

A Comparison of Effectiveness of Parent Behavioral Management Training and Methylphenidate on Reduction of Symptoms of Attention Deficit Hyperactivity Disorder

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Abstract- Attention deficit hyperactivity disorder (ADHD) is one of the most common psychological disorders of childhood. Methylphenidate is highly effective in the treatment of ADHD. This study aimed to determine the effectiveness of combined Parent behavioral management training (PBMT) and medication treatment (Methylphenidate) in reducing ADHD symptoms in 6-12-year-old children, using randomized sampling. A total of 50 children with ADHD were assigned into two groups: an experimental group of PBMT and a control group of medication treatment (Methylphenidate) without other interventions. Conners' Parent Rating Scale (CPRS-48) was employed before and after interventions to determine the effects. Descriptive Statistics method (consisting of Mean and Standard deviation) and Statistical inference method, (including t-test and Levene's Test) were used for data analysis. Findings revealed that the combined behavioral intervention of PBMT and methylphenidate treatment is more effective in reduction of ADHD in children. The difference of means between pre-test and post-test of CPRS in the experimental group was equal to 10.77, and it was equal to 1.88 in the control group. In addition, PBMT was more effective in the case of younger parents ($P < 0.025$). However, parents' education level did not affect the behavioral intervention ($P < 0.025$). The findings suggest that combined intervention of PBMT and methylphenidate is effective in reducing the symptoms of ADHD in children.

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Introduction

Attention deficit hyperactivity disorder (ADHD) is one of the most common psychological disorders of childhood. It affects various aspects of development including social, emotional, and cognitive functions of a child either at home or school (1). ADHD disorder is identified with such behavioral symptoms as inattention, hyperactivity, and impulsivity. Children with ADHD may also suffer from cognitive disorders that may affect their daily living activities at school or home. Patients usually show a deficiency in executive functions (for example, in planning or sustained working) and data processing speed (they prove slower than their peers) (2).

Difficulty in attention and concentration is one of the fundamental problems in children with ADHD, and it is likely that these children are affected by serious flaws in memory processes in childhood and adulthood. Studies of cognitive and behavioral domains, particularly cognitive therapies in the areas of behavioral management, lead to devising new methods of intervention invalid clinical and scientific centers in the world which must be considered in the treatment of children with ADHD in Iran (3).

Although studies showed the effectiveness of medical treatment in reducing the symptoms of ADHD in children, experience has shown that combination therapies are more effective in improving and

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maintaining patients' health level in the long term in the majority of mental disorders. Therefore, most researchers believe that the combination therapy may be a selective treatment for ADHD (4). This study was based on expansion combined interventional pharmacological (Methylphenidate), behavioral and cognitive methods, or in cases of necessity as an alternative therapy when methylphenidate was ineffective or had serious physical complications.

Because parents of ADHD children often express their frustration, some researchers provided special educational programs to increase the ability of parents. In this study, the researcher provided the mothers with parent behavioral management training (PBMT) to enable them to regulate hyperactivity or deficiency in their children.

This study was based on a review of the effectiveness of parent behavioral strategies training of parents in a population sample of Iranian children with ADHD. Thus, the researchers were faced with the issue of whether or not parents could use combined methods of parent behavioral training to reduce symptoms of ADHD in children.

Materials and Methods

This study examined the effectiveness of combined PBMT and medication treatment (Methylphenidate) on reducing ADHD symptoms in 6-12-year-old children with ADHD. Furthermore, it measured the effectiveness of the behavioral and cognitive methods when combined with methylphenidate. In addition, it determined the effectiveness of methylphenidate in reducing ADHD symptoms when it was used alone. Then, this study compared the effectiveness of each of these interventions.

The study population included all 6-12-year-old children with ADHD who met the research criteria and referred to Roozbeh Hospital and the child psychiatry clinic in 2011.

For sampling, we prepared the list of all referrals to the health care center. In the next step, we selected 47 children through a stratified random relative manner using Cochran formula. Then, we divided the selected samples into two groups: The experimental group received the PBMT and methylphenidate treatment (n=22), and the control group received methylphenidate treatment without other interventions (n=25). Children in both groups were matched for age and sex. Family's consent was obtained prior to the study.

Children with all types of ADHD participated in this

study and frequency dispersion was as follows: 39 children with combined type (55.7%), 17 with inattentive type (24.3%) and 14 with hyperactive-impulsive type (20%).

Instruments

Clinical interview

Pediatrician diagnostic psychiatric interview for children and adolescents based on DSM- IV- TR by the child psychiatrist.

Conners parent rating scale (CPRS-48)

Conners' Parent Rating Scale consists of 48 revised items from the 93-item questionnaire (6). Questions on this scale are based on a rating scale that is divided into four degrees from none to very high and scores of 0 to 3. This questionnaire was answered by one of the parents (participating in the research) before and after the intervention. Conners' Parent Scale is designed to assess the severity of ADHD symptoms in 3-17-year-old children (7).

Conners' Rating Scale is one of the measures that has the most clinical and research application in the assessment and treatment of ADHD and perhaps can be considered as one of the most practical and acceptable measures of psychometric properties in assessing ADHD. This scale can be utilized for children 3 to 17 years of age and square away the data about outward-oriented problems in children, especially attention, hyperactivity, and conduct disorder (6).

This experimental and standardized scale was assessed with Pearson correlation and Cronbach's alpha in the studies of Khushabi and *et al.*, (2006). The validity of Conners' Rating Scale was evaluated to be 0.98, and the reliability of this test has been reported to be 70 to 90 percent (8). The cutoff points for scores above 60 is determined "above average," for scores above 65 "higher than average" and for scores above 70 "much higher than average" (6).

Procedure

After selecting the subjects, placing them in the groups and performing the pretest, we selected PBMT as the intervention. The training sessions were provided to the subjects for two hours per week over a 10 week period. In these sessions, mothers of the sample group were trained using special training packages for each session. These packages were based on the views of Berkeley and were developed by the latest approaches to behavior change.

In this training, the first and second sessions were

held to understand and respond to the parents' questions and resolve ambiguities. After the second session, parents were trained to use modeling techniques based on Bandura's social learning theory, conditioning, and extinction, reward stepwise, removal of reward and punishment.

Data analysis

The t-test for comparison of means (two groups) and Levene's test for equality of variance were used to

analyze the data.

Results

In this study, 22 children with ADHD participated in the experimental group and received the PBMT and methylphenidate treatment; 25 children with ADHD participated in the control group and received methylphenidate treatment without other interventions.

Table 1. Demographic data for group of parents' behavioral management training (PBMT) and control group

Group		Group of parent Behavioral Management training	Methylphenidate without other intervention
Age	9 years and less than 9 years	11	14
	More than 9 years	11	11
Sex	Male	17	19
	Female	5	6
Education level of parent	Low education	12	17
	High education	10	8
Age of parent	25-38	15	19
	38-50	7	6

Also, the mean of differences and standard deviation for experimental group were -10.77 and 3.77879, respectively. Also, mean of differences and standard deviation for the control group were -1.88 and 2.69753,

respectively.

The results of t-test for the two groups are shown in Table 2.

Table 2. T-test for parents' behavioral management training group and control group

Variable	Levene's Test for Equality of Variance		t	t-test for equality of means			
	F	Significance level		Degrees of freedom	Significance level (Two-tailed)	Mean of differences	Standard deviation
Difference between pre-test and post-test	1.529	0.223	-9.368	45	0	-8.89273	0.94925

The significance level was equal to 0.000 because the test was two-tailed and was compared with 0.025. The equality of means of the two groups was rejected as it was less than 0.025. In the following table, the difference of means is examined to determine which group had more symptom reduction.

The difference of means between pre-test and post-test of CPRS in the PBMT group was equal to 10.77, and it was equal to 1.88 in the control group. Therefore, it can be concluded that the PBMT group had a greater reduction than the control group. In other words, the rate

of ADHD in children whose parents received behavioral management training was further reduced compared to those children whose parents did not receive the training.

Table 3 presents the results of the t-test for the experimental group and the education level of parents. In addition, this table shows the results of the t-test for the experimental group and the age of parents are presented.

Table 3. T-test for the group of parents' behavioral management training and educational level of parents and age of parents

Variable	Levene's test for equality of variance		T-test for equality of means				
	F	Significance level	t	Degrees of freedom	Significance level (Two-tailed)	Mean of differences	Standard deviation
Difference between pre-test and post-test (education level of parent)	0.026	0.873	1.174	20	0.254	1.88	1.60
Difference between pre-test and post-test (age of parent)	0.737	0.401	-2.491	20	0.022	-3.85714	1.54840

The results of the t-test for the experimental group and levels of education revealed that there was a significance level equal to 0.254 (Table 3), and it was compared to 0.025 because the test was two-tailed. Then, it was observed that the significance level was higher than 0.025. Thus, the efficacy of treatment for behavioral management training is independent of the level of parental education, and this method of training works the same in parents with higher education and non-educated parents.

In the third row of this table, two groups of parents are presented: the younger age group and the older age

group. According to the results of the t-test for the experimental group and age of parents, a significance level equal to 0.022 was observed which was compared to 0.025 because the test was two-tailed. Furthermore, it was observed that the significance level was less than 0.025. Therefore, it can be concluded that parents' age is effective in reducing the rate of ADHD in children in the experimental group who received parent behavioral management training. The difference of means was used to examine the effect (Table 3).

Table 4. The difference means between pre-test and post-test of conners parent rating scale according to age of parents and divided by groups

Groups	Mean				Difference between pre-test and post-test of CPRS*	
	Post-test CPRS*		Pre-test CPRS*		older age	younger age
	older age	younger age	older age	younger age		
PBMT** Group	53.2857	51.4	61.4286	63.4	8.1429	12
Control Group	56	59.1579	59.1667	60.6316	3.1667	1.4737

*Conners Parent Rating Scale

** Parent Behavioral Management training

In the experimental group, it was observed that the difference of means between pre-test and post-test of CPRS in the younger parents was equal to 12 and in the older parents was equal to 8.14 which may indicate that ADHD symptoms are reduced more in children with younger parents. Also, the results showed that PBMT is more effective in reducing the ADHD symptoms of children whose parents are younger (Table 3).

Discussion

These findings are consistent with studies that have confirmed the effectiveness of PBMT in reducing the symptoms of ADHD. These studies (9-20) have

confirmed the effectiveness of PBMT in reducing the symptoms of ADHD.

Also, some of the studies indicate that combination interventions with medication treatment can increase the effects and efficacy of the treatments (21-31).

Finally, most studies showed a substantial effect of combination therapy or behavioral therapy compared to medical therapy (Methylphenidate) alone (32-36).

In addition, this study focused on mothers (as they spend more time with their children than fathers). Therefore, fathers did not have any role in this study. According to studies of Fabiano *et al.*, (2009) the fathers' behavioral training is effective in reducing the symptoms of ADHD and cooperation of fathers acted as

a factor in the success of educational sessions for parents (30). This is evident in studies of Zargari Nejad (2004) that selected fathers to participate in the training sessions (37). This is another study suggesting that low father-child relationship is an important factor in ADHD (38).

In another study, the effectiveness of behavioral training programs to improve children's behavior immediately after treatment was evaluated to be slight to moderate. Furthermore, this study evaluated the behavioral group training of parents, especially in low-income families (39).

Some studies have also shown that combination of medication treatment with behavioral training was useful, but behavioral treatments alone were not beneficial; in some cases, medication treatment was more successful than combination therapy (40,41). Finally, most studies have shown a significant effect of the combination therapy (33-35,40,42).

In this study, the effectiveness of behavioral management training method in reducing symptoms of ADHD in children with younger parents was assessed, and the results of the comparison showed a significant difference between the groups. Therefore, parents' age is an effective factor in reducing ADHD in children. It is noteworthy to mention that the effectiveness of interventions of younger parents in the PBMT group was more than the older parents in reducing the rate of ADHD. The study of Fathi (1995) also provides evidence of the success of these skills in the reduction of ADHD symptoms in younger mothers (43).

In this study, it was also found that parents' education level did not have a statistically significant effect on reducing the symptoms of ADHD. In other words, the efficacy of interventions through the PBMT is the same in both groups of parents with higher and lower education level. However, the study of Fathi (1995) indicated that PBMT was more successful for educated mothers (43).

The current study had a number of limitations. First, this study was conducted only on mothers, and fathers did not participate in the workshops. Second, individual differences and personality of mothers and their probable disorders are also among limited factors which could affect the results. Third, it should be noted that more effective behavioral interventions in the younger parents may be due to more motivation and patience of these parents in addressing the problems of their children. Also, young parents often have fewer responsibilities towards the number of children and most of them have single-child families. However, similar

studies should be conducted to investigate the effect of this intervention on reducing ADHD symptoms in children.

Combination interventions through medication treatment with PBMT of children with ADHD had an almost significant effect on reducing ADHD symptoms. Moreover, applying this type of intervention with medication treatment can increase the effects of the treatments. Also, in this study, it was found that PBMT was more effective for younger parents than the older ones. Furthermore, the results showed that the efficiency of parent's behavioral management training in children with ADHD was independent of parents' education.

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