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The Study of the Effect of Magnetic Therapy on Improvement of Neuropsychological Functions in Children with Attention Deficit Disorder and Hyperactivity

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Abstract

This study aims to evaluate the effect of magnetic therapy on improvement of neuropsychological functions in those with attention deficit disorder with hyperactivity. The statistical population of present study includes 30 children with attention deficit- hyperactivity disorder in ages of 7 to 8 who are studying in Tehran in 2011-2012 and have admitted to the neurologist's office for treatment. In this study, those children with attention deficit-hyperactivity disorder that referred to a neurologist doctor were used as the sample, who were randomly divided into a control and experimental group. The questionnaires used for this study included Children Symptom Inventory (CSI-4)for the assessment of symptoms of attention deficit-hyperactivity disorder and inhibition, Wisconsin's test for assessment of self-control skills, Andre-ray test to assess the ability to plan and organize, subtests of comprehension, analogies, adjustment of images and joining pieces and Kessler children-III for assessment of changing rate of inhibition skills. The results indicated that magnet therapy method has had impact on improvement of organization, planning ability, and attention deficit symptoms of children with attention deficit -hyperactivity disorder.

Key words: Magnetic Therapy, Attention Deficit Disorder, Hyperactivity,

1. Introduction

Hyperactivity disorder- attention deficit is one of the most common developmental disorders that its prevalence has been reported about 4 to 8 percent. This disorder causes various problems in many areas of social, cognitive, academic and behavior. This disorder is not a single factor and has an extensive etiology. Multiple genes and various environmental factors in specific situations and by interact with each other cause to receive the label of disorder of attention deficit – hyperactivity. In fact, the etiology of this disorder is known as the genetic and neurological, but environmental factors, particularly during pregnancy have also been of interest of researchers. Communication and behavioral characteristics of these children have created innumerable problems for parents, teachers and community leaders. Damage disorder in executive functions such as inhibition, organization, planning, self-control, working memory and sustained attention, create serious problems in their

everyday lives and activities of the school and jobs (Alizadeh, 2006). In the early 1900s, uncontrollable impulsive and hyperactive children who most of them were suffering from encephalitis caused by nerve damage, were classified as hyperactive syndrome. In the 1960s, a heterogeneous group of children with ataxia, learning disabilities and emotional instability (without special nerve damage) were described with minimal brain damage and then hypotheses were proposed to explain the origin of this disorder. In one of the theories, the mentioned disorder is known with the genetic basis that leads to abnormal levels of arousal and weak ability for emotional modulating. The causes of attention deficit – hyperactivity disorder (ADHD) is unknown. Most children with attention deficit – hyperactivity do not show the evidence of clear structural damage in the Central Nervous System (CNS). In contrast, most children with known neurological disorders, caused by brain damage suffered from attention deficit and hyperactivity. Despite the lack of neurological, physiological and particular neuro-chemical base for this disorder, there is an expected relationship between attention deficit- hyperactivity disorder and a variety of other disorders that affect the brain function such as learning disorders. Proposed contributing factors for attention-deficit hyperactivity include pesticide exposure during prenatal, earliness and mechanical damage to the nervous system of the fetus before the birth. Food additives, colors, preservative materials and sugar, are proposed as well as the possible causes of ADHD. But the scientific evidences do not show the involvement of these factors in the genesis of attention deficit - hyperactivity disorder (Barkley, 2006). The present study aims to investigate the effect of magnetic therapy on recovery of neuropsychological functions in children with attention deficit - hyperactivity disorder. Given that the drug regulates part of the brain's functions, whether the complementary treatments along with medication can create relative improvement in mentioned areas in children with attention deficit / hyperactivity?

1.2. Statement of problem

Attention deficit-hyperactivity disorder is a multifactor disorder which arises in result of interaction of environmental and genetic factors and leads to instability in the size and structure of the brain and Cerebellar abnormalities - the fronto-striatum especially in the right hemisphere of brain, which can be responsive to a lot of motor control damages and abnormalities of motor- sensory planning. Magnetic stimulation therapy is the latest and most powerful noninvasive therapy which is extensively used in studies of the nervous system and with the promising findings in formation of the central nervous system. Currently, this method is widely used in the treatment of brain diseases and disorders and based on the results a significant improvement in patients treated with this technique is reported in recent years. Meanwhile this therapy method has helped a lot in understanding of more points about the pathophysiology of attention deficit-hyperactivity disorder. It also is proposed that it isn't used as an independent treatment therapy in the treatment of attention deficit / hyperactivity disorder so far. Researchers hope that as rTMS method influences on dopamine system in the normal individuals, also effects on those persons with the attention deficit-hyperactivity disorder. Of course available evidences indicate the possibility of applying this therapy method in patients with attention deficit-hyperactivity disorder. After Baker and colleagues (1985) that proposed the application of this therapy method in 1985, treatment with rTMS method is proposed as an effective method in clinical and para-clinical treatment of extensive abnormalities in areas of neuropsychological and neurological disease like Tourette syndrome - Obsessive-Compulsive Disorder - Depression - schizophrenia - bipolar disorder, etc. Barkly (2006) in his review on 22 conducted Neuropsychological studies on frontal lobe functioning in children with hyperactivity / attention deficit disorder found that most of the tests that have been used in these studies have measured the ability of response inhabitation. This function is done by frontal lobe particularly orbital prefrontal areas and medial- prefrontal and their rich communication with striatum and core of cordite and other

parts of limbic system (Benson 1991; Hillman 1991; Stasi and Benson 1986,as cited in Barkly, 2003). Barkley (1992) subsequently concluded that there is a relationship between the delayed response mechanism and the prefrontal areas in those with attention deficit-hyperactivity disorder. In another study by using of tests of frontal and parietal lobes children with attention deficit- hyperactivity disorder have weakness in function of both groups of test compared to normal children. This weakness in tests related to frontal lobe was more severe than tests of parietal lobe (Eman, 1998).Penigton also in his review article stated that executive function deficits in children with hyperactivity accompanied with attention deficit can be caused by a desirable reduction of frontal lobe function which in its own turn may be caused by structural or biochemical changes in the prefrontal area (Penigton, 1996).Elia (2005) stated that in Wisconsin Card, hyperactive children with attention deficits are not able to understand the meaning of concepts and mental flexibility.

1.3. The purpose of the study

This study aims to evaluate the effect of magnetic therapy on improvement of neuropsychological functions in those with attention deficit disorder with hyperactivity. Meanwhile, whether this therapy method can be used with other methods of therapy in the treatment of attention deficit disorder-hyperactivity? In order to evaluate the effectiveness of magnetic therapy on 30 children with attention deficit -hyperactivity disorder aged 7 to 8 years among patients admitted to the neurologist's office within the year2011-2012.

1.4. The significance of the study

Children with attention deficit due to impulsiveness behaviors and low inhibition skills and self-control, often provide more incorrect answers and and much more organized and require more organization and emphasis on details, also attention deficit- hyperactivity disorder were stable status that its treatment and revision is necessary during the time. Children with attention deficit / hyperactivity disorder should have access to evidence-based and effective treatment (Ramshid, Halmos, translated by Tavakoli Zade, 2007).Remembering requires paying attention to stimuli; this means that bulk of the subjects that are deposited in memory refer to those that draw attention to themselves and based on the fact that these children have problem in concentrating and paying attention to stimuli, recent research can help education officials and parents in the education of these children and create acceleration in treatment and improvement of educational and behavioral situation. These children (children with attention deficit hyperactive) in many areas of education, employment and social are faced with failure and delay of function compared to normal children.This disorder emphasized the susceptibility of this group of children for catching up other emotional and behavioral disorders, antisocial personality disorder, drug abuse and alcoholism and necessity of early and timely intervention for their treatment (BehPazhoh, et al, 2007).Because the early treatment prevents the stabilization of secondary signs in patients and accelerate the treatment of this disorder. It should be noted that hyperactive children with attention deficit experience delay in all areas of mental and this research was conducted to reach this conclusion that whether this treatment method is effective on neuropsychological function (self-control, inhabitation skills, planning and organizing ability) in children with attention deficit -hyperactivity disorder or not. Specific tests are used to evaluate the effect of this treatment method on neuropsychological function and symptoms of attention deficit - hyperactivity disorder that will be mentioned in Chapter III.

1.5. Research hypotheses

In the present research, with regard to the statement of problem, the following hypotheses were considered:

1. Magnetic Therapy Method is effective on self-control skills of children with attention deficit -hyperactivity disorder.

2. Magnet Therapy Method is effective on inhibition skills in children with attention deficit and hyperactivity disorder.

3. Magnetic Therapy Method is effective on organizing and planning abilityof children with attention deficit and hyperactivity disorder.

2. Review of Literature

2.1. Magnetic Therapy Method

Magnetic Therapy Methodis a type of non-medical treatment but is becoming a popular and developing method in treatment of patients admitted to treatment centers (pathology). Types of methods of Magnet therapy are mentioned in the following:

• Constant magnetic field: the amount and direction do not change in magnet therapy time. • Variable magnetic field: both of the amount and direction change in magnet therapy time.

• The magnetic field pulse (pulsatory): changes take place in amount but direction is usually fixed. Here the magnetic pulses be conducted alternately and a series of pause.

While the effectiveness of these three methods are very similar to each other, but therapists are more interested in the pulsatory magnetic field. It has been proven that pulse hit like pulsatory hit toward the fixed and variable magnetic field has very quick and clear treatment effects and about its reason, experts state that the adapting rate of body with pressure of each pulse is lower in this case. Because pressure of each pulse was very physiological and since all creatures are gradually adapting themselves to the rhythm so in pulsatile method, body does not find the opportunity to create adaption with pulses of magnet. Pulsatile pulses cause to incidence of significant impacts and muscle contraction and effects of this treatment method with low frequency and high amplitude and short duration are used in diagnostic and therapeutic purposes. All practical treatment methods in patients with attention deficit – hyperactivity disorder is to modify the operating system of brain's function. It seems that dopamine is a major neurotransmitter that is effective on how the brain function and is the most effective treatment method based on the remaining duration in created changes. This issue is caused the therapists and parents are looking forward to new treatment methods. Attention deficit-hyperactivity disorder is a multifactor disorder which arises in result of interaction of environmental and genetic factors and leads to instability in the size and structure of the brain and Cerebellar abnormalities and fronto- striatum especially in the right hemisphere of brain (Which can be responsive to a lot of motor control damages and abnormalities of motor- sensory planning). Magnetic stimulations therapy is the latest and most powerful noninvasive therapy which is extensively used in studies of the nervous system and with the promising findings in formation of the central nervous system. In this method with targeting of the cortex cells with short frequency (non-invasive) changes in the function of nerve cells are created. Currently this method is widely used in the treatment of brain diseases and disorders and based on the results a significant improvement in patients treated with this technique is reported in recent years. Meanwhile this therapy method has helped a lot in understanding of more points about the pathophysiology of attention deficit-hyperactivity disorder. It is also proposed that it is not used as an independent treatment therapy in the treatment of attention deficit / hyperactivity disorder so far. Researchers hope that as rTMS method influences on dopamine system in the normal individuals, also effects on those with the attention deficit-hyperactivity disorder. Of course available evidences indicate the possibility of applying this therapy method in patients with attention deficit-hyperactivity disorder. After Baker and colleagues (1985) that proposed the application of this therapy method in 1985, the treatment with rTMS method is proposed as an effective method in clinical and para-clinical treatment of extensive abnormalities in

areas of neuropsychological and neurological disease like Tourette syndrome, Obsessive-Compulsive Disorder, Depression, schizophrenia, bipolar disorder, etc.

2.2. Previous research done in this area

Today, conducted studies about utilization of magnetic stimulation of brain in treatment of neuropsychological diseases show that the magnetic stimulation as a therapeutic and researches device has been used in these diseases. When this stimulation is used as a research and diagnostic device, it is a suitable tool for assessment of cortical excitability, cortical connections, plasticizer CT of brain, cognitive activities and status of the patient. Also, some individuals have used the magnetic stimulation for treatment of diseases and especially these stimuli are applied about depression. But, there are still problems in interpreting the results. In general, it can be said that these stimulations were an excellent means for neuropsychology researches and also have the power to become a therapeutic tool.

Brain magnetic stimulation (TMS) was performed on 12 patients with idiopathic Parkinson's disease. In this experiment, it was found that stimulation of the occipital lobe has no effect on clinical signs of Parkinson's patients. But frontal lobe stimulation caused to improvement of individual's clinical symptoms. Magnetic stimulation with high-frequency and the severity close to the motor threshold in Parkinson patients by using of Kinriologic and motor ability tests before and24 hours after the magnetic stimulation shows that clinical symptoms have had significant improvement in other side but Kinriologic tests did not show an increase in speed of movement. Also, some patients' handwriting is improved. The results of this study confirm previous studies' results and show that with magnetic stimulation, symptoms of these patients have improved at least temporarily. In repeated stimulation in Parkinson's patients, symptoms and status of patients were measured by standardized tests of Parkinson patients' activity. The patients were evaluated before and 2 months after the application of stimulus. Magnetic stimulation was applied on both sides of the frontal lobes. The group that received the magnetic stimulation significantly showed improvement in clinical tests compared to the control group (as cited in Bazarnoei, 2012). Barkly in his review on 22 conducted Neuropsychological studies on frontal lobe functioning in children with hyperactivity / attention deficit disorder found that most of the tests that have been used in these studies measure the ability of response inhabitation. This function is done by frontal lobe particularly orbital prefrontal areas and medial- prefrontal and their rich communication with striatum and core of cordite and other parts of limbic system (Benson, 1991; Hillman, 1991; Stasi and Benson, 1986, as cited in Barkly 1992). Barkley followed conducted investigations and came to this conclusion that there is a relationship between the delayed response and parts of frontal lobe in children with attention deficit-hyperactivity disorder. Panington and colleagues in their article state that executive function deficits in children with hyperactivity -attention deficit disorder can be caused by a desirable reduction of frontal lobe function which in its own turn may be caused by structural or biochemical changes in the frontal area (Panington, 1996).

Furthermore, in conducted research by Singer and Valp (2002) children with attention-deficit/hyperactivity disorder showed weakness in transmission of subjects compared to normal children in Wisconsin's tests. Due to these findings, it can be found that children with attention deficit - hyperactivity disorder are not able to use taught content in self control – self revision in different positions.

- Recently brain imaging while using the rTMS shows that involved areas in attention and executive activities and inhibitory control is improved (Paulo Karatolo, et al, 2010).

3. Methodology

Since the data condition of this study is consistent with features of pilot or experimental design, the pilot technique of pre-test - post-test design with control group was used.

3.1. Statistical population

The statistical population of present study includes 30 children with attention deficit- hyperactivity disorder in ages of 7 to 8 who are studying in Tehran in2011-2012and have been admitted to the neurologist's office for treatment.

3.2. Sampling method

In this study for sampling, those children with attention deficit-hyperactivity disorder that referred to a neurologist doctor (available sampling method) were used as a sample study and randomly divided into two groups of control and experimental.

3.3. Instruments

In this study, Children Symptom Inventory (CSI-4)is used for the assessment of symptoms of attention deficit- hyperactivity disorder and inhibition, Wisconsin's test is used for assessment of self-control skills, Andre-ray test to assess the ability to plan and organize, sub-tests of comprehension, analogies, adjustment of images and joining pieces and Kessler children-III are used for assessment of changing rate of inhibition skills.

3.3.1. Children symptom inventory (CSI-4) parent form:

This questionnaire is designed for the screening of 18 behavioral and emotional disorders in children of 2 to 5 years old by Mohammad EsmailI (2002). Later in 1987, CSI-4-R form was made by following of DSM-III-R classification. In 1994, with the publication of DSM-IV this questionnaire also with a few changes (revised) was published with the name of CSI-4. Inventory of CSI-4 has two forms for parent and teacher. Parent Form has 12 questions which are adjusted for 11 major group of behavioral disorder. Teacher form has 77 questions which are in 9 major groups of disorders.

3.3.2. Wisconsin Card Sorting Test (WCST)

This test is prepared by the effort of Grant and Berg in 1948 and is widely used to study the abstract behavior and in this study, has been used to measure self-control skills (Lezak, 1995).This test contains 64 cards and is the most common means of abstract thinking assessment that requires the ability to make hypotheses and test them. Four types of shapes (triangle, star, cross, circle) are printed on each card and the number of each shape on each card is range from one to four. In this test, subject tries to memorize the notion or the rule that has found (color, number, and shape) for successive periods and when the rules of classification changed, he also alters the previous notions.

3.3.3. Andre-ray test

Geometric images test was designed by Prof. Andre Ray in1942 to measure the type of perceptual activity and visual memory of those referred to psychology and psychiatry clinic (Bahrami, 1998) and in this study is used to consider the ability to plan and organize. This test consists of two cards of A and B. Card A consists of 18 perceptual components and is applied about older than 7 years old (especially for adolescents and adults). Card B is composed of 11 components of geometry and because of more perceptual simplicity is used for 4 to 8 years old or mentally retarded adults (Bahrami, 1998). In the present study card A is used.

3.3.4. Sub-tests of comprehension, analogies, adjustment of images and joining pieces of WISC-III test

One of the most prestigious intelligence tests refers to Wechsler's IQ tests which are prepared for age groups of preschool, children and adults and is used in this study to measure the inhibition skills. Wechsler Intelligence Scale which is suitable for ages of 4 to 6/5andwaspublished in 1976.

Thelast revised form of the test was published in 2002 which is applicable for the age group of 3 to 7. Special forms for children which were published in 1974, is applicable for age group of 6 to 16 and also is used in this study (This test is normalized in Iran, shiraz city by Shahim in 1994. This test consists of compound intellectual test which is administered individually (Marnat, 2003) and WISC-III scale in1991 and WISC-4 scale in 2003, after revision has been published. First Wechsler Intelligence Scales published in 1939 as the Wechsler Boloyo Intelligence Scale for measurement of adults' intelligence. This scale was revised laterand in 1955 as the Wechsler Intelligence Scale for Adults (WAIS) was published.

3.4. Data analysis

In order to analyze the findings, the indicators of mean and standard deviation were used and to compare the created neuropsychological changes' rate (in each of self-control skills, symptoms of hyperactivity and attention deficit, planning and organizing ability and inhibition skills) in 30 children with attention deficit / hyperactivity, in two groups of children with attention deficit - hyperactivity disorder treated with magnet therapy (n = 15) and children with attention deficit / hyperactivity disorder without magnet therapy receiving (n = 15), the covariance analysis method was used. All statistical analysis was performed by using of social science statistical software of SPSS.

4. Discussion and Conclusion

H1: Magnetic Therapy Method is effective on organizing and planning ability of children with attention deficit and hyperactivity disorder.

In order to investigate the effect of magnetic therapy on improvement of organizing and planning ability of children with attention-deficit hyperactivity disorder (scores obtained from Andre Ray test) and in order to maintain constant the effect of pre-test scores of organizing and planning in both control and experimental groups and comparison of post-test scores of organizing and planning the statistical analysis of covariance was used. The results are presented in Table 1.

Table 1.Results of ANCOVA for planning and organization scores in both experimental and control group

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Itâ coefficient
Pretest	3975.296	1	3975.296	111.76	0.001	0.805
Group	1473.017	1	1473.017	41.41	0.001	0.605
Error	960.334	27	35.568			
Total	11676.634	29				

According to table 1, due to the significant difference of pre-test scores of organization and planning (F (29,1) = 111/76, P<0/01), the calculated amount of F for posttest scores of organizing and planning abilities in children with attention-deficit hyperactivity disorder is significant in both control and experimental groups after fixing the pretest scores effect (F (29,1) =41/41, P<0/01). Therefore, there is a significant difference among post-test scores of organizing and planning abilities in children with attention-deficit hyperactivity disorder in both experimental and control groups with fixing the effect of pretest scores of organization and planning. The adjusted mean comparison

of two groups shows that the mean score of organization and planning in children with attention deficit- hyperactivity disorder in experimental group (M= 66/31, SD= 1/67) is higher than the control group (M= 50/06, SD= 1/67). The calculated Itâ square is equal to (= 0/60) which represents the average effect of magnet therapy on improvement of organization and planning ability. According to Cohen (1998), if the Itâ square is equal to 0/01, indicates a small effect, 0/60represents the average effect and 0/138 indicates a large effect. Therefore, this magnet therapy method has had impact on improvement of organization and planning ability of children with attention deficit -hyperactivity disorder in experimental group that have received this program compared to children in control group that have not received this program. So that, increase the scores of organization and planning ability in experimental group.

H2: Magnet Therapy Method is effective on inhibition skills of children with attention deficit and hyperactivity disorder.

Again, the statistical analysis of covariance was used in order to investigate the effect of magnetic therapy on inhibition skills of children with attention deficit -hyperactivity disorder (scores obtained from subtests of the Wechsler) and in order to maintain constant the effect of pre-test scores of inhibition skills in both control and experimental groups and comparison of post-test scores of inhibition skills. The results are presented in table 2.

Table 2. Results of ANCOA for inhibition skills scores in both experimental and control groups

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Itâ coefficient
Pretest	2801.434	1	2801.434	347.12	0.001	0.928
Group	394.794	1	394.794	48.91	0.001	0.644
Error	217.899	27	8.070			
Total	3295.367	29				

Table 2 shows that, due to the significant difference of pre-test scores of inhibition skills (F (29,1) = 347/12, P<0/01), the calculated amount of F for posttest scores of inhibition skills in children with attention-deficit hyperactivity disorder in both control and experimental groups after fixing the pretest scores effect is significant (F (29,1) =48/91, P<0/01). Therefore, there is significant difference among post-test scores of inhibition skills in children with attention-deficit hyperactivity disorder in both experimental and control groups with fixing the effect of pretest scores of inhibition skills. The adjusted mean comparison of two groups shows that the mean score of inhibition skills in children with attention deficit- hyperactivity disorder in experimental group (M= 32/20, SD= 0/73) is higher than the control group (M= 24/93, SD= 0/73). The calculated Itâ square is equal to 0/64, which represents the average effect of magnet therapy on inhibition skills. According to Cohen (1998), if the Itâ square is equal to 0/01, indicates a small effect, 0/60 represents the average effect and 0/138 indicates a large effect. Therefore, this magnet therapy method has had impact on inhibition skills of children with attention deficit -hyperactivity disorder in experimental group that have received this program compared to children in control group that have not received this program. So that, increase the scores of inhibition skills in experimental group.

Based on the obtained data analysis and comparison of test results CSI-4 in both experimental and control groups, it can be concluded that: Magnetic therapy is not effective in reducing symptoms of hyperactivity and impulsivity. This result corresponds to results of conducted research on adults with attention deficit-hyperactivity disorder in in Israel by Bloch & et al (2010) and confirms the results of current research.

H3: Magnetic Therapy Method is effective on attention deficit symptoms of children with attention deficit and hyperactivity disorder.

In order to investigate the effect of magnetic therapy on attention deficit symptoms of children with attention deficit- hyperactivity disorder, in order to maintain constant the effect of pre-test scores of attention deficit symptoms in both control and experimental groups and for comparing the post-test scores of attention deficit symptoms the statistical analysis of covariance was used. The results are presented in Table 4-8.

Table 3.Results of ANCOVA for attention deficit symptoms scores in both experimental and control group

Source of Variation	Sum of Squares	df	Mean Square	F	Sig.	Itâcoefficient
Pretest	2.521	1	2.521	11.075	0.003	0.291
Group	85.402	1	85.402	375.189	0.001	0.933
Error	6.146	27	.228			
Total	95.367	29				

As table 3 indicates, due to the significant difference of pre-test scores of attention deficit symptoms (F (29,1) = 11/07, P<0/01), the calculated amount of F for posttest scores of attention deficit symptoms in children with attention-deficit hyperactivity disorder in both control and experimental groups after fixing the pretest scores effect is significant (F (29,1) =375/18, P<0/01). Therefore, there is significant difference among post-test scores of attention deficit symptoms in children with attention-deficit hyperactivity disorder in both experimental and control groups with fixing the effect of pretest scores of attention deficit symptoms. The adjusted mean comparison of two groups shows that the mean score of attention deficit symptoms in children with attention deficit- hyperactivity disorder in control group (M= 7/45, SD= 0/123) is higher than the experimental group (M= 4/07, SD= 0/123). The calculated Itâ square is equal to 0/933, which represents the average effect of magnet therapy on attention deficit symptoms. According to Cohen (1998), if the Itâ square is equal to 0/01, it indicates a small effect, the amount of 0/60 represents the average effect and 0/138 indicates a large effect. Therefore, this magnet therapy method has had impact on attention deficit symptoms of children with attention deficit -hyperactivity disorder in experimental group that have received this program compared to children in control group that have not received this program. So that, decrease the scores of attention deficit symptoms in experimental group. This result corresponds to results of conducted research on adults with attention deficit-hyperactivity disorder in 2010 in Israel by Bloch & et al and confirms the results of current research.

5. Limitations of the study and suggestions for further research

Since this conducted study was limited to children with attention deficit- hyperactivity disorder in a private center, we cannot be sure about the effectiveness of this therapy method for all children with attention deficit / hyperactivity disorder.

In this study, there were some uncontrolled variables such as parental occupation, parental education, how family deal with the problem, in terms of applying other therapies beside the above therapy and referral source of child for treatment, which can be taken into consideration in future research.

Finally, the last limitation was related to the sample size limitations; the small number (two groups of 15 each) can make it difficult to generalize the results. Therefore, it is recommended that a larger sample can be studied in further research.

As far as the area of the study for further research is concerned, the following can be mentioned:

- It is suggested that this research be done in different age groups and both sexes, and the results be compared.
- It is suggested that the effect of this therapy method be considered on language skills development of children with attention-deficit hyperactivity.
- It is recommended that the effect of this therapy method be considered on improvement of educational performance of children with attention deficit -hyperactivity disorder.
- It is recommended that the effect rate of this therapy method be considered on improvement of active memory in children with attention deficit -hyperactivity disorder.
- It is recommended that two method of Magnet Therapy and Drug therapy be examined on treatment of ADHD children and the lasting impact of each of them.

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