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Original Article

Effect of Self-determination Theory-based Discharge Program on Lifestyle and Readmission of Patients with Heart Failure: A Clinical Trial

Tahere Sarboozi Hosein Abadi[1,2], Mohammad Namazi Nia[1,2], Seyed Reza Mazlom[3*]

Abstract
Background: Lifestyle and behaviors of human beings are major factors in cardiovascular diseases. Therefore, a discharge program based on Self-determination Theory could improve the lifestyle of the patients.
Aim: This study aimed to determine the effect of this program on the lifestyle and readmission of patients with heart failure.
Method: This clinical trial was performed on 60 patients with heart attack in a city in north-east of Iran, during 2018-19. The participants were selected by convenience sampling method and divided randomly into intervention and control groups. Subsequently, the intervention group was subjected to a 12-week SDT-based discharge program. However, the control group received the routine program. The data were collected using a demographic characteristics form, the Health-Promoting Lifestyle Profile II questionnaire, and the readmission questionnaire. Moreover, the data were analyzed in SPSS software (version 20) using the Chi-square, independent t-test, paired t-test, and Wilcoxon.
Results: In total, 20.0% and 46.7% of the subjects in the intervention and control groups were re-hospitalized, respectively. The Chi-square showed a significant difference in this regard (P=0.028). The results also showed a significant increase in the lifestyle score of the patients at post-test stage, in the intervention group (164.6±16.9), compared to the control group (119.1±17.2) (P<0.001). Furthermore, the mean score of various lifestyle subscales significantly increased in the intervention group, compared to the control group, three months after discharge (P<0.01).
Implications for Practice: The design and implementation of a SDT-based discharge program could be included in the nursing care program as an effective method to create and maintain health-promoting behaviors.

Keywords: Discharge program, Heart failure Lifestyle, Readmission

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Introduction

Cardiovascular diseases are the first cause of mortality in the world, in a way that more than 50% of deaths in developed countries are caused by cardiovascular diseases (1). Heart failure is one of the most prevalent cardiovascular diseases and a major health problem associated with a high mortality rate and recurrent hospitalizations (2, 3). About one million people have heart failure in Iran (4), and this condition imposes significant costs on the individual and the society due to its several complications and long course (5). In addition, patients with heart failure are at the risk of recurrence of the disease (4). Therefore, one of the main goals is the prevention of readmission due to the disease (6). The rate of readmission of patients with heart failure remains high despite the advancement of technology and medical treatments (7, 8). In this respect, the application of solutions to reduce the readmission of patients with heart failure has become a priority for healthcare centers (9). A key solution to reduce readmission in patients with heart failure is adopting a healthy lifestyle. Introduced by Adler, the concept of lifestyle refers to a specific way of life of an individual, group, or society (10). Given the fact that the role of many risk factors related to an improper lifestyle in the recurrence of heart failure (e.g., smoking, unhealthy eating, and obesity) is predictable (11), the burden of the disease can be reduced or prevented by changing health-related behaviors (12). It is generally believed that people need education and help to change their health-related behaviors (13). On the other hand, educational programs lead to behavioral changes when conducted based on a specific protocol (14). Several educational theories exist on behavioral change, some of which can be adopted by nurses for patients. In this regard, one of the theories is self-determination theory (SDT), which focuses on processes through which a person gets the motivation to start and maintain health-related behaviors through time. This theory includes the basic needs of competence, autonomy, and relatedness. As a major nursing goal, nurses can act on changing the attitude and behavior of patients by assessing their motivation level (12).

After discharge from the hospital, most patients experience several problems, such as issues related to their daily activities, emotional problems, lack of knowledge, and awareness about drugs and dietary regimen (15). The SDT can be effective in improving lifestyle and reducing hospitalization for patients with heart failure owing to its experimental validation and successful application in various fields, such as physical education, politics, and health (16).

According to a study conducted by Fenton et al. (2009), the SDT-based intervention improved rheumatoid arthritis in athletes (17). In another study, Carlsson et al. (2012) emphasized the effectiveness of a healthy lifestyle on cardiovascular health (18). Despite the benefits of this technique, the extensive study of research revealed a lack of use of SDT-based discharge program for patients with heart failure inside and outside the country. With this background in mind, this study aimed to determine the effect of the SDT-based discharge program on the lifestyle and readmission of patients with heart failure.

Methods

This two-group clinical trial was performed on 60 patients with heart failure hospitalized in Coronary Care Unit (CCU) of 9 Dey Hospital in Torbat Heydarieh (a city in the east of Iran) during October 2018-2019. Inclusion criteria were: 1) full consciousness, 2) diagnosis of class II and class III heart failure by a specialist based on the New York Heart Association, 3) age below 80 and above 18 years, 4) no hearing and visual problems, and 5) minimum literacy level. On the other hand, exclusion criteria included increased severity of the disease, patients' need for special care, and lack of access to patients after discharge. The sample size was estimated at 28 individuals per group based on a pilot study on 20 patients (10 per group) while considering a 95% confidence interval and 80% test power, a mean (standard deviation) of 15.9 (3.13) for the control group and a mean (standard deviation) of 18.66 (1.37) for the intervention group regarding lifestyle (which provided more estimates than readmission), using the mean comparison formula. However, a total of 35 individuals were enrolled in each group considering attrition. During the study, five subjects were removed from the intervention group due to a lack of willingness to continue participation in the discharge program (n=3), worsened situation (n=1), or immigration to another city (n=1).

Moreover, the same number of patients were eliminated from the control group due to a worsened situation (n=3) and immigration to another city (n=2). Ultimately, 30 individuals were analyzed in each group. The subjects were selected among those admitted to the CCU of 9 Dey Hospital, Torbat

Heydarieh, Iran, using convenience sampling. In addition, the participants were allocated to the control and intervention groups by random time block with four blocks (two for intervention and two for control). In this context, a random sequence was extracted by SPSS software for assigning each week from sampling to one of the two groups. The sequence was maintained in a closed envelop and opened at the beginning of each sampling week to determine which individuals were in the intervention or control group. This process was applied to prevent the spread of information between patients in two groups. Notably, the sampling process continued for nine months.

Data collection tools included a sample selection checklist, a demographic characteristics form, a readmission questionnaire, and the Health-Promoting Lifestyle Profile II (HPLP II) questionnaire. The HELP II is the modified version of HPLP presented by Walker et al. in 1997 (19). The questionnaire measures health-promoting lifestyles by focusing on individual initiatives and perceptions that work to maintain or increase health, self-fulfillment, and individual satisfaction. The questionnaire encompasses 52 items and six subscales of nutrition (nine items), physical activity (eight items), health responsibility (nine items), stress management (eight items), interpersonal relations (nine items), and self-actualization (nine items). The items are scored based on a four-point Likert scale from never (score=1) to always (score=4).

In a study performed by Walker et al. (1996), the reliability of the tool was reported at the Cronbach's alpha of 0.94 and a range of 0.79-0.94 for all six subscales. In addition, the reliability of a three-week test-retest was confirmed at 0.89 for the entire tool (20). Moreover, the validity of the questionnaire was confirmed in the current study using qualitative content validity method. The confirmation process involved the assessment of the tool by 10 faculty members of Torbat Heydarieh University of Medical Sciences and preparation of a final tool after considering the necessary suggestions and corrections. In the present study, the reliability of HELP II was confirmed at the Cronbach's alpha of 0.81 by the internal consistency method for 10 subjects.

In addition, qualitative content validity was applied to determine the validity of the readmission questionnaire. In this regard, this tool was prepared with extensive review and based on new sources. For evaluation, the tool was provided to 10 faculty members at Torbat Heydariyeh University of Medical Sciences. The final tool was prepared after applying the necessary corrections.

On the other hand, the reliability of the readmission questionnaire was confirmed at the Cronbach's alpha of 0.81 in a sample size of 10 participants. The questionnaire consisted of three items about hospitalization during the three months after discharge, the time of hospitalization, and its causes. It is worth mentioning that the questionnaire was completed by interviewing the patients at CCU. Moreover, demographic characteristics form encompasses items on patients' information and their disease history, which was completed by the second-author at CCU using interview.

As a pretest, the lifestyle of patients was assessed in two groups within the first days of hospitalization (whenever their physical and mental situations allowed the researcher to do so) using HELP II. In the intervention group, the discharge program of the patients started since admission and continued to 12 weeks after discharge from the hospital. Each patient was visited twice before discharge (with a 24-hour interval) (the mean hospitalization duration of patients was three days). In the first visit of the patients in the intervention group, they were asked to be accompanied with a family member, a friend, or any person who lived with and had a close relationship with them in the following visits so that their presence could be used as a support and reinforcement resource for patients. In addition, the researcher could be able to evaluate the support system of patients and their communication with their relatives by adopting this technique. Initially, it was attempted to establish a suitable therapeutic relationship between the researcher, patients, and their families based on the subscales of competence, autonomy, and relatedness (SDT) so that the patients and their families could answer questions and express their problems related to the disease with peace of mind.

In the next stage, the researcher aimed to determine the individual needs, barriers, and changes from patients' viewpoints, and the changes the patient hoped to make during the three-month period. By doing so, the researcher respected patients' sense of autonomy and considered more responsibility for patients in their self-care.

Furthermore, the researcher attempted to create, maintain, and internalize the motivation of change in patients. In the intervention group, instead of saying that lack of performing this educational program might lead to re-experiencing of the attack, the patients were informed that adhering to this educational program would improve their level of health and reinforce a sense of well-being in these

individuals. In order to create a sense of autonomy in patients, another approach was asking them to determine ways to prevent another attack and methods (other than the regular consumption of drugs) that would improve their current health status. By doing so, the researcher encouraged patients and their families to participate in the discussion, and as the program progressed, the patients were requested to choose their realistic and short-term goals for a maximum of two weeks.

Therefore, the patients themselves selected lifestyle-modifying approaches to be taken after discharge and until the first phone call. Some of the changes pointed out by the patients included smoking less than before, jogging, consuming low-salt and low-fat foods, and being with family and friends more than before. During the hospitalization of patients and two visits, the specific needs of each patient were determined and special training was given based on the specific needs of the patients and in proportion to their age, the level of comprehension, and the level of education.

The educational content was prepared and approved after reviewing texts and careful and up-to-date studies and based on reference books, articles, American Heart Association recommendations for patients upon discharge, the national program for prevention and control of heart disease published by the Ministry of Health and the World Health Organization and under the supervision of professors of the research team, specialized in educating and caring for patients with heart failure. After discharge, the patients were contacted via a phone call every two weeks for 12 weeks to evaluate their progress in achieving their goals and adherence to the educational program. The first phone call was made 24 h after discharge, and each phone call was allocated to two sections. The first section included routine recommendations about heart failure care and the second section was determined based on the clients' needs. During the call, the patients were encouraged to take effective steps toward changing their lifestyle, including exercise, dietary regimen, quitting smoking, improving relations with friends and families, and reducing stress.

Patients were supposed to achieve their short-term goals determined in the last phone call at home while keeping their long-term goals in mind. For instance, the number of cigarettes smoked should be lower than the base number two weeks ago (two cigarettes less than before). In terms of walking, the patients should have walked 10 min more than the base level after two weeks. Therefore, the process of lifestyle modification was followed by patients focusing on these issues. In addition, the SDT was applied to increase motivation and adherence to the new lifestyle while maintaining the therapeutic relationship developed between patients, their families, and the researcher during the hospitalization period in order to improve the sense of competence and autonomy in their self-care. The duration of telephone conversations in the initial calls was at least 25-30 min, and at the end of the study, it reduced to at least 10 min according to the patients' needs.

It is notable that the calls were made in a time window (9:00 a.m. to 9:00 p.m.) with the agreement of the patients. In addition, the last phone call was made to each patient separately on the 12th week after discharge during which the necessary coordination was made for the final visit of patients in addition to providing counseling. Moreover, the subjects were able to call the researcher 24 h a day to assess unforeseen needs.

The patients attended three in-person meetings. The first two sessions at the beginning of the study led to effective communication with patients and families, need assessment of the patients, and the questionnaire completion. Moreover, the questionnaires were completed and two groups were provided with the final educations on the third session at the end of the study. In total, five educational sessions were held via a phone call with the researcher every two weeks. In order to prevent subject exclusion, the phone number and address of first-degree relatives were obtained in addition to the patients' phone number and address in order to have access to the participants in case of problems in making phone contact or change of number. On the other hand, the subjects in the control group only received the routine education of the hospital (recommendation to consume drugs) by the ward's personnel. Moreover, these individuals received the routine face-to-face pharmaceutical training during their hospitalization and used drug pamphlets available in the ward. The same program was held for the intervention group as well. In both groups, the lifestyle of the participants was assessed by completing the HELP II, whereas the readmission of these individuals was assessed by completing the readmission questionnaire at the end of the intervention course (three months after discharge) during the in-person meeting with patients.

The present study was carried out after receiving approval from the Ethics Committee of Torbat Heydarieh University of Medical Sciences, Torbat Heydarieh, Iran, with the code of

IR.THUMS.REC.1395.27 and presenting it to the study setting authorities following coordination with the hospital's managers and the supervisor of the ward. The patients were divided into two groups after oral explaining about the research objectives and obtaining written consent. The subjects were ensured that participation was voluntary.

Data were analyzed in SPSS software (version 20) using descriptive statistics (i.e., distribution frequency, mean, and standard deviation) to describe and classify the data, as well as inferential statistics (i.e., Chi-square, independent t-test, and Mann-Whitney U) to test the hypothesis. Moreover, paired t-test and Wilcoxon test were utilized for intragroup comparison, and Kolmogorov-Smirnov test was employed to evaluate the normal distribution of the data. It is notable that all tests were performed at a 95% confidence interval, and a p-value less than 0.05 was considered statistically significant.

Results

In this study, the majority of the participants in the intervention (n=22, 73.3%) and control (n=20, 67.7%) groups were male. In terms of marital status, the majority of the subjects in the intervention (n=28, 93.3%) and control (n=23, 76.7%) groups were married. According to the results, the patients were homogenous in terms of age, gender, insurance status, level of education, marital status, and heart failure class (P>0.05) (Table 1). In total, 20% and 46.7% of the participants in the intervention control groups were re-hospitalized for three months after discharge, respectively. According to the Chi-square test results, the frequency of readmission was significantly lower in the intervention group, compared to the control group (P=0.028). In addition, the relative risk of readmission was equal to 0.43 (CI95%: 0.19-0.97) in individuals with the discharge program, compared to those who did not have the program (P=0.041) (Table 2).

In the pretest stage, there was no significant difference between the intervention and control groups regarding the mean lifestyle score (P=0.086), which meant that the two groups were homogenous in this regard. However, the mean lifestyle score was significantly higher in the intervention group (164.6±16.9) after the intervention, compared to the control group (119.1±17.2) (P<0.001). Moreover, the difference in the lifestyle score before and after the test was significantly higher in the intervention group (34.9±11.7), compared to the control group (2.8±11.8) (P<0.001). In intragroup comparison, the mean lifestyle score significantly increased in the intervention group in the post-test stage (P<0.001), whereas no significant difference was observed in the control group in this regard (P=0.197) (Table 3).

Table 1. Demographic characteristics of the patients with heart failure

Variable		Group		P-value
		Intervention	Control	
Age (Mean±SD)		62.7±10.4	62.3±12.4	****P=0.87
Insurance status (N [%])	Yes	30 (100.0)	29 (96.7)	***P=0.50
	No	0 (0.0)	1 (3.3)	
Gender (N [%])	Male	22 (73.3)	20 (66.7)	*P=0.73
	Female	8 (26.7)	10 (33.3)	
Level of education (N [%])	Illiterate	6 (20.0)	5 (16.7)	**P=0.45
	Elementary school	8 (26.7)	12 (40.0)	
	Primary degree	3 (10.0)	4 (13.3)	
	High-school diploma	7 (22.3)	6 (20.0)	
	Higher education degree	6 (20.0)	3 (10.0)	
Heart failure class (N [%])	2	16 (53.3)	16 (53.3)	*P>0.99
	3	14 (46.7)	14 (46.7)	
Marital status (N [%])	Single	1 (3.3)	2 (6.7)	*P=0.17
	Married	28 (93.3)	23 (76.7)	
	Deceased spouse-divorced	1 (3.3)	5 (16.7)	

*Chi-square, **Mann-Whitney U, ***Fisher's exact test, ****independent t-test

Table 2. Frequency distribution of patients with heart failure assessed based on readmission in the last three months in the intervention and control groups

Readmission	Group	
	Intervention (N=30)	Control (N=30)
Yes	6 (20.0%)	14 (46.7%)
No	24 (80.0%)	16 (53.3)
P-value Chi-square	*P=0.02	

Table 3. Mean±SD of lifestyle score of patients with heart failure studied in two intervention and control groups

Total lifestyle score	Group		Intragroup comparison
	Intervention (N=30)	Control (N=30)	
	Mean±SD	Mean±SD	
Pretest	129.7±18.3	121.9±15.7	*P=0.08
Posttest	164.6±16.9	119.1±17.2	*P<0.001
Difference between the pretest and posttest stages	34.9±11.7	-2.8±11.8	*P<0.001
Intragroup comparison	**P<0.001	**P=0.19	

*Independent t-test, **paired t-test

In addition to the overall lifestyle score, the score of each of the six subscales was assessed, the results of which are presented below.

In the pretest stage, no significant difference was found between the intervention and control groups regarding the mean nutrition score (P=0.12). However, the mentioned score significantly increased in the intervention group in the post-test stage (32.5±2.1), compared to the control group (25.6±3.5) (P<0.001). Furthermore, the difference in the nutrition score before and after the test was significantly higher in the intervention group (7.7±3.30), compared to the control group (2.2±1.7) (P<0.001). In an intragroup comparison, the mean nutrition score significantly increased in the post-test stage in the intervention group (P<0.001). Moreover, the intragroup comparison showed a significant increase in the mean nutrition score in the control group after the test (P<0.001) (Table 4).

In the pretest stage, there was a significant difference between the intervention and control groups regarding the mean physical activity score (P=0.02). In the posttest stage, the mean score of physical activity was significantly higher in the intervention group (19.4±4.4), compared to the control group (10.2±3.4) (P<0.001). In addition, the difference in the score of physical activity before and after the test was significantly higher in the intervention group (7.2±3.1), compared to the control group (-0.3±2.0) (P<0.001). According to the intragroup comparison, the mean score of physical activity significantly increased in the intervention group after the test (P<0.001), whereas no difference was observed in the control group in this respect (P=0.45) (Table 4).

Furthermore, in the pretest stage, there was no significant difference between the intervention and control groups in terms of the mean score of health responsibility (P=0.190), which meant that the two groups were homogenous in this regard. However, the mean score of health responsibility significantly increased in the intervention group in the posttest stage (29.7±3.6), compared to the control group (19.7±4.3) (P<0.001). Additionally, the difference in the score of health responsibility before and after the intervention was significantly higher in the intervention group (8.3±2.5), compared to the control group (0.1±3.8) (P<0.001). According to the intragroup comparison, the mean score of health responsibility significantly increased in the intervention group after the test (P<0.001), whereas no significant difference was observed in the control group in this regard (P=0.88) (Table 4).

In the same vein, in the pretest stage, no significant difference was observed between the intervention and control groups regarding the mean score of stress management (P=0.46). However, the mean score of stress management significantly increased in the intervention group (21.6±2.2), compared to the control group (15.7±2.1) (P<0.001). Moreover, the mean score of stress management was significantly higher in the posttest stage in the intervention group (4.4±2.2), compared to the control group (0.8±2.5) (P<0.001). The intragroup comparison revealed that the mean score of stress management significantly increased in the intervention group in the posttest stage (P<0.001), whereas no significant difference was observed in the control group in this regard (P=0.10) (Table 4).

Similarly, in the pretest stage, the intervention and control groups were homogenous in terms of the

Table 4. Mean±SD of scores of lifestyle subscales of patients with heart failure studied in two intervention and control groups

Score of health-promoting lifestyle subscales		Group				Intergroup test result
		Intervention		Control		
		Mean±SD	N	Mean±SD	N	
Nutrition	Pretest	24.8±4.2	30	23.3±2.8	30	*P=0.12
	Posttest	32.5±2.1	30	25.6±3.5	30	P<0.001*
	The difference between the pretest and posttest	7.7±3.3	30	2.2±1.7	30	P<0.001*
Intragroup comparison		P<0.001***		P<0.001***		
Physical activity	Pretest	12.2±3.4	30	10.5±3.1	30	P=0.02**
	Posttest	19.4±4.4	30	10.2±3.4	30	P<0.001**
	The difference between the pretest and posttest	7.2±3.1	30	-0.3±2.0	30	P<0.001**
Intragroup comparison		P=<0.001****		P=0.45****		
Health responsibility	Pretest	21.3±4.4	30	19.6±5.4	30	P=0.19*
	Posttest	29.7±3.6	30	19.7±4.3	30	P<0.001*
	The difference between the pretest and posttest	8.3±2.5	30	0.1±3.8	30	P<0.001*
Intragroup comparison		P<0.001***		P=0.88***		
Stress management	Pretest	17.2±3.1	30	16.5±2.1	30	P=0.46**
	Posttest	21.6±2.2	30	15.7±2.1	30	P<0.001**
	The difference between the pretest and posttest	4.4±2.2	30	-0.8±2.5	30	P<0.001*
Intragroup comparison		P<0.001***		P=0.10****		
Interpersonal relations	Pretest	28.9±3.6	30	27.8±3.7	30	P=0.25*
	Posttest	31.6±2.9	30	26.8±4.0	30	P<0.001**
	The difference between the pretest and posttest	2.6±2.3	30	-1.0±1.8	30	P<0.001**
Intragroup comparison		P<0.001****		P=0.051***		
Self-actualization	Pretest	25.1±4.7	30	24.0±5.0	30	P=0.37*
	Posttest	29.7±3.9	30	21.0±4.7	30	P<0.001**
	The difference between the pretest and posttest	4.5±3.5	30	-3.0±3.5	30	P<0.001**
Intragroup comparison		P<0.001****		P<0.001***		

*Independent t-test, **Mann-Whitney U, ***Paired t-test, **** Wilcoxon

mean score of interpersonal relations (P=0.25). However, the mentioned score was significantly higher in the intervention group at the posttest stage (31.6±2.9), compared to the control group (26.8±4.0) (P<0.001). In addition, the difference in the score of interpersonal relations in the intervention group (2.6±2.3) was significantly higher, compared to the control group (-1.0±1.8) (P<0.001). The intragroup comparison showed a significant increase in the mean score of interpersonal relations in the intervention group after the test (P<0.001), whereas no significant difference was observed in the control group in this regard (P=0.051) (Table 4).

In the pretest stage, there was no significant difference between the intervention and control groups regarding the mean score of self-actualization (P=0.37). However, the posttest results were indicative of a significantly higher mean score in the intervention group (29.7±3.9), compared to the control group (21.0±4.7) (P<0.001). Moreover, the difference in the mean score of self-actualization before and after the test was significantly higher in the intervention group (4.5±3.5), compared to the control group (3.0±3.5) (P<0.001). According to the intragroup comparison, the mean score of self-actualization significantly increased in the posttest stage in the intervention group (P<0.001), whereas no significant difference was observed in the control group in this respect (P<0.001) (Table 4).

Discussion

The present study aimed to evaluate the effect of a SDT-based discharge program on the lifestyle and readmission of patients with heart failure. According to the results, the intervention led to a significant increase (21%) in the lifestyle score of the patients. On the other hand, no significant change was observed in the lifestyle score of the control group at the end of the study. Moreover, the number of readmissions significantly decreased in the intervention group, which was 57% lower than that in the control group. A review of the literature revealed that no similar research has been conducted to assess the effect of the SDT-based discharge program on patients with heart failure. Therefore, the researchers used the results of other studies in this area.

Foroushani Rahimi et al. (2014) carried out a health promotion intervention by providing educational booklets and following up the patients for three months after discharge. In this study, the lifestyle of the participants was assessed using the HPLP II, which showed a 22% increase in the lifestyle score of the subjects (21). Consistent with our findings, it could be expressed that the intervention used in the aforementioned study improved the lifestyle of the subjects in this age group.

In a study conducted by Eshah et al. (2013), the Health Belief Model-based educational program before discharge significantly increased motivation and adherence in the health-promoting behaviors of patients with acute coronary syndrome after discharge. In the present study, the mean scores of nutrition, health responsibility, and interpersonal relations significantly increased after the intervention leading to an increase (6%) in the lifestyle of the patients with acute coronary syndrome, which showed a significant difference (22). Meanwhile, no significant change was observed in the score of the control group.

Given an increase in the scores of all subscales in the intervention group, compared to the control group, our findings are in line with the results of the mentioned study. However, in the current study, the mean score of nutrition significantly increased in the control group after the intervention, which might be related to the education of patients with other sources regarding adherence to a healthy diet for cardiac patients.

Similarly, Eslami et al. (2018) reported that while lifestyle-based educational packages improved nutrition among overweight pregnant women after eight weeks of education, there was no significant change in their level of physical activity at the end of the study. This could be related to the short duration of education in the mentioned study (23). Despite an increase in the education duration to 12 weeks in the present study, there is still a need to increase the training duration to realize more sustainable education.

In a study performed by Faller et al. (2011) on patients hospitalized in the rehabilitation ward, the SDT-based program improved motivation and changed the lifestyle of the subjects in the counseling group in the nutrition and exercise subscales (24), which is in line with our findings. In a similar way, Holzemer et al. (2011) used special individual education based on SDT and revealed modifications in the risk factors and the lifestyle of patients with a transient ischemic attack (25).

In a study, Williams and Patrick (2012) showed that SDT and motivational interviews (a set of clinical techniques) could be both used to change health-related behaviors (e.g., nutrition and physical activity) (26). In the present study, the mentioned theory was applied to improve the lifestyle of the participants. On the other hand, Kelley et al. (2014) marked that support by family and friends led to an increase in leisure time and physical activities of the elderly (27). This could be justified by one of the most important constructs of the SDT. In this regard, a significant emphasis is made on the interpersonal relation subscale, which leads to the internalization of motivation and behavioral change.

According to a study carried out by Hemati et al. (2018) entitled "the effect of a BASNEF model-based educational intervention on the lifestyle of patients with heart failure", no significant difference was observed between the two groups in terms of the total mean lifestyle score after the intervention. Nonetheless, a significant difference was found between the groups regarding the mean scores of nutrition, sleep pattern, physical health, stress, and smoking (28).

In a study conducted by Szescenyi and Gerlach (2013), the discharge program based on the empowerment of in-home caregivers giving care to patients with heart failure significantly decreased the number of hospitalizations (29). Our findings are consistent with the results of the mentioned study regarding the fact that changing the lifestyle of patients with heart problems needs the following up of the treatment and educational programs by family of the patients who are involved in this

condition, as well as the healthcare team, especially nurses (30) in addition to the results that have shown that continuous education empowers the caregivers of such patients in re-admissions and reduces patient mortality, (31). Moreover, Waterhouse and Wheeler (2015) reported that a discharge program based on primary care through a phone call made by nursing students significantly decreased the readmission of patients with heart failure (32). Therefore, it seems that the improvement of knowledge and awareness and following up the patients after discharge could reduce the number of readmission (33). One of the major drawbacks of the present study was its intervention duration (12 weeks). Therefore, it is recommended that future studies use a longer SDT-based discharge program to obtain more accurate results.

Implications for Practice
The SDT-based discharge program increased the lifestyle score and decreased the number of hospitalizations for patients with heart failure. Given the significant importance of lifestyle in the treatment course and secondary prevention and the impact of this issue on readmission, it could be concluded that the improvement of lifestyle helps patients and increases their satisfaction with the treatment program. However, further assessments are required to determine the precise mechanism of the effect of the SDT-based discharge program on the number of readmissions. Accordingly, it is proposed that the mentioned program be used for other diseases for a longer duration to yield more accurate results on its effectiveness.

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Conflicts of Interest
The authors declare that there is no conflict of interest regarding the publication of this paper.

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