

Cognitive Behavioral Treatment in Children with Attention Deficit Hyperactivity Disorder¹

Tratamiento cognitivo conductual en niños con trastorno
de déficit de atención e hiperactividad

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Abstract

This research determines the effect of the cognitive behavioral treatment (CBT) in the core symptoms of the attention deficit hyperactivity disorder (ADHD), impulsive cognitive style, sustained attention, self-esteem and anxiety. The subjects were 20 private school children aged 6 to 9 years with ADHD from Arequipa distributed in control and experimental groups. Both groups completed before and after the CBT tests that assess inattention, hyperactivity-impulsivity, impulsive cognitive style, sustained attention, self-esteem and anxiety. The results show a significant decrease in inattention, hyperactivity, impulsivity, impulsive cognitive style and a significant increase in sustained attention in the experimental group after the treatment. Contrary to what was expected, CBT did not affect self-esteem and anxiety of children with ADHD after the treatment.

Key words authors: Attention Deficit Hyperactivity Disorder, Impulsive Cognitive Style, Sustained Attention, Self-Esteem, Anxiety, Cognitive Behavioral Treatment.

Key words plus: Attention Deficit Disorder with Hyperactivity, Attention, Self Concept, Anxiety, Cognitive Therapy.

Resumen

Esta investigación establece el efecto del tratamiento cognitivo conductual (TCC) en los síntomas centrales del trastorno por déficit de atención e hiperactividad (TDAH), estilo cognitivo impulsivo, atención sostenida, autoestima y ansiedad. Los participantes fueron 20 niños de Arequipa de 6 a 9 años de edad con TDAH de colegios particulares distribuidos en grupo control y experimental. Ambos grupos respondieron antes y después del TCC pruebas que miden la inatención, hiperactividad-impulsividad, estilo cognitivo impulsivo, atención sostenida, autoestima y ansiedad. Los resultados muestran una disminución significativa en la inatención, hiperactividad, impulsividad, estilo cognitivo impulsivo y un aumento significativo de la atención sostenida en el grupo experimental después del tratamiento. Contrario a nuestras expectativas, el TCC no afectó la autoestima y ansiedad de los niños con TDAH después del tratamiento.

Palabras clave autores: Trastorno de déficit de atención e hiperactividad, Estilo cognitivo impulsivo, Atención sostenida, Autoestima, Ansiedad, Tratamiento cognitivo conductual.

Palabras clave descriptores: Trastorno por Déficit de Atención con Hiperactividad, Atención, Autoimagen, Ansiedad, Terapia Cognitiva.

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1. Main features of attention deficit hyperactivity disorder

Attention deficit hyperactivity disorder (ADHD) (American Psychiatric Association, 2013) or hyperkinetic disorder (World Health Organization, 2004) is a childhood disorder with a neurobiological etiology, responsible for the core symptoms, inattention, hyperactivity-impulsivity, which, in turn, may affect multiple areas of functioning that are considered secondary features of the disorder (Rapport, 2001). The diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM) for ADHD are widely recognized by teachers, parents and clinicians of different geographic regions, ethnicities and cultures (Bauermeister, Canino, Polanczyk & Rohde, 2010). The prevalence of ADHD has been estimated at 5 % in school-age children (American Psychiatric Association, 2013).

Children with inattention symptoms often have difficulty to pay close attention to details and sustain attention in tasks or games, do not seem to listen when spoken to directly, do not follow through on instructions and fail to finish schoolwork or chores, have difficulty organizing tasks and activities, are reluctant to engage in tasks that require sustained mental effort (such as schoolwork or homework), lose things necessary for tasks and activities, are easily distracted by extraneous stimuli and are forgetful in daily activities (American Psychiatric Association, 2013; Colonna-Prete, 2005; Ayora, 2004; Cebrián & Pérez, 2005; Avila & Polaino-Lorente, 2002).

Hyperactivity is characterized by fidgetiness or squirming in one's seat, but not remaining seated when expected to do so, by excessive

“Hyperactivity is characterized by fidgetiness or squirming in one's seat, but not remaining seated when expected to do so, by excessive running or climbing in situations where it is inappropriate, difficulty playing quietly, talking excessively and acting as if driven by a motor”

running or climbing in situations where it is inappropriate, difficulty playing quietly, talking excessively and acting as if driven by a motor. The impulsivity manifests itself as the difficulty to wait their turn and the delay of responses; children diagnosed with ADHD blurt out answers before questions have been completed, interrupt or intrude on others' conversations to the point of causing difficulties in social, academic or occupational settings (American Psychiatric Association, 2013; Shillingford, Lambie & Walter, 2007).

Impulsive individuals rush through assignments missing correct answers. This is the impulsive cognitive style, a tendency to solve cognitive tasks quickly and incorrectly (López et al., 2010). Children get incomplete information and answer intuitively without thinking, because they miss key steps for the appropriate problem solving approach such as observing, gathering information, analyzing, rejecting unnecessary data, drawing up an action plan, examining all possible answers, foreseeing the possible consequences of each answer, making a decision, checking answers, self-congratulating if the

answer is right or analyzing the information and all alternatives again if the answer is wrong (Orjales, 2002).

Another cognitive function impaired in children diagnosed with ADHD is sustained attention (Aguiar, Eubig & Schantz, 2010). This cognitive function enables the subject to direct attention to one or more sources of information over a relatively long and unbroken period of time once the alert state is entered (Tucha et al., 2006; Tsal, Shalev & Mevorach, 2005; Oken, Salinsky & Elsas, 2006). ADHD hinders a child's capacity to sustain attention (Daly, Creed, Xanthopoulos & Brown, 2007); children find difficulty in keeping the alert state in monotonous tasks that require continual responses from the individual, usually in dichotomic terms or answers too far apart with long alert periods (Servera & Llabrés, 2004).

The cognitive impairments associated with ADHD are not diagnostic criteria for the disorder because they constitute secondary features that often accompany ADHD and need to be considered as part of a comprehensive clinical formulation and multidisciplinary treatment plan (Nigg, 2011).

1.1. Cognitive behavioral treatment for ADHD

The aim of cognitive behavioral treatment (CBT) is that ADHD children self-regulate their own behavior according to rules, self-regulate their daily habits, use strategies to behave properly, select relevant data from irrelevant information, self-evaluate and self correct their behaviors, develop a healthy self-esteem and satisfactory relationships with others (Orjales, 2002).

“The therapist should know the child in detail, his cognitive behavioral profile, the age and the level of impairment, in order to select and adapt the most appropriate cognitive behavioral techniques for the specific child”

CBT can facilitate treatment tailoring if delivered appropriately (Abikoff, 2001); it is effective if a) each patient is well-assessed and well-understood and the treatment matches the assessed needs and cognitive skills deficits of each individual; b) key adults implement the treatment in the environments where the performance of those cognitive skills are required; c) the length of time for the treatment is sufficient to effectively train skills and ensure positive treatment effects over a longer period; and d) the outcomes are clinically meaningful (Greene & Ablon, 2001).

The therapist should know the child in detail, his cognitive behavioral profile, the age and the level of impairment, in order to select and adapt the most appropriate cognitive behavioral techniques for the specific child (Orjales, 2007). The treatment cannot remain the same day after day, it must be tuned to a moving target with each successive session based on progressive changes in the child (Whalen, 2001, p. 138). The treatment adjustments are directed to the progressive acquisition of cognitive skills and behavioral performance planned in the overall treatment.

In CBT, ADHD children are taught to use self-instruction, self-monitoring, self-reinforcement,

problem solving and motivational strategies to develop self-control of their attention and impulse behavior problems (Purdie, Hattie & Carrol, 2002). For example, children with ADHD exhibit stop-signal performance deficits (Alderson, Rapport, Sarver & Kofler, 2008) due to cognitive impairments rather than behavioral inhibition deficit (Alderson, Rapport & Kofler, 2007); this means that children are so uninhibited that they cannot stop and take a moment to think about something beforehand, they are doing the first thing that is generated in their mind (Rindge, 2002). ADHD hinders a child's capacity to exercise age appropriate inhibition in behavioral settings or in cognitive tasks (Daly et al., 2007). To overcome inhibition, in CBT children are taught to use cognitive strategies and the contingencies encourage them to delay responding and to apply cognitive strategies (Purdie et al., 2002).

Cognitive interventions are most effective when they are combined with behavioral contingencies in the natural environment at the time that the problem behavior occurs (in the classroom or home rather than at the clinic) and when they focus on specific training that matches the desired performance as closely as possible (Purdie et al., 2002). CBT is almost a step-by-step approach to dealing with the individual, familial and scholastic factors (Wagner, 1993). Besides, CBT has more positive effects when parents and/or teachers get involved to promote the generalization of the techniques at home and/or at school (Pffner, 2003).

The basic techniques of the treatment are self-instructions, contingent reinforcement and response cost (Calderón, 2001). The self-instructional training is a cognitive technique that teaches children a sequence of useful

thoughts for solving problems; they replace wrong thoughts created by impulsive children (Orjales, 2007). The self-instructional training in this study is based on the model developed by Miechenbaum & Goodman and adapted by Orjales (2007); the sequence is as follows: 1) First, I watch and say what I see, 2) what do I have to do?, 3) How will I do it?, 4) I have to pay careful attention (and look at all possible answers), 5) I can do it!, 6) Great! I did a good job/ I didn't get the right answer. Why? (I review all steps) Ah! This is why! The next time I won't make any mistake (Orjales, 2007, p. 25). These strategies of verbal mediation or self-talk let the children pay attention for an unbroken period of time and stay on task.

At the same time, the cognitive self-instructional training of Miechenbaum & Goodman assists children with processing cognitive thoughts into adaptive appropriate behaviors. This model is often employed to aid students with impulsivity difficulties. For example, ADHD children who blurt out answers before waiting their turn during classroom discussion must be taught to give the answers to themselves quietly, without interrupting the class; besides, they may be taught to say words of restraint to themselves, such as "I can wait my turn" or "I know the answer, but I'll wait my turn". The steps of this training are the following: a) Students are trained to become aware of their maladaptive thoughts, b) the therapist models appropriate behaviors while verbalizing effective actions strategies, c) the students then perform the targeted behavior while verbalizing appropriate self-instructions and then trying them out (Shillingford et al., 2007, p. 106).

When children diagnosed with ADHD apply self-instructions to cognitive or social tasks or

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mention any situation in which they are useful, the therapist provides positive reinforcement to increase the use of cognitive strategies (self-instructions) (Orjales & Polaino-Lorente, 2002). ADHD children require more consistent and immediate rewards and consequences than do their same age peers without ADHD (Kaiser & Pfiffner, 2011).

Behavioral interventions involve manipulating environmental factors that are antecedents to (for example, setting, structure) or consequences of (for example, adult attention) the maladaptive behavior in order to shape target behavior (Chronis, Jones & Raggi, 2006). Parents and teachers of children with ADHD are trained to manipulate the antecedents and the consequences of the behavior (Daly et al., 2007). Children with ADHD respond best to clear and consistent behavioral expectations monitored by the adults at home and school (Evans, Schultz & Sadler, 2008).

Parents learn how to identify and manipulate the antecedents and consequences of a child's behavior, target and monitor problematic

behaviors, reward prosocial behavior through praise, positive attention, token economy (tangible rewards) and decrease unwanted behavior through planned ignoring, time out and response cost (Chronis et al., 2006).

Teachers implement behavior classroom interventions that target ADHD symptoms and associated functional difficulties such as complying with classroom rules, engaging in appropriate interactions with classmates, displaying disrupting behavior and complying with teacher commands (Daly et al., 2007). Behavioral interventions in classrooms include verbal praise, effective commands, a point or token economy system, daily report card or time out (Chronis et al., 2006). Intensive programs often include a token or point system that may be implemented for an entire classroom or school rather than only for an individual child (Daly et al., 2007).

Miranda, Presentación y Soriano (2002) evaluated the effectiveness of a multicomponent program for treating ADHD carried out by teachers in a classroom context. Teachers were previously trained in behavior modification techniques, cognitive behavior strategies and instructional management. Parents' and teachers' ratings detected improvements in primary symptoms (inattention, hyperactivity-impulsivity).

In this study, CBT is based on the treatment developed by Orjales (2007; Orjales & Polaino-Lorente, 2002) which is an improved version of her own model of treatment developed in 1991, adapted from the program of Kendall, Padawer and Zupan in 1980. The treatment consists of self-instructional training, self-evaluation training, attributional training, relaxation, social interaction strategies, problem solving, techniques to improve self-esteem and self-control, feelings discrimination training, collective

positive self-reinforcement, contingent reinforcement and a point system.

The study aims to evaluate the effects of CBT in children diagnosed with ADHD in inattention, hyperactivity, impulsivity, impulsive cognitive style, sustained attention, self-esteem and anxiety in comparison to children with ADHD who didn't receive CBT.

2. Method

2.1. Participants

Twenty children diagnosed with ADHD aged 6 to 9 years, born in Arequipa (Perú). It is a group of 16 boys and 4 girls who attended private schools between the first and the fourth grades of primary educational level.

All children met the following inclusion criteria:

- a. A previous diagnosis of ADHD carried out by psychologists of Essalud Hospital in Arequipa during the last six months before the study. Essalud Hospital meets the needs of the most part of population from Arequipa.
- b. The age of the children was 6 years old and up.
- c. A percentile of 77 or higher in the total ADHD quotient, measured by the Attention Deficit Hyperactivity Disorder Test of Gilliam (1995), scale applied to the children's parents.
- d. A percentile of 86 or higher in the impulsive cognitive style measured by the Matching Familiar Figures Test of Cairns & Cammock (2005).
- e. An IQ of 90 or higher evaluated by the WISC-IV (Weschler, 2005).
- f. The absence of any other organic and psychopathological disorder. This information was obtained from the ADHD children's psychological clinical history.
- g. The lack of stimulant medication because only ADHD children who did not receive any pharmacological treatment, before the study, were included as participants.
- h. ADHD children who did not receive, before the study, any other psychological treatment based on cognitive and behavioral techniques.

The assessments of the total ADHD quotient, impulsive cognitive style and clinical psychological history based on DSM criteria, were done by one of the researchers, who is a psychologist. These assessments were done in order to confirm the previous diagnosis of ADHD that children received from psychologists of Essalud Hospital in Arequipa.

The exclusion criteria consisted in the non compliance of any inclusion criteria.

2.2. Group assignment

The study is quasi experimental with pre test, post test and control group design. The assignment of participants to control and experimental groups was random according to gender, age and grade equivalence in both groups.

The experimental group consists of 8 boys and 2 girls:

- 4 boys and 1 girl aged 6 years studying in first grade,

- 2 boys and 1 girl aged 7 years studying in second grade,
- 1 boy aged 8 years studying in third grade,
- 1 boy aged 9 years studying in fourth grade,

The control group is composed of 8 boys and 2 girls:

- 4 boys and 1 girl aged 6 years studying in first grade,
- 2 boys and 1 girl aged 7 years studying in second grade,
- 1 boy aged 8 years studying in third grade,
- 1 boy aged 9 years studying in fourth grade,

2.3. Procedure

The children were enrolled through an announcement in the local newspaper. From the 35 children that answered the announcement, we excluded 12 children because they were receiving pharmacological treatment and besides, 3 children were excluded because they were aged less than 6 years old. We selected 20 children who met the inclusion criteria. All parents gave their written consent to work with their children. Then, all children were distributed randomly to control and experimental groups. Children of both, control and experimental groups were given pre tests that evaluate inattention, hyperactivity-impulsivity, impulsive cognitive style, sustained attention, self-esteem and anxiety.

The experimental group received the cognitive behavioral treatment (CBT) that consisted of individual therapies with the children diagnosed with ADHD, sessions of treatment carried

“Teachers of the children assigned to the experimental group carried out some sessions in the classroom. They were 10 teachers who were previously trained by the researcher who is a psychologist and acted as the therapist, to use behavioral techniques in the classroom and help the children to apply cognitive strategies in cognitive and social tasks”

by teachers in classroom settings and parent training.

The control group did not receive the treatment, but in the afternoons some of them took private classes at home for some schoolwork and others stayed home with their parents. Finally children of control and experimental groups took post tests to evaluate inattention, hyperactivity-impulsivity, impulsive cognitive style, sustained attention, self-esteem and anxiety.

2.4. Cognitive behavioral treatment (CBT)

CBT is based on the model developed by Orjales (2007; Orjales & Polaino-Lorente, 2002) and consists of 30 sessions, (of) 60 minutes each, for 3 months and 15 days. One of the researchers acted as the therapist and managed individual therapeutic sessions with the ADHD children assigned to the experimental group in children's houses. Teachers of the children assigned to the

experimental group carried out some sessions in the classroom. They were 10 teachers who were previously trained by the researcher who is a psychologist and acted as the therapist, to use behavioral techniques in the classroom and help the children to apply cognitive strategies in cognitive and social tasks. All experimental group of ADHD children completed all cognitive behavioral treatment sessions.

The cognitive behavioral techniques of the 30 sessions were the following: Session 1: Self-evaluation; sessions 2, 3 and 4: Self-instructions and self-evaluation; sessions 5 and 6: In class, techniques to improve self-esteem, collective self-reinforcement, self-instructions, the point system and self-evaluation; sessions 7, 8 and 9: Self-instructions, the point system, attributional training and self-evaluation; sessions 10 and 11: In class, self-instructions, attributional training, self-evaluation and techniques to improve self-esteem; sessions 12, 13, 14 and 15: Self-instructions, problem-solving strategies, the point system, attributional training and self-evaluation; sessions 16, 17, 18, 19 and 20: In class, techniques to improve self-esteem and self-control, self-instructions for math and language problems, the point system, attributional training and self-evaluation; sessions 21, 22, 23, 24 and 25: Relaxation, the point system, attributional training and self-evaluation; sessions 26 and 27: Feelings discrimination training, the point system, attributional training and self-evaluation; sessions 28 and 29: Social interaction strategies, attributional training and self-evaluation; session 30: Evaluation of treatment achievements.

The parent training was done by the researcher who is a psychologist and acted as the therapist and consisted of some sessions before the

treatment: Session 1: Overall information about the diagnosis, etiology, evolution, associated impairments, treatments, educational needs and some experiences; sessions 2 and 3: cognitive behavioral techniques. The following sessions took place simultaneously with individual therapies of children and consisted of: Sessions from 4 to 20: Parents were trained to use behavioral techniques to shape target behaviors and to praise children when they use cognitive strategies at home; session 21: Final evaluation of treatment achievements. All parents of the experimental ADHD children group completed all parent training sessions.

2.4.1. *Measuring instruments*

- **Attention Deficit Hyperactivity Disorder Test** (Gilliam, 1995). Consists of a checklist of inattentive, hyperactive and impulsive behavior used to identify individuals with ADHD
- **Children Sustained Attention Task CSAT** (Servera & Llabrés, 2004). Consists of a computerized test for children with ADHD that measures the ability to sustain attention through a vigilance task.
- **Matching Familiar Figures Test MFF-20** (Cairns & Cammock, 2005). Consists of a perceptive matching test for children with ADHD which measures the reflexivity-impulsivity cognitive style.
- **Culture-free Self-esteem Inventory** (Battle, 1990). It is a self-report that measures overall, social, parent-related and academic self-esteem.
- **Children's Manifest Anxiety Revised Scale CMAS-R** (Reynolds & Richmond, 1997). It

is a self-report that measures the level and nature of anxiety in children and adolescents. It gives scores of total anxiety, physiological anxiety, worry/oversensitivity and social anxiety/concentration.

3. Results

3.1. Results of measures before CBT

Table 1 shows no statistically significant differences between experimental and control groups before CBT in impulsivity ($t=0.00$; $p=0.05$), inattention ($t=0.76$; $p=0.05$), total ADHD quotient ($t=1.15$; $p=0.05$), impulsive cognitive style ($t=-0.01$; $p=0.05$), sustained attention ($t=0.68$; $p=0.05$), self-esteem ($t=-0.66$; $p=0.05$), physiological anxiety ($t=1.03$; $p=0.05$), worry/oversensitivity ($t=-0.51$; $p=0.05$), social anxiety/concentration ($t=-1.05$; $p=0.05$) and total anxiety quotient ($t=-0.17$; $p=0.05$).

In the subtest hyperactivity ($t=2.19$; $p<0.05$) there are statistically significant differences between control and experimental groups, some children were more hyperactive than others due to the heterogeneity of the disorder; however the total ADHD quotient is the same for both groups before CBT.

Table 1. Analysis of T test in control and experimental groups before the treatment

Test		Control group			Experimental group			Control – experimental
		N	Media	SD	N	Media	SD	
ADHD –T	Hyperactivity	10.00	13.60	0.70	10.00	12.80	0.92	2.19**
	Impulsivity	10.00	13.10	0.57	10.00	13.10	1.29	0.00
	Inattention	10.00	11.50	0.85	10.00	11.20	0.92	0.76
	Total ADHD quotient	10.00	117.00	1.63	10.00	115.30	4.37	1.15
MFF-20	Impulsive cognitive style	10.00	2.24	0.32	10.00	2.24	0.32	-0.01
CSAT	Sustained attention	10.00	-1.14	1.67	10.00	-1.65	1.67	0.68
CFSEI-2	Self-esteem	10.00	45.90	7.99	10.00	48.20	7.54	-0.66
CMAS-R	Physiological anxiety	10.00	11.30	2.00	10.00	10.30	2.31	1.03

	Worry/ oversensitivity	10.00	10.30	2.21	10.00	10.80	2.15	-0.51
	Social anxiety/ concentration	10.00	10.90	1.29	10.00	11.50	1.27	-1.05
	Total anxiety quotient	10.00	56.00	5.44	10.00	56.50	7.32	-0.17

**p < 0.05

3.2. Effects on the measures of the experimental group

The analysis pre-post treatment of the experimental group (Table 2) shows a statistically significant reduction in hyperactivity ($t=4.98$; $p<0.05$), impulsivity ($t=6.16$; $p<0.05$), inattention ($t=2.88$; $p<0.05$), total ADHD quotient ($t=7.69$; $p<0.05$) and impulsive cognitive style ($t=5.97$; $p<0.05$); besides, a statistically significant improvement in sustained attention ($t=-3.57$; $p<0.05$). The statistically significant differences between the pretest and posttest of the experimental group prove the effectiveness of the treatment to reduce the core symptoms of ADHD, impulsive cognitive style and to increase sustained attention.

On the other hand, the results do not reflect statistically significant differences in self-esteem ($t=-1.91$; $p=0.05$), physiological anxiety ($t=-1.03$; $p=0.05$), worry/ oversensitivity ($t=0.51$; $p=0.05$), social anxiety/ concentration ($t=1.05$; $p=0.05$) and total anxiety quotient ($t=0.17$; $p=0.05$).

Table 2. Analysis of pre-post treatment of experimental group

Tests		Pretreatment Pretest			Posttreatment Posttest			Experimental
		N	Media	SD	N	Media	SD	T
ADHD -T	Hyperactivity	10.00	12.80	0.91	10.00	11.10	0.57	4.98**
	Impulsivity	10.00	13.10	1.29	10.00	10.40	0.52	6.16**
	Inattention	10.00	11.20	0.92	10.00	10.00	0.94	2.88**
	Total ADHD quotient	10.00	115.30	4.37	10.00	103.00	2.54	7.69**
MFF-20	Impulsive cognitive style	10.00	2.24	0.32	10.00	0.82	0.68	5.97**
CSAT	Sustained attention	10.00	-1.65	1.67	10.00	0.33	0.54	-3.57**
CFSEI-2	Self-esteem	10.00	48.20	7.54	10.00	53.80	5.39	-1.91
CMAS-R	Physiological anxiety	10.00	10.30	2.31	10.00	11.30	2.00	-1.03
	Worry/ oversensitivity	10.00	10.80	2.15	10.00	10.30	2.21	0.51
	Social anxiety/ concentration	10.00	11.50	1.27	10.00	10.90	1.29	1.05
	Total anxiety quotient	10.00	56.50	7.32	10.00	56.00	5.44	0.17

**p < 0.05

3.3. Results of measures after CBT

The results of the posttest (Table 3) show a statistically significant reduction in the experimental group in comparison to the control group in hyperactivity ($t=4.09$; $p<0.05$), impulsivity ($t=7.24$; $p<0.05$), inattention ($t=3.34$; $p<0.05$), total ADHD quotient ($t=9.85$; $p<0.05$), impulsive cognitive style ($t=5.59$; $p<0.05$) and a rise of sustained attention ($t=-2.77$; $p<0.05$). However, the results of the posttest in self-esteem ($t=-0.81$; $p=0.05$), physiological anxiety ($t=0.35$; $p=0.05$), worry/oversensitivity ($t=-1.10$; $p=0.05$), social anxiety/concentration ($t=0.11$; $p=0.05$) and total anxiety quotient ($t=-0.37$; $p=0.05$) do not show statistically significant differences between control and experimental groups after CBT.

Table 3. Analysis of T test in control and experimental groups after the treatment

Test		Control group			Experimentalgroup			Control experimental
		N	Media	Dt	N	Media	Dt	T
ADHD -T	Hyperactivity	10.00	12.20	0.63	10.00	11.10	0.57	4.09**
	Impulsivity	10.00	12.00	0.47	10.00	10.40	0.52	7.24**
	Inattention	10.00	11.20	0.63	10.00	10.00	0.94	3.34**
	Total ADHD quotient	10.00	112.10	1.45	10.00	103.00	2.54	9.85**
MFF-20	Impulsive cognitive style	10.00	2.20	0.39	10.00	0.82	0.68	5.59**
CSAT	Sustained attention	10.00	-1.37	1.86	10.00	0.33	0.54	-2.77**
CFSEI-2	Self-esteem	10.00	51.50	7.25	10.00	53.80	5.39	-0.81
CMAS-R	Physiological anxiety	10.00	10.30	1.34	10.00	10.00	2.36	0.35
	Worry/ oversensitivity	10.00	9.80	2.15	10.00	11.10	3.07	-1.10
	Social anxiety/ concentration	10.00	9.70	2.26	10.00	9.60	1.90	0.11
	Total anxiety quotient	10.00	53.10	5.00	10.00	54.00	5.85	-0.37

** $p < 0.05$

4. Discussion

This study shows statistically significant results about the effectiveness of CBT to reduce core symptoms of ADHD (inattention, hyperactivity and impulsivity) and impulsive cognitive style and to improve sustained attention. However, the study does not show statistically significant results about the improvement of self-esteem and anxiety after CBT.

Other studies have similar findings about the effectiveness of CBT to reduce core symptoms of ADHD. Calderón (2001) y Arco, Fernández & Hinojo (2004) found a statistically significant reduction of oppositional factor, hyperactivity-impulsivity and the overall score of ADHD after treatment. Miranda, García & Presentación (2002) found statistically significant results for the improvements of inattention, hyperactivity and impulsivity after a psychosocial treatment based on cognitive behavioral techniques. Miranda, Soriano, Presentación and Gargallo (2000) found positive effects of a psychoeducational intervention combined with cognitive behavioral techniques to reduce ADHD symptomatology.

The statistically significant results about the reduction of impulsive cognitive style and the improvement of sustained attention after CBT in our study are consistent with other studies (Arco et al., 2004; Calderón, 2001 and Miranda et al., 2000). On the other hand, CBT did not cause any effect over self-esteem and anxiety.

In this study, some children with ADHD showed high levels of self-esteem. This result is consistent with the findings of Orjales & Polaino-Lorente (1994) who explained that inflated self-esteem masks feelings of inferiority, other children do not show affected self-esteem due to their immaturity and they do not report impairment in their academic or social competencies.

ADHD symptoms and associated impairments cause that adults often make use of frequent reproaches and penalties to the children with ADHD. The constant failures experimented by children negatively affect self-esteem causing a sense of lack of abilities and the feeling of being different from their peers (Ayora, 2004); however, the children unexpectedly report ex-

tremely positive self-perceptions about their own social, behavioral and academic competencies (Ohan & Johnston, 2011) that reflect a relatively normal self-report and a good feeling about themselves (Murray-Close et al., 2010) that differ from the real performance placed in low levels; this contradictory phenomenon is called positive illusory bias (Owens, Goldfine, Evangelista, Hoza & Kaiser, 2007).

The self-protective hypothesis suggests that the overestimation of the own competencies done by children with ADHD is a coping mechanism that shows a positive and trustful image to protect their self-esteem (Owens et al., 2007) and cope with their failures or limited competencies (Murray-Close et al., 2010). According to Orjales (2002) children with ADHD might show attitudes of arrogance, overbearing and a seemingly positive self-esteem; nevertheless, behind a deep exploration there is an inconsistency of that image that hides a negative perception of themselves.

Anxiety is associated with intense intrapsychic suffering. Anxiety symptoms are generally expressed in 4 domains: physical, cognitive, affective and behavioral. The cognitive domain may range from rumination and vigilant apprehension to catastrophic thinking (threat to life). The behavioral domain includes agitation, tantrums, attentional seeking, overdependence and rituals. Many of these symptoms are misinterpreted because they overlap with ADHD (Spencer, Biederman & Mick, 2007). Walcott & Landau (2004) studied emotional regulation processes and concluded that children with ADHD were more inefficient than children without ADHD in the emotional regulation during tasks that cause anxiety (presence of competitors) even though they received previous instructions to control their emotions.

Since emotional features seem not to be affected by CBT, we suggest specific interventions for low self-esteem, anxiety and other associated emotional characteristics such as the inability to inhibit aggression (King & Waschbusch, 2010), low tolerance for frustration (Spencer et al., 2007) and emotional deregulation (Walcott & Landau, 2004).

The involvement of parents and teachers in the treatment allowed three essential aspects, the participation of people relevant for the children with ADHD, the implementation of the treatment in two settings (home and school) where the symptoms of the disorder appear and where the reinforcement of the cognitive behavioral techniques is required. The participation of the parents is relevant because in our city parents go along with their children in therapy sessions and at that moment, parents understand better the characteristics of ADHD and learn therapeutic techniques. The aim is to let parents and teachers learn how to deal with ADHD symptoms because they spend much more time with the children than therapists do.

ADHD and associated symptoms cause impairment in familiar functioning, academic, behavioral and social difficulties (Daly et al., 2007). Although these variables were not the objective of this study, we remark the statements of parents and teachers after CBT, they state that the relationship with the children is better, the behavior of the children at home and at school improved, children do better in completion of tasks and have better relationships with other children. We suggest further research about the effects of CBT in the variables mentioned.

Despite the positive results of the treatment, we remain cautious in indicating full effectiveness of CBT because Calderón (2003) shows that

improvements in impulsive cognitive style and sustained attention achieved after treatment did not remain in the follow-up phase; we suggest that future studies include a follow-up assessment after treatment to evaluate whether the effects of therapeutic intervention remain with time.

5. Conclusion

The cognitive behavioral treatment is an effective therapy for ADHD children. CBT reduces inattention, impulsivity-hyperactivity, impulsive cognitive style and increases sustained attention of children with the disorder. On the other hand, CBT does not affect self-esteem and anxiety of ADHD children.

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