows: 80.1% ($n = 153$) ADHD combined subtype; 13.1% ($n = 25$) attention deficit (AD) subtype; 6.8% ($n = 13$) hyperactivity-impulsivity (HI) subtype. Distribution of ADHD subtypes in Group 2 was as follows: 68.1% ($n = 32$) combined subtype; 21.0% ($n = 10$) AD subtype; 10.6% ($n = 5$) HI subtype. The distribution of ADHD subtypes in both groups was similar ($\chi^2 = 3.1$, $p > 0.05$). At least one comorbid diagnosis was evident in 57.6% of Group 1 ($n = 110$) and in 63.8% ($n = 30$) of Group 2. The most frequent comorbid diagnosis was oppositional defiant disorder (ODD); 59 (30.9%) in Group 1 and 17 (36.2%) in Group 2. There were no significant differences between the groups in terms of comorbidity ($\chi^2 = 0.6$, $p > 0.05$).

In preliminary evaluations, when T-DSM-IV-S, CTRS, and CPRS scores were evaluated, the 2 groups were similar in terms of total scores ($p > 0.05$). In Group 1, verbal, performance, and total IQ scores according to WISC-R ($n = 144$) were 98.2 ± 15.8 , 102.8 ± 17.3 , and 100.4 ± 16.4 , respectively, whereas in Group 2 ($n = 41$) they were 94.8 ± 16.8 , 101.0 ± 17.7 , and 97.8 ± 17.1 , respectively. There were no significant differences between the groups in terms of intelligence scores ($p > 0.05$). When WISC-R subscales were compared, only

the comprehension scores were significantly different (10.6 ± 3.0 in Group 1 vs. 9.3 ± 3.3 in Group 2) ($t = 2.4$, $p = 0.02$).

The differences between groups in terms of drug side effects were not determined ($\chi^2 = 0.2$, $p > 0.05$). The most frequent side effect in both groups was loss of appetite, which was noted in 9.4% ($n = 18$) and 14.9% ($n = 7$) of Groups 1 and 2, respectively. There were no significant differences in terms of additional medication usage ($\chi^2 = 0.08$, $p > 0.05$).

There was a significant difference between the 2 groups in parental approach to treatment ($\chi^2 = 28.8$, $p = 0.000$). When the distribution of the 2 groups in terms of parental approach was evaluated, more than 80% of the children whose parents found drug treatment necessary and beneficial ($n = 175$, 73.5%) or found the treatment beneficial, but were anxious about the drug side effects ($n = 14$, 5.9%) were in Group 1. Approximately half of the children of doubtful parents were in Group 1 ($n = 49$, 20.6%). In order to detect which parent group affected drug compliance, the doubtful parent group was excluded and there were no statistical differences between the other 2 parent groups ($p > 0.05$). In conclusion, it was determined that the difference was originated from doubtful parent group, and that the children of these parents had a low rate of drug compliance (Table II).

DISCUSSION

The rate of medication treatment in ADHD treatment was 97.5% in this study. It was observed that short-acting MPH usage, which was formerly the only psychostimulant in Turkey, was 90%. This finding is compatible with the rate reported in studies conducted in Western countries. Studies that evaluated drug choice and stimulant usage in Turkey report dramatic changes in the last 10-15 years. Öktem and Sonuvar (1993) reported a selection rate of 70% for imipramine and 2%-3% for MPH in the treatment of children with ADHD. In a study conducted in 1996 to determine the drug choices of child and adolescent psychiatrists (Baysal and Gökler

1996) showed that 80.4% preferred drug treatment and the most frequent medication choice (60%) was antidepressants (imipramine). Another study conducted at a university hospital showed that in 94% of cases drug treatment is initiated and MPH was the first choice of drug in 49.6% of the cases (Şenol, 1997). It is thought that the increase in MPH usage in ADHD treatment is due to increased knowledge about ADHD, and MPH's mild side effects, low price, and availability.

In the present study, drug compliance in children with ADHD who were using MPH was 80.3% at the end of the first year. There are very few studies on psychotropic drug compliance in children. In a review study that included 7 studies conducted between 1981 and 1993, it was reported that the largest sample included 76 children aged between 6 and 9 years. This review study reported rates of drug compliance ranging from 35% to 80% (Hack and Chow, 2001). In a more recent 3-year follow-up study of stimulant treatment compliance and related factors in ADHD children, drug compliance rates in the first, second, and third years were 81%, 67%, and 52%, respectively. The variables related to increased drug compliance were absence of ODD symptoms at school, severe ADHD symptoms reported by teachers, and younger age at the time of treatment onset (Thiruchelvam et al., 2001). Researchers emphasized that compliance to stimulant treatment is a dynamic process and that while some children stop using the medication over time, others can start using the drug in different time intervals. In the light of these findings, it can be proposed that the rate of 80.3% found in our study may decrease in the future. Our clinical experience shows that after the optimal dosage was established and after receiving information about the disorders families tend to seek help only during the crisis situations. Therefore, it was concluded that long-term follow-up of children with ADHD is important for better treatment outcomes.

Our findings showed that the treatment compliance of younger children was better than that of older children. This might have been due to heightened parental control of younger children. Upon the decreases in certain symptoms of ADHD, such as hyperactivity, during adolescence children and families may think that drug usage is no longer necessary. Adolescents might consider drug usage as obeying parental authority and the loss of autonomy. In addition, being "ill and using drugs" might cause social problems for the adolescent.

Although the total intelligence level of the children

in our study did not differ in terms of drug compliance, the scores of the comprehension subscale of WISC-R were lower in Group 2. This subscale included questions about organizing knowledge, social judgment, and social adaptive abilities. Weaknesses in these abilities might affect a child's awareness regarding the disorder, personal responsibility towards treatment, and perception of positive changes due to treatment. It was reported that low intelligence levels in parents and children negatively affect drug compliance (Swanson, 2003).

We found that drug compliance of the children with parents who doubted the treatment due to information based on the media and other sources was low. In another study of parental attitudes towards drug treatment in ADHD, 55% of parents were doubtful about the treatment due to information gathered from the media. Misinformation and doubts of parents regarding drug treatment can be due to factors related to family and children (such as race and ethnic background), which have a negative affect on treatment (Dosreis et al., 2003). On the other hand, it was reported that providing only information about the disorder and its treatment is not sufficient for enhancing treatment compliance in ADHD. It is emphasized that the availability of clinician, the level of support, adoption of the treatment, and regular drug follow-up are important. In this regard, it was proposed that daily single dose medications and psychosocial interventions that include the family, teachers, and children increase treatment compliance (Swanson, 2003).

In this observational study behavior-rating scales were administered to parents and teachers in order to determine the effectiveness of medication and to determine dose titration. However, these ratings during the follow-up was not applied the certain time periods for all cases. Therefore, we could not evaluate whether parental attitudes changed according to response to medication. Parental attitudes might be positively affected in cases that respond well to drug treatment.

CONCLUSION

There are many articles describing that children with various temperamental characteristics might be labeled as ADHD. From this point of view, psychostimulants are also considered as a part of this process (Malacrida, 2004; Aras and Şemin, 2005). On the other hand, with their proven effectiveness and relatively low rate of side effects, psychostimulants are the mainstay of ADHD treatment. The contemporary treatment approach includes psycho-

social interventions with teachers, and parents, and drug treatment (Schachar and Tannock, 2002).

Although all of the factors that might affect drug compliance were not examined, this study evaluated age, comprehensive ability, parental attitudes and thoughts about drug treatment as the possible factors that might affect medication compliance in children. In order to increase medication adherence in ADHD, parental attitudes should be considered and collaboration should be

established between parents and clinician. In addition, it is noticed that the adolescence is a period that affects the compliance negatively. Therefore, a positive treatment relationship, especially with adolescents, might increase treatment compliance. We may expect that, the new single dose form of MPH, which is new in Turkey, can have a positive affect on drug compliance. Further prospective controlled studies are needed to determine the factors that affects drug compliance related to children and family variables and that of various drug forms.

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