

# Educational Intervention for Increasing Teachers' ADHD Knowledge, Attitude, and Behavior

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## Research article

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# Abstract

**Background:** this study evaluated the effect of an educational intervention for increasing elementary school teachers' ADHD knowledge, attitudes, and behavior.

**Method:** Teachers from 12 schools who had at least one students with a definitive diagnosis of ADHD participated in the study and were allocated into either an intervention (n=31) or control group (n=27). Teachers' ADHD knowledge, Attitude, and Behavior were assessed before and after intervention. Six-session participatory intervention were provided only for the intervention group.

**Results:** Two mounts after the intervention, the intervention group scored significantly higher on all three outcomes ( $P \leq 0.001$ ).

**Conclusion:** The educational intervention significantly improved teachers', knowledge, attitudes as well as their behaviors and strategies to manage children with ADHD. It is recommended that this program will incorporate into in-service training courses for primary school teachers as a means of facilitating teaching and managing children with ADHD in class.

**Trial registration:** The study was approved by the by the Research Deputy of Isfahan University of Medical Sciences. In addition, The Ethical Committee of Isfahan University of Medical Sciences approved the study proposal. (ID code: IR.MUI.RESEARCH.REC.1398.297). The required permission from Education Department of Isfahan City was attained. Participation in the study was voluntary. Before taking part in the study, selected teachers provided written consent also study goals were described to them.

## Background:

Attention Deficit Disorder with Hyperactivity (ADHD) is one of the important problems of the fields of psychiatry and education. defining as a neurodevelopmental disorder, it progresses with hyperactivity, lack of attention, and impulsivity(1). Based on DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, 5th edition) hyperactivity/impulsivity and/or lack of attention in adolescents and children must be at least six of the nine problematic behaviors in a child confirmed by a mental health professional in multiple settings (at least two different social settings). In addition that symptoms last in an unsuited style with developmental level for at least 6 months, compromise functionality and that ADHD symptoms begin before the age of 12 so that a diagnosis can be made (2).

Numerous studies throughout the world indicate that the prevalence of ADHD is increasing significantly over the past two decades (3–6). According to a population-based survey among 30,532 children and adolescents between 6 and 18 years in Iran, the prevalence of ADHD was 4%, with more prevalence among boys (5.2% vs. 2.7%)(7).

ADHD symptoms adversely affect cognitive, emotional, behavioral, social, and academic, functioning of the children(6). Various studies have reported that most of the children with ADHD experience different behavioral and social problems at home and school(8) such as anxiety disorder(9), the likelihood of being rejected by their friends and peers(10), the problems of the evolution of identity and social

communication(11). This disorder not only adversely affects the different aspects of the functioning of the individual but also affects the members of the family and society(12).

Despite the fact that the early diagnosis and stable treatment are very critical, literature search indicates that ADHD is not early diagnosed among children until they started their studying life due to lack of parents and teacher knowledge' about the serious consequences of this disorder(13). Therefore, elementary school teacher is considered as a unique person for the early diagnosis and effective management of ADHD(14).

The elementary school teacher is most often the first one who notice the hyperactivity or inattentive behaviors in the classroom and should be able to manage them and to do a right action, for example, make a referral for accurate assessment for ADHD(15). Elementary school teachers play an important role in the assessment of children's behavioral and academic problems due to their extensive interaction with children in a variety of unstructured and structured settings(16). Also, they play an crucial role in the implementation, support and assessment of recommended treatment plan for affected children (14). Furthermore, elementary school teachers make recommendations, inappropriate or appropriate, about ADHD to the parents, who tend to follow such recommendations(17).

When children with ADHD present in class with their peers and friends, their teachers face numerous challenges (4, 18, 19). Therefore, elementary school teachers need efficient knowledge about problems and special needs of the children with ADHD and they have to plan effective behavior management strategies in dealing with those children(16). Nonetheless, findings from earlier researches indicate that elementary school teachers may be inadequately prepared to support children with ADHD effectively, because of low knowledge about this disorder as well as negative attitude and misconceptions towards affected children due to limited training (14, 19–21).

The results of a study by Amidi showed that teachers' knowledge regarding the ADHD symptoms was better than their knowledge of the etiology of ADHD as well as the methods of treatment and consequences of ADHD. In addition, some of the teachers had misconceptions about this disorder, for example, agreed with punitive laws for these students (12).

Evidence-based researches indicated that teachers with prior ADHD training have significantly higher knowledge and fewer negative attitude and misconceptions towards affected children compared with teachers without training(21).

Considering the importance of improving teacher's awareness, understanding, and modifying their negative attitudes towards ADHD, this study was designed to assess the effect of an ADHD educational intervention on the knowledge, attitudes, and behavior of elementary school teachers in Isfahan, Iran. To the authors' knowledge, only a small number of studies focused on evaluating the effect of teacher's education on ADHD among teachers in Iran. The current study aimed to determine the following question and hypothesis:

Research Question: Can educational intervention increase teachers' ADHD knowledge, attitudes, and behavior?

It was hypothesized that the intervention would increase teachers' ADHD knowledge, attitudes, and behavior.

## Methods:

### Design

This quasi-experimental study with a randomized control group before and after was conducted in Isfahan province of Iran, in the autumn of 2019. Fifty-four primary school teachers (n = 31) in intervention group and (n = 27) in control group take part in this research.

### Participants

In this research, we used a multi-stage sampling method. Initially, we randomly selected one of the five Education Offices in Isfahan (Office 3); then, 12 elementary schools were chosen randomly from the list of the elementary schools in that area (six public primary and six private schools). Three public and three private primary schools were randomly assigned as the intervention group and three public and three private primary schools as the control group.

In selected schools in both groups, all students with a definitive diagnosis of ADHD based on their medical records were identified and their teachers were invited to participate in the study. Those teachers (71 teachers) were evaluated for inclusion criteria. Finally, based on inclusion criteria the eligible teachers (58 teachers) participated in the study as intervention (n = 31) or control (n = 27) groups.

To participate in this study, teachers required to meet the following inclusion criteria: (a) being willing to participate, (b) having at least two years' work experience as a schoolteacher. They were excluded from the study if they dropped more than one session of training.

### Procedure

Participation in the study was voluntary. Before taking part in the study, selected teachers provided written consent also study goals were described to them. Eligible teachers in selected schools (in both groups) attended a single assessment session of 30 minutes to complete the assessment tools before the intervention. The training sessions were provided only for the teachers in intervention group. After 2 months, participants in both groups completed the questionnaires again.

### Measures

Developing by researchers, a self-reported questionnaire was used to data collection. This questionnaire was developed based on a review of the literature to assess teachers' knowledge, attitudes, and behaviors to support children with ADHD (8, 12, 14, 15, 18, 19). An expert's panel who were selected based on their qualifications and experience in health education, psychology, and ADHD determined the face validity and content validity of the questionnaires. The review of the expert's comments led to minor modifications in the wording of several items. In addition, the expert panel indicated that the means CVI (item relevance) for the questionnaires and its subscales were acceptable. Finally, the questionnaire was tested in a classroom setting with 10 elementary school teachers to assess the difficulty and degree of comprehension of the questionnaire. This tool had two main parts:

1- The demographic information checklist included age, years of experience as a primary school teacher, level of education, marital status, attending any training workshop about ADHD.

2- The Teacher's ADHD Knowledge, Attitude, and Behavior Scale. This scale consists of 36 items and 3 subscales. Using 12 items, the first subscale measured the teacher's general Knowledge related to ADHD. The answers were designated as "true", "false", or "don't know". Correct answers were designated as a '2', incorrect answers were designated as a '0' and don't know responses were designated as a '1'. Examples of questions are as follows: Attention Deficit Disorder only improves with medication. Children diagnosed with ADHD usually behave thoughtlessly. The correct answers were summed into a knowledge score where higher scores indicate better knowledge of ADHD (range 0–36,  $\alpha = 0.89$ ).

Using 12 items, the second subscale assessed teachers' beliefs and attitudes about ADHD, scored on a 3-point Likert-type scale (disagree = 1, no idea = 2, and agree = 3).

The answers were summed to make an ADHD attitude score where higher scores indicate a more positive attitude (range 12–36,  $\alpha = 0.94$ ). Examples of questions are as follows: I think it takes more time for students diagnosed with ADHD to do their classroom exercises. I think students diagnosed with ADHD need more support than their peers need.

The third subscale consisted of 12 items to investigate teachers' behaviors and strategies to manage children with ADHD in the classroom. At the beginning of the subscale, the teachers were given a short scenario, which displayed the typical behavioral problem of a student suffering from ADHD in regular classrooms. Each item asks them strategies commonly recommended for use with students with ADHD. For example, reinforcement, organizing classroom/curriculum, negative consequences, emotional support, and planned ignoring. Teachers indicated their responses to items using a 4-point Likert-type scale ranging from 1 "never" to 4 "most of the time". The answers were summed to create a behavior score where higher scores indicate more support and better behaviors and strategies to manage children with ADHD. (range 12–48,  $\alpha = 0.95$ ).

## **Intervention:**

Based on an extensive review of relevant literature, the intervention was developed as a six-session training only for the teachers in the intervention group. The Classroom Accommodations for Children with ADHD (22) was chosen by researchers as an intervention design framework.

The Skilled and trained educator in the field of ADHD delivered every session. Every session ran for 45 minutes to 1 hour (including a 10-min break) and it was presented in lecture format. In addition, role-playing, and active participation in-group discussion were used as supportive activities in the intervention.

The participants were encouraged to contribute their comments and questions during the presentation. In each session, two trained facilitators encouraged teachers to explore, discuss, and practice learned managing strategies. By engaging in-group work, teachers had the best opportunity to listen, pay attention to others' experiences, and share similar teaching and managing experiences with each other. They could

modify approaches to their class situations and achieve confirmation and support, for their individual practices to become more confident and effective. The content of the sessions was as follows:

**Session 1:** the definition of ADHD: ADHD symptoms and diagnosis, ADHD etiology and epidemiology, short term and long term consequences of ADHD, manifestations in the classroom, common treatment strategies.

**Session 2:** the main principles that must be considered for the planning and management of programs for affected students with ADHD

**Session 3:** the main behavior strategies that must be taken by the teacher to increase incentives, for example, increase praise, approval, and appreciation of student's good behavior and work performance.

**Session 4:** self-awareness training, to display student work productivity on a daily chart or graph on the public

**Session 5:** fundamental methods and measures to make rules and time clearer for affected students with ADHD

**Session 6:** The possible punishment methods in case of necessity. Also in last session, a summary of medications used for treatment of ADHD was provided to point out the effect of probably side effects such as stomachaches, insomnia, decreased appetite, growth problems, and irritability.

## Statistical Analysis

Even though the teachers were randomly assigned to the two groups, possible differences could exist between them. Teacher's age and years of experience, student's sex, school type (private or public), level of education, marital status, attending any training workshop about ADHD were compared between the intervention and control groups using descriptive statistics, Chi-square test and independent-sample t-test.

Independent t-tests were applied in both groups to examine the effects of the intervention on knowledge, attitudes as well as behavior before and after the intervention.

Analysis of covariance (ANCOVA) was applied to examine the effect of the educational intervention. The post-intervention scores were set as the dependent variables and the group (two levels: intervention and control group) was set as a fixed factor as well as Pre-intervention scores were set as covariates and controlled for.

Statistical analyses were performed by the 20th version of the Statistical Package for the Social Sciences (SPSS) for Windows, with  $p = .05$  as the significance level.

## Results:

It should be noted that 58 subjects participated in the study and completed baseline measures. Thirty-one teachers in intervention and 27 teachers in the control group. Table 1 summarizes demographic characteristics for the intervention and control groups. No statistically significant differences between the

intervention and control groups could be detected for age, years of experience as a primary school teacher, school type (private or public), level of education, marital status, attending any training about ADHD. All of the teachers in the study were women and almost most of them were married. More than half of the teachers in the study in both groups had attended no prior ADHD training.

In the intervention group, seven teachers excluded because three of them dropped more than one session of training and four teachers were not available for the follow-up measures. Similarly, in the control group, 27 teachers filled the baseline measures while 24 teachers were available for the follow-up measures. In the final analysis, there were 24 teachers as the intervention and 24 teachers as the control group.

Table 1  
Teacher Characteristics

Variables	Intervention group (n = 31)	Control group (n = 27)	t test or $\chi^2$	p
Age, mean (SD)	45.50(6.45)	44.54(5.54)	0.55	0.552
years of teaching, mean (SD)	15.33(9.68)	13.42(10.10)	0.67	0.869
Type of school No (%)				
Public	14(45.1)	12(44.4)	1	0.54
Private	17(54.9)	15(55.6)		
Education No (%)				
Associate's degree	8(25.8)	6(22.2)	1	0.62
Bachelor's degree	14(45.1)	14(51.9)		
Master's degree	9(29.1)	7(25.9)		
Marital status No (%)				
Single	2(6.5)	1(3.7)	1	0.59
Married	29(93.5)	26(96.3)		
Previous training about ADHD No (%)				
Yes	13(41.9)	11(40.7)	1	0.31
No	18(58.1)	16(59.3)		

As shown in Table 2, at baseline, the scores on knowledge, attitude as well as behavior were not significantly different between the two groups. However, two months after the intervention, ANCOVA showed that the intervention group scored significantly higher on all three outcomes ( $P \leq 0.001$ ). The results of the paired t-test showed a significant improvement in knowledge, attitude as well as behavior in the intervention group. However, in the control group, there was no statistically significant pre-to-post improvement on any teacher's measures.

Table 2  
Mean Scores and Standard Deviations Over Time for the Two Groups (Intervention vs. Control).

Variable	Intervention group (n = 24)				Control group (n = 24)				
	Baseline	End	Change	P-value <sup>a</sup>	Baseline	End	Change	P-value <sup>a</sup>	P-value <sup>b</sup>
	M (SD)	M (SD)	M (SD)		M (SD)	M (SD)	M (SD)		
knowledge	26.45 (6.10)	34.45 (6.99)	8 (9.17)	< 0.001	26.22 (6.97)	27.04 (7.26)	0.41 (1.31)	0.135	< 0.001
Attitude	22.79 (8.52)	31.50 (6.10)	8.70 (7.34)	< 0.001	25.12 (7.45)	25.20 (7.39)	0.08 (1.41)	0.775	< 0.001
behavior	25.20 (7.36)	36.58 (7.58)	11.37 (6.90)	< 0.001	24.33 (6.20)	24.04 (6.34)	-0.29 (0.69)	0.051	< 0.001
P-value < 0.05 was significant									
Data reported based on Mean (SD)									
<sup>a</sup> P-value was obtained from paired t-test									
<sup>b</sup> P-value was obtained from ANCOVA adjusted for baseline									

## Discussion:

The purpose of the current study was to evaluate the effects of a six-session participatory ADHD training program in improving elementary school teachers' ADHD knowledge, attitude, and behavior. Despite the busy schedule of teachers in both groups, the response rate was desirable. As expected, in the intervention group teachers and school principals welcomed the program. It can be said that addressing the needs of children with ADHD is one of the educational needs of teachers in Iran.

As predicted, results demonstrate that participants in the intervention group demonstrated a statistically significant increase in ADHD knowledge compared with the control group. This result is supported by numerous previous studies, for example, a similar study in Nigeria showed that brief ADHD training using a standard training package could increase teacher's ADHD knowledge(14). Likewise, an Australian study revealed that brief professional interventions could be utilized to increase teachers' ADHD knowledge(18). In addition, the results of a recently published study in Saudi Arabia showed that teachers' training was effective in promoting teachers' ADHD knowledge (13).

The results also determined that two months after the intervention, compared with the control group, intervention group teachers demonstrated a statistically significant increase in their attitude towards children with ADHD. Consistent with our finding, desirable changes in teachers' attitude toward students with ADHD were

reported after teacher training in previous studies (14, 15, 23). Also contrary to the present study, there was no significant difference between pre/post assessments of teachers' attitudes in a similar study in Saudi Arabia (13).

Researchers reported that teachers' attitudes toward affected children with ADHD might be negative (8). Unaware teachers may describe children with ADHD as less favorably and see their behavior as more disruptive to the classroom(12).

In the present study, teachers had the best opportunity to listen, pay attention to others' experiences, and share similar teaching and managing experiences with each other by engaging in-group work. Hence improving teacher's attitudes towards children with ADHD after educational intervention in this study could be interpreted due to increasing teacher's knowledge and correcting misconceptions about ADHD.

It is obvious that teachers' ADHD knowledge and attitudes influence their behavior in the classroom while working with ADHD students. As we expected the results revealed that after intervention teachers' classroom behavioral management in the intervention group was significantly improved rather than those of the control group.

Similar to our study, changing ADHD behavior management strategies into a more positive one after teacher training programs were reported previously(13).

Improving ADHD behavior management strategies could be interpreted because of increasing teachers' knowledge and self-efficacy. A study in Australia revealed that primary school teachers' ADHD knowledge and self-efficacy increased following the educational intervention (21).

In the present study, participants were encouraged to contribute their comments and questions during each session. In addition, two trained facilitators encouraged them to explore, discuss, and practice learned behavior-managing strategies. They could modify approaches to their class situations and achieve confirmation and support, for their individual practices to become more confident and effective.

As teachers' ADHD knowledge increases, their self- efficacy will improve. As a result, they can develop more self-confidence in their abilities in making necessary changes and better control in classrooms; also use less destructive behavior toward children with ADHD. The relationship between ADHD behavior management strategies and teaching self- efficacy await further support by accurate measures in future research.

The educational intervention based on "The Classroom Accommodations for Children with ADHD" is helpful in improving teachers' understanding of school-age children with ADHD and their abilities in addressing attentional and disruptive behavior problems of children affected with ADHD in the classroom.

It is important that the limitations of this study mentioned. First, all outcome measures relied on the self-report questionnaire, because of the limited resources available. In addition, masking was not possible which means that socially appropriate responding could have contributed to the higher scores among the teachers in the intervention group. Future studies should include observational measures of teachers' behavior in addition to self-report.

Second, the participants were aware of whether they were assigned to the control or intervention group. The higher scores in intervention, but not control group teachers may be a function of their expectation that educational intervention worked. Future studies should control the intervention's attention and maintain the blindness by using a psychological placebo such as a support group.

Third, the teachers were assigned to the control or intervention group at the school level rather than as individuals. The latter would have been ideal but would have been impossible because of the time and resource constraints.

Finally, this study examined only short-term outcomes; as a result, the long-term impact of education is uncertain. The intervention's positive long-lasting effects await further support by long time follow-up measures in future research.

## **Conclusion**

This six-session participatory intervention significantly improved teachers' knowledge, attitudes as well as their behaviors and strategies to manage children with ADHD. Due to the adverse effects of ADHD on the academic achievement, well-being, and social interactions of children, it is recommended that this program will incorporate into in-service training courses for primary school teachers as a means of facilitating teaching and managing children with ADHD in class.

## **Abbreviations:**

ADHD (Attention Deficit Disorder with Hyperactivity)

DSM-5 (Diagnostic and Statistical Manual of Mental Disorders, 5th edition)

## **Declarations**

## **Ethics approval and consent to participate:**

The study was approved by the by the Research Deputy of Isfahan University of Medical Sciences. In addition, The Ethical Committee of Isfahan University of Medical Sciences approved the study proposal. (ID code: IR.MUI.RESEARCH.REC.1398.297). The required permission from Education Department of Isfahan City was attained. Participation in the study was voluntary. Before taking part in the study, selected teachers provided written consent also study goals were described to them.

## **Consent for publication:**

"Not applicable"

## **Availability of data and materials:**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

## Competing interests:

"The authors declare that they have no competing interests"

## Funding:

The Research Deputy of Isfahan University of Medical Sciences provided the sources for this study.

## Authors' contributions:

Maede Hosseinnia and Maryam Amidi Mazaheri performed designing the work. Maede Hosseinnia did acquire the data. Interpreting the data was done by Maede Hosseinnia, Maryam Amidi Mazaheri, Zahra Heidari. Drafting the work/ revising the work critically for intellectual content was performed by Maede Hosseinnia and Maryam Amidi Mazaheri.

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