Research & Reviews: Journal of Educational Studies

Medication Compliance in Israeli Children with ADHD: A Cross Sectional Study

Dana Lazar Bar-David[1], Idit Goldstein-Glikser[2]*, Tally Lerman-Sagie[3]

[1] Department of Medicine, Tel-Aviv University, Tel Aviv, Israel

[2]Department of Humanities, Tel Aviv University, Tel Aviv, Israel

[3]Department of Pediatric Neurology Unit, Wolfson Medical Center, Holon, Israel

Research Article

Received: 13-May-2022, Manuscript No. JES-22-64812; **Editor assigned:** 18-May-2022, PreQCNo. JES-22-64812(PQ); **Reviewed:** 07-Jun-2022, QC No. JES-22-64812; **Revised:** 16-Jun-2022, Manuscript No. JES-22-64812 (A); **Published:** 27-Jun-2022, DOI:10.4172/J.Educ.Stud.8.5.004

***For Correspondence:**
Idit Goldstein-Glikser, Department of Humanities, Tel Aviv University, Tel Aviv, Israel

Email: iditgoldstein@gmail.com

Keywords: Drug adherence; Behavioural problems; Hyperactivity Disorder; Social life

ABSTRACT

Objective: To assess the compliance of children with Attention Deficit Hyperactivity Disorder (ADHD) to medical recommendations and to identify the factors associated with drug adherence.

Methods: The degree of compliance to medical recommendations and associated factors were assessed by a questionnaire answered by parents of 140 children with ADHD attending two ADHD clinics.

Results: 58% of the participants were compliant (43% fully, 15% mostly) to medical recommendations. Compliance was positively correlated with enhanced severity of behavioral problems at school; and negatively correlated with academic achievements, social status, and the child's conduct at home. The following factors did not influence compliance: age and gender, parental characteristics (educational status, prejudice against medications, and satisfaction with the diagnostic process) and type of clinic.

Conclusion: The factors associated with medical compliance in Israeli children with Attention Deficit Hyperactivity Disorder are primarily related to the effect of the symptoms on their academic and social life.

INTRODUCTION

Attention Deficit Hyperactivity Disorder (ADHD) is the most common neuropsychiatric behavioral disorder in children. The prevalence is 5%-10% among children of school age [1]. In Israel the prevalence is 12% [2]. ADHD is chronic disorders that can persist into adulthood [3].The symptoms include inattention, impulsivity, distraction, and hyperactivity.

ADHD can significantly affect the child's life in many areas, including social integration, academic achievements and self-esteem [4]. Many studies have documented effectiveness and positive outcome of medical treatment of ADHD. Early diagnosis and adherence to drug therapy are significant factors for long-term effects in the treatment of children and adolescents with ADHD [5]. It has been shown that untreated ADHD had negative long-term outcomes; untreated children had worse academic performance outcomes and poorer self-esteem and social function outcomes [6].

There are primarily two types of pharmacological agents proven to be effective for treating ADHD; psychostimulants and a Norepinephrine Reuptake Inhibitor (NRI) atomoxetine [7].

Adherence/compliance to treatment is defined as the extent, to which the patient's actions are consistent with the recommendations of the physicians treating him World Health Organization (WHO).

Despite the proven importance of drug therapy in children with ADHD, the positive effect of treatment on the core symptoms and on many aspects of the patient's life, drug and dosage compliance is relatively low. In a review of 11 studies on medication adherence in adults and children with ADHD mean compliance rates ranged from 13.2% to 64% [8]. Lack of adherence to medication leads to poor outcomes in children and adolescents with ADHD [9].

Past studies have found several factors that predict poor compliance: older age. Parent's negative stigma of medication [10]. On the other hand, good predictors for increased compliance were: a diagnosis of ADHD with a component of hyperactivity, and poor behavioral and general condition of the child [11,12].

MATERIALS AND METHODS

The study was a cross-sectional study examining the relationship between variables. A telephone survey was conducted with parents of children attending ADHD clinic at Wolfson Medical Center and the private clinic of Prof. Tally Sagie. The children were all diagnosed with ADHD, and medical treatment was recommended. They did not suffer from other medical conditions requiring medications.

Participants

Participants in this study included 140 parents of patients with ADHD who were diagnosed in equal numbers either at the ADHD clinic at Wolfson Medical Center in Holon (by pediatric neurologists) or at the private clinic of T.L-S in Tel Aviv, Israel.

The Participants included 129 mothers and 11 fathers (81% of them were married, 17% divorced and 2% were widows). The children were between the ages of 6 to 20 (mean=11.55, SD=3). 90 of them were boys and 50 were girls. Most participants live in the center of Israel. 45.6% of the mothers were high school educated, 42% had academic education and 12.5% had professional education. A similar number of fathers have high school and academic education (39%), while 22% possessed professional education. All the participants in the study gave their informed consent. The patients were diagnosed from 2011 to 2017 and the questionnaire was submitted at least 6 months after diagnosis.

The hospital visit is funded by the insurance, while in the private clinic visit is paid by the family. The evaluation in both clinics includes: 1. Connors questionnaire filled by parents and teachers in advance. 2. A teacher evaluation form. 3. Medical and developmental history, medical reports, previous psychodidactic and psychological reports. 4. Behavioral evaluation 5. Attention tasks that include repeating and understanding a story, Digit Span, Serial 7's, and repeating complex sentences. 6. Neurological examination 7. Didactic evaluation-reading, writing and arithmetic at their age-appropriate level.

Exclusion criteria were additional morbidities requiring other drugs or children who were also diagnosed with Oppositional Defiant Disorder (ODD), which could affect compliance

All subjects answered a telephone survey after giving their oral consent to participate in the study. The questionnaire examined criteria related to the child and his parents. They were asked to provide demographic characteristics, information regarding the diagnosis, child's characteristics and the medical treatment taken. Also, they were asked regarding their child's compliance: Never (1) Rarely (2) Sometimes (3) More than half of the time (4) Frequently (5) Always (6). The research was approved by the Institutional Review Board.

RESULTS

The mean compliance score was 4.15 (range 1-6, SD=2.049). 23% of participants were not compliant at all, while 43% were compliant to all the neurologist's recommendations (Table 1).

Table 1. Distribution of compliance scores.

Compliance score	Number of patients	Percent
Never	32	22.9
Rarely	7	5
Sometimes	10	7.1
More than half of the time	10	7.1
Frequently	21	15
Always	60	42.9
Total	140	100

A Pearson correlation coefficient found a positive correlation between the child's compliance score and the extent of the child's behavioral problems at school ($r=0.781$, $p<0.001$). Spearman correlation coefficients found negative correlations between the child's compliance score and the extent of behavioral problems at home ($rs=-0.371$, $p>0.001$.), academic achievements ($rs= -0.503$, $p<0.001$) and social status ($rs= -0.437$, $p<0.001$). Age, gender and subtype of ADHD did not correlate with compliance (Table 2).

Table 2. Pearson and Spearman correlation between different variables and compliance score

	Pearson correlation	p-value
Behavioral problems at school	0.781	<0.001
Behavioral problems at home	-0.371*	<0.001
Academic status	-0.503*	<0.001
Social status	-0.437	<0.001
Age	-0.067	n.s
Parental satisfaction	1.32	n.s
Mother's parental education	1.22	n.s
Father's	0.97	
Note: *An independent-samples t-test found a significant difference in the compliance score for patients		

An independent-samples t-test found a significant difference in the compliance score for patients returning for follow-up (M= 4.660, SD=1.78) and patients who did not (M=3.028, SD=2.17) conditions; t (53)=4.044, p<0.001 (Table 3).

Spearman correlation.

Table 3. Independent sample T-Tests between different variables and compliance score

	t-value	Sig. (two tailed)
ADHD subtype	1.64	0.08
Gender	0.558	n.s
Return for follow up	4.044	<0.001
Prejudice Against drugs in general	-0.694	
Against ADHD drugs	0.938	n.s
Place of evaluation	0.58	n.s

The following factors were not found to be significantly correlated with compliance scores: parental degree of satisfaction with the evaluation process, parents' education, prejudice against medication use, and place of assessment (Tables 2 and 3).

DISCUSSION

A review of 11 past studies on the rate of compliance to drug treatment in ADHD has found extreme variability ranging from 13.2%-64%. This variability was primarily attributed to a different definition of adherence and diverse methodology. The cutoffs for adherence were not consistent between studies and ranged from 50%-80%.

In the current study, we developed a new methodology for evaluation of compliance to medical treatment in children with ADHD, in order to achieve “real world" estimation. We did not use a dichotomic division to adherent and non-adherent groups (as in previous studies) but utilized a compliance scale based on parental questionnaires.

We found that 42.9% of the patients fully adhered to the physician's instructions, and only 22.9% did not comply at all. This rate of compliance is in line with a rate found in a study conducted in Italy in 2009 which sampled 134 children and adolescents of the same age range and with similar methods [13].

Most of the previous studies in this field solely examined the adherence rate. In our research, we also identified factors affecting response. We found that the most significant factors related to treatment adherence were those concerning the child's characteristics. We found that adherence was better in children with poor academic achievements and social difficulties.

To the best of our knowledge, academic achievements were not tested as a predictor of adherence. But many studies have found that pharmacological treatment has a positive effect on school achievements and attendance and that adherence was better in children who needed greater help at school, such as a support teacher [14,15]. In a study parents of teenagers were asked what factors would influence their decision to treat their children with ADHD. It was found that a belief regarding academic benefits was a predictor of increased adherence [16]. It should be noted that this study described overall perceptions regarding willingness to use ADHD medications and did not examine actual compliance.

ADHD often has negative social consequences and treatment was found to improve long term social function outcomes [17].The single link between the child's social status and adherence to treatment was examined in a study from 2012, which reviewed parental attitudes that promote or interfere with adherence to medical treatment in ADHD. In a focus group of parents to children diagnosed with ADHD it was found that a perception that medical treatment would lead to improvement in social functioning was a good predictor of adherence [18].

Another child characteristic that we found that influenced compliance was home and school behavior. There is a direct correlation between the behavioral severity at school and the adherence to physician's instructions. These finding concords with a previous study that rated the baseline severity of ADHD by the number of teacher complaints-the more severe the classroom behavioral status, the more compliant the patients were. In contrary, we and others have found that behavioral problems at home are negatively correlated with compliance. A possible explanation is that children with behavioral problems resist treatment, and the parents submit to their child’s unwillingness to take medication.

Most studies have found that compliance is better in children with hyperactivity compared to those who are only inattentive. The possible explanation provided was that medication adherence increases with symptom severity. Furthermore, parents and children have more opportunities to see the medication's positive effects at school and afternoon activities. In our study, the difference between the two types of ADHD was only close to significance, probably due to our sample size.

As expected, we found that patients who returned for follow-up visits were more likely to adhere to drug therapy than patients who did not. This finding can be explained by parents' embarrassment to return to the clinic following no adherence and by the redundancy of follow up visits when medical treatment has not been started, since these visits are important for discussing the positive and negative effects of the drug.

We did not find a relationship between the child's age and adherence to treatment, contrary to our expectations and previous studies. Most of the literature found that an older age is a predictor of poor compliance since teenagers frequently refuse medical treatment. Moreover, parents make treatment decisions for younger children, but older children have their own opinion. In fact, parental influence can decrease with time, and, as children reach preadolescence, they may discontinue the stimulant medication.

Another recent study from South Korea found the opposite regarding the effect of age on compliance-that older age was a predictor of good adherence to treatment. The authors explained this contradiction by describing the South Korean adolescent pressure for good achievements. In South Korea, high school students are under substantial academic pressures, and their parents are concerned regarding their performance. Another study demonstrated that the pressure on Korean children to excel is almost the highest in the world, especially considering college or university entry.

Our finding that the child's age does not affect compliance can be understood by the Israeli mentality. The Israeli teenagers find it extremely important to have better achievements in the high school years since they determine their future acceptance to academic institutes and improve their ability to perform well in the sorting tests for military positions. This process determines their near future; the military service is a significant part of the young Israeli citizen's life. Most Israeli adolescents do not want to stop medications in order not to negatively affect their academic performance.

Furthermore, we suggest that the explanation given by some authors for a low compliance due to decreased parental involvement at an older age does not apply to Israel. It was found that both American and Israeli parents are involved in their children's schooling at a young age; but in contrary to findings from the US, indicating a reduction in parental involvement from elementary to post-elementary school, it was found that Israeli parents of high school students remain involved in their children's schooling as much as they did in earlier years.

Parent's educational status was not found to be associated with adherence to treatment. Other studies have shown inconsistent results regarding the correlation between socioeconomic status and compliance.

Parental prejudice against medications, in general, or for treating ADHD did not influence compliance in contrast to past studies that showed that the parents' belief that the medication is safe contributed to an increase in compliance and that stigma was related to a decrease in compliance [19]. This can be explained by the importance that Israeli parents attribute to academic performance, which overcomes their disapproval of drug therapy.

In the future, we suggest that compliance to ADHD will be examined in a more holistic, multimodal approach that will include also non-pharmacological recommendations (e.g. behavioral and emotional therapy and parental guidance) as the disorder affects many aspects of child's life.

CONCLUSION

We found that adherence of Israeli children with ADHD to medical recommendations is relatively high (58%). Factors associated with compliance are those directly relevant to the child's condition and whether the symptoms affect his academic and social life. A good compliance correlated with severe behavioral problems at school, less behavioral problems at home, low academic achievements and a poor social status.

LIMITATIONS

The most significant limitation of the current study is the definition and quantification of the dependent variable. In the literature on the subject, the research definition of treatment compliance varies between studies. Most of the reviewed studies included a large population and compliance was measured by the amount of prescriptions produced in pharmacies or by pill counting. Our research was of a different nature; it involved only 140 patients based on self-report questionnaires of the children's parents. As with all self-report questionnaires, the information

could have been biased. Moreover, because the parents and not the children themselves were questioned, there could have been a discrepancy between the reports, especially among adolescents.

Another limitation is the use of a homogenic population in terms of demographic characteristics – Jewish Israelis, most of whom live in cities in the center of Israel (Holon, Bat-Yam, Tel Aviv), although they come from different socioeconomic backgrounds.

ACKNOWLEDGEMENTS

1. Dana Lazar Bar-David Has a BA in Psychology from IDC Herzliya, and pursuing her MD degree at Tel Aviv University, Israel.
2. Idit Goldstein-Glikser has an MA in Cognitive Studies of Language, and she is a certified Special Education teacher. She is pursuing her Phd, researching reading comprehension and language abilities of children diagnosed with ADHD at Tel Aviv University, Israel.
3. Prof. Tally Lerman-Sagie is the head of the Pediatric Neurology Unit at Wolfson Medical Center, Israel. She is a Professor of Pediatrics and Pediatric Neurology at Sackler School of Medicine, Tel-Aviv University, Israel

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