

The Effect of Dohsa-hou on Reducing Attention Deficit and Hyperactivity in 6- to 12-Year-Old Children and Adolescents

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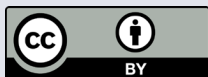
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ABSTRACT

OBJECTIVE To investigate the effect of Dohsa-hou relaxation on reducing attention deficit and hyperactivity.

METHODS Eighty children with attention-deficit/hyperactivity disorder (ADHD) aged 6-12 years were selected by the block randomization method and assigned to either an experimental group or a control group. The data collection tools included a demographic questionnaire, Conners' parent rating scale and Conners' (CPRS-RS) child attention deficit index.

RESULTS The mean score of the children's hyperactivity and attention deficit decreased after the intervention, which was statistically significant ($p < 0.001$). The children's hyperactivity scores were significantly different before and after the intervention in the two groups: a greater reduction was observed in the intervention group than in the control group. Although hyperactivity decreased in both groups, it was more pronounced in the intervention group ($p < 0.001$). The comparison of children's attention deficit scores before and after the intervention in the two groups also showed that Dohsa-hou treatment led to a more significant decrease in the scores of the intervention group ($p < 0.001$).

CONCLUSION Dohsa-hou exercises may lead to reduced hyperactivity and attention deficit in most children with ADHD.

KEYWORDS Dohsa-hou, hyperactivity, attention deficit, complementary treatment

INTRODUCTION

Attention-deficit/hyperactivity disorder (ADHD) is a neurobehavioral disorder affecting school-age children around the world. More than 50% of referrals to child and adolescent psychiatric clinics are attributed to ADHD, and 3-5% of school-age children are affected by this disorder (1, 2). This neurodevelopmental disorder is known to affect 8-12% of children worldwide (3). A study in the United States found that 10% of children had

ADHD and that 7% used ADHD medications (4). One study in Iran showed that 18% of students had ADHD (5). Other studies of ADHD in Iran have reported the prevalence of this disorder among school-age children to be 9%-15% (7). It is well-established that ADHD is often associated with other mental disorders. Research shows that 54-84% of children and adolescents with ADHD may also experience other disorders, and that some of these disorders may exacerbate their

behavioral and emotional problems (6).

This disorder has been discussed in numerous studies, as it has a variety of consequences for children and imposes heavy costs on the family and the community (8).

Although the rate of hyperactivity decreases with age, at least half of children with this disorder continue to exhibit symptoms in adulthood (9). Today, one of the most common treatments for ADHD is the use of medications, including the central nervous system stimulants (10); however, due to the heterogeneity of this disorder in children, medications may not be similarly effective for all children (11). Therefore, the use of medications alone cannot meet the therapeutic needs of all children with ADHD, and must be accompanied by other interventions (12).

Nervous tics are among complications of ADHD in children after taking medications. They may appear unexpectedly while the child is performing their school activities. Although these tics may seem worrying and frustrating, they do not physically damage the brain. Impacts of ADHD may also appear in other forms, such as excessive blinking, verbal tics (e.g., repeating words), clearing the throat, burping, and making unusual sounds. Illusions (e.g., seeing snakes, insects, and worms that do not really exist) are other complications of using ADHD medications (13).

Additionally, some children with ADHD experience severe behavioral changes or become frustrated or anxious. These complications are not usually dangerous, but they can impair the child's emotional stability. Long-term complications, on the other hand, threaten the health and normal life of a child with ADHD (14).

Dohsa-hou is a Japanese psychological rehabilitation method which was first applied by Naruse (1966) to improve motor problems in children with cerebral palsy. Naruse believed that disabilities associated with cerebral palsy were associated with physiological disorders and were also affected by mental activities (15). He explained that elements of cognitive processing are involved in motor control. In Dohsa-hou a solidarity between the physiological and psychological process of movement is achieved when the client desires to move a body part, strives toward that goal, and realizes the movement they intended (16). Exercise alone is not adequate for achieving the desired

mental health in the patient. Dohsa-hou is a client-centered method in which the therapist's role is facilitating the movements of clients which can help them experience positive changes. Overall, the role of the therapist is to take the necessary measures to help the patient achieve successful results (17). Dohsa-hou has two patterns of intervention approaches: relaxation (with the goal of easing tension in the body) and standing (with the goal of improving posture and movement) (18).

In the Dohsa-hou method, physical activity with the aim of learning and developing perceptual, sensory-motor and cognitive skills is performed. Dohsa-hou has also been enlisted in the treatment of many psychological problems such as cerebral palsy (19), depressive symptoms (15), Parkinson's disease (17), anxiety disorders (20), multiple sclerosis (21) and schizophrenia (22).

Ohno and Dadkhah (1999) conducted a study with three children with ADHD in Japan. Based on their final evaluation, communication, attention, concentration, and body awareness problems improved in these children after Dohsa-hou treatment (23). Naoki showed that Dohsa-hou helped ADHD patients to recognize their emotion and mood states and made them calm and stable (24). Also, with regulation of emotional arousal and expression, these patients were better able to establish good relationships with others (25). However, there are few reports of the effectiveness of the Dohsa-hou technique with children. Due to the importance of ADHD and the demonstrated effectiveness of Dohsa-hou technique, this study aimed to investigate the effect of this treatment on reducing ADHD in 6- to 12-year-old children and adolescents referred to a child psychiatric subspecialty clinic.

METHODS

Participants

This study was conducted using the block randomization method with an experimental and a control group in two stages: before and after the intervention.

The study population consisted of children and adolescents with ADHD who had been referred to a psychiatric subspecialty clinic in 2020. With a minimum reduction of 3 units in the hyperactivity score, a confidence factor of 95% and a test power of 80%, using G*Power software it

was determined that a sample of 38 people per group was required for the study. A total of 40

participants was recruited in each group.

$$n = \frac{(Z_{1-\alpha/2} + Z_{1-\beta})^2 \times [\sigma_1^2 + \sigma_2^2]}{[d]^2} = \frac{(1.96 + 0.84)^2 \times (4.17^2 + 5.14^2)}{(3)^2} \cong 38$$

Inclusion criteria included age 6-12 years, parental consent to participate in the research, a diagnosis of ADHD based on the DSM5 criteria and the approval of a child and adolescent psychiatry subspecialist. The exclusion criteria included lack of interest in continuing to participate in the research, presence of obvious physical or movement disorders, a history of seizures and use of seizure-related drugs. Participants were selected by simple random sampling and assigned to one of two groups using the block randomization method (Figure 1).

Instruments

The data collection tools used in this study included three questionnaires: a demographic and medical information questionnaire, Conners' hyperactivity index, and Conners' child attention deficit index. The demographic information questionnaire included information such as birth order, parents' educational level, parents' occupation, duration of illness, types and amounts of medications used, economic status, family history of ADHD, and ADHD medications used.

The 48-item Conners' parent rating scale (CPRS-48) was used in this study. This scale ex-

amines the child's behavior on a four-point Likert scale (from "not at all" to "extremely") in six areas: conduct problems, psychosomatic problems, learning problems, hyperactivity/impulsivity problems, anxiety problems, and hyperactivity index. In the CPRS-48, Conners does not suggest a specific cutoff point for identifying clinically significant problems; however, scores above 60 were considered to be "above average". In this study a cutoff point of 60 was used for screening hyperactive children as used in a study by Khooshabi and colleagues (2006). In that study, an alpha coefficient of 0.91 was reported for the questionnaire (26).

Children's attention deficit or inattention was assessed using the revised Conners' 26-item parent rating scale. This scale examines parents' rating of a child's behavior using a four-point Likert scale (from "not at all true" to "absolutely true"). The total score range is from 26 to 104. If a child obtains a score above 34, it indicates an attention deficit: the higher the score, the greater the level of the child's disorder. Alizadeh et al. reported the reliability of this scale to be 0.90. The reliability of the questionnaire was estimated to be 0.85 (27).

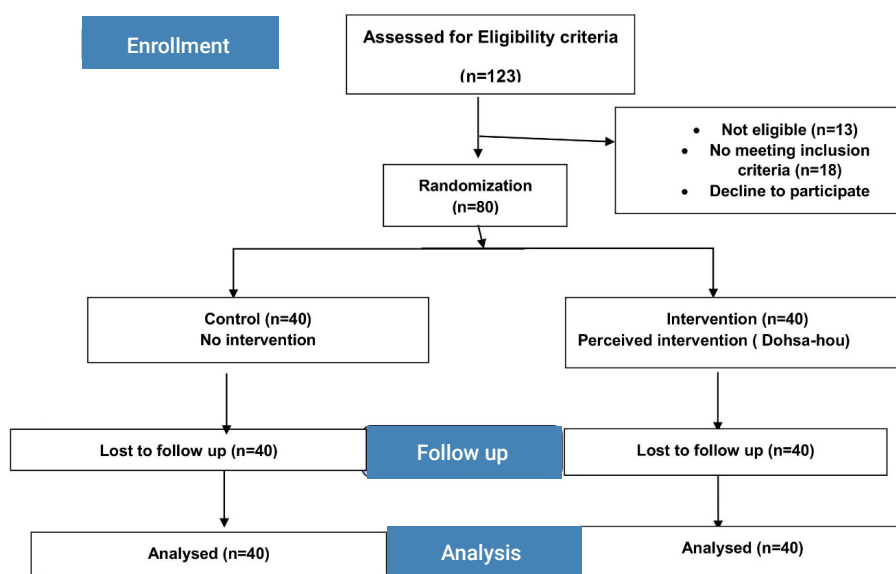


Figure 1. Consort diagram of Dohsa-hou treatment

Intervention (Dohsa-hou technique)

Patients in the experimental group underwent Dohsa-hou psychomotor relaxation therapy for eleven 45-minute weekly sessions (Table 1). In each session, the first 15 minutes of counseling focused on establishing a relationship with the patient. The next 25 minutes of the session were devoted to Dohsa-hou psychomotor relaxation exercises, and the final 5 minutes was allocated to relaxation. The basic steps (28) of this technique are as follows: (a) Relaxation (relaxing the body and the mind). This step is performed based on “Kukan-no-hineri” techniques; (b) Movements of arms, hands, and legs. This step helps the patient perform basic movements of arms, hands, and legs using a variety of techniques, including the “Ude-age” technique; and (c) The “Tate-kei” technique. “Tate-kei” refers to placing the body in a straight vertical line. By aligning the vertical axis of the body, different parts of the body are placed in a straight line perpendicular to the ground. The Dohsa-hou relaxation was performed in cross-legged sitting, kneeling, half-kneeling, standing, and walking positions.

Before starting treatment, the researcher provided a full explanation of the training to the patients and their families. After the questionnaires were completed by the patients' families

(both experimental and control groups), the intervention group received training for 11 sessions. The control group received the standard treatment. At the end of the sessions, the questionnaires were completed again by the patients' families, and the results were compared with the previous results. Dohsa-hou was provided for the control group during a follow-up period.

Ethical considerations

Patients participated in this study after their parents or legal guardians had voluntarily signed a written informed consent form. It was explained to them that they could withdraw from the study at any time. Additionally, they were assured of the confidentiality of their information and the accuracy and reliability of the information obtained during data collection and analysis. After the explanation of the research objectives and methods, the patients were invited to participate in the study. They were also informed that their participation in the study did not prevent them from receiving routine hospital services. The present study was ethically approved (code: ir.QUMS.REC.1399.048).

Data was analyzed using SPSS version 24. Frequencies, percentages, means, and standard deviations (SD) were used to describe the data.

Table 1. Summary of the Dohsa-hou relaxation sessions

Sessions	Techniques	Duration of movements
Session 1-3	1. Moving the hands up and down in a lying position (Ude-age)	7 min
	2. Moving the shoulders up and down (Kata-age)	7 min
	3. Moving the shoulders and the upper body back and forth in a lying position (Kukan-no-hineri)	7 min
	4. Pulling the shoulders back (Se-so-ra-se)	7 min
Session 4-6	1. Moving the shoulders and the upper body back and forth in a lying position (Kukan-no-hineri)	7 min
	2. Pulling the shoulders back (Se-so-ra-se)	7 min
	3. Moving the shoulders up and down (Kata-age)	7 min
	4. Moving the hands up and down in a lying position (Ude-age)	7 min
Session 7-9	1. Moving the shoulders and the upper body back and forth in a lying position (Kukan-no-hineri)	7 min
	2. Standing on two knees and moving the hips (Hizatachi)	7 min
	3. Standing on one knee and moving the hips (Kata-hizatachi)	7 min
Session 10-11	4. Opening and closing the chest and shoulders (Mune-hiraki)	7 min
	1. Pulling the upper body forward, with the sides in a sitting position (Zai)	7 min
	2. Kneeling and moving the hips (Hizatachi)	7 min
	3. Taking a knee and moving the hips (Kata-hizatachi)	7 min
	4. Opening and closing the chest and shoulders (Mune-hiraki)	7 min

Data were analyzed using the Mann-Whitney U test, Fisher's exact test, the independent t-test, the paired t-test, the chi-square test, and ANOVA. Statistical significance was set at $p < 0.05$.

RESULTS

Out of 123 children who were initially contacted, 80 children agreed to participate in the study and were assigned to one of two groups, either intervention or control. The patients were examined regarding quantitative and qualitative demographic variables, including age, gender, living status, place of residence, medication use, family history of mental illness, duration of hospitalization, frequency of hospitalization, and type of disease. Some variables such as marital status, education level, occupational status, and income level referred to the parents. (Table 2). There were no significant differences between the two groups in terms of these variables ($p > 0.05$).

Children's hyperactivity decreased statistically significantly more in the intervention group than in the control group, and this difference was

statistically significant, also the results showed demonstrating that the Dohsa-hou method resulted in a significant decrease in the attention disorder of the children in the intervention group (Table 3).

DISCUSSION

The findings of the present study regarding the effect of Dohsa-hou treatment on hyperactivity and attention deficit in 6- to 12-year-old children and adolescents who had been referred to a clinic are consistent with the findings of a study by Yazdkhasti and Shabazi, which investigated the effect of Dohsa-hou treatment on reducing ADHD symptoms and increasing social skills in 6- to 12-year-old students with ADHD (29). The present study results demonstrated that using mental rehabilitation and building will-power in children with ADHD can decrease their hyperactivity and attention-deficit symptoms. These findings are comparable to a study by Adachi that showed Dohsa-hou decreases situational anxiety and improves cognitive task per-

Table 2. Demographic characteristics of children in the study

	Control (n = 40) n (%)	Intervention (n = 40) n (%)	Total (N = 80) N (%)	p-value
Age (years), mean±SD	8.68±2.28	9.10±2.07	8.88±2.17	0.386
ADHD diagnosis time (year), mean±SD	3.4±1.83	4.6±2.59	4±2.31	0.019
Gender				0.809
Male	12 (30.0)	13 (32.5)	25 (31.3)	
Female	28 (70.0)	27 (67.5)	55 (68.8)	
Grade				0.292
Pre-school	8 (20.0)	5 (12.5)	13 (16.3)	
Grade 1	8 (20.0)	5 (12.5)	13 (16.3)	
Grade 2	5 (12.5)	7 (17.5)	12 (15.0)	
Grade 3	5 (12.5)	4 (10.0)	9 (11.3)	
Grade 4	3 (7.5)	10 (25.0)	13 (16.3)	
Grade 5	3 (7.5)	5 (12.5)	8 (10.0)	
Grade 6	8 (20.0)	4 (10.0)	12 (15.0)	
Family birth order				0.335
1	20 (50.0)	27 (67.5)	47 (58.8)	
2	15 (37.5)	10 (25.0)	25 (31.3)	
3	4 (10.0)	3 (7.5)	7 (8.8)	
4	1 (2.5)	0 (0.0)	1 (1.3)	
Family history of hyperactivity				0.809
No	27 (67.5)	28 (70.0)	55 (68.8)	
Yes	13 (32.5)	12 (30.0)	25 (31.3)	
Medication use				0.060
No	9 (22.5)	3 (7.5)	12 (15.0)	
Yes	31 (77.5)	37 (92.5)	68 (85.0)	

ADHD, Attention-deficit/hyperactivity disorder

Table 3. Comparison of mean attention deficit and hyperactivity disorder between the intervention and control groups

	Control (n = 40) Mean±SD	Intervention (n = 40) Mean±SD	p-value ^a	p-value ^b
Children's mean hyperactivity score before the intervention	73.18±27.62	90.15±21.75	0.003	< 0.001
Children's mean hyperactivity score after the intervention	51.35±27.31	18.58±16.87	< 0.001	
Children's attention deficit score before the intervention	76.78±18.28	87.45±15.77	0.007	< 0.001
Children's attention deficit score after the intervention	64.43±18.83	38.35±14.68	> 0.001	

^aIndependent t-test, ^bRepeated measurement

formance (30). Although more studies are needed in this area, families and special education experts are recommended to use this method to improve the social interactions and hyperactivity symptoms of these children. In terms of subject matter, both the Adachi study and the present study investigated the effect of the Dohsa-hou technique on ADHD in students. In both studies, psycho-physical tension was minimized by Dohsa-hou, especially the relaxation techniques. This demonstrates that self-control over the movement of one's body is directly related to one's self-control over the mind (28).

Dohsa-hou helped patients recognize their emotions and moods and made them calm and stable. By learning to control their emotional arousal and expression, patients were able to communicate with others (24).

Dehkordi et al. explained that changes were evident in body posture and in efforts to use and control the body (19). Based on the Ohno and Dadkhah assessment, communication, attention, concentration, and body awareness problems improved in children after treatment (23). Dohsa-hou promotes emotional stability and increases social activity. When we want to move our body, our physical perception takes place according to our intention and will. This process of mental movement is aimed at matching the movement pattern of the body with the movement pattern of the will. This is the process of self-regulation of a person's movements by himself (31).

After Dohsa-hou training, parents' knowledge of ADHD and about their child's disorder and behavioral problems significantly increased (32); in other words, the parents' increased under-

standing of ADHD lead to changes in their attitude. Through Dohsa-hou training, the parents learned to associate their children's behaviors to ADHD and not consider them to be intentional.

Additionally, Nejatifar and Babarabi investigated the effect of the Dohsa-hou technique and showed that the technique, as a psychological rehabilitation treatment, was effective in improving the quality of life of children with cerebral palsy (33). Using this method, the child increases their ability to control their movements, and, as a result, their self-confidence also increases. Reducing impulsivity and increasing attention leads to an increase in law-abidingness, a decrease in aggression, an increase in the desire to communicate as well as improved social skills and social adequacy.

Based on current findings, it can be stated that the Dohsa-hou technique, a Japanese psychological rehabilitation method, is highly effective for the treatment of hyperactivity. In spite of various sociocultural characteristics specific to Iranian society, this method can be applied to motivate researchers to perform clinical activities on different disorders, as it has no cultural bias. This technique can reduce sympathetic activities and stress, which subsequently activates the parasympathetic system in individuals with ADHD (34).

Recently, the Dohsa-hou technique has been applied as a complementary approach, because it improves the attention and effort of ADHD patients to relax their body, making them more conscious of their body and helping them understand it better. With Dohsa-hou exercises, a person does purposeful activities and performs specific movement patterns. During exercises, ADHD patients begin to understand their body

and feel their body movements. These exercises focus on the person's feeling of actual movement, their mental image of their body, their experience of the environment and the outside world, and their feeling of presence and being, all of which are essential in psychotherapy (35).

Based on the results of this study, our research hypothesis was confirmed and the effects of Dohsa-hou technique on the target variables were found to be significant. The Dohsa-hou technique can lead to significantly increased attention in children with ADHD. Dohsa-hou training increases the person's attention control and consciousness of the body's senses. The therapist, through verbal encouragement that complements the Dohsa-hou treatment process, constantly gives feedback to children and encourages and motivates them to persevere and perform their activities, increasing their concentration on the activities.

Konno believed that the Dohsa-hou technique stabilizes patients emotionally and increases their social activities (36). In these exercises, physical contact and modeling improve the patients' concentration, eye contact, attention, and body awareness, change their behavioral patterns, build willpower, increase effort and activity in line with the process (effort, willpower, and movement), improve self-awareness and social relationships, and help the patients cope with different situations. The Dohsa-hou technique can also significantly decrease hyperactivity in children with ADHD.

The effect of the Dohsa-hou technique on hyperactivity has not yet been adequately investigated in children. However, it can be argued that when a person aims to move his/her body, the physical perception depends on his/her intention and willpower; if the effort made is adequate for moving the body, the desired movement is perceived and takes place. It is a purposeful mental process which matches a known motor pattern in the body with a voluntary motor pattern; this refers to the self-regulation of body movements (self-governance). As a result of self-regulation of body movements, the person develops the ability to control sudden motor movements and stop emotional outbursts (37). In the Dohsa-hou technique, change of breathing pattern into a calmer and more controlled one can neutralize

the attention deficit response by creating a relaxed state in the individual. It also allows the person to focus on the body and breathing rather than thinking negative thoughts (21).

The Dohsa-hou technique influences the level of effort in individuals, and to complete the learning process, their motivation needs to increase. Self-management skills help children with disabilities to establish social interactions because with the Dohsa-hou technique children feel in control of their body and physical activities, as a result of which their confidence and social relationships increase. Moreover, increased confidence due to changes in the child's body image increases their tendency to communicate with others. In other words, by decreasing impulsivity and increasing attention through Dohsa-hou exercises, the child's agreeability is increased, while their aggression is decreased due to increased relaxation. In addition, the children with ADHD gain an increased tendency to communicate with others, express emotions, and control impulses. Dohsa-hou exercises increase their peer communication and improve their social competence. Dohsa-hou as a form of psychological rehabilitation can be used as a complementary approach alongside other therapeutic methods. Therefore, application of this useful and non-pharmacological method is recommended for children with ADHD; however, additional studies are recommended to determine its effectiveness in different age groups and patients with other disorders.

A limitation of this study was the limited age range of patients due to hospital conditions which influenced the generalizability of our findings. Therefore, further research is suggested on a larger sample size and without any age restrictions. It is also suggested to consider long-term follow-ups in subsequent studies, as that can help understanding of the long-term effects of treatment in patients.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interest.

AUTHOR CONTRIBUTIONS

M.A.: conceptualization, formal analysis, investigation, methodology, resources, writing—original draft; R.Z.: conceptualization, formal analysis, funding acquisition, Investigation, methodology, project administration, resources, supervision, validation, writing—original draft, writing—review & editing; B.R.: conceptualization, methodology, resources, validation; A.J.: conceptualization, data curation, formal analysis, methodology, resources, software, supervision, validation.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

INSTITUTIONAL REVIEW BOARD STATEMENT,

The study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. All procedures performed in studies involving human participants were approved by QUMS ethic committee (ir.QUMS.REC.1399.048).

INFORMED CONSENT

Informed consent was obtained from all individual participants included in the study

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