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Treatment of children with ADHD: Psychopedagogical program at school versus psychostimulant medication

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This study examined the impact of medication management compared to a psycho-educational program on parent and teacher ratings of children with combined type ADHD. The study lasted 14 weeks and included 50 children. 17 children took medication, 17 received psycho-educational intervention, and 16 children were assigned to the control group. The measures used were the IOWA Conners Scale, the School Problem Inventory, the Abbreviated Conners, and the DSM-IV Inattention-Disorganization and Hyperactivity-Impulsivity rating scales. Regarding teacher ratings, improvements were observed on: a) inattention and school problems in the medication group versus the control group; and b) hyperactivity symptoms in the psycho-pedagogical group versus the control and medication groups. Regarding to parent ratings, improvements were observed on: a)inattention in the psycho-pedagogical group versus the control and medication groups; and b) hyperactivity symptoms in the psycho-pedagogical group versus the control and the medication groups.

Tratamiento para niños con TDAH: programa psicopedagógico en la escuela frente medicación psicoestimulante. Este estudio comparó el impacto de la medicación versus un programa psicopedagógico en las estimaciones de los padres y profesores de niños con TDAH, subtipo combinado. El estudio duró 14 semanas y participaron 50 niños. 17 niños tomaron medicación, 17 recibieron una intervención psicopedagógica y los otros 16 conformaron el grupo de control. Se emplearon las siguientes medidas: IOWA Conners, Inventario de Problemas en la Escuela (IPE), versión abreviada del Conners y escalas de Inatención-Desorganización e Hiperactividad-Impulsividad del DSM-IV. Según las estimaciones de los profesores, se observaron mejoras en: a) inatención y problemas escolares en el grupo de medicación versus el grupo control; y b)hiperactividad en el grupo de intervención psicopedagógica versus el grupo control y el de medicación. Según las estimaciones de los padres, se observaron mejoras en: a) inatención en el grupo de intervención psicopedagógica versus el grupo control y el grupo de medicación; y b) hiperactividad en el grupo de intervención psicopedagógica versus el grupo control y el grupo de medicación.

The Attention deficit hyperactivity disorder (ADHD) is, together with the oppositional defiant disorder, the most frequently diagnosed disorder in school-aged children (August, Reamulto, McDonald, Nugent and Crosby, 1996). This condition produces academic, relational, familiar and clinical problems (López-Villalobos, Serrano and Delgado, 2004). Furthermore, it is of a chronic nature, persisting to a worrisome degree in adolescence and adult life, and it is usually associated with negative consequences, such as low self-esteem, failure in school, school dropout, behavioral problems and delinquency (Mannuzza, Klein, Bessler, Malloy and LaPadula, 1998). The social, family and personal repercussions of ADHD have led to research about its treatment. The pharmacological, psychosocial (behavioral, cognitive and cognitive-behavioral) and combined (pharmacological and psychosocial) forms of treatment have had the best results.

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The administration of psycho-stimulant medication is the least costly option, and it has positive effects in a short period of time (Klassen, Miller, Raina, Lee and Olsen, 1999; Miranda, Pastor, Roselló and Mulas, 1996; Pelham, Wheeler and Chronis, 1998). However, its use also has important limitations, which are essential for understanding the potential usefulness of psychosocial interventions. In the first place, between 10% and 30% of hyperactive children are not helped by the medication and/or experience adverse side effects (Wilens and Biederman, 1992).

Therefore, specialists do not have clear criteria that would allow them to decide what the safest dosage is for each patient. Thus, among the most relevant conclusions from the «Consensus Development Conference» was the existence of great variations in the guidelines for prescribing the stimulants and a lack of agreement among specialists regarding to which patients these drugs should be administered (NIMH Consensus Statement, 1998).

Finally, there is evidence that the therapeutic effects of the stimulants are symptomatic, disappearing when the drug is no longer administered, which implies a need to prescribe the medication to the children for indefinite periods of time. For these reasons, we agree with the view of Pelham and Gnagy (1999) that

«simply medicating children, without teaching them the skills they need to improve their behavior and performance, is not likely to improve the children's long-term prognosis» (p. 226).

Indeed, given that the development of the self-governing mechanisms occurs in a complex network of social influences, the psychosocial intervention programs designed to improve these children's executive functioning will have to take place in natural contexts, that is, school and home. In fact, recently various psychopedagogical intervention programs have demonstrated their effectiveness in treating ADHD using behavior modification techniques (Fabiano and Pelham, 2003), cognitive-behavioral techniques (Ardoin and Martens, 2004; Miranda and Presentación, 2000), or a combination of behavioral or cognitive-behavioral techniques and other techniques, such as training in social skills or study habits (Anhalt, McNeil and Bahl, 1998; Arco, Fernández and Hinojo, 2004; Miranda, Presentación and Soriano, 2002).

In short, all of these findings encourage continued research on the therapeutic effects of both psycho-stimulant medications and psycho-educational techniques, where the advantages and limitations of the two forms of intervention are compared. With this objective in mind, the Multi-modal Study of Children with Attention-Deficit/Hyperactivity Disorder (The MTA Cooperative Group, 1999) was carried out, in which the authors analyzed the relative and differential efficacy of four intervention modes in children with ADHD of the combined subtype: pharmacological, psychosocial, combined and community. In general, their initial data showed a superiority of the pharmacological treatment compared to the behavioral or community intervention strategies, as well as a comparable efficacy of the medication and the combined treatment (medication plus behavior modification), for improving the basic symptoms of the disorder (The MTA Cooperative Group, 1999).

However, posterior analyses of the MTA data produced results that slightly shaded the original findings, by showing that the greatest percentage of improvement occurred in children who underwent the combined treatment (68%), followed by the pharmacological (56%), the behavioral (34%) and the community (25%) (Swanson et al, 2001).

There are still many questions left to resolve regarding the effectiveness of the different therapeutic approaches to ADHD. We are faced with a relative lack of comparative studies, which, on the other hand, have provided inconsistent results on many occasions. Coinciding with the interest in this line of research, our study was designed with a dual purpose: to analyze the therapeutic effects of a pharmacological intervention and a psycho-pedagogical treatment, and to examine the differential efficacy of both intervention strategies.

Method

Participants

The entire sample was composed of 50 subjects.

17 of them made up the group that received medication, another 17 received psycho-pedagogical intervention, and 16 made up the control group**.** The criteria adopted to determine the presence of ADHD were: (1) a score of 6 or higher on items on the Inattention-Disorganization and Hyperactivity-Impulsivity scales of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association, 1994), according to parental reports and teachers´ reports; it should be noted that, in order for a symptom to be present according to the DSM-IV subscales, the behavior must be rated as at least a 2 on a 0-3 scale, with 2 indicating high frequency of the behavior (very often); (2) the presence of ADHD symptoms for more than one year; (3) the onset of symptoms at 6 years of age or younger; (4) an IQ of 80 points or higher, as evaluated by the administration of the Progressive Colored Matrices test (Raven, 1956)**;** and (5) the absence of psychosis or any gross neurological, sensory or motor impairment. The symptoms of ADHD were serious enough to interfere in the subjects' daily functioning.

The group with medication was composed of two females (11.8%) and fifteen males (88.2%), with a mean age of 8 years and 3 months (SD: 1.40). The psycho-pedagogical intervention group was composed of three females (17.6%) and fourteen males (82.4%), with a mean age of 8 years and 3 months (SD: 1.35). Finally, the control group included fifteen males (93.8%) and one female (6.3%), with a mean age of 8 years and 4 months (SD: 1.31). Furthermore, two children in the medication group, one in the psycho-pedagogical group, and two in the control group had repeated one school year.

Finally, the children participating in our study were enrolled in general education classrooms with an average of 25 students per class. They belonged to families without cultural or environmental disadvantages. 92.6% of the parents in the psycho-pedagogical intervention group, 90.3% in the medication group and 92.2% in the control group had completed primary and/or secondary studies.

Materials

Behavioral ratings were obtained from the teachers and parents of all the subjects in order to gather information on the children's functioning in natural environments.

Teacher Ratings of Child Behavior

Abbreviated Conners Rating Scale (Conners**,** 1975). This scale is considered to be a sensitive measure of ADHD behavior in the classroom. It consists of 10 easy-to-complete items, including descriptions referring to restlessness, temper tantrums, distractibility and impulsivity. Each item has four possible answers, which are scored between 0 and 3, corresponding to the frequency of the behavior in question. Thus, the total score may range between 0 and 30.

IOWA Conners Teacher Rating Scale (Adapted and translated by Loney and Milich, 1982). This instrument contains two subscales: Inattention/Hyperactivity and Aggression (oppositional defiant behavior). Both subscales are composed of five items with the same scoring method as the Conners test (1975). The scores for each subscale range between 0 and 15.

School Problem Inventory (Miranda, Martorell, Llácer, Peiró and Silva, 1993). This questionnaire is completed by the teacher and analyzes the behavior and problems observed in the child in the classroom environment. It contains 92 items with three alternative responses (no, sometimes and often) and comprises the following subscales: Learning Problems, Antisocial Behavior, Anxiety and Shyness, Inhibition and School Maladjustment. The internal consistency, measured using Cronbach´s alpha coefficient for the different subscales, ranges between .77 and .95, whereas the level of temporal stability ranges from .95 to .98. This instrument has also been shown to have sufficient construct and criteria validity (See Miranda et al, 1993).

Parent Ratings of Child Behavior

Child Symptoms Inventory 4 (Gadow and Sprafkin, 1997). Both the parents and teachers completed the 18 items included in this inventory related to typical ADHD behaviors found in the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV, American Psychiatric Association, 1994): 9 associated with Inattention-Disorganization and 9 from the Hyperactivity-Impulsivity domain. In this case, items are scored from 0 (never or rarely) to 3 (very often).

Design and procedures

A quasi-experimental design was used, given that the children in the sample could not be randomly assigned to the different experimental groups; the design contained a fixed effect intergroups variable (with three levels of treatment: control group, psycho-pedagogical treatment group and pharmacological treatment group) and an intragroup variable with two levels of fixed effects (the measures on the corresponding dependent variables, before and after the respective treatments).

Participant Selection and Evaluation Procedures.

In order to gather the sample of children with ADHD that would receive stimulant medication, the psychologist from the Children's Neurology Department of La Fe Hospital for children in Valencia carried out individual interviews with the parents of 120 children referred by pediatricians from local Medical Centers for a possible ADHD diagnosis. Information on the DSM-IV[2] criteria was also collected from their teachers. Together with the scale, a letter was attached in which the teachers were provided information about our study, and their cooperation was requested.

Of the 120 cases referred, 21 did not meet the diagnostic criteria for ADHD, either from the point of view of the parents or according to the teachers; sixteen had an IQ of less than 80; twenty-four were diagnosed with ADHD of an inattention predominant subtype; eleven met the criteria for a general unspecified developmental disorder or had epilepsy, and in eight cases the parents refused to participate in the study. Finally, of the 40 children who met the diagnostic criteria for combined subtype ADHD**,** only 17 remained after matching the subjects on age(between 8 and 9 years of age), academic level (3rd and 4th grades of primary education) and sex, with the other two groups (psycho-pedagogical treatment and control groups).

The children who made up the control group and the psycho-pedagogical treatment group were selected through a training program for teachers of students with ADHD. Our research team offered a course for teachers through the Valencian Teacher Training Center on management in the classroom of children with ADHD[1]. Seventy-three teachers were interviewed individually and, in order to check for the presence of inter-judge agreement, they were asked to have the parents of their students fill out a brief scale that included the DSM-IV criteria for the diagnosis of ADHD. Of the 73 cases gathered, 15 children were eliminated because they did not meet the diagnostic criteria for combined subtype ADHD, and 6 others were eliminated because they were taking medication. Of the children with ADHD who were selected using this process, 30 followed the psycho-pedagogical intervention program, while 22 received no treatment. From this group, subjects were selected who had a score of 15 or more on the parent and teacher estimations of inattention/disorganization and hyperactivity/impulsivity, so that they would be matched on severity of ADHD symptoms with the subjects from the medication group. Thus, as described above, 16 children made up the control group, and 17 participated in the psycho-pedagogical intervention group**.**

Both the parents and the teachers completed the behavioral ratings at two specific points in time: prior to and at the end of the treatments. In the psycho-pedagogical intervention and control groups, the teachers filled out the questionnaires in group sessions that took place before the first session and after the last session of the training course. In this case, the teachers were in charge of gathering and sending the parent information. In the medication group, the parents filled out the DSM-IV individually before the psycho-stimulant was administered and approximately 14 weeks later, during a routine visit for monitoring the medication. These parents were in charge of gathering and sending the information requested from the teachers.

Intervention procedures

Pharmacological intervention: administration of methylphenidate

The neuro-pediatrician responsible for managing the medication obtained the parents' consent to begin the treatment, after explaining to them the possible therapeutic and/or adverse effects of administering methylphenidate. The guidelines used in the Neuro-pediatric department of La Fe hospital for administering the medication to treat combined subtype ADHD were followed: a daily dosage of 10 mg, divided into two doses of 5 mg. each, one in the morning and the other at midday (after lunch)**.** No medication was administered to the subjects on weekends or non-school days.

Psychosocial intervention: intervention program in the classroom

The psychosocial program was carried out by teachers with ADHD students in their classrooms. All of the teachers attended a training course on managing students with ADHD. The course consisted of eight three-hour sessions with a short break in the middle. The course was given over a four-month period, and the teachers applied the techniques in the classroom at the same time that they were presented in the training program.

The first session was dedicated to providing general information about ADHD: nature, incidence and effects of ADHD on behavior and learning; basic features of this disorder regarding impulse control, activity and attention; common problems associated with hyperactivity; early identification, the developmental progression and long term prognosis and educational demands of hyperactive students. The second session focused on behavior modification procedures designed to increase desirable behaviors: positive reinforcement, the Premack principle and token systems. The third session involved teaching techniques designed to decrease inappropriate behaviors: extinction, time-out and response cost.

During the fourth session, teachers received guidelines on instructional management procedures for students with ADHD that would be compatible with the demands of hyperactive students and improve their learning: patterns to rearrange the physical space, the presentation of explanations, the directions and feedback in the performance of tasks and examinations.

The remaining two sessions were dedicated to cognitive-behavioral techniques. In session 5, teachers were trained in the use of the «Think Aloud» self-instruction procedure, created by Camp and Bash (1981).

In session 6, teachers received training on the combination of self-evaluation skills with a token economy system (adapted from Hinshaw and Melnick, 1992; Rhode, Morgan and Young, 1983).

Finally, two sessions were devoted to the exposition of possible difficulties and doubts (See in Miranda et al, 2002, a more complete description of the teacher training program).

Results

Once it had been shown, by means of the Kolmogorov-Smirnoff test, that the variables followed a normal distribution, the analysis of variance of repeated measures was used as a contrast statistic, which made it possible to find out the intra-subjects (effects of time) and inter-subject (effects of the treatments) effects, as well as the presence of interactions between the time and the treatments on the dependent variables. In our case, as the interventions took place between the pre- and post-treatment evaluations, the interaction is the most important and most revealing result, because it indicates whether the difference in gains between the three groups analyzed is significant. When the overall interaction was significant, post hoc comparisons were carried out of each contrast from the group versus group interaction, by means of the Scheffée test. Given that various measures were contrasted, the probabilities of each *F* test were adjusted by using the Dunn-Bonferroni procedure (Winer, Brown, and Michels, 1991).

For each of the analyses carried out, a α= .05 level of significance was established, with the results presented according to the types of tests and their areas of application: behavioral estimation scales filled out by teachers and scales filled out by parents.

Behavioral Estimation Scales of Teachers

The means and standard deviations of the different groups of children in the pre- and post-treatment phases on the scales of teacher estimation, with regard to ADHD symptoms, are shown in Table 1.

There were significant effects of time on symptoms of Inattention-Disorganization from the DSM-IV Questionnaire (APA, 1994) filled out by the teachers, $F(1, 47)= 39.281$, $p<.000$, $\eta^2= .455$. Furthermore, significant effects of the time x group interaction were found, $F(2, 47)= 6.496$, $p<.000$, $\eta^2= .217$. It was shown that the two experimental groups improved compared to the control group, with no significant differences between the two. However, the group with medication significantly decreased their scores on inattention-disorganization compared to the control group, while the psycho-pedagogical intervention group did not reach the significance level of .05.

The information from the teachers about Hyperactivity-Impulsivity on the Questionnaire adapted from the DSM-IV (APA, 1994) showed significant effects of time, $F(1, 47)= 36.904$, $p<.000$, $\eta^2= .440$. Furthermore, significant effects were observed of the time x group interaction, $F(2, 47)= 9.004$, $p<.000$, $\eta^2= .277$; the psycho-pedagogical treatment group obtained better results. The medication group also achieved significant changes with regard to the control group, but as was shown in the interaction

Table 1
Means and standard deviations on the DSM-IV, Conners and Iowa scales for each group, filled out by teachers, in the pre-treatment and post-treatment phases

	Measurement		**Interactions**			
Variable and group	**Pre M(SD)**	**Post M(SD)**	**Overall *F*(2,47)**	**CGxMG *F*(2,47)**	**CGxPG *F*(2,47)**	**MGxPG *F*(2,47)**
DSM-IV-Inattention			6.49*	12,96***	3.81	2.80
Control Group (CG)	19.13(4.69)	17.94(3.86)				
Medication Group (MG)	20.53(2.90)	13.18(4.94)				
Psychoped. (PG)	20.00(3.77)	15.47(6.35)				
DSM-IV-Hyperactiv.			9.00***	4,82*	18,00***	4,52*
Control Group	18.13(4.08)	17.56(4.30)				
Medication Group	19.29(4.91)	14.88(5.84)				
Psychoped.	21.59(3.83)	13.59(6.00)				
Conners.			2.79	Ns	Ns	Ns
Control Group	21.00(4.63)	18.94(4.89)				
Medication Group	21.47(6.39)	15.06(6.24)				
Psychoped.	23.53(4.54)	16.24(6.08)				
Iowa-Hyperactivity			1.58	Ns	Ns	Ns
Control Group	11.38(1.75)	10.00(2.80)				
Medication Group	11.18(2.30)	7.94(3.01)				
Psychoped.	12.29(2.39)	9.18(2.98)				
Iowa-Aggression			0.97	Ns	Ns	Ns
Control Group	7.94(5.04)	6.38(4.33)				
Medication Group	7.24(2.17)	4.88(2.91)				
Psychoped.	8.12(5.17)	5.06(4.85)				

*** $p<0.001$; ** $p<0.01$; * $p<0.05$

between the two experimental groups, the psycho-pedagogical intervention achieved significantly superior results**.**

On the Conners Hyperactivity Questionnaire for Teachers (Conners, 1975), significant effects of time were found, $F(1, 47)= 30.108$, $p<.000$, $\eta^2= .390$. There were also significant effects of time found on the Iowa Questionnaire Hyperactivity Scale for teachers (Loney and Milich, 1982), $F(1, 47)= 29.702$, $p<.000$, $\eta^2= .387$. In this way, it has been shown that the children who followed either of the two treatments, pharmacological or psycho-pedagogical, showed significant reductions in the symptoms evaluated by both scales, but the improvements of both were very similar, with no interaction effects appearing.

Table 2 shows the means and standard deviations of the different groups of children in the pre- and post-treatment stages, corresponding to the estimation scales of teachers regarding the problems associated with ADHD in school.

On the Inventory of Problems in School (IPE) (Miranda, Martorell, Llácer, Peiró and Silva, 1993), effects of time x group interaction were shown on two scales (see table 2): Learning Problems, $F(2, 47)= 3.192$, $p=.049$, $\eta^2= .120$, and School Maladjustment, $F(2, 47)= 4.287$, $p= .019$, $\eta^2= .154$. For both variables, only the group with medication managed to reduce significantly the scores on these two variables compared to those of the control group. However, no differences were observed in the comparison between the two experimental groups.

Behavioral Estimation Scales of Parents

Table 3 shows the means and standard deviations of the different groups of children in the pre- and post-treatment phases on the parent estimation scales.

Specifically, our results showed significant effects on the time x group interaction in the symptomatology of Inattention-Disorganization from the DSM-IV Questionnaire for parents (APA, 1994), $F(2, 47)= 4.678$, $p= .014$, $\eta^2= .166$. According to the perceptions of the parents, only the group of children who followed the psycho-pedagogical treatment improved significantly compared to the control group; on the other hand, no significant differences were observed between the two experimental groups.

On Hyperactivity-Impulsivity from the DSM-IV Questionnaire (APA, 1994), there were significant effects of time, $F(1, 47)= 18.853$, $p<.000$, $\eta^2= .286$ and significant inter-subjects effects, $F(2, 47)= 3.387$, $p= .042$, $\eta^2= .126$. There were also significant time x group interaction effects, $F(2, 47)= 7.123$, $p= .002$, $\eta^2= .233$. The improvement observed was quite striking in the children from the psycho-pedagogical treatment group, as they significantly reduced their scores on Hyperactivity-Impulsivity, in comparison with the other two groups- the medical intervention group and the control group. In contrast, the pharmacological treatment group did not improve in a significant way compared to the control group.

Discussion

The present study was designed with the purpose of analyzing the therapeutic effects of a pharmacological treatment and a psycho-pedagogical intervention program in the behavioral functioning of children with ADHD in their natural environments, and to examine the differential efficacy of both intervention strategies. In general terms, our findings were positive and hopeful, showing that both modes of intervention were effective for reducing the main symptoms of the disorder, compared with a no treatment condition.

Table 2
Means and standard deviations on the school problems scale (IPE) for each group, filled out by teachers, in the pre-treatment and post-treatment phases

	Measurement		**Interactions**			
Variable and group	**Pre M(SD)**	**Post M(SD)**	**Overall *F*(2,47)**	**CGxMG *F*(2,47)**	**CGxPG *F*(2,47)**	**MGxPG *F*(2,47)**
Learning Prob. (IPE)			3.19*	6.27*	1.02	2.30
Control Group (CG)	30.13(10.68)	29.31(8.91)				
Medication Group (MG)	32.35(9.54)	23.35(12.53)				
Psychoped. (PG)	30.71(8.52)	26.59(11.12)				
Antisocial Beh. (IPE)			3.06	Ns	Ns	Ns
Control Group	27.19(11.32)	24.69(10.59)				
Medication Group	32.00(5.92)	23.06(7.64)				
Psychoped.	28.06(9.93)	21.88(9.37)				
Withdrawal (IPE)			1.28	Ns	Ns	Ns
Control Group	10.88(8.35)	11.94(6.60)				
Medication Group	12.76(8.74)	9.53(6.02)				
Psychoped.	10.47(5.98)	9.82(8.60)				
Shyness-Anx. (IPE)			1.72	Ns	Ns	Ns
Control Group	9.13(2.47)	6.25(3.49)				
Medication Group	14.00(6.37)	13.41(6.59)				
Psychoped.	17.18(7.74)	13.47(6.82)				
School Malad. (IPE)			4.28**	8.57**	2.41	1.94
Control Group	4.38(2.75)	5.88(4.13)				
Medication Group	5.82(3.11)	3.06(3.47)				
Psychoped.	5.47(3.61)	4.71(3.72)				

*** $p<0.001$; ** $p<0.01$; * $p<0.05$

Table 3
Means and standard deviations on the DSM-IV scale, filled out by parents, for each group in the pre-treatment and post-treatment phases

	Measurement		Interactions			
Variable and group	Pre M(SD)	Post M(SD)	Overall *F*(2,47)	CGxMG *F*(2,47)	CGxPG *F*(2,47)	MGxPG *F*(2,47)
DSM-IV-Inattention			4.67*	3.43	9.24**	1.45
Control Group (CG)	15.75(3.40)	16.13(4.50)				
Medication Group (MG)	18.82(4.86)	16.35(4.78)				
Psychoped. (PG)	18.82(3.07)	14.53(5.37)				
DSM-IV-Hyperactiv			7.12**	2.75	14.14***	4.55*
Control Group	18.50(5.32)	18.56(5.19)				
Medication Group	18.00(2.32)	15.65(3.24)				
Psychoped.	17.76(3.78)	12.35(5.48)				

*** $p<0.001$; ** $p<0.01$; * $p<0.05$

Specifically, the children with ADHD who received stimulant medication experienced significant changes in inattention, impulsivity and hyperactivity, according to the ratings of their teachers. Likewise, in comparison with the children who did not receive treatment, the medication group managed to significantly reduce the problems of learning and maladaptive school behaviors. Our findings, which show the effectiveness of methylphenidate for reducing the symptoms of hyperactive children, coincide with numerous earlier studies (Chacko et al, 2005; Lage and Hwang, 2005; Swanson et al, 2001; The MTA Cooperative Group, 1999). In contrast, the parent information did not point out significant positive changes. However, we are aware that the guidelines followed for administering the medication may have introduced a bias that should be taken into account. Given that the medication was administered according to the guidelines usually followed by the child neurologists in our hospital environment**,** the doses administrated were minimal, so that some children might have received a dosage that was lower than what would have been optimum for them. Furthermore, given the timing of the administration of the medication, the parents did not have much chance to observe possible improvements, as the children did not receive medication on the weekends or in the evenings.

On the other hand, according to the ratings of the teachers, the hyperactive children who participated in the psycho-pedagogical intervention, compared to the no treatment control group, significantly reduced their hyperactivity and impulsivity problems. The teacher information also indicated a positive trend toward changes in lack of attention and disorganization behaviors, although it was not significant when contrasted with the control group. A key question refers to the possibility that the evaluation of the teachers may not be objective, as they are involved in treatment delivery. However, the parent information confirmed that the children with psycho-pedagogical intervention experienced significant decreases in hyperactive and impulsive behaviors and inattention, in comparison with the group that did not receive treatment. Therefore, in agreement with a substantial number of recent studies, our findings provide support for the potential usefulness of psychosocial interventions in improving the basic symptoms of ADHD, as rated by parents and teachers (Ardoin and Martens, 2005; Miranda and Presentación, 2000; Miranda and Jarque, 2001; The MTA Cooperative Group, 1999; Swanson et al, 2001; Swanson et al, 2002; Van Lier et al, 2004).

Another question worth examining has to do with the possible effectiveness differential between the two forms of treatment. The medication, at least from the point of view of the teachers, is more effective in treating the inattention of the children with ADHD and the academic problems associated with attention problems (learning problems and poor adaptation to school). The ability of the psycho-stimulants to produce changes in attention inside the classroom is supported by studies like the one by Rapport, Denney, Du Paul and Gardner (1994). On the other hand, in our study the psycho-pedagogical program was more effective in reducing the hyperactive and impulsive behaviors. The improvements in this area in the children who followed the intervention program in the classroom were even significantly superior to those of the group that received medication. Furthermore, in this particular aspect, the views of the parents and teachers coincided.

In summary, the psycho-pedagogical treatment and the medication, with the above-mentioned nuances, had similar levels of efficacy for reducing the essential symptoms of ADHD. These results are in line with those of other studies (Carlson, Pelham, Milich and Dixon, 1992), but they differ from those obtained in the MTA study, which showed the superiority of the stimulant medication compared to behavioral therapy (The MTA Cooperative Group, 1999). This contrast can be partially explained by the fact that the MTA behavioral management program was not as individualized and monitored as the pharmacological treatment (Carey, 2000). Finally, the inclusion of instructional management procedures, together with the behavioral and cognitive-behavioral techniques presented in the teacher training, may have been another factor that contributed, in our study, to equalizing the effects of the pharmacological and psycho-psychopedagogical interventions. In fact, many authors emphasize the importance of making modifications in the teaching-learning process of students with ADHD.

Therefore, the present study highlights the importance of training teachers in procedures designed to manage the behavior and instruction of students with ADHD. It is a crucial topic, given that some families may be opposed to medication, and, in other cases, practical compliance problems may arise. In addition, in the opinions of the teachers themselves, even when a student is receiving psycho-stimulant medication, other methods of intervention are still necessary (Snider, Busch and Arrowood, 2003).

Notes

[1] The teachers were told that one of the ends of the course was the research study.

[2] The parents and teachers of the children gave their consent to have the data obtained on the evaluations used for research purposes.

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