

# The Effect of Foot Massage by Mother on the Severity of Attention-Deficit Hyperactivity Disorder Symptoms in Children Aged 6–12

## Abstract

**Background:** Various pharmacological and non-pharmacological approaches have been proposed to control the symptoms of Attention-Deficit Hyperactivity Disorder (ADHD). The aim of this study was to investigate the effect of foot massage by a mother on the severity of ADHD symptoms in children. **Materials and Methods:** This study was a randomized controlled trial conducted on 56 children who referred to psychiatric clinics affiliated to Isfahan University of Medical Sciences in Iran, 2018. The subjects were randomly divided into two groups of intervention and control. In the intervention group, after giving massage therapy training to the mother, the mother massaged her child's foot three times a week for 1 month. The data were collected using the ADHD questionnaire. Data were analyzed using inferential and descriptive statistics (independent *t*-test, paired *t*-test, Mann-Whitney test, and Chi-square test). **Results:** Comparison of the mean score of ADHD symptoms, after the intervention, showed a significant difference between the two groups in terms of the dimensions of the memory and attention deficit ( $t_{47} = 3.42, p = 0.001$ ), lack of responsibility and organization ( $t_{47} = 7.16, p < 0.001$ ), lack of cooperation with others ( $t_{47} = 5.23, p < 0.001$ ), and the total score of symptom severity ( $t_{47} = 3.78, p < 0.001$ ). **Conclusions:** Massage therapy is affordable and low-cost care that together with pharmacotherapy programs can reduce some symptoms of ADHD.

**Keywords:** Attention deficit disorder with hyperactivity, child, Iran, massage, mothers

## Introduction

Attention-Deficit Hyperactivity Disorder (ADHD) is one of the most prevalent disorders in children and adolescents. While the global prevalence of this disorder in children and adolescents is 5–7%,<sup>[1]</sup> it has a prevalence of 8% in Iran.<sup>[2]</sup> The three main symptoms of this disorder are attention-deficit (short attention), hyperactivity (restlessness, the difficulty of sitting in one place), and impulsivity (doing things before thinking, poor planning, and a low tolerance for failure).<sup>[1]</sup> Another important symptom of ADHD is a deficit in problem-solving and decision-making.<sup>[3]</sup> This disorder, which affects cognitive and behavioral function,<sup>[4]</sup> can be found in boys 2–9 times more than girls.<sup>[1]</sup> These children are usually bullies and have social communication problems with their peers.<sup>[5]</sup> Additionally, dealing with these children is a stressful factor for families. The inattention of such a child to the orders causes the mother to become distressed and, consequently, the relationship between the

child and the mother is disrupted.<sup>[6]</sup> Mothers of these children are usually responsible for the behavior of their children. They blame themselves and, because of being rejected, maybe socially isolated.<sup>[7]</sup>

Research on the treatment of ADHD has shown that behavioral therapy, together with pharmacotherapy, is effective in the treatment of this disease.<sup>[8]</sup> However, pharmacotherapy is not useful for all children, and it is difficult for parents to participate in therapeutic activities continually. Moreover, parents complain that although pharmacotherapy improves their children's educational performance as well as their attention and motor behavior, the children still have problems in performing their tasks and correcting inappropriate behaviors.<sup>[9]</sup>

Studies have shown recently that interest in using complementary and alternative medicine, beside pharmacotherapy, has increased among the public as well as among health care staff all around the

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world.<sup>[10]</sup> In Western societies, physicians introduce a large number of patients to professional massagers and believe that massage can be used as a complementary therapy.<sup>[11]</sup> Massage is defined as a set of regular movements applied to the soft tissues of the body for achieving some specific purposes. Massage reduces anxiety and pain, contributes to the improvement of blood circulation,<sup>[12]</sup> increases blood flow to the arteries and veins, increases serotonin and dopamine, reduces cortisol, inhibits the mechanism of pain, treats insomnia, and makes one feel relaxed.<sup>[13]</sup> The results of the study conducted by Cutshall (2010) showed the effectiveness of massage on postoperative pain in patients with heart surgery.<sup>[14]</sup> In addition to the abovementioned things, the use of atraumatic treatment and care is essential for children, and the nurse plays an important role in preventing and reducing the incidence of injury by providing proper counseling and education to parents.<sup>[15]</sup> On the other hand, most families tend to take part in caring programs for their children and find an effective factor in their recovery, which confirms the need for family-based care.<sup>[16]</sup> Although many studies have investigated the treatment of children with ADHD, little attention has been paid to effective non-pharmacological approaches in resolving these problems. Accordingly, this study was designed and conducted to answer the question that whether or not foot massage by mother has an effect on the symptoms of ADHD in children with this disorder.

## Materials and Methods

This research was a randomized controlled trial (IRCT20181224042090N1) conducted between November and December of 2018. The sample of the study consisted of 56 ADHD children who had the inclusion criteria and referred to psychiatric clinics affiliated to Isfahan University of Medical Sciences [Figure 1]. The sample size was determined by the expert of statistics. The confidence coefficient of  $Z_1$  was 0.95, that is, 1.96; power factor of  $Z_2$  was 0.80, that is, 0.84; and  $S$  was the minimum estimation of standard deviation for each variable that was considered to be 7 based on similar studies, and  $d = 5.50$  which was the minimum mean difference for each of the variables between the two groups. Considering the probable drop in the samples, the sample size was 56 subjects (28 subjects in each group). Inclusion criteria were aged between 6 and 12 years old; at least 6 months have passed from the diagnosis of the disease; no other psychiatric illness; having the inclination to participate in the study and to be randomly assigned to the two groups of the study; no simultaneous participation in another similar study; no specific problem such as fracture, infection, ulcers, and any other problem that prevent full access to the legs. Exclusion criteria were the lack of willingness to continue participation in the research and the use of other non-pharmacological treatments. Sampling and determination of inclusion and exclusion criteria were done

by the research team. The convenience sampling method was used and the samples were randomly divided into the intervention ( $n = 28$ ) and the control ( $n = 28$ ) groups.

Randomization was performed secretly in the clinic. To this end, the researcher prepared a list of the patients supported by the clinic and those who were eligible to enter the research, and assigned a number to each patient's clinic file. Each number was written on a piece of paper and all papers were mixed in a container. The first randomly selected number among the numbers was assigned to the intervention group and the next to the control group. As such the patients were alternately assigned to the intervention and control group. The study was single-blind and none of the subjects knew to which group they would be assigned.

During a session, the foot massage was taught to the mothers of the intervention group, and a video file was given to them showing how to massage. The type of massage used in this study was Swedish massage that the researcher trained and obtained its license. Among different types of massages, Swedish massage is generally relaxing and is used mostly as a basic massage.<sup>[17]</sup> Massage is applied to different parts of the body. As there are many nerve branches in the legs, the whole body can be affected when the legs are massaged. Accordingly, many massage therapists focus on foot massage when they do not have enough time to massage all parts of the body.<sup>[18]</sup> The mothers were also trained by the researcher to do this massage. Then, they performed the massage in the presence of the researcher so that she can confirm it. The massage was performed by the mother during a 1-month period between November and December, 3 days a week and every other day (on odd days); the total number of massage sessions was 12 and each session took 10 min which was performed 1 h before the child's bedtime. Sweet almond oil was given to mothers to be used for the massage. Vegetable oils such as sweet almond oil help skin care and facilitate the contact between the massager hand and the patient's body.<sup>[19]</sup> The control group used only their previous treatments and did not receive any intervention. The questionnaires were completed by the mothers of the two groups both before and after the intervention. After the intervention, a video film of the massage was also given to the mothers of the control group.

The tool used in this study was the ADHD questionnaire. ADHD questionnaire was developed by Karim Savari (2012) in Iran.<sup>[20]</sup> To make this questionnaire, an initial version of it was prepared and, then, some parents and teachers of the children with ADHD answered the questionnaire. The validity and reliability of this questionnaire were assessed by Savari himself using factor analysis and Cronbach's Alpha, respectively. Finally, the analyses showed that the 35-item form of the questionnaire with five subscales had appropriate validity and reliability.

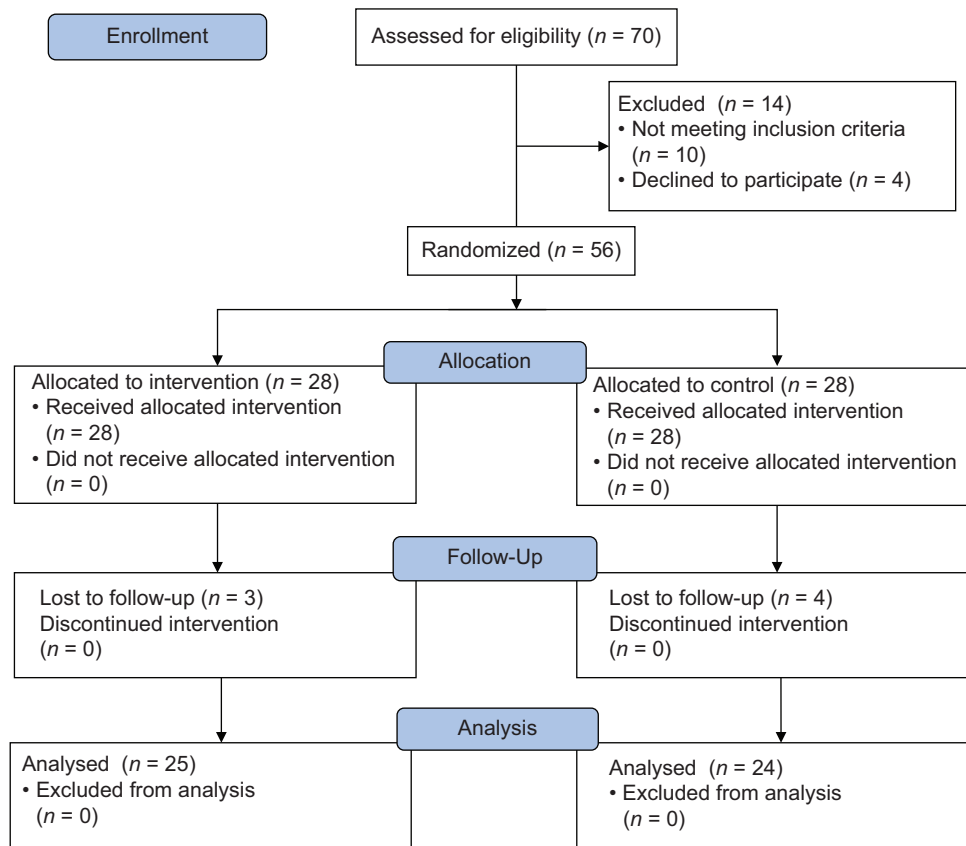


Figure 1: CONSORT flow diagram of the participants

These five subscales included memory and attention deficits, responsibility and organization, untargeted movements, cooperation with others, and impulsivity. The minimum and maximum scores were 35 and 140, respectively. While 35 was indicative of low ADHD symptoms, 140 suggested a high level of these symptoms. The reliability of the questionnaire, as mentioned above, was checked using Cronbach's  $\alpha = 0.70$  obtained for the whole scale.<sup>[20]</sup> After completing all questionnaires, the obtained data were analyzed using SPSS software version 18 (SPSS18, Inc, USA). An independent  $t$ -test was used to compare the mean severity score of children with ADHD before and after the intervention between the two groups. A paired  $t$ -test was used to compare the mean score of severity of ADHD symptoms before and after the intervention in both groups. Independent  $t$ -test was used to determine and compare the mean of the changes in the severity of the symptoms of ADHD both before and after the intervention between the two groups.

### Ethical considerations

Obtaining informed consent from the mothers and explaining the aim and the method of the study to the mothers and children and giving them the right to leave the study at any desirable time were the most important ethical considerations in the present study. This study was approved by Isfahan University of Medical Sciences

with the ethical approval code of IR.MUI.RESEARCH.REC.1397.305.

### Results

The mean (SD) age of the children was 8.76 (1.81) in the intervention group and 8.46 (1.67) in the control group. The mean (SD) age of the mothers was 35.48 (6.14) in the intervention group and 34.26 (5.60) in the control group. In the intervention group, 32% of the children were female and 68% were male; in the control group, 25% were female and 75% were male. 40% of the children of the intervention group and 41.70% of the control group were first-grade students which were the highest frequency in the two groups. The highest percentage of the children's birth rate belonged to the first-child children in the intervention group (52%) and the second-child children of the control group (50%). The highest level of education among the mothers was academic education that 36% of mothers of the intervention group and 29.2% mothers of the control group had academic education. Based on the results, there was no significant difference between the two groups in terms of demographic characteristics ( $p > 0.05$ ).

Results also showed that the mean score of severity of ADHD symptoms in the dimensions of untargeted movements and impulsivity was not significantly different before and after the intervention ( $p > 0.001$ ). However, in the intervention

group, the mean score of the severity of ADHD symptoms in the dimensions of memory and attention deficit, lack of responsibility and organization, and lack of cooperation with others after the intervention was significantly lower than before the intervention ( $p < 0.001$ ) [Table 1]. Paired  $t$ -test showed that the mean score of the severity of ADHD symptoms and its dimensions in the control group were not significantly different before and after the intervention ( $p > 0.001$ ) [Table 2]. However, after the intervention, the mean score of ADHD symptoms in the dimensions of memory and attention deficit disorder ( $t_{47} = 3.42$ ,  $p = 0.001$ ), lack of responsibility and organization ( $t_{47} = 7.16$ ,  $p < 0.001$ ), lack of cooperation with others ( $t_{47} = 5.23$ ,  $p < 0.001$ ), as well as the total score of the severity of symptoms ( $t_{47} = 3.78$ ,  $p < 0.001$ ) were significantly lower in the intervention group than the control group [Table 3].

## Discussion

The results showed that after the intervention, the mean total score of the severity of ADHD symptoms and the mean score of the dimensions such as lack of cooperation with others, lack of responsibility and organization, and memory and attention deficits in the intervention group were significantly lower than the control group ( $p < 0.001$ ). The research conducted by Jalali *et al.* (2014) showed the effect of an exercise program in reducing the symptoms of ADHD in children.<sup>[21]</sup> In the present study, it was shown that foot massage was effective in reducing symptoms of deficit attention but had no positive effect on impulsivity. It seems that the activity of all muscles during exercise together with the duration of exercise time is an effective factor in

reducing impulsivity symptoms. In the study conducted by Kangarlou *et al.* (2012), behavioral problems (hyperactivity and attention deficit) of children suffering from ADHD were reduced in the intervention group through training the families.<sup>[22]</sup> Therefore, the intervention and participation of parents, either through some care programs or through control and management of behavior, can be effective in reducing the symptoms of children with ADHD. Investigating the effect of massage on the level of anxiety before invasive procedures in 7–11-years-old children, the study of Sadat Hoseini *et al.* (2011) showed that massage reduces the anxiety of children before invasive procedures.<sup>[23]</sup> In a study conducted by Chen *et al.* (2018), it was found that massage can positively affect ADHD symptoms, improve social behaviors, and reduce anxiety in children with this disorder.<sup>[24]</sup> Since massage can effectively reduce anxiety, anxiety reduction, in turn, may be effective in the reduction of other symptoms. The present study also showed that the reduction of some symptoms such as lack of cooperation with others, lack of responsibility and organization, and memory and attention deficit can be effective in changing the social behaviors of these children. Examining the effect of foot reflexotherapy on ADHD symptoms and enuresis nocturia in children with ADHD. Senol and Menizibeya (2018) showed that foot reflexotherapy improved children's behaviors, attention, and impulsivity, as well as nocturia in these children.<sup>[25]</sup>

Nowadays, complementary medicine simply provides nurses with the opportunity of taking full care of their patients. Identifying the use of complementary and alternative medicine in patients and providing them with the information they need, nurses can be strongly

**Table 1: Comparison of the mean total score of severity of ADHD\* and its dimensions in the intervention group before and after the intervention**

Dimensions	Before intervention	df	After intervention	Paired $t$ -test	
	Mean (SD)		Mean (SD)	$t$	$p$
Memory and attention deficit	22.14 (3.27)	24	17.74 (3.92)	9.77	<0.001
Lack of responsibility and organization	22.76 (2.62)	24	18.88 (2.12)	14.43	<0.001
Untargeted movements	15.52 (4.001)	24	14.56 (3.32)	1.60	0.12
Lack of cooperation with others	11.84 (2.03)	24	8.93 (1.81)	11	<0.001
Impulsivity	8.04 (1.90)	24	7.68 (2.08)	1.40	0.17
Total score	80.30 (10.92)	24	69.79 (10.63)	11.93	<0.001

\*Attention-deficit hyperactivity disorder

**Table 2: Comparison of the mean total score of severity of ADHD and its dimensions in the control group before and after the intervention**

Dimensions	Before intervention	df	After intervention	Paired $t$ -test	
	Mean (SD)		Mean (SD)	$t$	$p$
Memory and attention deficit	21.47 (2.85)	23	21.09 (2.82)	0.89	0.38
Lack of responsibility and organization	23.08 (1.82)	23	22.69 (1.54)	0.93	0.36
Untargeted movements	15.08 (3.27)	23	14.83 (3.25)	0.50	0.62
Lack of cooperation with others	11.46 (1.56)	23	11.50 (1.61)	0.20	0.85
Impulsivity	7.79 (1.61)	23	7.38 (1.17)	1.24	0.23
Total score	78.88 (8.06)	23	77.48 (6.79)	1.25	0.22

**Table 3: Comparison of the mean total score of severity of ADHD symptoms and its dimensions after the intervention between two groups**

Dimensions	Before intervention	df	After intervention	Paired <i>t</i> -test	
	Mean (SD)		Mean (SD)	<i>t</i>	<i>p</i>
Memory and attention deficit	17.74 (3.92)	47	21.09 (2.82)	3.42	0.001
Lack of responsibility and organization	18.88 (2.12)	47	22.69 (1.54)	7.16	<0.001
Untargeted movements	14.56 (3.32)	47	14.83 (3.25)	0.29	0.77
Lack of cooperation with others	8.93 (1.81)	47	11.50 (1.61)	5.23	<0.001
Impulsivity	7.68 (2.08)	47	7.38 (1.17)	0.64	0.53
Total score	69.79 (10.63)	47	77.48 (6.79)	3.78	<0.001

influential in achieving care and treatment goals.<sup>[26]</sup> The short duration of the follow-up was among the limitations of this research. Therefore, it is recommended that future researchers conduct their follow-ups 6 months and 1 year after the intervention.

### Conclusion

The results of this study showed that foot massage performed by the mother can be used as a useful non-pharmacological treatment. Massage can help improve the memory and attention of these children. It is also helpful in terms of cooperation and accountability in these children's relationships with others. Additionally, family-based care interventions not only contribute to the family's ability and, thus, reduce their anxiety and concern but also make the child more acceptable and engaging.

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### Conflicts of interest

Nothing to declare.

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