

## Research Paper:

# Effectiveness of ACT with and without Mindfulness plus Exercises on Spiritual Health in Hemodialysis



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## ABSTRACT

**Background and Objectives:** Spirituality and psychological interventions are effective in promoting mental health and treating patients undergoing hemodialysis. The present study seeks to evaluate the effectiveness of treatment based on acceptance and commitment therapy (ACT) before dialysis, with and without mindfulness exercises during dialysis, on the spiritual health of these patients.

**Methods:** The research design was quasi-experimental with a control group (two experimental groups and one control group) and a two-month follow-up. The study population included all patients on hemodialysis referring to hospitals affiliated to Imam Zaman Hospital in Mashhad City, Iran, from July to December 2020. A total of 60 patients were selected by a purposive sampling method based on the inclusion criteria. Then, they were randomly divided into three groups. The research instrument included a spiritual health questionnaire, and data analysis was performed by repeated-measures analysis of variance.

**Results:** The results showed that both experimental groups of ACT before dialysis ( $P < 0.001$ ), with or without mindfulness plus exercises during dialysis ( $P = 0.004$ ), were effective on spiritual health in patients on hemodialysis.

**Conclusion:** ACT alone as an effective intervention can be used in medical centers to increase the spiritual health of patients on hemodialysis.

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## Introduction

**T**oday, 2% to 3% of the world's population suffers from chronic renal failure. It has a gradual onset and eventually causes irreversible damage to the kidney tissue [1]. The prevalence of chronic renal failure globally is 8%-16% and is increasing, especially in developing countries [2]. One of the alternative therapies for kidney malfunction is hemodialysis, which is a stressful process associated with psychosocial problems [3]. It lowers the quality of life of these patients [4].

On the other hand, spirituality is part of the quality of life [5]. In a broad sense, spirituality is one of the sources of human coping and adapting to problems and even incurable diseases. It can be considered a factor of psychological support in difficult situations [6] by creating hope. Therefore, among the factors affecting mental health, spirituality [7] is essential. Spirituality, with its role in people's health [8], is an essential element of clinical care in patients on hemodialysis [9]. Compromising religious faith in chronic diseases may disrupt adaptation mechanisms, and a spiritual crisis may appear in the individual [10], which in turn can be associated with a decrease in positive therapeutic motivations [11]. Spiritual health includes the two concepts of satisfaction with God and existential wellbeing. It has been scrutinized by researchers in recent decades as a positive psychological construct [12]. Therefore, it is necessary to evaluate the effectiveness of psychological interventions for promoting the spirituality of patients who are mainly suffering from chronic diseases.

Over the past two decades, Acceptance and Commitment Therapy (ACT) and mindfulness-based cognitive therapy, which are different forms of cognitive-behavioral therapy, have developed [13]. ACT focuses on accepting unpleasant thoughts and feelings and clarifying values and goals, and committing them [14]. ACT is effective in addressing a wide range of psychological problems [15] and promoting spirituality [16-18]. However, in these studies, the target population was not patients on hemodialysis.

On the other hand, mindfulness in the ACT is a kind of specific, purposeful attention in the present time and without judgment [19]. Although in the ACT, people must accept their experiences without judgment and be actively involved in the values of their life and practice them, mindfulness interventions revolve around identifying and reinforcing positive experiences [20]. However, studies have also shown the effect of mindfulness in re-

ducing psychological symptoms [21] in patients, such as those with chronic renal failure [22-25]. In addition to the effectiveness of psychological interventions, exercise is also effective in recovering dialysis patients [26]. Therefore, it seems that synchronizing sports exercises with mindfulness improves people's performance [27]. Thus, in the present study, mindfulness and exercises were used alongside ACT. In general, due to the independent effects of each intervention of ACT and mindfulness plus exercise, the present study compares the effectiveness of ACT with and without mindfulness exercise in a specific group of patients. In this multidimensional research, we seek to determine the effectiveness of treatment based on ACT before dialysis, with and without mindfulness exercises during dialysis in two separate experimental groups to measure their effect on spiritual health.

## Methods

The present study is a quasi-experimental with pretest-posttest design, a control group, and a 2-month follow-up period. The statistical population included all patients on hemodialysis covered by Imam Zaman Hospital in Mashhad City, Iran, from July to December 2020. They were undergoing dialysis three sessions a week. In the present study, the code of ethics was obtained from the University of Medical Sciences of South Khorasan Province (IR.BUMS.REC.1399.116) and the code of clinical trial (IRCT20200604047657N1). According to Stevens Table [28] for reviewing and comparing the three groups, considering the minimum test power of 78%, the average effect size of 0.4, and the probability of error of 0.05, 20 people were considered for each group. They were randomly assigned to three groups. By targeted sampling method, 60 people were selected based on the inclusion criteria and randomly divided into three groups (two experimental and one control group). The first group received ACT before dialysis and exercise combined with mindfulness exercises during dialysis. The second group received ACT before dialysis, and the third group was the control without receiving an intervention.

It should be noted that the interventions of the two experimental groups lasted five weeks and then, a follow-up period was performed for all three groups after two months. The procedure was conducted in the first experimental group in 5 weeks, two sessions per week, and each session for 40 minutes. ACT was performed for 10 sessions on odd days. Besides, mindfulness training was also presented for 10 sessions (two sessions per week) 20 minutes before dialysis. Overall, each session lasted 60 minutes (40 minutes of acceptance and commitment intervention and 20 minutes of training mindfulness techniques). Also,

during dialysis, lower extremity exercises were performed for 10 sessions (two sessions per week for five weeks) with the performance of previously trained mindfulness techniques. In the second experimental group, who received only the ACT intervention, this intervention was performed in 5 weeks, two sessions a week on even days, for 10 sessions, and each session lasted 60 minutes. It is noteworthy that in this group, patients did not perform mindfulness plus exercises during dialysis and were only on dialysis. On the whole, both groups were homogeneous in the number of sessions per week and the duration of each session, and the beginning and end of interventions. Also, the participants in both groups received interventions on different days and were not in contact with each other. The statistical analyst also did not know how the groups were doing and the type of interventions.

The control group did not receive training and, of course, at the end of the training pamphlet, they received self-care behaviors, mindfulness, and exercise to observe ethical considerations. It should be noted that after the initial selection of the samples based on the inclusion and exclusion criteria, they were homogenized into groups based on education and employment. After classifying patients based on variables, each person from each class was randomly placed in a group. According to the experts, the type of dialysis membrane was constant for all patients at the study time, and flux types were selected. Besides, the size of the membranes, the circumference of the device, and the blood flow of the patients were kept constant during dialysis. The inclusion criteria included having efficient arterial and venous fistula; completing the consent form; showing physical ability in the walking test; having at least a diploma; being between 20 and 60 years old; being on hemodialysis for 6 months; not participating in concurrent other psychological courses; lacking experience of kidney transplantation, chemotherapy or radiotherapy, lung disease; needing for oxygen; no underlying disease of diabetes and hypertension, history of a heart attack in the last three months; being aware of place and time. The exclusion criteria included hospitalization at the time of intervention, catching infection and foot ulcer, developing high blood pressure of higher than 110/110 and lower than 90 mm Hg, being absent of more than two sessions.

### Acceptance and Commitment Therapy (ACT)

In this study, the ACT protocol [29] in Table 1 was used. The ACT intervention was performed in 10 sessions for 5 weeks (two sessions per week).

### Mindfulness techniques

Mindfulness-based interventions are one of the third generation or third-wave cognitive-behavioral therapies. In the first experimental group, mindfulness exercises were continued for up to 15 sessions equal to dialysis sessions at the time of dialysis. Training of mindfulness techniques of each series was done for 30 minutes before the start of dialysis for 10 sessions and was practiced during dialysis (15 sessions of dialysis). Accordingly, mindfulness was done exercises in 15 sessions during dialysis in the first two hours of dialysis (the first half-hour and the third half-hour of receiving sports intervention with mindfulness techniques and half an hour in the middle of rest). In this study, the mindfulness protocol described in Table 2 was used [30].

### Half-hour limb exercises during dialysis

To improve blood flow to the limbs, especially the lower limbs, and the function of the cardiovascular system, the following exercises were performed three times a week in two short intervals in the first half-hour hour and the third half-hour after dialysis. In the first half-hour hour, there were alternating contraction and expansion of both legs for 10 minutes, then raising and lowering each leg in turn (without bending the knee) for 10 minutes, and finally cycling the legs for 10 minutes. In the third half-hour, the first and second 10 minutes were the same as in the first half-hour, but in the last 10 minutes, the legs were rotated in and out without lifting due to the possibility of eating and preventing pressure on the abdomen. The method of performing the exercise steps was taught to each patient in person and by preparing an educational pamphlet. It should be noted that mindfulness techniques were also performed for the patient at the beginning and during the exercise process. Mindfulness plus exercise intervention continued in 15 sessions for 5 weeks.

### Research tools

#### Spiritual Health Questionnaire (SHQ)

In 1982, Palutzin and Ellison designed the spiritual health questionnaire. It includes 20 questions and two subscales of religious wellbeing and existential wellbeing. The questions are scored on a 6-point Likert scale from “strongly disagree” to “strongly agree”, and a higher score indicates greater spiritual health. In a study, Palutzin and Ellison reported the Cronbach  $\alpha$  coefficient of the whole scale 0.93 [31]. The reliability of this scale was reported by Dehshiri et al. [32] on male and female students through Cronbach  $\alpha$  for the whole scale as 0.90

**Table 1.** Acceptance and commitment-based therapy protocol

Sessions	Subjects, Contents, and Purposes
First	Familiarity of the members with the therapist and each other, explaining the group rules, familiarity, and general description of the therapeutic approach. Homework: list 5 examples of basic problems that patients have encountered in life.
Second	Assessing the task of the previous session, evaluating patients' problems from the ACT perspective (extraction of avoidance experience, mixing, and individual values). Homework: prepare a list of advantages and disadvantages and ways to control problems.
Third	Examining the task of the previous session, specifying the inefficiency of controlling adverse events using metaphors, and teaching the tendency towards negative emotions and experiences. Homework: record the cases in which patients have succeeded in abandoning inefficient control methods.
Fourth	Examining the task of the previous session, teaching the separation of evaluations from personal experiences (bad cup metaphor), and adopting an observational position of thoughts without judgment. Homework: record the cases in which patients have succeeded in observing and not evaluating experiences and emotions.
Fifth	Examining the task of the previous session, relating to the present, and considering oneself as a background (chess page metaphor), teaching mindfulness techniques. Homework: record the cases in which patients can observe thoughts using mindfulness techniques.
Sixth	Assessing the task of the previous session, identifying patients' life values, and measuring values based on their importance. Homework: prepare a list of obstacles to progress in the realization of values.
Seventh	Examining the task of the previous session, presenting practical solutions in removing obstacles while using metaphors and planning for a commitment to pursue values. Homework: a report of the steps to pursue values and think about the achievements of the meetings.
Eighth	Summarize and replicate the concepts explored during the sessions, ask members to tell their achievements to the group, and plan to continue living.
Ninth	Summarize and replicate the concepts explored during the sessions, ask members to tell their achievements to the group, and plan to continue living.
Tenth	Repeating and practicing the tasks of the previous sessions and resolving the ambiguities and possible problems, and evaluating.

**Table 2.** Mindfulness-based protocol

Sessions	Subjects, Contents, and Purposes
First	Automatic guidance: eat a raisin with awareness, meditation, and body inspection
Second	Dealing with meditation barriers: Body examination, ten minutes of mindful breathing, exercises of thoughts and emotions
Third	Mindfulness of breathing (and body in motion): conscious movement, the practice of stretching and breathing, defining the calendar of pleasant experiences, distinguishing thoughts from reality
Fourth	Staying in the present: 5-minute mindfulness of observing or hearing, meditating, mindful walking, cognitive distortions
Fifth	Accept and allow: meditation sitting, awareness of breathing and body, time machine, and examining previous thoughts and predictions
Sixth	Thoughts are not realities: sitting meditation, awareness of breathing and body, distinguishing thought from fact, practicing moods, alternative thoughts, and views
Seventh	How can I take the best care of myself?: meditation sitting; awareness of breathing, body, sounds, thoughts, and emotions; recognizing the connection between activity and mood; creating constructive solutions
Eighth	Apply what you have learned to apply in the future: body meditation, final meditation, overview the most valuable things in your life that practice can help you with?
Ninth	Practice and repeat the protocol steps and monitor their proper implementation
Tenth	Resolve problems and ambiguities of patients in how to implement the protocol

and by the retest method as 0.85. In the present study, the total score was considered. The data of this study were analyzed in two parts: descriptive (demographic data) and inferential. In addition, the Chi-square test and analysis of variance were used to examine the homogeneity of the groups. The statistical method of repeated measures analysis of variance was used to analyze the data using SPSS25. It should be noted that before each analysis, the hypotheses of repeated measures analysis of variance, including Box's M statistic, sphericity hypothesis, and Levene's test, were reviewed and reported.

### Results

Demographic data for age, education, employment, and duration of illness are as follows (Table 3). According to the results of the 1-way analysis of variance, no significant difference was observed between the mean age of the groups (P=0.81). The results of the Chi-square test showed that no significant difference between the groups in terms of education (P=0.80), employment (P=0.75), and duration of illness (P=0.39). Descriptive indicators of spiritual health are listed in Table 4.

For analysis, univariate repeated-measures analysis of variance was used. To ensure normalcy, the Shapiro-Wilk test was performed separately in groups and at all three time points. Considering that the level of Shapiro-Wilk test statistic error was higher than 0.05 (between the range of 0.03 to 0.72), the assumption of normality was confirmed in all groups. The Box's M test was used to evaluate the equality of covariance matrices. According to the test results, Box's M statistic (P=0.003,  $F_{(12,15746,15)}=2.47$ ) is equal to 32.31, indicating that the above hypothesis has not been confirmed. Still, because

the groups are equal, the Wilks' lambda effect was used to investigate the effect of time points and the interaction effect of the time\*group. The results of univariate F's Wilks' lambda effect showed time effect (P<0.001, F=14.73), with effect size of 0.35 and interaction time\*group effect (P=0.046, F=2.37) with an effect size of 0.15 are significant. However, in the repeated measures analysis of variance, the interactive effect was significant. It can be said that spiritual health has changed during the treatment to follow-up period and has also been different over time in the three groups studied. To investigate the effect of within-groups in the repeated-measures analysis of variance, we tested the assumption of sphericity. The result of Mauchly's test (P<0.001,  $X^2_{(2)}=23.91$ ) was 0.65, so the sphericity hypothesis was rejected. Therefore, to evaluate the effect of the subjects, the Greenhouse-Geisser epsilon index of 0.74 for spiritual health was used. As shown in Table 5, the significance level of time effect (P<0.001) and time\*group effect (P=0.01) was less than 0.05, so spiritual health is different both time and time\* group effect in different groups. To evaluate the effect of between-groups and examine the equality of variances of time-variable error during the treatment period, the results of Levene's spiritual health test for pretest (P=0.92,  $F_{(2,57)}=0.39$ ), posttest (P=0.008,  $F_{(2,57)}=5.22$ ), and follow-up (P=0.12,  $F_{(2,57)}=2.13$ ) were obtained at the non-significant level of 0.01, indicating the confirmation of the assumption. In examining the between-subjects effect, Table 5 shows that the effect of the group is significant.

To determine the effect of the group and the difference between the means of the three groups, the Bonferroni post hoc test was used. The results showed no significant difference between the two experimental groups on spiri-

Table 3. Descriptive indicators of demographic variables

Groups	Age	Education, No. (%)			Employment Status, No. (%)			Disease Duration, No. (%)		
	Mean±SD	Illiterate	Under Diploma	Diploma	Bachelor	Unemployed	Employed	6 Months to 1 Year	One Year to 3 Years	Over Three Years
ACT before dialysis	50.9±10.6	6(30)	9(45)	5(25)	-	12 (60)	8(40)	9(45%)	7(35%)	4(20%)
Pre-ACT and mindfulness exercise during dialysis	48.75±12.09	4(20)	10(50)	5(25)	1(5)	12(60)	8(40)	4(20%)	8(40%)	8(40%)
Control	49.2±10.7	5(25)	8(40)	7(35)	-	14(70)	6(30)	9(45%)	6(30%)	5(25%)
Statistical index	F=0.21, P=0.81	$\chi^2=3.09, P=0.80$			$\chi^2=0.57, P=0.75$			$X^2=4.09 p=039$		

ACT: Acceptance, and Commitment Therapy.

**Table 4.** Mean±SD of spiritual health variables in the pretest, posttest, and follow-up stages

Groups	Mean±SD		
	Pretest	Posttest	Follow-up
ACT before dialysis	67.50±3.60	71.25±3.29	71.70±3.22
Pre-dialysis ACT and mindfulness plus exercises during dialysis	64.90±2.97	67.95±5.06	68.55±4.33
Control	63.40±2.96	63.45±3.37	64.10±3.59

ACT: Acceptance, and Commitment Therapy.



tual health at the level of 0.05. But a significant difference was seen between the mean scores of “ACT before dialysis” and “ACT before dialysis with mindfulness plus exercises during dialysis” with the control group (respectively; the difference in mean=6.50 [P<0.001]; mean difference=3.5 [P=0.004]), which indicated the effectiveness of both interventions. To evaluate the stability of the interventions in experimental groups during the three time points (pretest, posttest, and follow-up stage), we used the Bonferroni test and made two-by-two comparisons of the means by groups in these three points. As Table 6 shows, in the two experimental groups, the average scores in the posttest and follow-up were significantly higher than the pretest scores. Still, the mean scores of follow-up and posttest stages are not significantly different.

## Discussion

The present study results showed the effectiveness of “pre-dialysis ACT” and “pre-dialysis ACT with mindfulness plus exercises during dialysis” on increasing spiritual health over time in both posttest periods and fol-

low-up. But there was no difference between the two interventions over time, which indicates the effectiveness of ACT in increasing spiritual health. This increase has been stable over time. The findings of the present study are in line with the findings of Siadat, Khajevand, and Akbari [16], Karkala and Konstantin [17], and Nemati, Dokanee Fard, and Behbodi [18]. These studies show the effectiveness of ACT on promoting spiritual coping [17], spiritual attitudes [16], and spiritual health [18]. Although in these studies only ACT was compared with the control group, one study [18] showed that there is no significant difference between the ACT and emotion-based therapy plus ACT, and ACT alone is effective. In this regard, this finding is consistent with the present study’s findings, which showed that the ACT with or without the intervention of mindfulness plus exercises has the same results in increasing spirituality.

In the ACT, patients are helped to experience disturbing thoughts and feelings only as a thought, become aware of the ineffectiveness of current programs, and instead of controlling negative thoughts and feelings, do what is im-

**Table 5.** Results of repeated measures analysis of variance in explaining the effects of within-subjects and between-subjects spiritual Health

Effects of Within- and Between-subjects	Source of Changes	Sum of Squares Type 4	Degrees of Freedom	Mean of Squares	Statistics F	P	Squared Eta
Effect of within-subjects	Time	273.14	1.48	184.05	21.86	0.0001	0.27
	Time * Group	98.88	2.96	33.31	3.96	0.01	0.12
	Error	711.96	84.59	8.41			
Effect of between-subjects	Width of origin	807484.09	1	807484.09	29126.45	0.0001	0.99
	group	1269.67	2	634.84	22.89	0.0001	0.45
	Error	1580.23	57	27.72			



**Table 6.** Bonferroni test results of comparing the study groups

Time	Means Difference	ACT Before Dialysis			Pre-dialysis ACT and Mindfulness Exercises During Dialysis			Control		
		Means Difference	SD	P	Means Difference	SD	P	Means Difference	SD	P
Pretest	Posttest	-3.75	0.97	0.003	-3.05	1.15	0.04	-0.05	0.36	1
	Follow-up	-4.20	0.97	0.001	-3.65	1.11	0.01	-0.7	0.5	0.54
Posttest	Follow-up	-0.45	0.37	0.73	-0.6	0.62	1	-0.65	0.48	0.59

ACT: Acceptance, and Commitment Therapy.

portant in life in line with values [14], one of which can be spiritual health for a person. Spiritual health is one of the concepts in how the patient copes with the problems and stress caused by the disease. This coping leads the person to satisfaction, peace, inner balance, and purpose in life [33]. However, since the decrease in spiritual health is associated with an increase in grief [34], and on the other hand, due to the high level of psychological stress caused by chronic diseases [35], psychological interventions to reduce grief and as a result, increasing spiritual health is essential. Therefore, the goal of ACT is to reduce empirical avoidance along with increasing psychological flexibility (not avoiding unwanted events and not trying to change and control them) and thus reduce suffering. In other words, by receiving this intervention, patients spend their energy on the values of life instead of coping with avoiding pain and unwanted internal events [36]. In other words, ACT is a spiritually and religiously sensitive treatment. This approach aims to discover a person's values (including spiritual and religious values), help the person to accept any experience that has no control over it. Due to the commitment to the values of life, which can be spiritual values for religious people, the promotion of spirituality is possible [17].

But another significant result in this study is that performing mindfulness plus exercises during dialysis in a group that received ACT did not increase the effectiveness of ACT in promoting spiritual health. This result is inconsistent with other studies on the effectiveness of mindfulness interventions [22-25]. However, it should be noted that in these studies, mindfulness intervention was not compared with other interventions. However, it cannot be concluded that mindfulness intervention was ineffective because, in this study, one of the groups received both mindfulness intervention and ACT. Therefore, it is not possible to compare the two treatments of mindfulness and ACT.

On the other hand, in this study, mindfulness was performed along with sports activities during dialysis. In

this regard, a study showed that exercise alone [26] or with mindfulness [27] increases dialysis adequacy and the level of motor balance, respectively [27]. There are two points to consider in this regard. The first point is that there are differences between this study and the present study, including the fact that this study [27] was not performed on dialysis patients and comparison with other interventions [26, 27]. Most importantly, in the mentioned studies, the non-psychological structure, i.e., adequacy of dialysis and motor function of the individual, were considered, while in the present study, spiritual health was examined as a psychological/spiritual structure. It seems that mindfulness plus exercises cannot directly affect spiritual health.

The second point is that in the present study, two separate interventions of ACT and mindfulness plus exercises were not examined, and the aim was not to compare the two interventions. Instead, the goal was whether mindfulness plus exercise could increase the effectiveness of the ACT intervention, which results were not confirmed. However, this finding does not mean that mindfulness plus exercises have not been effective, but they may be equally effective, with both targeting the underlying psychological mechanisms. However, what can be seen in this result is that the effectiveness of the ACT has not been increased with the presence of mindfulness. Still, it does not mean the ineffectiveness of mindfulness. Maybe in other areas related to the mechanism of effectiveness of mindfulness plus exercises, including the dialysis adequacy [26], it could be effective, which was not examined in this study.

In other words, although mindfulness exercise helps people identify situations that cause anxiety and stress and gain a better understanding of themselves [37], and provide a new way to get rid of dysfunctional cognitive patterns, just like ACT [19], the present results showed that the mindfulness does not increase the effectiveness of ACT on spiritual health, which indicates the importance of ACT in this regard. Of course, it is likely that the

efficacy of ACT interventions combined with mindfulness plus exercises on other psychological constructs, including disease-related negative emotions, will vary. We suggest that these areas be investigated in future research. However, it can be noted that mindfulness is considered part of ACT. Besides, in ACT, one must accept one's experiences without judgment and actively engage in the values of one's life and practice them. At the same time, mindfulness interventions revolve solely around identifying and reinforcing positive experiences, so it is worth pondering why ACT without mindfulness plus exercises can also increase patients' spiritual health. Also, the lack of increase in the effectiveness of ACT intervention by mindfulness exercises may be due to the small sample size and limited duration of exercise in this group. These gaps suggested that future research should consider them.

## Conclusion

According to the present study results, the ACT has adequate efficiency without mindfulness plus exercises and can be done in dialysis centers to promote spiritual health in patients on hemodialysis. However, the present study has some limitations, like a short follow-up period and the use of self-report questionnaires.

## Ethical Considerations

### Compliance with ethical guidelines

The ethics code was obtained from South Khorasan University of Medical Sciences (IR.BUMS.REC.1399.116) and the code of clinical trial (IRCT20200604047657N1).

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### Authors' contributions

Study design and idea: Fatemeh Shahabizadeh; Scientific advisor: Fatemeh Shahabizadeh, Ali Akbar Samari, and Maryam Nasri; Data collection and analysis: Ali Kazemi and Fatemeh Shahabizadeh; Preparing, compiling, and editing the educational program: Ali Kazemi and Fatemeh Shahabizadeh; Writing, compiling, and editing the article: Fatemeh Shahabizadeh and Ali Kazemi.

### Conflict of interest

The authors declared no conflict of interest.

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