



Effectiveness of Educating Program on Knowledge, Attitude, and Performance of Primary School Teachers Toward Attention-Deficit/Hyperactivity Disorder

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Abstract

Background: Teachers are regarded to have a key role in the diagnosis, referral, implementation, and follow-up interventions and treatment of children with attention-deficit/hyperactivity disorder (ADHD).

Objectives: The current study aimed to investigate the teachers' knowledge, attitude, and function related to ADHD and evaluate the effectiveness of a training program in this regard.

Methods: This quasi-experimental study was conducted on teachers in the elementary schools of Gorgan, Iran, in 2014. A total of six one-day workshops were held. In each workshop, 24 teachers were trained about ADHD for 4 h. Teachers' knowledge, attitude, and function were assessed before, immediately after the workshops, and 2 weeks later. The data were analyzed using the analysis of variance (ANOVA), repeated-measures ANOVA, and Bonferroni post-hoc test.

Results: The results revealed that older ($P < 0.05$) and more experienced teachers ($P < 0.05$), those working at public schools ($P < 0.001$), and teachers without higher education ($P < 0.05$) had significantly lower levels of knowledge and less positive attitude toward children with ADHD. In addition, differences between the mean scores before and after the intervention for knowledge ($P < 0.001$) and attitude ($P < 0.001$) were statistically significant.

Conclusions: Training teachers could improve the teachers' knowledge and attitude toward ADHD. Workshop education appears to be an effective and efficient training method that can decrease the awareness gap between teachers with different experiences and education levels.

Keywords: Attention-Deficit/Hyperactivity Disorder, Attitude, Knowledge, School Teachers

1. Background

Attention-deficit/hyperactivity disorder (ADHD) has been considered a neurobiological and developmental disability (1, 2) and defined as a persistent pattern of inattention and/or hyperactivity-impulsivity that is more frequent and severe than is typically observed in individuals at a comparable level of development (3). The ADHD is a prevalent childhood behavioral disorder, affecting approximately 5-12% of worldwide primary school-aged children (4, 5), which is close to the rates reported in Iran (6-10).

Children with ADHD have to deal with numerous and constant difficulties at school (11-13). The school environment demands children's attention for a long time and re-

quires them to keep quiet or wait for their turns, which may worsen ADHD behaviors (3). Students with ADHD are rated by teachers as "more disruptive or less socially competent or favorable" (14-16). They have been reported to show lower levels of learning abilities, motor skills, working memories, cognitive functioning, and visuospatial and verbal abilities (17). Their academic performance is characterized by lower achievement, poor grades, and school failure (2, 18).

Since children who have ADHD spend the majority of their time in the school setting (19), teachers have been regarded to play the key role in diagnosis, referral, implementation, follow-up interventions, and ADHD treatment

(20-23). However, there are some concerns about the accuracy of their recognitions and suggestions, as they may confuse ADHD symptoms with other disorders and problems, such as anxiety or psychosocial problems (24, 25). Furthermore, teachers may be reluctant or not accepting to be involved in the implementation of recommended treatments for ADHD (21).

To take appropriate action and help to improve children's performance, teachers need to acquire a proper insight into ADHD. Teachers with greater knowledge and a more positive attitude deal with such students with more self-confidence and willingness. They can effectively manage children's challenging behaviors and improve their educational and social outcomes (26, 27). Teachers who have gained experience in working with ADHD children or already have been trained hold a more inclusive attitude toward their educational needs (28). It has been suggested that the teachers' awareness of ADHD may be associated with medication acceptability and treatment effectiveness for students with ADHD (21).

Available literature about the effectiveness of training teachers in their knowledge, attitude, and performance appears to be inconclusive. Nevertheless, some studies have suggested that educational workshops significantly improve teachers' awareness, attitude, and self-confidence (26, 29, 30). A study observed no strong association between workshop education and teachers' knowledge of potential treatments for ADHD (21). In a comparative study performed on the effectiveness of two methods in changing the knowledge and attitudes of primary school teachers toward ADHD, the findings revealed that workshops were more effective than written training package (31).

There is evidence showing that teachers in Iran have poor knowledge and negative attitude toward ADHD and lack preparation to overcome the challenges of dealing with this group of students (32, 33). Teachers have been reported to have average knowledge of the diagnosis and treatment of ADHD and a neutral attitude toward students with ADHD (27, 30). The increasing need for confident, informed, and capable teachers has encouraged researchers to think about the significance of training and educating teachers through effective interventions.

2. Objectives

This study aimed to investigate the factors related to teachers' knowledge, function, and attitude toward ADHD

and evaluate the effectiveness of an ADHD program intervention in this regard.

3. Methods

The current quasi-experimental study was conducted on teachers in the elementary schools of Gorgan, Iran. The study population included the first-, second-, and third-grade teachers of elementary school. For the determination of the sample size, the confidential interval of 95%, study power of 80%, and sample loss of 10% were assumed in this study. Although 48 teachers were needed, the number of samples was tripled to 144 with respect to the study objectives and need to compare subjects based on education, teaching experience, and type of school.

Multistage sampling was utilized to access the samples. First, elementary schools were divided into four categories, namely boys, girls, public, and private schools. A total of 12 schools from each category and one teacher from each school were randomly selected. At last, 144 teachers from 92 schools attended the designed workshops. A total of six one-day workshops were held. In each workshop, a child psychiatrist trained 24 teachers for 4 h. The content of the training package was well-researched, well-organized, and practical and considered the teachers' level of understanding and education.

The workshops provided information on the definition, symptoms, assessment, treatment strategies, diagnosis, misconceptions, and manner of controlling children. Each workshop was divided into two sessions; in the first part, theoretical debates on ADHD were presented. In the second part, teachers discussed their experiences with students, such as behavioral problems and ways to manage them. The questionnaires of teachers' knowledge, attitude, and function toward ADHD were completed before, immediately after the workshop, and 15 days later.

3.1. Measurement

The following tools were used in this study: (1) A demographic questionnaire included age, gender, teaching experience, and experience of having a student with ADHD; (2) The questionnaire of ADHD knowledge comprises 33 items and 3-response options of right, wrong, and no idea. It covers the text revision of the Diagnostic and Statistical Manual of Mental Disorders-IV criteria, epidemiological disorder, etiology, accompanying disorders, differential diagnosis, and ADHD prognosis. Each right answer was scored +1, and wrong and no idea answers were scored 0;

(3) The questionnaire of attitude toward ADHD included 9 items and 5-response options from strongly agree to strongly disagree; (4) The questionnaire of teachers' functions included 30 items with responses of right, wrong, and no idea. Each right answer was scored +1, and wrong and no idea answers were scored 0. This questionnaire covered teachers' performance and their strategies to manage students with ADHD.

The questionnaires used in this study have been validated by Sarraf et al. (32). In their study, Sarraf et al. assessed the face validity of the scale through consulting with experts on child and adolescent psychiatry, and the content validity was approved after some changes. Cronbach's alpha values for the knowledge, attitude, and function questionnaires were 0.75, 0.79, and 0.71, respectively.

3.2. Data Analysis

The data were analyzed using SPSS software (version 19). The demographic characteristics of the participants were described by frequency and percentage. Analysis of variance (ANOVA) compared the mean and standard deviation of main variables based on demographic factors. The repeated-measures ANOVA was applied to assess the effect of workshops on the teachers' knowledge, attitude, and function. The Bonferroni was used for post-hoc analysis. The level of significance was set at $P < 0.05$.

4. Results

Table 1 tabulates participants' age, education level, teaching experience, and school type. A total of 140 female teachers were eventually evaluated. The majority of teachers in this study were married with children (80.6%) and within the age range of 35 - 50 years (63.4%). Table 1 also shows the mean values of teachers' knowledge, attitude, and function regarding the demographic variables. Overall, the teachers had average knowledge of ADHD prevalence, symptoms, and diagnosis (20.92 ± 4.13). However, the analysis of individual items suggested that two-thirds of teachers (70.2%) did not know that ADHD is not caused by too much sugar and additives in the diet. Only 35.2% knew that ADHD could be a genetic condition. About 80% of teachers believed that if a child plays computer games or watches TV for an hour, they probably do not have ADHD.

Table 1 also shows that younger teachers ($F = 3.79$; $df [2,138]$; $P = 0.02$), teachers without children ($F = 12.90$; $df [1,137]$; $P < 0.001$), teachers at private schools ($F = 34.81$; $df [1,140]$; $P < 0.001$), and teachers with less experience ($F =$

4.10 ; $df [2,139]$; $P = 0.02$) had significantly more positive attitude toward children with ADHD. The mean values of knowledge for teachers in public schools ($F = 5.14$; $df [1,140]$; $P = 0.03$), teachers with diploma ($F = 4.33$; $df [1,140]$; $P = 0.04$), and more experience teachers ($F = 2.88$; $df [2,139]$; $P = 0.05$) were significantly lower. None of contextual factors was significantly related to teachers' functions.

The mean values of knowledge of teachers who acquired their information about ADHD from the media ($F = 7.07$; $df [1,140]$; $P = 0.009$) and their close network ($F = 4.05$; $df [1,140]$; $P = 0.05$) were significantly higher than those reported for other resources. In addition, the mean values of the positive attitude among teachers receiving the information from academic education ($F = 5.82$; $df [1,140]$; $P = 0.02$) and scientific references ($F = 5.48$; $df [1,140]$; $P = 0.02$) were significantly higher than those reported for others.

In Table 2, the Pearson correlation indicates that the teachers' knowledge was significantly associated with the attitude ($r = 0.24$; $P < 0.001$) and function ($r = 0.45$; $P < 0.001$). There was also a significant positive correlation between attitude and function ($r = 0.21$; $P < 0.05$).

The results obtained from the repeated-measures ANOVA indicated that differences between the mean scores before and after the intervention for knowledge ($P < 0.001$), attitude ($P < 0.001$), and function ($P < 0.001$) were statistically significant (Table 3). The results of the Bonferroni post-hoc test showed that the differences between the first and second as well as the first and third assessments remained statistically significant. Although a slight decline was observed from the second time point (i.e., immediately after the intervention) to the third time point (i.e., two-week follow-up) in the mean scores of knowledge (30.23 to 28.71), attitude (50.86 to 48.16), and function (32.50 to 31.40), these differences were not statistically significant ($P > 0.05$), suggesting the lasting effectiveness of the intervention.

5. Discussion

The current study aimed to investigate the effectiveness of a workshop educating program on the knowledge, attitude, and performance of primary school teachers toward ADHD. This study also examined the association between some demographic factors and teachers' knowledge, attitude, and function. It was observed that primary school teachers' knowledge of ADHD was not satisfactory, and there has still been some considerable room for improvement. The results also revealed that younger teach-

Table 1. Descriptive Statistics of Study Variables and Results of One-Way Analysis of Variance Between Demographic Variables and Teachers' Knowledge, Attitude, and Function

Variables	No. (%)	Mean (SD)		
		Knowledge	Attitude	Function
Age (y)				
< 34	30 (21.3)	21.53 (3.46)	45.06 (3.52)	27.80 (3.34)
35 - 49	90 (63.8)	20.87 (4.38)	42.96 (3.39)	27.55 (3.79)
> 50	21 (14.9)	20.23 (5.19)	43.42 (4.58)*	27.52 (3.68)
Education level				
High school diploma	8 (5.6)	17.87 (3.27)	41.87 (3.13)	28.12 (3.13)
Higher education	134 (94.4)	21.10 (4.30)*	43.54 (3.71)	27.58 (3.68)
Having a child				
Yes	112 (80.6)	20.78 (4.47)	42.91 (3.56)	27.66 (3.71)
No	27 (19.4)	21.81 (3.61)	45.66 (3.56)***	27.77 (3.35)
School type				
Public	102 (71.8)	20.39 (4.46)	42.43 (3.43)	27.39 (3.53)
Private	40 (28.2)	22.27 (3.60)*	46.05 (3.02)***	28.17 (3.92)
Teaching experience (y)				
< 10	39 (27.5)	21.76 (3.57)	44.89 (3.67)	28.07 (3.41)
11 - 20	41 (28.9)	21.65 (3.73)	43.04 (3.35)	27.48 (4.03)
> 21	62 (43.7)	19.90 (4.89)*	42.80 (3.72)*	27.40 (3.56)
Information recourse: Media				
Yes	94 (66.2)	19.60 (5.12)	42.33 (3.36)	26.66 (3.62)
No	48 (33.8)	21.59 (4.16)**	43.62 (3.71)	27.80 (3.61)
Information recourse: Social network				
Yes	77 (54.2)	21.58 (3.72)	43.49 (3.77)	27.68 (3.77)
No	65 (45.8)	20.13 (4.83)*	43.40 (3.62)	27.52 (3.53)
Information recourse: Academic education				
Yes	95 (66.9)	21.14 (4.26)	43.96 (3.58)	27.71 (3.61)
No	47 (33.1)	20.46 (4.40)	42.40 (3.72)*	27.40 (3.76)
Information recourse: Scientific references				
Yes	29 (20.4)	21.75 (4.07)	44.86 (4.07)	28.31 (3.74)
No	113 (79.6)	20.70 (4.36)	43.08 (3.51)**	27.43 (3.62)

Abbreviation: SD, standard deviation.

* $P < 0.05$; ** $P < 0.01$; *** $P < 0.001$.

ers (compared to older ones), teachers without children (compared to mothers), teachers at private schools (compared to those of public schools), and teachers with lower teaching experience (compared to experienced ones) had a significantly more positive attitude toward children with ADHD.

Moreover, the mean scores of knowledge of ADHD in the teachers of public schools, teachers with a diploma,

and more experienced teachers were significantly lower, compared to private-school, educated, and less experienced teachers. None of the contextual factors was significantly related to the teachers' functions. These findings are different from the findings of another study performed on primary teachers in Tehran, Iran, observing no association between age, educational level, and educational experiences with teachers' knowledge and attitude toward

Table 2. Descriptive Statistics and Correlations Between Teachers' Knowledge, Attitude, and Function^a

	Mean (SD)	R Pearson	
Knowledge (range: 10 - 28)	20.92 (4.13)	0.24**	0.45***
Attitude (range: 38 - 50)	43.45 (3.59)		0.21*
Function (range: 20 - 34)	27.61 (3.60)		

Abbreviation: SD, standard deviation.

^a*P < 0.05; **P < 0.01; ***P < 0.001.

ADHD (34).

Although some previous studies have indicated that teachers with higher teaching experience perceive themselves as more knowledgeable than less experienced teachers (35), the findings of the present study are consistent with the findings of studies suggesting that younger teachers have more knowledge of the different aspects of ADHD (36, 37). One explanation for these results may be the differences between senior and fresh teachers in using resources to obtain information. In the present study, it was noticed that younger and more educated teachers and private school teachers were more likely to use scientific and professional sources to gain knowledge of ADHD ($P < 0.001$).

There are several reasons for the success of the current intervention. First, the data obtained from before and after the intervention indicated that the workshop was effective in the enhancement of teachers' awareness and attitude. This finding, consistent with the findings of other studies (32, 33, 38), endorses the significance of workshop education effectiveness in increasing teachers' knowledge and change in their attitudes. According to Evans et al. (39) and Sarraf et al. (32), workshop education is an active and efficient training method. Face-to-face communication between trainers and teachers appears to be an effective learning strategy, which contributes to the success of such training programs.

Previous studies have suggested that teachers perceive professional interventions as too time-consuming and prefer those interventions that do not demand a great deal of time (40). To address this preference, the workshop education of the current study presented a wide range of required information in only one day. According to the questionnaires distributed after the intervention, 90% of teachers found the program highly satisfactory. They asserted that their needs in dealing with ADHD students, such as effective communication, behavioral modification, controlling disruptive behaviors, and referral strategies, were met

during this workshop.

The findings of this study suggest that training interventions may bridge the ADHD-related gaps between teachers with different levels of education and experience. As previously mentioned, before the training, the results showed that older, experienced, and less educated teachers reported lower levels of knowledge and positive attitude toward ADHD. However, after the training, ANOVA revealed that the differences in knowledge ($F = 1.872$; $df [2,135]$; $P = 0.15$) and attitude ($F = 2.240$; $df [2,139]$; $P = 0.11$) between teaching experience groups were no longer significant. In addition, the intervention could minimize the differences of diploma and educated teachers' knowledge ($F = 1.622$; $df [1,136]$; $P = 0.21$) and attitude ($F = 2.963$; $df [1,140]$; $P = 0.09$).

The present study has several practical implications. Firstly, due to the prevalence of ADHD in students and with regard to the vital role of teachers in assisting children and their families, educational workshops for teachers may lead to more positive and constructive attitudes toward children with ADHD. Secondly, teachers, similar to the general population, may have some misperceptions about medication treatments for students with ADHD. This attitude can be improved through informative educational programs. Thirdly, greater efforts are needed to provide teachers with valid and scientific resources about ADHD. Particularly, targeted interventions are required for senior teachers whose knowledge might need to be updated.

5.1. Limitations

The current study was based on a short-term investigation which did not allow for further follow-up to the stability of changes, especially in teachers' performance, over time. It was not possible to use a randomized control group design, which may have affected the statistical validity of the present study. Furthermore, this study relied only on quantitative methods in the investigation of teachers' knowledge, attitude, and function. In-depth and qualitative interviews could have provided more accurate information in this regard.

Footnotes

Authors' Contribution: F.D. developed the original idea, analyzed and interpreted the data, and drafted the manuscript. M.A. and M.A.V. contributed to the development of the protocol and data collection. S.A. contributed to the interpretation of the data and revision of the manuscript.

Table 3. Results of Repeated-Measures Analysis of Variance for Mean Scores of Teachers' Knowledge, Attitude, and Function Before Intervention, Immediately After Intervention, and 15 Days After Intervention^a

	Mean (SD)			F	Bonferroni Post-hoc Pairwise Comparisons
	Before Intervention (1)	After Intervention (2)	Follow-Up (3)		
Knowledge	20.92 (4.34)	30.23 (2.26)	28.71 (2.50)	496.28***	(2) and (3) > (1) ***
Attitude	43.45 (3.59)	50.86 (4.24)	48.16 (4.17)	229.43***	(2) and (3) > (1) ***
Function	27.62 (3.62)	32.50 (1.98)	31.40 (2.48)	164.26***	(2) and (3) > (1) ***

Abbreviation: SD, standard deviation.

^a*P < 0.05; **P < 0.01; ***P < 0.001.

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