

Effectiveness of a care plan based on the Roy adaptation model for fatigue and activities of daily living of patients with heart failure disease: A randomized controlled trial

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Abstract

Abstract Rationale, aims, and objectives: Cardiac failure is one of the most common chronic diseases with high rate of morbidity and mortality. Fatigue and decreased ability to perform daily activities are of the most common complications of this disease. The purpose of this study was to determine effect of care plan based on Roy adaptation model on fatigue and daily activities in patients with heart failure. **Methods:** This clinical trial was performed on 60 heart failure patients admitted in two educational hospitals supervised by the Kerman University of Medical Sciences in 2019. Sample was randomly assigned into two intervention and control groups. The intervention group received the care plan through a face to face and group training program in 6 sessions at one month. Interval followed by a follow-up period for 4 weeks later, while the control group only received the regular services from hospital. Fatigue level was calculated based on piper fatigue scale and daily activities were calculated by Barthes scale. **Results:** finding indicated there was a significant difference between the two groups control and intervention after the intervention. Result showed that the intervention group had significantly lower mean scores in fatigue and higher mean scores in daily activities compared to the control group after intervention $P [?] .05$. There was significant relationship between fatigue and daily activities of life with frequency of hospitalization and duration of disease in both groups $P [?] .05$. **Conclusion:** Implementation of Roy model based education program as a low-cost, effective, and non-aggressive nursing intervention can affect fatigue and improve the ability to perform daily activities in patients with heart failure.

Introduction

Heart failure is regarded as the common ultimate path for all cardiac disorders ^[1]. Prevalence of heart failure is increasing in the world ^[2]. According to reports for American Heart Association in 2016, it is estimated that currently 5.7 million individuals in USA live with heart failure and annually 5500000 ones are caught by this disease ^[3]. Heart failure is also regarded as a major mortality factor in Iran, and by changing the age pyramid of society and population aging, in the near future, the current outbreak will be 3,500 patients per one hundred thousand people ^[4]. It is estimated that between 30-56.6 percent of patients with heart failure are re-admitted to the hospital at the first trimester after admission^[5].

Heart failure, in addition to imposing heavy costs on the individual and the community, has many complications and side effects for the patient. Often, these patients experience symptoms such as dyspnea, fatigue, sleep disturbances, depression, and chest pain, which limit the patient's daily social and physical activity and reduce the quality of life ^[6]. Fatigue often neglected because the relatives and the treatment team treat it as an ambiguous and indeterminate complaint. In the physical dimension, fatigue is experienced as the absence of energy and need for rest, in the cognitive dimension, there is a defect in the concentration of the senses and in the emotional dimension, it is experienced in the form of a decrease in motivation or interest ^[3]. Prevalence of fatigue in heart failure varies between 50 - 96 percent, and it is associated with increased mortality risk in patients with heart failure by 2-3 times ^[1].

Fatigue and non-tolerance of activity in these patients causes loss of independence in performing common life activities, and makes them dependent on others in self-care. Thus, it influences quality of their life. Therefore, paying attention to fatigue in patients is highly important in heart failure management programs^[7]. Meanwhile, nurses often are in the best situation for identifying symptoms of fatigue and investigating effect of these symptoms on daily performance, interpersonal relationships, and quality of life of patients^[3]. One of the solutions for clinical readiness of nurses is scientific care based on standard care models^[8]. On the other hand, using nursing theories in studies is regarded as an attempt for validating nursing theories, organizing nursing measures, and generating knowledge^[9]. Thus, diagnosis and training self-care methods and adaptation with current status, which eliminate or reduce fatigue in these patients, would be highly effective^[10]. Overall, various models and theories have been proposed in relation with adaptation with chronic diseases^[11].

Roy model is one of the nursing models that were designed for better understanding of adaptation concept^[12]. Based on Roy model, the human being is a biologic, psychological, social, and spiritual creature, which is in relation with his surrounding environment and uses adaptation mechanisms for preserving balance^[13]. “Roy” introduces this model as follows: in order to achieve this goal, the patient requires to achieve physical adaptation (physiologic dimension) and psychological adaptation in different dimensions (self-concept, role function, interdependence)^[14]. A nurse according to this model, systematically and carefully survey the patient through observation and interview. Then, she specifies the maladaptive behavior, which is in fact the patient’s problems, in four dimensions, along with the stimulus of behavior (causes), and subsequently, designs the precise educational and care plans to address the patient’s problems (maladaptive behaviors)^[11]. study of Bakan and Akyol reported that using Roy model caused increased adaptation in patients with heart failure^[15]. researchers used Roy’s Adaptation Theory in cardiac patients as a suitable tool for patient care and performing nursing measures^[16].

Considering above-mentioned material, fatigue and reduced or inability of patients with heart failure in performing daily activities are raised as maladaptive behaviors, which require nursing attention. Thus, diagnosis and training effective adaptation methods in this regard would be valuable. In Iran less studied the application of this model on fatigue and daily activities of patients with heart failure. Therefore, due to the importance of this issue the present research was designed and carried out to investigate effect of care plan based on Roy adaptation model on fatigue and daily activities of patients with heart failure.

Methods

Design

This study was approved by the Ethical Committee of the Islamic Azad University, Yazd Branch prior to the collection of data. A clinical trial in which two groups of samples were evaluated pre and post intervention in 2019. The ethical approval code is IR.IAU.YAZD.REC.1396.8.

Study Participants

To determine the sample size for the first time as a pilot, ten patients in the control group and ten patients in the intervention group were evaluated using the obtained results and the formula for comparing the mean of the final sample rates with confidence of 95%, 80% of the 30 people in each group was calculated. Participants were selected with used convenience sampling method and randomly assigned into two control ($n = 30$) and intervention groups ($n = 30$).

Inclusion and Exclusion Criteria

Inclusion criteria included all patients with heart failure disease that in duration of performing this research hospitalized for treatment, have full consciousness and their conditions were not acute, they have not been suffering from other chronic diseases and patients had not previously received any kind of formal education related to aims of this study; Exclusion criteria included abstention more than two sessions, and also no tendency for continue to participate in the research.

Measures

Background information

The first questioner included questions about demographic characteristics of participants including age, gender, marital status, educational level, number of hospitalization, job and duration of disease.

Roy Adaptation Model (RAM): To formulate a care plan in the intervention group, Roy model understanding form was used .the form for examining maladaptive behaviors in four modes of physiologic (50 question), self-concept (22 question), role function (10 question) and (8 question) for interdependence of the patient mode^[17]. The form for the verification of Roy model, which is a standard form, was confirmed in the study by^[14] using test-retest reliability test with correlation coefficient of 0.75. In this study, Cronbach's alpha method was used for determining reliability, and reliability coefficient was reported as 0.85.

Piper Fatigue Scale (PFS)

The four-dimensional fatigue scale (Behavioral / severity, Emotional, Sensory and Cognitive) consists of 27 items. Items 2-23 are calculated as eleven points out of which the total average score is based between 0-10. The higher score denotes higher level of fatigue. In addition, five end items are included for enrichment of the questionnaire, which are not calculated. Reliability of this tool was confirmed in the study by ^[18] with Pearson correlation coefficient as 0.08. In the current research, correlation was confirmed as 0.80 using Cronbach's alpha.

Barthel Index of Activities of Daily Living (BIADL)

This scale would be used to measure the performance of the patients. It had 28 items that measures one's ability in nutrition, feeding, mobility, intestinal and bladder control, using wheelchair, bed to chair transfer and vice versa, bathing, and wearing cloth. Maximum score is 112 and minimum score is 0. Scores below 20 indicate total dependency and 100 denotes independence. Higher scores denote optimal status. Reliability of tool was confirmed in study by^[17]. Reliability of this tool in the current research confirmed as 0.82 using Cronbach's alpha. The content validity of all the questionnaires were approved by 10 professors of the Kerman University of Medical Sciences.

Intervention and Data Collection

The intervention group received the care plan base Roy adaptation model of through a face to face training program in 4 sessions and group training program in 2 sessions at one month. Training program in intervention group base of Roy adaptation model in physiologic dimension for example included education appropriate and healthy nutrition, non-elimination of breakfast, adequate water drinking during the day, recommendation to eat fruits and vegetables, training required mobility, and factors affecting sleeping. In self-concept, education would be in line with creating positive change in mental image and ideal self, in dimension of interrelationships included education of participate in religious discussions and ceremonies, education in role-playing dimension included training participation in social ceremonies, and peer groups. In addition, main points of the sessions were provided with the patients in written form. The researcher followed-up implementation of care plan by the patients (intervention duration) through presence in the hospital and phone calls, and answered questions of patients. Interval followed by a follow-up period for 4 weeks later, while the control group only received the regular services from hospital.

Data Analyses

Data were analyzed with used descriptive tests including Mean, Percentage, and Standard Deviation and analytical tests including Kolmogorov-Smirnov, Pearson correlation coefficient, Independent t-test, paired t-test, Chi-square and ANOVA at significance level of P [?] .05 in SPSS software version of 20.

Ethical consideration

As regards the moral considerations included, research goals were explained and the research units were assured of the confidentiality of the information, the voluntary involvement in this research, the oral and written presentation of the research results, and the acquisition of informed consent.

Results

Finding showed majority of participants (71.9%) in both groups were within the age range 45-60. In the both groups (62.7%) were female and majority of participants (58.7%) base of education level in both groups were bachelor degree, another demographic characterized showed in Table 1. The Chi-square test showed that the intervention and control groups were no significant different base of demographic variables, $P < 0.05$, showed in Table 1. Findings indicated that care plan based on Roy adaptation model can influence maladaptive behaviors of patients with heart failure in all physiologic, self-concept, role function and interdependence modes, so that significant reduction was observed in the number of maladaptive behaviors after intervention compared to before intervention.

Results of current research showed that in relation with mean score fatigue and daily activities of life were not significant in intervention and control group before intervention, while it was significant after intervention $P < 0.05$. Pair t-test showed mean score of fatigue and daily activities in intervention group before and after intervention was significant $P < 0.01$, so that in the intervention group the mean score of fatigue were significantly decreased after intervention (3.5 ± 1.7) compared to before intervention (6.2 ± 2.2). Also in the intervention group the mean score of daily activities were significantly increased after intervention (62.2 ± 12.8) compared to before intervention (45.3 ± 11.2), showed in Table 2. T-test showed significant difference between intervention and control groups in terms of mean score of fatigue and daily activities, so that the intervention group had significantly lower mean scores in fatigue and higher daily activities after intervention compared to the control group $P < 0.01$, shows in Table 3.

The ANOVA test showed there was a significant relationship between the duration of time heart failure disease and frequency of hospitalization with fatigue in both intervention and control groups $P [?] .05$, so that, the mean score of fatigue was less than other participants in patients hospitalized twice a month because of the nature of the disease and their duration of heart failure was 5 years or less. The ANOVA test showed there was a significant relationship between the duration of time heart failure disease and frequency of hospitalization with daily activities level $P [?] .05$, so that, the mean score of daily activities level in the participants both control and intervention groups was more than other participants in the first 5 years of heart failure and hospitalization twice per month. The result showed no significant relationship was observed between another demographic characterized and variables of fatigue and daily activities in both groups.

Discussion

It is clear that adaptation of patients with long-term complications of chronic diseases had important role in controlling of disease and improve and promote of their quality of life^[14, 19]. Research findings indicated that care plan based on Roy adaptation model can influence maladaptive behaviors of patients with heart failure in all physiologic, self-concept, role function and interdependence modes, so that significant reduction was observed in the number of maladaptive behaviors after intervention compared to before intervention. This finding is in line with studies conducted by studies of ^[20-22]. They have revealed that mean score of all adaptation dimension of Roy adaptation model significantly increased after intervention. But this finding is not line with studies conducted by ^[14, 18]. that cause can be difference in research tools and cultural components. Patients with heart failure are required to perform some activities, pursue care recommendations, and change life style in order to control and avoid consequences of the disease. Thus, involving patients in implementation of these adaptation behaviors as well as change and manipulation of stimulus of maladaptive behaviors is an important factor in adaptation with heart failure disease. Therefor can be say Roy model of adaptation is one of the most widespread nursing models in coming to terms with diverse illnesses and problems.

Findings of this research showed effectiveness of the proposed care plan in improvement of patient's ability in performing daily activities in intervention group, so that significant statistical difference was observed in intervention group before and after intervention. While no significant statistical difference was observed in control group before and after intervention. This finding is in line with study conducted by^[19]with titled using Roy model on daily activities of hemodialysis patients, study of ^[23]conducted a on daily activities of

patients with MS using self-care program based on Orem's model and study of [24] with title effects of antenatal education on maternal prenatal and postpartum adaptation. They found that using nursing theories has positive effect on increasing ability to perform daily activities of patient's life. The patient's ability to perform life daily activities is one of the important indicators in order to assess the role performance compatibility that the results of this study indicate the effectiveness of the provided care plan in improving the patient's ability to perform life daily activities in the intervention group.

In the present study, results showed the mean Piper fatigue score in the pre and post intervention stage was significantly different in the intervention group in behavioral, emotional, sensory, and cognitive aspects of Piper's fatigue scale, so that mean score of fatigue in each aspect was decreased in intervention group. While no difference was observed in control group. This finding is in line with studies conducted by [4, 10, 23, 25, 26]. Various methods have been investigated for reducing fatigue in patients with heart failure. Including music and back massage [7], energy conservation techniques [3] and acupuncture [1], although these methods have helped patients with heart failure, the nature of the programs should be taken into account. That is, the more they are derived from their needs; motivation and empathy are increased in patient and family and empowers them. The present study also indicated that the implementation of a care program based on Roy adaptation model, adapted from their educational and tangible needs, is significantly effective on the fatigue of patients.

The results of this study showed that there was a significant relationship between the duration of time heart failure disease and frequency of hospitalization with fatigue in both intervention and control groups so that, the mean score of fatigue was less than other participants in patients hospitalized twice a month because of the nature of the disease and their duration of heart failure was 5 years or less. This result was consistent with similar studies performed in other chronic patients such as the studies of [18, 27]. They also reported in their studies that the more the frequency of hospitalization, the more the fatigue of individuals. According to the high prevalence of fatigue in heart failure patients because of the nature of disease, it is needed to provide necessary measures and facilities by health authorities in order to provide community-based therapeutic care, especially at home, to prevent multiple hospitalizations and increase well-being in these people.

The results of this study showed that there was a significant relationship between the duration of time heart failure disease and frequency of hospitalization with daily activities level so that, the mean score of daily activities level in the participants both control and intervention groups was more than other participants in the first 5 years of heart failure and hospitalization twice per month. This result was consistent with the results of studies by [28, 29]. Therefore, the nurses and patient's family must perform necessary interventions in order to increase life daily activities level and appropriate lifestyle patterns by increasing the disease duration through education. There was no significant relationship between other demographic features of the participants with daily activities level and fatigue in both control and intervention groups. In general, the absence of a significant relationship between some demographic information and fatigue does not mean that there is no real relationship, but the sample size of this study was not estimated to investigate these relationships. More specific studies with appropriate sample size and focus on these variables are needed to investigate these relationships.

Conclusion

Roy's nursing model allows identification of maladaptive behaviors in difference aspects and comprehensive educational planning based on the needs and stimuli of maladaptive behaviors of patient because of having need-assessment approach. In addition, this model is a non-invasive, non-pharmacological, low-cost and comprehensive method, thus it can be used as an appropriate solution for providing care and training chronic patients including patients with heart failure. Given the findings and discussions, research findings suggest that education based on Roy adaptation model can influence reduction of fatigue and promotion of daily activities of patients with heart failure. Thus, it is suggested that using Roy model is taken into account for clinical care.

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