



# The Effects of Peer Support on Depression, Anxiety, and Stress Among Patients Receiving Hemodialysis

Alireza Irajpour<sup>1</sup>, Maryam Sadat Hashemi<sup>1\*</sup>, Parvaneh Abazari<sup>2</sup>, Shahrazad Shahidi<sup>3</sup> and Maryam Fayazi<sup>4</sup>

<sup>1</sup>Department of Critical Care Nursing, Faculty of Nursing and Midwifery, Nursing and Midwifery Care Research Centre, Isfahan University of Medical Sciences, Isfahan, Iran

<sup>2</sup>Department of Adult Health Nursing, Faculty of Nursing and Midwifery, Nursing and Midwifery Care Research Centre, Isfahan University of Medical Sciences, Isfahan, Iran

<sup>3</sup>Department of Nephrology, Isfahan Kidney Disease Research Center, School of Medicine, Isfahan, Iran

<sup>4</sup>Mashhad University of Medical Sciences, Isfahan, Iran

\*Corresponding author: Ph.D in Nursing of Isfahan University Medical Sciences, Department of Critical Care, School of Nursing and Midwifery, Isfahan University of Medical Sciences, Isfahan, Iran. Tel: +989134118910, Email: maryamhashemi956@gmail.com

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## Abstract

**Background:** Depression, anxiety, and stress are the most prevalent psychological disorders among patients with chronic renal failure. These disorders increase mortality rate, impair immune function, reduce treatment adherence and quality of life, and heighten the risks of malnutrition, infection, and cardiovascular diseases. One potentially effective strategy for the management of psychological disorders is peer education; however, its effects on patients receiving hemodialysis are still unknown.

**Objectives:** This study was conducted to investigate the effects of peer education on depression, anxiety, and stress among hemodialysis patients.

**Methods:** This was a quasi-experimental study. Patients were randomly recruited and allocated in intervention and control groups. In the intervention group, patients were provided with two 120-minute peer education sessions per week for eight successive weeks-sixteen sessions in total. Patients in the control group solely received routine care services, which included no education by peers. Data were collected before and immediately after the intervention via the 42-item Depression Anxiety Stress Scale.

**Results:** Before the intervention, the groups did not significantly differ from each other, respecting the mean scores of depression, anxiety, and stress ( $P > 0.05$ ). After the intervention, significant decreases in the mean scores of depression, anxiety, and stress were observed in the intervention group ( $P < 0.05$ ), while none of the mean scores significantly changed in the control group ( $P > 0.05$ ). Consequently, posttest mean scores in the intervention group were significantly lower than the control group ( $P < 0.05$ ).

**Conclusions:** Peer education is effective in significantly alleviating hemodialysis patients' depression, anxiety, and stress. Therefore, peer education is recommended for alleviating psychological problems among patients receiving hemodialysis.

**Keywords:** Peer, Hemodialysis, Depression, Anxiety, Stress

## 1. Background

Patients with chronic renal failure suffer from different levels of depression, anxiety, and stress (DAS). The prevalence of depression and anxiety among patients with chronic renal failure who receive hemodialysis is 5% - 71.4% and 12% - 52%, respectively (1).

Different factors, mainly biological, psychological, and socioeconomic, can contribute to DAS among hemodialysis patients. Biological factors include sleep disorders, pain, fatigue, reduced appetite, decreased physical activity (2, 3), sexual dysfunction (4), and increased levels of cytokines and inflammatory factors such as interleukin 1 and 2 and tumor necrosis factor-alpha (5, 6). Psychological factors may include ineffective role performance in family

and society, altered body image, decreased self-confidence, and fear over an uncertain future. Socioeconomic factors are unemployment (7), have a low income, and inadequate social support. Other factors behind DAS among hemodialysis patients can range from difficulties in coping with long-term treatment (8, 9) to numerous invasive procedures (such as cannulation for hemodialysis or central venous line), equipment alarms, lack of control over one's own physical health, unknown prognosis, and hemodialysis complications such as hypotension and muscle cramps (10).

DAS in hemodialysis patients are associated with different consequences. For instance, depression can reduce adherence to treatments (11-14), increase hospitalization rate

and mortality rate (15-17), impair immune function (18), reduce the quality of life (19), and heighten the risks of malnutrition (20) and infection (15, 21). Moreover, the levels of inflammatory factors among anxious patients are high, and therefore, they are at risk for malnutrition, impaired immune function, and early death (22).

There are different pharmacological therapies for DAS management among patients with chronic illnesses. However, due to their decreased renal clearance, hemodialysis patients are at risk for the accumulation of drug metabolites in their bodies. Moreover, the use of pharmacological therapies for DAS management may put patients at risk for drug interactions. Besides, the numerous side effects of pharmacological therapies reduce patients' adherence to treatments so that 80% of hemodialysis patients do not appropriately use their medications due to experiencing different side effects (23). Therefore, non-pharmacological therapies are recommended for DAS management in these patients (5).

Peer education is one of the non-pharmacological therapies for managing psychological disorders and improving coping among patients with chronic illnesses. In peer education, a group of patients with the same illness share their own direct experiences and problems as well as emotionally support each other (24).

Although many mental health experts focus on the development of peer groups, there are only a few pieces of evidence on the effect of peer groups. Although some studies show that peer support may cause reducing depressions and anxiety (25), the consequence of other studies indicates that peer support may only be effective on increasing life expectancy and quality (26). Despite these findings, there are no certain evidence found on the effect of this way. Meta-analysis has been done regarding the effect of peer support on improving patients mental health. The results of this study indicated that although peer support in some studies may cause increasing the expectancy and empowerment of patients, it has not had an impression on improving the psychological health of patients in some cases. Furthermore, most of these studies focused on a special population (severe mental patients (26), postpartum depression (27, 28), postmenopausal depression (29), depression among patients with acquired immunodeficiency syndrome (30), cancer (31), and multiple sclerosis (32, 33). However, there is no information regarding the outcomes of peer support for hemodialysis patients. In studies that have been done on the effect of peer support in patients under treatment of hemodialysis, quality of life has been studied (24); however, the effect of this has not been studied on improving the mental health of these patients.

Meta-analysis and systematic review were done by Fuhr

et al. to survey the effectiveness of peer-delivered interventions for severe mental illness and depression on clinical and psychosocial outcomes; 14 studies were done in high-income countries (10 studies on severe mental illness and four studies on depression). Three studies on severe mental illness indicated that peer support lead to an improvement in the quality of life, and two studies showed improving patients' clinical symptoms. No studies reported the effect of this intervention in improving depression. These researchers believed that due to the fact that these studies were done in high-income countries, their results could not be generalized to countries with an average and low-income. These researchers reported that five out of eight studies on severe mental illness and one out of four on depression had a high risk of bias. The low number of participants and wide confidence intervals have affected the effect estimate (26). Thus, although there are some evidences regarding the effect of peer support programs and if they are effective in decreasing depression and anxiety or not. Therefore, more studies must be done on the effect of peer support in improving the mental health of these patients.

## 2. Objectives

Given the controversies over the effectiveness of peer education and due to the lack of information regarding its usefulness for hemodialysis patients, this study was conducted to evaluate the effects of peer education on hemodialysis patients' DAS.

## 3. Methods

### 3.1. Design and Participants

This was a quasi-experimental study. The study population consisted of all 130 hemodialysis patients who referred to the Ali-Asghar teaching hospital, Isfahan, Iran, in 2017; the Ali-Asghar hemodialysis facility served as the study site. The Ali-Asghar hemodialysis program is the largest hospital-based one in Isfahan, with two outpatient units. Specifically, Ali-Asghar hemodialysis is the largest governmental facility in the Isfahan health system. It is a referral center. There is often a waitlist for new patients. Ali-Asghar dialysis serves approximately 150 in-center hemodialysis patients six days per week, three shifts per day, and is comprised of five treatment bays, each containing four to five hemodialysis chairs for a total of 22 chairs. Two isolation chairs are available for use for patients with diagnosed Hepatitis B or HIV). Initially, a list was created of all eligible patients who regularly referred

to the study setting for hemodialysis. The eligibility criteria were definite diagnosis of renal failure, a history of receiving hemodialysis for more than three months, no history of cognitive problems such as memory impairment, and no simultaneous participation in peer education programs. Recruited patients were excluded if they voluntarily chose to withdraw from the study, incompletely filled out the study questionnaire, were hospitalized in a hospital, or underwent kidney transplant surgery during the study.

There were 85 hemodialysis patients in the study setting who met the inclusion criteria. These patients received hemodialysis either in odd or even days of the week. In order to prevent the leakage of peer education information from the intervention group to the control group, patients who received hemodialysis in even days were randomly allocated to the intervention group, while patients who received hemodialysis in the odd days were randomly allocated to the control group. Random allocation was done via the coin tossing method by a nurse who was external to the study.

Sampling was done randomly in the following steps. Initially, the name of each patient who received hemodialysis in even days was written on a card. Then, all the cards were mixed and placed in a bag. After that, one card was randomly drawn from the bag, and the intended patient was recruited to the intervention group. The card was then returned to the bag, and a new card was selected for the next patient. The same process was repeated until the determined number of patients was recruited. Patients for the control group were also recruited through the same process. Due to the characteristics of the study intervention, blinding and allocation concealment were not applicable for this study.

Sample size was calculated based on an estimation of the standard deviation of depression, a confidence level of 95%, a power of 80%, and a between-group difference of 0.7 of standard deviation. Therefore, the sample size calculation [Equation 1](#)

$$N = \frac{(z_1 + z_2)^2 (2s^2)}{d^2} = 32 \quad (1)$$

showed that at least 32 patients were needed for each study group. We recruited 38 patients to each group (76 in total) in order to prevent probable withdrawals from affecting the study results.

$$n = \frac{(z_1 + z_2)^2 (2s^2)}{d^2} \quad (2)$$

### 3.2. Procedure

Patients in the intervention group were provided with peer education, while their control group solely received

routine care services. Peer education is needed for the curriculum training. The staff was assisted with the development of the training content. Isfahan social workers, dietitians, nephrologist, psychologist, and nurses reviewed the counseling training curriculum and provided feedback. When possible, existing educational materials were used in order to keep consistent messages for the patients.

To be a peer supporter, some patients needed to be mentors for patients in the intervention group. The staff was asked to recommend mentors, or those patients who were supposed to be empathic, accept others, a good self-manager, and a good adherence. Seven patients were chosen as counselors. All mentors needed to complete eight 1.5-hour training sessions prior to being matched with a mentee. During this time mentors were provided with an outline or "sample peer time" flowchart for a meeting (i.e., greeting and welcome, ask about self-care in last week, point out and congratulate a good self-care, check in about expectations, and ask for and work together on one concern or challenge), with suggestions about topic and probes during the mentor training. The mentor training consultation(s) focused on some topics including leadership, verbal exchangeable abilities and relational constructions, the difference between information and clinical recommendation, privacy and confidentiality, and simple information regarding kidney sickness. Sessions were held three times a week in days in which they did not receive hemodialysis. Patients in the intervention group were divided into five six-patient groups and two four-patient groups, after these eight training sessions for mentors. Grouping of the patients was done based on their age, gender, marital status, income level, educational status, and weekly hemodialysis plan. In other words, the patients in each group were almost homogenous in terms of their age, gender, marital status, income level, educational status, and weekly hemodialysis plan. Then, peer education sessions were held by mentors in the days of their allocated patients' hemodialysis, either before or after hemodialysis.

Participants were paired with a mentor at the same treatment shift so that they were able to meet before or after treatment at the dialysis facility simply due to the fact that transportation to/from treatment was a substantial barrier to participation. Many patients at Ali-Asghar Dialysis are unable to drive or were uncomfortable driving themselves and rely on medical transport or friends/relatives. Each mentor held two 120-minute peer education sessions per week for eight successive weeks-sixteen sessions in total.

Furthermore, dyads were encouraged to interact as much as each individual pair seemed appropriate and not unduly burdensome. All interactions were to be registered

by the mentor to capture frequency, duration, and format (e.g., person, phone). Pairs meeting with suggested number of times in a month, as evident by their contact logs, were entered into a monthly plan for a \$10 gift card for each individual. Those pairs qualifying for a monthly drawing were also entered into a grand prize plan. This motivation was given to encourage participants to meet, complete, and turn in their logs.

During sessions, each mentor and his/her group members discussed and shared their experiences and opinions regarding their problems, treatment regimens, dietary regimens, coping strategies, vascular access line care, and pre- and post-transplant care. The content was discussed and the length of meetings was driven by the participants and their specific self-management needs at the time of the interaction.

### 3.3. Data Collection

Patients' DAS were assessed before and immediately after the intervention via the 42-item Depression Anxiety Stress Scale (DASS-42). The DASS was developed by Lovibond and Lovibond and is a 42-item self-report instrument designed to measure the three related negative emotional states of depression, anxiety, and stress (34). Each of the three DASS scales contains 14 items, depression (14 items), anxiety (14 items), and stress (14 items). DASS-42 items are scored on a four-point Likert-type scale as a following rate '0' it is not suitable for me, '1' it is a little bit suitable for me, '2' it is usually suitable for me, and '3' it is completely suitable for me (35). Subscale scores are categorized and interpreted as shown in Table 1. The depression scale examines dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia. The anxiety scale examined autonomic arousal, skeletal muscle effects, situational anxiety, and subjective experience of anxious effect. The stress scale is sensitive to levels of chronic non-specific arousal, which assesses difficulty relaxing, nervous arousal, and being easily upset/agitated, irritable/over-reactive, and impatient. Subjects were asked to use 4-point severity/frequency scales to rate the extent to which they have experienced each state. Scores for depression, anxiety, and stress are calculated by summing the scores for the relevant items (34, 36, 37). Previous studies by Askari et al., and Afzali et al., reported acceptable reliability and convergent and divergent validity for DASS-42 (36, 37).

### 3.4. Data Analysis

Data were analyzed using the SPSS Statistical for Windows, Version 16 (SPSS Corp., Chicago, ILL., USA). Between-group comparisons, with respect to nominal, ordinal, and

**Table 1.** Categorization and Interpretation of DASS-42 Subscale Scores

Interpretation	Subscales		
	Depression	Anxiety	Stress
Normal	0 - 9	0 - 7	0 - 14
Mild	10 - 13	8 - 9	15 - 18
Moderate	14 - 20	10 - 14	19 - 25
Severe	21 - 27	15 - 19	26 - 33
Extremely severe	28 - 42	20 - 42	34 - 42

numerical variables, were performed through the Chi-square, the Mann-Whitney U, and the independent-sample *t*-tests, respectively. Moreover, within-group comparisons were done via the paired-sample *t*-test. *P* values, which were less than 0.05, were considered significant.

### 3.5. Ethical Considerations

All participants were informed about the aim of the study, were assured about the confidentiality of study data, and signed the written informed consent prior to enrollment. Participation in and withdrawal from the study were both voluntary. The protocol of this study was approved by the Ethics Committee of Isfahan Medical Sciences University (IR.MUI.REC.1395.3.293).

## 4. Results

Five patients from the control group were excluded from the study, four patients due to voluntary withdrawal and one due to hospitalization. Moreover, six were excluded from the intervention group, three due to voluntary withdrawal, one due to kidney transplantation, and two for incompletely filling out the study questionnaire. Therefore, 33 patients in the control and 32 patients in the intervention group completed the study (Figure 1). The groups did not significantly differ from each other respecting patients' demographic characteristics ( $P > 0.05$ ; Table 2).

According to Paired *t*-test, the mean depression scores, before and after intervention, in the experimental group, were  $51.11 \pm 15.68$  and  $38.69 \pm 9.09$ , respectively; the *t*-test results showed a significant difference ( $P < 0.001$ ).

Paired *t*-test indicated that the mean depression scores, before and after intervention, in the control group, were  $50.50 \pm 5.73$  and  $49.39 \pm 5.03$ , respectively; there were no significant differences ( $P = 0.15$ ).

Paired *t*-test showed that the mean anxiety scores, before and after the intervention, in the experimental group, were  $30.57 \pm 10.18$  and  $25.47 \pm 7.09$ , respectively; *t*-test results showed a significant difference ( $P < 0.001$ ).

**Table 2.** Participants' Demographic Characteristics<sup>a</sup>

Characteristics	Group		Statistical Test	P Value
	Intervention	Control		
<b>Marital status</b>			Chi square	0.55
Single	4 (12.5)	6 (18.18)		
Married	25 (78.1)	25 (75.75)		
Widowed	1 (3.1)	1 (3.03)		
Divorced	2 (6.3)	1 (3.03)		
<b>Employment status</b>			Chi square	0.79
Employed	4 (12.5)	7 (21.21)		
Unemployed	17 (53.1)	16 (48.48)		
Disabled	6 (18.8)	6 (18.18)		
Retired	5 (15.6)	4 (12.21)		
<b>Educational status</b>			Mann-Whitney U	0.99
Illiterate	4 (12.5)	6 (18.18)		
Below diploma	25 (78.1)	22 (66.66)		
Associate and bachelor's	3 (9.4)	4 (12.21)		
Master's and higher	0 (0)	1 (3.03)		
<b>Income level</b>			Mann-Whitney U	1
Adequate	16 (50)	17 (51.51)		
Inadequate	16 (50)	16 (48.48)		

<sup>a</sup>Values are expressed as No. (%).

Paired *t*-test showed that the mean anxiety scores, before and after intervention, in the control group, were  $29.83 \pm 4.649$  and  $29.71 \pm 4.32$ , respectively; there were no significant differences ( $P = 0.86$ ).

Paired *t*-test determined that the mean stress scores, before and after the intervention, in the experimental group were  $43.68 \pm 13.9$  and  $31.45 \pm 8.54$ , respectively, and *t*-test results showed a significant difference ( $P < 0.001$ ).

Paired *t*-test determined that the mean stress scores, before and after the intervention, in the control group, were  $42.56 \pm 6.70$  and  $40.92 \pm 5.69$ , respectively; there were no significant differences ( $P = 0.14$ ).

Independent *t*-test showed that the mean depression scores, before the intervention, in the experimental and control group, were  $51.11 \pm 15.68$  and  $50.50 \pm 5.73$ , respectively; there were no significant differences between the groups respecting the mean scores of depression ( $P = 0.84$ ).

Independent *t*-test determined that the mean anxiety scores, before the intervention, in the experimental and control group, were  $30.57 \pm 10.18$  and  $29.83 \pm 4.649$ , respectively; there were no significant differences between the groups respecting the mean scores of anxiety ( $P = 0.71$ ).

Independent *t*-test indicated that the mean stress

scores, before the intervention, in the experimental and control group, were  $43.68 \pm 13.9$  and  $42.56 \pm 6.70$ , respectively; there were no significant differences between the groups respecting the mean scores of stress ( $P = 0.68$ ).

Independent *t*-test showed that the mean depression scores, after the intervention, in the experimental and control group, were  $38.69 \pm 9.09$  and  $49.39 \pm 5.03$ , respectively; there were significant differences between the groups respecting the mean scores of depressions ( $P < 0.001$ ).

Independent *t*-test determined that the mean anxiety scores, after the intervention, in the experimental and control group, were  $25.47 \pm 7.09$  and  $29.71 \pm 4.32$ , respectively; there were significant differences between the groups respecting the mean scores of anxieties ( $P < 0.001$ ).

Independent *t*-test indicated that the mean stress scores, after intervention, in the experimental and control group, were  $31.45 \pm 8.54$  and  $40.92 \pm 5.69$ , respectively; there were significant differences between the groups respecting the mean scores of stress ( $P < 0.001$ ) (Table 3).

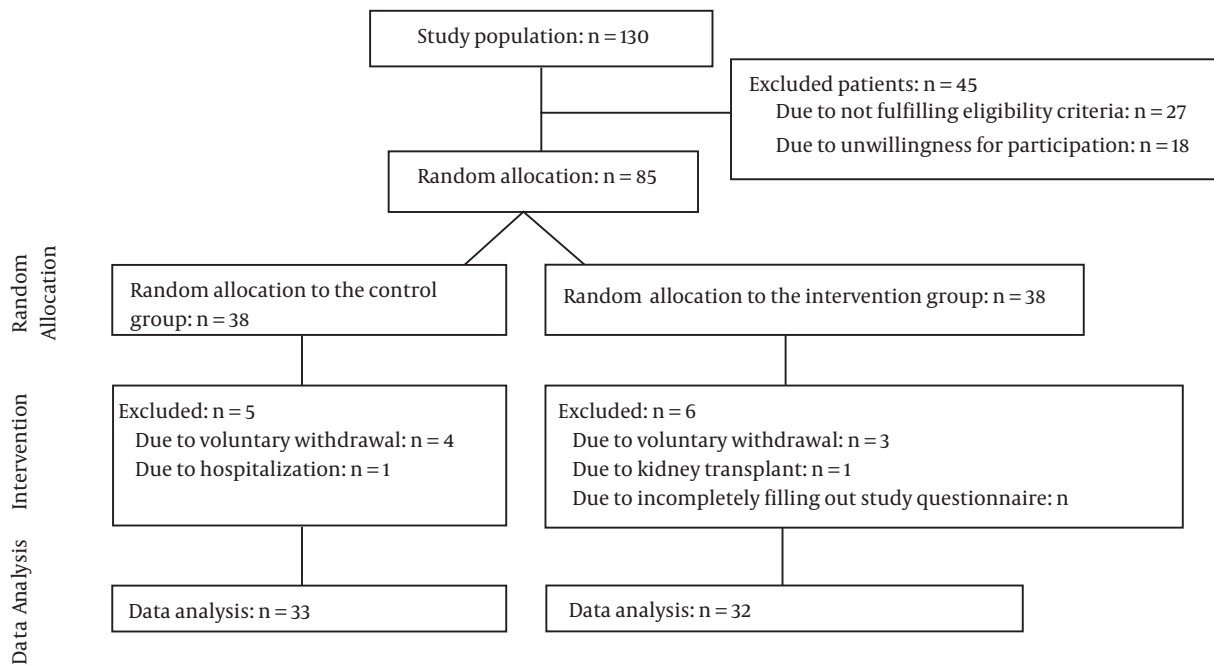


Figure 1. The flow of participants in the study

Table 3. Between- and Within-Group Comparisons Respecting the Mean Scores of DAS<sup>a</sup>

DAS/Time	Group		P Value <sup>b</sup>
	Intervention	Control	
<b>Depression</b>			
Before	51.11 ± 15.68	50.50 ± 5.73	0.84
After	38.69 ± 9.09	49.39 ± 5.03	< 0.001
P value <sup>c</sup>	< 0.001	0.15	
<b>Anxiety</b>			
Before	30.57 ± 10.18	29.83 ± 4.64	0.71
After	25.47 ± 7.09	29.71 ± 4.32	< 0.001
P value <sup>c</sup>	< 0.001	0.86	
<b>Stress</b>			
Before	43.68 ± 13.91	42.56 ± 6.70	0.68
After	31.45 ± 8.54	40.92 ± 5.69	0.005
P value <sup>c</sup>	< 0.001	0.14	

Abbreviation: DAS, depression, anxiety, and stress.

<sup>a</sup>Values are expressed as mean ± SD.

<sup>b</sup>The independent-sample *t*-test.

<sup>c</sup>The paired-sample *t*-test.

## 5. Discussion

This study aimed to investigate the effects of peer education on hemodialysis patients' DAS. Patients with ex-

cellent self-management and active coping with their illnesses shared their experiences and knowledge in a hospitable and friendly environment with other patients. Data analysis revealed that such peer education significantly alleviated hemodialysis patients' DAS.

An earlier study into the lived experiences of peer support among patients with chronic renal failure also indicated that peer support encouraged patients to support each other for starting treatments, helped them make better decisions about their treatments, facilitated their coping with their problems and illnesses, and significantly improved their self-management, self-confidence, hopefulness over future, and knowledge about their illnesses. Moreover, peer support was also associated with closer treatment adherence, greater competence in disease management, and lower levels of DAS (38). A meta-analysis also showed the effectiveness of peer support in alleviating depression in different patient populations (25). Other studies also showed that peer support significantly alleviated depression among postpartum women (27), anxiety, hopelessness, confusion, and depression among cancer patients (39), DAS among patients with multiple sclerosis (33), and psychosocial distress, particularly depression and anxiety, among patients with acquired immunodeficiency syndrome (30).

Peer support in the mentioned studies was done face

to face; however, it was done online in some other studies. Patients made a group to exchange their experiences on social networks such as Facebook, Twitter, and YouTube. The effectiveness of this method in decreasing depression in patients with severe mental illness and cancer has been proven. Due to the fact that all patients were not a member of a social network or did not have access to the internet, peer support was done face to face. However, we hope to study the effectiveness of online peer support after increasing access to the social network. Nonetheless, the result of some studies showed that this method was not effective in decreasing depression of patients. A study that was done by Proudfoot et al. on the effects of online peer support on perceptions of illness control and depression in patients with bipolar disorder, determined that peer support had no effect on decreasing patients' depression. These researchers stated that lack of significant consequences might be related to low sample volume and low study period (40).

The major reasons behind the positive effects of peer support on depression are decreased social isolation in peer groups, health- and illness-related information exchange by peers, and positive peer role-modeling for self-care (27). Moreover, peer education can alleviate DAS by improving the patients' perceived social support (41, 42).

A study was done by Dennis et al. to survey the effect of peer support on postpartum depression, 42 Columbian mothers were identified as high-risk for postpartum depression, according to the Edinburgh Postnatal Depression Scale (EPDS), which was randomly assigned to the control and intervention groups. The intervention group received standard care plus telephone-based peer support, and the control group just took post-delivery standard care. Data analysis of this research indicated that peer support decreased the mothers' depression. These researchers reported that there is no significant relationship between frequency of peer-volunteer interactions communications with Edinburgh Postnatal Depression Scale scores. It means that the quality of social communications or perception of social support is more important than its quantity (27).

In addition, peers' emotional support for each other reduces their social isolation and improves their perceived social support (24). Social support not only protects people against illness-related tensions, however, it also improves their psychosocial coping with their health problems and thereby, alleviates their DAS (43).

Self-efficacy is another factor contributing to the positive effects of peer education on DAS. It is defined as an individuals' beliefs in their abilities to control their actions, functions, and life events (44). Bandura's Social Learning Theory holds that when patients consider an individual as

a model, they learn through observation how to modify their lifestyle. Most patients model themselves on those individuals who are almost similar to them in age, gender, race, ethnicity, and socioeconomic status. This strategy helps them accept that they can show a given behavior due to the fact that another person with similar characteristics is showing it. Therefore, they attempt to show that behavior and acquire mastery over it. Such mastery and control over behaviors and life can significantly alleviate patients' DAS (24). Similarly, two studies on cancer patients' experiences of peer support showed that having positive role-models gives patients a feeling of empowerment in managing and coping with their illnesses and thereby, alleviating their DAS (45, 46).

### 5.1. Limitations and Strengths

Important strengths of this study include pilot study, randomization, few exclusion criteria, the blinded statistical analyses, and a reasonable response rate. The Intervention was standardized through specific selective criteria for peer volunteers, formal training, and structured activities for the volunteer coordinator to ensure initiation of the intervention. Depression, anxiety, and stress were assessed with the DASS-42, which is most commonly used to assess depression, anxiety, and stress. All the self-reported outcome measures and procedures were pilot tested.

The results should be interpreted with caution due to the small number of participants and at one-center administration.

### 5.2. Conclusions

This study indicates that peer education is effective in significantly alleviating hemodialysis patients' DAS. Therefore, peer education is recommended for alleviating psychological problems among patients receiving hemodialysis. Investigating the effects of peer education on other patient outcomes and in other patient populations can be the areas of further investigation.

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## Footnotes

**Authors' Contribution:** Study concept and design: Alireza Irajpour and Maryam Sadat Hashemi. Analysis and interpretation of data: Maryam Sadat Hashemi.

Drafting of the manuscript: Alireza Irajpour, Maryam Sadat Hashemi, Parvaneh Abazari, Shahrazad Shahidi, and Maryam Fayazi. Critical revision of the manuscript for important intellectual content: Alireza Irajpour, Parvaneh Abazari, Shahrazad Shahidi, Maryam Sadat Hashemi, and Maryam Fayazi. Critical revision of the manuscript for important intellectual content: Alireza Irajpour, Parvaneh Abazari, and Shahrazad Shahidi.

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