


Effectiveness of super brain yoga for children with hyperactivity disorder

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Abstract

Purpose: This study aimed at determining the effectiveness of super brain yoga for children with hyperactivity disorder.

Design and method: This quasiexperimental and interventional research was conducted on 80 school-age children through a pretest–posttest design.

Results: Results showed that there was a significant difference between the means of severity of hyperactivity disorder before (75.1) and after the intervention (63.5) ($p < .001$).

Practice implications: Practicing super brain yoga reduced the symptoms of hyperactivity disorder among the school-age children.

KEYWORDS

children, hyperactivity disorder, super brain yoga

1 | INTRODUCTION

Attention deficit/hyperactivity disorder (ADHD) is the most prevalent neurobehavioral disorder among children.^{1,2} Boys are two to nine times more likely than girls to develop ADHD.^{3,4} The peak incidence for this disorder is between 6 and 12 years when establishing a strong educational foundation in children is critical to their long-term success.^{5,6} Children with ADHD also suffer from higher levels of temper-tantrums, tics, and problems with family and peer relationships. If the condition remains untreated, it can continue into adulthood and prevent the person from achieving their maximum potential.^{7,8} There are different reports on ADHD incidence rates. For example, Kaplan and Sadock reported that over 50% of the visits to children's psychiatric outpatient clinics and 3–5% of the school-age children include the children with ADHD.^{1,3} Also, Pineda,⁹ Biederman,¹⁰ and Catherine¹¹ have reported the general incidence rate of this disorder as 16.4%, 8–10%, and 6.5%, respectively. Similarly, multiple studies have been conducted on this issue in Iran, all representing the relatively high prevalence of this disorder in school-age and preschool children. Among them, there are studies of Ali Shahi et al.,¹² Moayedli et al.,¹³ Salehi et al.,¹⁴ and Akhavan Karbasi et al.,¹⁵ which reported a general incidence rate of this disorder as 5.8%, 9.5%, 2.3–3.5%, and 16.3%, respectively.

ADHD is of three main types, that is, inattentive, hyperactive/impulsive, and combined types. To diagnose all the three types, the

symptoms must be present at least for 6 months. (a) inattentive type: presence of ≥ 6 symptoms of inattention, (b) hyperactive/impulsive: presence of ≥ 6 symptoms of hyperactivity, (c) combined type: presence of ≥ 6 symptoms of both inattention and hyperactivity.^{1,2,7} The etiology of this disorder is multifactorial. Besides the undeniable role of genetic factors causing this disorder, cigarette smoking and alcohol use during pregnancy, exposure to environmental toxins such as lead after the birth, and deficiencies of iron and some micronutrients are considered as other causes of this disorder. Regardless of the cause of the disorder, children with ADHD are at high risk of poor school performance, behavioral problems (particularly in interpersonal relationships with family members and peers),^{8,16,17} low self-confidence, substance abuse, misdemeanors, accidents, asthma, and mental disorders.^{8,18} Children with ADHD are generally affected by other psychiatric disorders (learning disabilities, anxiety disorders, depression, and conduct disorders) as well.^{1,8,16} Therefore, if not being diagnosed and treated, this disorder has irreversible consequences for the individual's occupational and educational future and causes many problems for the people related to the patients including their family members, schoolmates, etc.^{1,8,19} Using the common drugs for controlling the disorder has been limited due to the parents' anxiety about dependency of their children to these drugs and their side effects. Expected side effects of methylphenidate include loss of appetite, sleep disorders, weight loss, restlessness, tics, nervousness, lethargy, dizziness, dry mouth, and liver damage. Using complementary

treatment has been the consistent opinion of scientists. Complementary therapies have been seen as a new way to treat ADHD.^{8,16} In this regard, treatment purposes focus on controlling and improving undesired behaviors, enhancing concentration and relaxing for reducing stress and anxiety.^{17,20} Yoga as a branch of complementary medicine can be effective in getting access to treatment purposes in these patients. Flexibility and self-controlling are among the lessons of yoga. This complementary therapy generally can reduce anxiety,²¹ increase tranquility, and treat high tensions.^{17,22} Yoga as therapy uses physical postures (*āsanas*), breathing exercises (*Prāṅyāma*), and meditation techniques.¹⁷ The goal of these components is to connect the breathing, thoughts, emotions, and body into awareness of the present moment. The studies reviewed showed a significant decrease among the children practicing yoga in a variety of measures such as negative stress response behaviors, total mood disturbance, negative affect, anger, resilience, and fatigue/inertia.^{1,17} Yoga changes the physiology of the body through respiratory manipulation (breathing techniques), postures, and cognitive control (relaxation and meditation). Neurotransmitter dysfunction in ADHD is indicated in several studies, and the use of yoga reduces this dysfunction.²³ According to the studies, yoga is an intrusive treatment technique that needs no special technology and equipment, no particular time and place to practice; as a result, the final cost of treatment is reduced and more importantly, the independence of the patients is preserved. One type of yoga is called super brain yoga. Kok Sui²⁴ explained that in super brain, the main centers of energy are actually the main acupuncture points.²⁴ The center of crown energy is located at the crown of the head and has the task of controlling and energizing the brain. The energy center for sex is located in the coccyx area. It controls the energy of the gonads and gives them energy. Base energy center is a dynamic activity center. This energy center is the center of action and operation. If this center of energy is imbalanced, it will be very active and energetic. By transferring the energy of the base energy centers and the sex center to the energy center of the crown, energy is transferred from the lower centers to the upper centers. This technique can be used to improve the condition of patients with mental illness or diseases of the brain and nervous system.²⁴ In addition to improving ADHD symptoms, a family treatment approach for children with ADHD in the form of *Sahaj yoga* meditation made parents feel happier, less stressed, and better able to manage their child's behavior, thereby improving the quality of child–parent relationship.¹⁷ Given the high prevalence of this disorder and the challenging consequences that are imposed by this disorder on the patient's occupational, educational, and social future, extensive research on improving the treatment of the disease is necessary. Therefore, the researchers were aimed at investigating the effectiveness of super brain yoga therapy for symptoms of ADHD in primary school children.

2 | METHODOLOGY

This study started by acquiring a letter of introduction from Research and Technology, Vice-Presidency elsewhere, acquiring the permission

for research in the outpatient clinic, and selecting the patients. The present study is a quasiexperimental research. All the patients visiting outpatient clinic of Amir Kabir Hospital and Imam Reza Clinic, Arak, Iran, who were qualified in terms of the research criteria were selected through purposive sampling.

2.1 | Inclusion criteria

- being in the age range of 6–13 years;
- diagnosed with ADHD;
- having no history of taking psychiatric medicines except drugs for ADHD;
- being content to participate in the study;
- having no history of acute physical diseases;
- having no history of other psychiatric disorders.

2.2 | Exclusion criteria

- Practicing the exercises during 1month irregularly (exercises should be done regularly and daily);
- Being unwilling to continue the research.

2.3 | Ethical considerations

This research proposal was approved by the Research Council elsewhere in terms of ethical considerations. The subjects (parents) were informed about the purpose and method of the study. They were assured that they could withdraw from the study at any time without being penalized. Lastly, written informed consent was obtained from the nurses who willingly declared their participation in the study.

After selecting the subjects (children/parents) and taking their consent for participation, written informed consent forms were completed by the parents. Tools for gathering information included two questionnaires. The first one was a questionnaire of demographic information of the patients containing 13 questions (age, sex, place of residence, number of children in the family, mother's job, history of ADHD in the family, history of taking sedatives, and the type of ADHD), which was completed by the subjects (parents) before the intervention.

The second questionnaire was Conners' Parents Rating Scale (CPRS) for investigating the behavioral improvement rate of the patients including 48 questions. CPRS includes five items (conduct, psychosomatic, impulsive, hyperactive, anxiety, and learning difficulties) each providing four options for which scores vary from 0 (*never*) to 3 (*always*). In this way, the lowest attainable score throughout this questionnaire is 0 and the highest is 144. In the study of Khooshabi et al. in Iran²⁵ on 2,667 girls and boys of 7–12 years of age, correlation of each question with the whole test and also test validity was evaluated using Pearson's correlation coefficient and Cronbach's alpha ($\alpha = 0.93$). Mean and standard deviation scores were obtained as 21.42 and 16.38 for CPRS. Given the mean and standard deviation, the highest score a child without any behavioral problem may obtain is $21.42 + 16.38 = 38$. Therefore, obtaining the score higher than 38 represents ADHD, otherwise the presence of this disorder is rejected

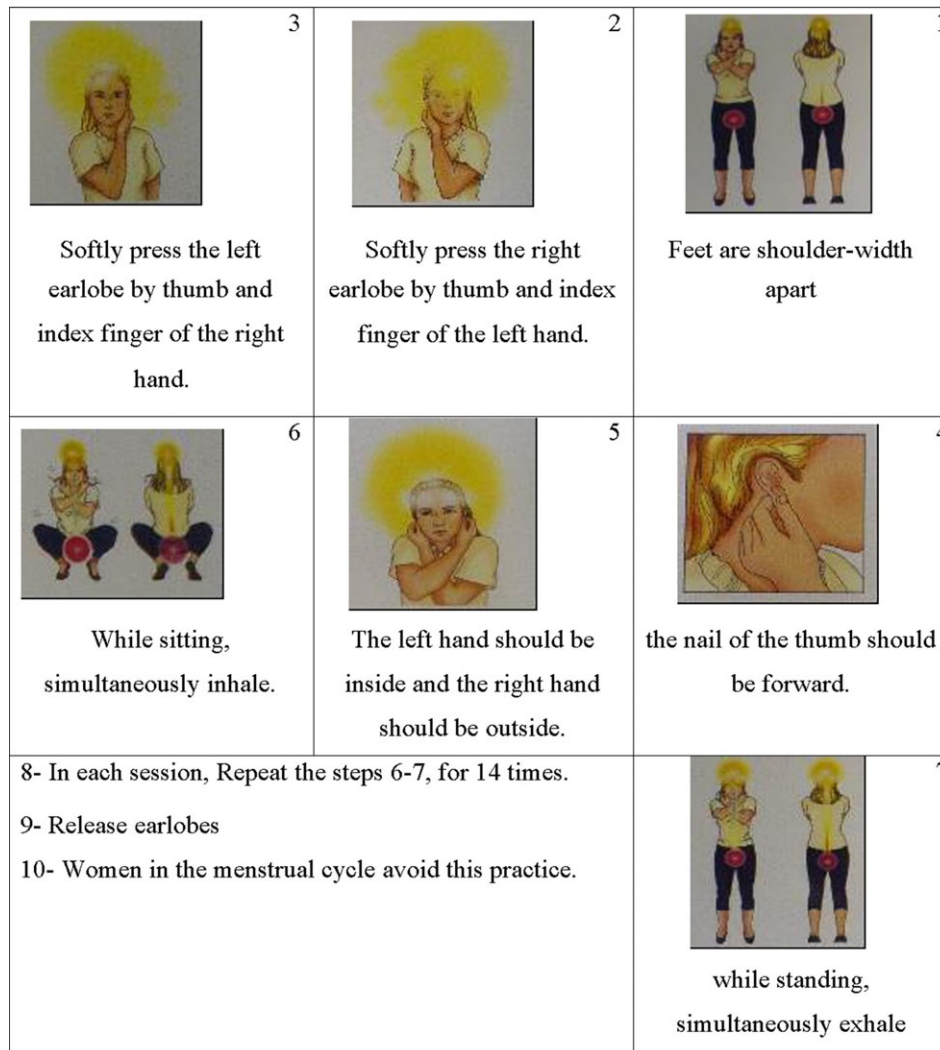


FIGURE 1 Procedure of super brain yoga [Color figure can be viewed at wileyonlinelibrary.com]

(doctors also base their final diagnosis on this criterion). High score shows that the disorder is severe and low score shows it is mild.

Validity and reliability of this scale have been reported in various studies in different countries. Goyette, Conners, and Ulrich reported the internal correlation as 0.41–0.57. This questionnaire has been standardized by Conners et al. in 1999 and its validity has been reported as 0.85 by the Institute of Cognitive Sciences.²⁶ Among the various scales for measuring the behavior of children, this questionnaire has been widely used in the world because of its characteristics. Completing this questionnaire takes 10–15 minutes. To determine the reliability of CPRS for ADHD (which has different dimensions and is based on Likert scale), internal validity was used. To this aim, the questionnaire was completed by 10 children with ADHD similar to the subjects (other than the groups participating in this study) in a cross-sectional study. Then, $\alpha = 0.75$ was obtained by Cronbach's alpha test.

In the pretest, the researcher's partner (a pediatric psychiatrist) filled Conners' ADHD questionnaire for all the children participating in the study. After the final diagnosis of ADHD and considering the inclusion criteria by the researcher's partner, CPRS was completed in the beginning of the study.

In the Amir Kabir Hospital and Imam Reza Clinic, super brain yoga was theoretically and practically taught by the researcher's partner (who was experienced in teaching this type of yoga) both to the children and their parents. After the training, the parents were provided with a pamphlet explaining the steps of performing super brain yoga. Then, the children practiced the exercises at home daily for 2 minutes for a month. To ensure the regular daily practice of these exercises, the researcher's partner followed the course of action by making phone calls to the subjects once a week.

Teaching of super brain yoga included the following steps:

- Stand facing the east;
- Stick your tongue to the roof of your mouth;
- Softly press the right earlobe by the thumb and index finger of the left hand and left earlobe by the thumb and index finger of the right hand;
- The left hand should be inside and the right hand should be outside;
- While sitting, simultaneously inhale and while standing, simultaneously exhale;
- Repeat the last step for 14 times²⁴ (Figure 1).

TABLE 1 Absolute and relative frequency distribution of individual characteristics of the subjects

Individual characteristics		Frequency	%
Sex	Male	40	50
	Female	40	50
Age	6–8	31	41.2
	9–13	47	58.8
Place of residence	City	69	86.2
	Village	11	13.8
Number of the children in the family	1	6	7.5
	2	45	56.2
	3	21	26.2
	4	5	6.2
	5	3	3.8
Mother's job	Employee	12	15
	Housewife	67	83.8
	Self-employed	1	1.2
History of hyperactivity disorder in the family	Yes	8	10
	No	72	90
History of mental disorder in parents	Yes	1	1.2
	No	79	98.8
History of taking sedatives by the child	Yes	8	10
	No	72	90
The child's ADHD type	Hyperactivity	80	100

After practicing the exercises of super brain yoga, CPRS for ADHD questionnaire was completed again by the children 1 month after the starting the intervention. Then, the obtained data were analyzed by SPSS v.20 using descriptive statistics and paired *t*-test at a significance level of $p < .05$.

3 | RESULTS

The results show that the children participating in this research were 50% girls and 50% boys. The majority of children (58.8%) were in the age range of 9–13 years and the average age of the children was $9/3 \pm 1/6$ years. Most of the children (86.2%) live in the city and were in a family with two children (56.2%). Mothers of 83.8% of the children were housewives. Ninety percent of the children had no history of ADHD in their families and 98.8% had no history of mental disorders in their parents. Ninety percent of the children did not take sedatives. The type of the disorder of 100% of the children was hyperactivity (Table 1).

The results showed that the mean of severity of ADHD symptoms in the subjects was 75.1 ± 10.4 and 63.5 ± 10.7 before and after the intervention, respectively. The result of paired *t*-test showed that there was a significant difference between the mean of severity of ADHD symptoms before and after the intervention ($p \leq .001$) (Table 2). The lower

TABLE 2 Mean and standard deviation of the severity of hyperactivity symptoms of the subjects before and after the intervention

Variable	Before		After	
	Mean	SD	Mean	SD
Hyperactive children	75.1	10.4	63.5	10.7
Paired <i>t</i> -test	$p \leq .001$			

the score of the child in the pretest, the higher was the rate of improvement.

The results showed that improvement in behavioral symptoms of children with ADHD mentioned by their parents after the intervention was observed in dimensions of psychosomatic problems, conduct problems, and hyperactive/impulsive in order of priority (Table 3).

4 | DISCUSSION

In the present study, the effect of super brain yoga on the symptoms of ADHD was investigated. The results of this research showed that the mean of severity of ADHD symptoms was 75.1 in school-age children before the intervention. Hariprasad et al. reported that yoga training for therapy is feasible and can be used as an add-on therapy for ADHD.^{8,17} The study of Ali Shahi et al.¹² showed that about 5.8% of the students are affected by ADHD. Given the relatively high prevalence of ADHD in primary-school students and its adverse consequences, it is recommended that some programs for identification and early treatment of this disorder are provided so that the mental health of this group of students will be enhanced.¹² As the results of this study showed, the mean of severity of ADHD symptoms in school-age children was 63.5 after the intervention. It has been significantly reduced after the intervention compared to before the intervention. The results show that 4 weeks of super brain yoga exercise has a significant effect on behavioral symptoms of ADHD and a significant difference was observed between the mean of severity of ADHD symptoms in the children in the pretest and that in the posttest ($p \leq .001$).

Harrison et al.²⁷ in their study showed that there were improvements in children's ADHD behavior, self-esteem, and relationship quality. Children described benefits at home (better sleep patterns, less anxiety) and at school (more able to concentrate, less conflicts).^{8,23,27} Similarly, the study of Chang confirmed the significant effect of one session of intense aerobic exercises on the ADHD symptoms.²⁸ Based on the results of Nazer et al.²⁹ sport treatment or play therapy was considered effective as a complementary or alternative therapy for the children with ADHD.²⁹ Galantino et al.³⁰ stated that yoga is effective on the physiological condition of children in the process of rehabilitation; it improves their concentration power, enables them to employ their energy for doing purposeful activities, induces feeling of relaxation in them, and strengthens their memory.³⁰ In their study, Omid et al. concluded that yoga leads to improvements in educational achievement of the students.³¹

The results of this pilot study demonstrate that a 6-week peer-mediated multimodal behavioral program that included yoga and

TABLE 3 Frequency distribution of the subjects by the order of priority in terms of improvement before and after the intervention

Serial number	Question	Always (3)		Often (2)		Sometimes (1)		Never (0)		Score	Difference	Rank
		Before	After	Before	After	Before	After	Before	After			
1	Nausea and/or vomiting	50	10	30	0	0	1	0	69	210	179	1
										31		
2	Feels cheated in family circle	43	10	35	0	0	0	2	70	199	169	2
										30		
3	Bowel problems	78	13	2	3	0	65	0	0	238	130	3
										108		
4	Impolite to grown-ups	38	0	30	5	9	53	3	22	183	120	4
										63		
5	Steals	61	23	15	4	2	43	2	10	215	95	5
										120		
6	Pains and aches	59	32	5	5	16	6	0	37	203	91	6
										112		
7	Wants to run things	34	8	27	26	18	46	1	0	174	52	7
										122		
8	Quarrelsome	31	16	38	39	11	3	0	22	180	51	8
										129		
9	Basically an unhappy child	52	32	18	10	0	27	10	11	192	49	9
										143		
10	Picks at things	45	35	28	13	7	19	0	13	198	48	10
										150		

The score of each factor is calculated as follows:

Sum of (frequency of each response times response coefficient) = score

Example for question number 1: (3 × 45) + (2 × 28) + (1 × 7) + (0 × 0) = 198

The scores before and after the intervention are subtracted from each other to obtain the difference and the more the difference between the scores before and after the intervention in a question, the better the effect of that item on the child.

meditation can lead to measurable benefits in children with ADHD. More than 50% of the children improved their academic and behavioral performance. The improvement did not really vary by age, gender, or type of diagnosed ADHD.^{7,23}

Also, the results of the present study show that priority in terms of improvement in behavioral symptoms of the children with ADHD mentioned by the parents after the intervention was in with the dimensions of psychosomatic problems (nausea or vomiting, bowel problems, and pains and aches), conduct problems (impolite to grownups, wants to be run things), and hyperactive/impulsive behavior (picks at things like nails, fingers, hair, or clothing).

Therefore, given the past research and the results of the present study, it seems that yoga is a collection of physical positioning, controlled breathing, and relaxation exercises.³² Individuals free distracting thoughts through concentration. In this way, they take control of their own brain and internal secretions and hormones by their bodies.³³ Yoga slowly guides unhealthy and disordered rhythms of body organisms toward simple and natural rhythms in a systematic route³⁴ and creates the required coordination between the nervous system and glands of internal secretion. Finally, this coordination directly influences internal systems and organs.³⁵ In addition, yoga is effective for regulating life power (*Prana*) in the body and main acupuncture points.³³ In ADHD, a large amount of energy has been

blocked in lower energy centers or the main acupuncture points which inhibits sending enough energy to the brain. By doing super brain yoga, the energy of lower parts flows toward the upper parts and nourishes the brain. This practice sends energy to upper centers as well and makes concentration and thinking easier. Also, super brain yoga has a relaxing effect.²⁴ The person's responsibility for his own health is a necessary part of every change program. In fact, the key point of super brain yoga exercises is the patients' participation in his treatment. In sum, the results of this research showed that super brain yoga, even in a short time, caused improvements in behavioral symptoms of ADHD in primary-school children. This study was conducted following a pretest–posttest design and without a control group due to possible sample dropout, nonresponse, or withdrawal. This was one of the limitations of the present study. The study was double-blind to avoid biased information. Collecting the questionnaires was performed by the researcher's partner and the statistician was not aware of the groups and the data were analyzed as the variables of x_1, x_2 .

5 | CONCLUSION

The results of the present study showed that super brain yoga exercises reduced the symptoms of ADHD in school-age children.

Therefore, it is suggested that super brain yoga is considered as a complementary therapy along with the medical treatment for primary-school children and be taught to the children with ADHD and their parents for doing these exercises at home. Given the limitation of the present study as absence of the control group, it is recommended to conduct controlled clinical trial studies and do exercises in a longer period of time for the children with ADHD at other ages in future studies in order to determine the effectiveness of this practice more certainly.

ACKNOWLEDGMENT

The authors would like to thank all the children and their parents who participated in this study. Also, they would like to express their deepest appreciation to the Research and Technology, Vice-Presidency, and Nursing and Midwifery Department elsewhere for their support and guidance for approving and funding this research, and also the managers of Imam Reza and Amir Kabir Clinics who cooperated in conducting this research.

CONFLICT OF INTEREST STATEMENT

The authors report no actual or potential conflicts of interest.

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How to cite this article: Farahani PV, Hekmatpou D, Khonsari AH, Gholami M. Effectiveness of super brain yoga for children with hyperactivity disorder. *Perspect Psychiatr Care*. 2018;1–7. <https://doi.org/10.1111/ppc.12266>