

■ Original article

Self-care behaviors in patients with systolic heart failure

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Abstract

Background and Purpose: To improve life quality, and lower mortality and rehospitalization for heart failure patients, awareness and adherence to self-care behaviors are essential. This study aims to determine the adherence level to self-care behaviors in the patients with systolic heart failure hospitalized in Alborz hospital in Karaj and Shahriar hospital, and it was conducted in 2013.

Methods: In this cross-sectional study, 100 patients with at least one year experience of developing heart failure and ejection fraction below 40% were studied. They were admitted to Alborz Social Security hospital of Karaj and the Social Security Hospital Shahriar during 2012-2013. They were selected through convenience sampling. Demographic data and European Heart Failure Self-care Behavior questionnaires were completed through interviews. Data analysis has been done using SPSS, V.18 and independent t-test and ANOVA.

Results: 84% of the subjects had moderate and 10% had poor adherence to self-care. The best adherence to self-care behaviors was related to the drug and diet regimen and the poorest to the daily weight control and exercise. There was a significant relationship between self-care behaviors and age ($p=0.011$), marital status ($p=0.008$), the number of chronic diseases ($p=0.048$), hypertension ($p=0.038$), chronic pulmonary obstruction ($p=0.029$), renal disease ($p=0.017$) and severity of the disease ($p=0.032$).

Conclusion: Adherence to self-care behaviors in heart failure patients is not appropriate. Training and following up self-care behaviors should focus on the specific problems of aging, social support, diet and drug regimens simplification and its relation with other chronic diseases.

Keywords: Heart failure, Self-care, Drug and diet adherence

Introduction

Heart failure is a prevalent problem which is costly, debilitating and life threatening (1). The spread of this disease is turning out to range from 0.4% to 2% of the total population and from 0.16% to 2.3% of the population over 75 (2). Despite the recent developments in treating heart failure, the prognosis of this disease has still

remained poor so that half of the heart failure stricken patients die after 4 years since the disease has been diagnosed, and more than 50% of the patients with a severe kind of heart failure die in the first year after the disease diagnosis (3). Heart failure results in longer hospitalizations leading to increased health and medical costs (4). 50% of

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the patients discharged from hospital will be hospitalized up 6 months later, 70% is related to worsened symptoms (5). In the study in 197 countries, it has been divulged that for almost 98.7% of the world population, about \$108 billion is annually spent on treating heart failure patients; \$ 65 billion are spent on direct expenses and \$43 billion on indirect expenses of the treatment (6). Adherence to self-care behaviors is an effective factor in decreasing the rate of rehospitalization, Self-care is a multi-dimensional structure including lifestyle management, treating minor illnesses, managing long-term chronic diseases and care after being discharged from hospital (10). These patients require adherence to medication instructions, low-sodium diet, body exercises, and treatment cost, and mortality of the heart failure patients (7), so that adherence to self-care behaviors in patients with heart failure has resulted in decreased direct cost of a six-month treatment (8), and a 50% increase in the patients' five-year survival (9). also following preventive behaviors and monitoring their performance in terms of symptoms and signs (11).

Adherence to medication and diet involves adherence to the prescribed dose of the drug at the exact time as an important factor in improving heart failure outcomes (12). The results of Nieuwenhuis's study in 2012 revealed despite the fact that 100% of the patients had reported taking the prescribed drugs, their direct monitoring showed that only 76% of them had complete adherence to the medication diet (13). Controlling symptoms is another critical part of self-care. Raising the patients' awareness level of key body symptoms, interpreting bodily changes, taking appropriate actions, initiating treatment and receiving help in critical cases are some of the appropriate strategies for checking and adapting with chronic patients. Knowledge, interpretation and implementing suitable interventions based on the clinical symptoms are possible through frequent practice and periodic supervision by the health team (14). Another aspect of self-care behavior is

one's daily weighing at a certain time and constantly, with a fixed weighing machine and informing the doctor about gaining weight over 0.9 to 1.4 kg/day or 2.4 kg/week (15). Khoshtarash's study result in 2013 displayed that the last level of self-care behaviors followed by heart failure patients was related to their daily weighing (16). Sodium limitation is one of the significant self-care behaviors in heart failure patients. The American Heart Association has announced the acceptable sodium level in heart failure patients as 2 to 3 gr/day (17). In spite of the importance of limited low-sodium diet in treating heart failure, the patients' adherence to that is reported to be poor (18). Lennie research results in 2008 denoted that 75% of heart failure patients claimed that most of the time, they adhere to low-salt diet. But through experimenting sodium in 24-hour urine, it was revealed that only 25% of the subjects had adhered to low-salt diet (19). In heart failure patients suffering from severe hyponatremia or those with liquid suppression, despite sodium limitation and taking diuretics, water limitation less than 2 liters per day is often advised; though, the fixed liquid limitation in patients with slight symptoms is neither useful nor recommended (11). In Abootalebi's study, the behavior most adhered to heart failure patients was a limitation of liquid use (20).

Heart failure patients with body mass index over 40 kg/square meter were encouraged to lose weight (11), and these patients were instructed to have a body mass index less than 30 kg/square meter (21). In terms of activity and rest, these patients were advised to have activity for 120 m/week for 10 to 12 months after being affected by heart failure. In heart failure patients with middle severity, physical activity caused improvement in ventilation, changeability of the frequency of pulse, and increase in blood circulation (11). Shojaei in a study in 2009 suggested that 38.8% of heart failure patients had no physical activities (22). Quitting smoking is another important aspect of self-care behaviors in these patients. Smoking

cigarette is of the critical risk factors in developing heart failure. Evidence showed that smoking heart failure patients had lower life quality compared to those who did not smoke (23). In preventive part of self-care behaviors, vaccination against Pneumococcal and influenza was recommended (15) because of exacerbating heart failure symptoms after being affected by respiratory diseases like influenza and pneumonia (11). Despite the major role of self-care behaviors in preventing problems and serious outcomes of heart failure patients, the patients' adherence is poor. The results of Ngoc Huyen's study in 2011 also indicated that 50.9% of heart failure patients had poor level of self-care (24). The results of Shojaei's survey also implied that only 26% of the patients had good self-care behaviors, and three fourth of them adhered to these behaviors poorly (22). To boost life quality, decreasing mortality and rehospitalization of heart failure patients in hospital, the awareness of and adherence to self-care behaviors are necessary. Comprehensive recognition of self-care requirements and adherence to them by the patient has an effective role in designing and providing self-care plan. So, the present study has been conducted to determine the rate of adherence to self-care behaviors in systolic heart failure patients hospitalized in Alborz Social Security Hospital of Karaj and Shahryarduring 2012-2013.

Materials and Methods

The present study is a descriptive and cross-sectional one in which self-care and its related factors have been examined in 100 systolic heart failure stricken patients. This research population included all heart failure patients hospitalized in the interior unit of Alborz Social Security Hospital of Karaj and Social Security Hospital of Shahryar from early February 2012 to late December 2013. This study was a part of a correlational study. The sample size has been calculated using the correlation between the two variables with 99% reliance and 90% strength (formula: $N = (2.58 + 1.64) / c \cdot 2 + 3$); the result was 21 people. To avoid probability, to control the

intervening variables, and for more accuracy, we increased the sample size to 100 subjects.

According to the inclusion criteria (at least one year case history of suffering from heart failure, ejection fraction under %43), the samples of this study have been selected through convenience sampling from research population. Considering the inclusion criteria and explaining the general goal of the study, the assistant completed the research tool through interviewing the patients in the hospitals. The information related to left ventricular ejection fraction was derived from the patient's records. The tools used in this study were a questionnaire about demographic characteristics (age, sex, marital status, education, job) and the European questionnaire of self-care behaviors in heart failure patients designed by Jaarsma et al. in 2003. This questionnaire consisted of 12 items and the answer of each one was graded based on a 5-option Likert Scale from 1 (absolutely so) to 5 (not so at all) to determine the appropriate style of adhering to the behavior. The obtained scores from the questionnaire ranged from 12 to 60, and the lower the score, the better the self-care behavior would be. In this questionnaire, the total score was categorized as it follows: 12-28 stands for good, 29-44 average, and 45-60 poor. The scientific validity of this tool has been measured through the content validity method by Shojaei, Khoshtarash, and Abootalebi (16, 20, 22) and it was confirmed. The reliability of this tool in Shojaei's study has been verified by α -Cronbach 0.68 (22) and in Khoshtarash's research by α -Cronbach 0.71 (16). The present study tool reliability has been calculated through re-tests on 10 heart failure patients with a 10-day interval, $r = 0.84$ and internal consistency $\alpha = 0.72$.

Ethical considerations in the current study were taken into account through gaining permission from the hospital authorities in order to perform the research, explaining the objectives and methodology for each of the subjects, and taking informed consent from the subjects. SPSS software (version 18) was used for data analysis. Data have been described using the tables of frequency distribution, mean, and

standard deviation; in data analysis, independent T-test and ANOVA have been used. The significance level in this study has been considered to be less than 0.05.

Results

Demographic characteristics and treatment information about the subjects were given in Table 1. In terms of the adherence to self-care behaviors, 6% of the subjects have been placed in good category, 84% in average one, and 10% in poor category. Table 2 depicted that the best self-care behaviors were related to following up the medication and diet regimen and the poorest self-care behavior was related to controlling weight daily and exercise.

As Table 3 showed, the mean of self-care score had a significant difference according to age ($p=0.011$), marital status ($p=0.008$), the number of chronic diseases ($p=0.048$), being affected by hypertension ($p=0.038$), chronic pulmonary obstruction ($p=0.029$), renal disease ($p=0.017$) and the disease degree ($p=0.032$).

Table 1. demographic characteristics and some information related to heart failure patients

Variable	Categories	No.	%
Age	Less than 60	19	19
	61-70	44	44
	71-80	20	20
	More than 81	17	17
Sex	Male	56	56
	Female	44	44
Marital Status	Married	71	71
	Divorced and widow or widower	29	29
Education	Illiterate	53	53
	Primary school	37	37
	Secondary school and higher	10	10
Job	Employed	9	9
	Unemployed	23	23
	Retired	32	32
	Housewife	36	36
The number of chronic diseases	<1	19	19
	2	45	45
	3	26	26
	>1	10	10
chronic disease Type	Diabetes	53	53
	Hypertension	51	51
	Ischemic heart disease	77	77
	Asthma	8	8
	Chronic Pulmonary Obstructive Disease	17	17
	Gout	2	2
	Arthritis	3	3
	Renal	11	11
Degree	Hypothyroidism	2	2
	Degree 2	39	39
	Degree 3	49	49
	Degree 4	12	12

Table 2. the mean and standard deviation of self-care behavior of heart failure patients Item

Item	SD±Men	Max scores	Min scores
1 I weigh myself every day	4.8±0.6	5	1
2 If I get short of breath, I take it easy	2.6±0.9	5	1
3 If my shortness of breath increases, I contact my doctor	2.6±0.9	5	1
4 In case my feet inflammation increases, I contact my doctor	2.8±0.9	5	1
5 If I gain more than 2 kg weight in one week, I'll contact my doctor	3.9±1.3	5	1
6 I follow the limitation in taking liquids (at most 6 to 8 glasses per day)	2.5±1.3	5	1
7 I take a rest during the day	2.1±0.7	4	1
8 If I suffer from too much fatigue, I contact my doctor	3.2±1.3	5	1
9 I eat low-salt diet	1.9±0.9	5	1
10 I take my medication as prescribed	1.6±0.9	5	1
11 Every year, I do influenza vaccination	4.5±0.9	5	1
12 I exercise regularly	4.7±0.6	5	2
Total score	37.9±6.1	53	16

Table 3. the relationship between self-care behaviors & some variables in heart failure patients

Variable	Categories	Mean±Standard deviation	Test result	
Age (years)	Less than 60	35.3±6.5	F=3.393 P=0.011	
	61-70	37±5.6		
	71-80	39.2±4.8		
	More than 81	41.4±6.5		
Sex	Male	38±6.2	T=0.348	
	Female	37.6±6	P=0.728	
Marital status	Married	36.8±6.2	T=-2.717	
	Divorced and	40.4±5	P=0.008	
Education	Illiterate	38.2±6.7	F=0.489 P=0.615	
	Primary school	37.1±5.4		
	Secondary school and higher	38.8±5		
Job	Employed	37.2±7.9	F=0.278 P=0.841	
	Unemployed	38.6±5.4		
	Retired	38.1±5.2		
	Housewife	37.5±5.6		
The number of chronic diseases	1 and less	36.1±5.1	F=2.731 P=0.048	
	2	36.8±6.6		
	3	39.8±5.8		
	4 more	40.8±3.6		
chronic disease type	Diabetes	Yes	38.3±5.7	T=0.731
		No	37.4±6.5	P=0.467
	Hypertension	Yes	39.1±5.9	T=2.104
		No	36.6±5.9	P=0.038
	Ischemic Heart Disease	Yes	37.9±6	T=0.027
		No	37.8±6.5	P=0.978
	Asthma	Yes	37.3±4.3	T=-0.253
		No	37.9±6.2	P=0.801
Chronic pulmonary obstructive disease	Yes	40.8±6.8	T=2.211	
	No	37.3±5.7	P=0.029	
Gout	Yes	34.5±7.7	T=-0.795	
	No	37.9±6	P=0.429	
Arthritis	Yes	36.3±14.1	T=-0.450	
	No	37.9±5.8	P=0.654	
Renal	Yes	42±5.3	T=2.420	
	No	37.3±6	P=0.017	
Hypothyroidism	Yes	33	T=-1.149	
	No	38±6.1	P=0.253	
Degree	Degree 2	36±7	F=3.575 P=0.032	
	Degree 3	38.8±5.2		
	Degree 4	40.3±4.7		

Discussion

In the present study, 94% of the patients had average and poor self-care behavior. This finding is in line with that of Khoshtarash in 2013 revealing that only 6.1% of heart failure patients followed self-care behaviors well (16). The Ngoc Huyen's study result in 2011, also indicated that 50.9% of heart failure patients had poor adherence to self-care behaviors (24). It seems that the patients' average to poor adherence to self-care behaviors was the result of a complicated process requiring identifying different aspects and reinforcing facilitating factors.

In the current study, the highest adherence to self-care behaviors was related to following the medicinal and low-salt diet regimen. Khoshtarash's study in 2013 and Abootalebi's study in 2012 were consistent with the current study. They showed that following the doctor's medicinal order was of the best self-care behaviors in heart failure patients (16, 20). But Nieuwenhuis's study results in 2012 denoted that although 100% of the patients had reported taking the prescribed drugs, the direct monitoring of the patients disclosed that only 76% of them had really followed the medical regimen completely (13). The study of Butler et al (2004), with following up the heart failure patients after being discharged from the hospital, showed that only 80% of the patients had received angiotensin converting enzyme completely during the first 30 days; this rate even decreased to 60% at the end of the year (25). The results of Muzzarelli's study in 2010 showed that more than 25% of patients with heart failure did not follow the medical treatment (26). In regard to the adherence to the low-salt diet regimen, too, the results of Frediani in 2012 was not in line with the results obtained in the current study, which showed that only 33% of the patients would follow the low-sodium diet regimen (18). The Lennie's study in 2008 reported that 75% of heart failure patients claimed they had observed low-salt regimen most all the time but sodium examination in their 24-hour urine indicated that

only 25% of them had followed low-salt regimen (19). It seems that following the medicinal and low-salt diet regimen was not enough only by question of patients and the use of objective parameters and laboratory evaluation is necessary.

In the present study, the least self-care behaviors were related to controlling daily weight, and exercising. The results of Khoshtarash's study (2013) also showed that the least rate of adherence to self-care behaviors belonged to daily weighing (16). Although daily weighing is one of the recommended self-care behaviors, this behavior is hardly adhered to even in patients with severe symptoms. One of the reasons behind ignoring daily weighing is the patients' misunderstanding about this matter; they think that controlling weight is only for examining overweight, and they do not have enough awareness of its application in examining the body fluid. The other reason is lack of knowledge about the relationship between gaining weight and other symptoms like asthma and edema. For instance, sudden gaining weight over 3 kg caused a pain in thorax, and other important symptoms in the patient (11). The results of Jaarsma's study implied that inability in reading weight due to visual problems, lack of ability to interpret the results, not having an appropriate tool for weighing, not believing in the usefulness of weighing, and inability to stand on the weighing machine were the other preventive factors for doing daily weighing (27). This finding emphasizes the necessity of relying on and paying attention to the daily weighing in order to recognize body fluid, and control the disturbing symptoms in self-care training programs.

In this research, the patients suffering from heart failure had fewer adherences to do regular exercise and physical activity. Evidence indicated the positive effect of exercise on heart failure patients' life quality (28). But Shojaei's investigation (2009) showed that 38.8% of the heart failure patients had no physical activities (22). In Abootalebi's study (2011), also the poorest self-care behavior

adherence was related to regular physical activity (20). It seemed that this finding was probably because of asthma and fatigue in heart failure patients; these problems restricted their physical activities.

The current study results demonstrated that following self-care behaviors decreased as patients' age increased. This finding was compatible with that of other studies displaying age increase was one of the major reasons for decreased self-care of heart failure patients (29, 22). Changes due to age increase in different organs, like cardiovascular, respiratory, digestive, visual and auditory systems, simultaneously being affected by several chronic diseases and being obliged to follow several different drug and diet regimens (24), lowered motivation for learning self-care behaviors. Decline in body strength, depression, cognitive disorders, loneliness, inadequacy of social support, and low level of health literacy were some of the barriers for learning and following self-care behaviors in the elderly affected by heart failure (11).

In this study, widower and widow heart failure patients had poorer adherence to self-care behaviors compared to those with a spouse. This finding matched with the results of Abutalebi's study reporting that having a spouse is accompanied with some positive effects such as affective support and help to change lifestyle and to improve self-care behaviors, so these patients had a better ability in self-care behaviors than those who did not have a spouse (20). But in Khoshtarash's survey (2013), no relations were found between marital status and adherence to self-care behaviors (16). Self-care is a complicated behavior controlled by a combination of environmental and behavioral factors. Social support is known to be a socio-psychological factor and the facilitator of healthcare behavior. Alizadeh's study (2013) showed that in terms of receiving social support, the patients got the highest affection, tool, information and evaluation support from their spouses. Closeness and

intimacy between a couple leads to strong union as the basic and primary source of social support. Trusting and relying on their spouses, the patients know this union as a reliance to make complaints and express their grievances (30). Sebern's study (2009) stated that making decisions with the spouse played a role in following self-care behaviors and to gain assured about complying these behaviors (31). It seems that spouse has a major role in supporting and improving self-care behaviors and loneliness is also a barrier for following them.

This study revealed that enduring several chronic diseases concomitant with heart failure such as hypertension, chronic pulmonary obstruction, and renal diseases decreased adherence to self-care behaviors. This finding was the same as what resulted from the research by Shojaei et al that being affected by chronic disease complicated the process of following the treatment and self-care regimen, and patients would need more time and skill for conducting these behaviors; this matter lowered the quality of following self-care behaviors (22). In Masterson Creber's study (2013), being afflicted by diabetes, obesity, and cognitive disorders were some of the factors decreasing the adherence to self-care behaviors (32). Riegel believed that having several chronic diseases would make heart failure patients encounter problems in taking drug, following diet regimen, controlling the symptoms, and managing several chronic diseases at the same time (33). The results of Martinez-Selles's study (2004) showed that sometimes the patients had to take 9 to 12 tablets per day, and they were often not aware of the drug's purpose and effects, and this matter would make their quality of self-care behavior problematic in terms of following the medicinal treatment (34).

Carlson's study in 2001 also revealed that more than one third of heart failure patients had to follow 2 kinds of diet regimen; one third of them do 3 kinds; and 11% of them had to follow 4 kinds

of diet regimen; this matter made it difficult for them to follow this behavior (35). It seems that being affected by several chronic diseases made the patient confused, which decreased the adherence to the self-care behaviors. So, paying attention to training general look based on the chronic diseases, and simplifying the medicinal regimens and treatments is advised.

In this study, the patients suffering from higher degrees of heart failure had fewer adherences to self-care behaviors. This finding is similar to that of Abootalebi's study indicating that there was a relationship between the severity of heart failure and ability in self-care so that the patients with heart failure of degree 2 had more self-care ability (20). In Shojaei's study, also the self-care ability increased with a decrease in ejection fraction (22). It seems that probably an increase in the severity of the disease affected the patient's self-care ability with symptoms gravity and reduces performance capability.

Conclusion

Adherence to self-care behaviors is not appropriate in heart failure patients. In designing and providing self-care plan in patients with heart failure, the focus should be on the special problems of the aged people, such as cognitive problems, family members' encouragement, especially the spouses, to support the patient in learning the skills of self-care behaviors, help to simplify the drug diet; and concomitant attention to other chronic diseases in addition to heart failure. Of the limitations of this study, we can mention not conducting this study in several centers, non-accidental sampling, and subjective examining of self-care process instead of objective methods. It is recommended that other studies be conducted on examining the relationship between cognitive problems and the level of performance and adherence to self-care behaviors in the elderly patients with heart failure. Moreover, it is suggested that subjective and objective

observations of adherence to self-care behaviors in heart failure patients be compared with each other.

Conflict of interests

The authors declare that they have no competing interests.

Author's Contributions

Zeighami participated in planning, executing, statistical analysis and developing the article. Dr. Alhani contributed in examining the article and supervising its conduction and writing the plan. Manijeh Shakoor, Parvin Famani and Farzad Fahidi helped to perform the study and collect data, accompanied with Behnam Mohseni, and Ebrahim Fallah Taher Pazir.

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References

1. Meng K, Musekamp G, Seekatz G, Glatz J, Karger G, Kivus U, et al. Evaluation of a self-management patient education program for patients with chronic heart failure undergoing inpatient cardiac rehabilitation: study protocol of a cluster randomized controlled trial. *BMC Cardiovasc Disord.* 2013, 13:60:1-7. PMID: 23968340.
2. Go AS, Mozaffarian D, Roger VL, Benjamin EJ, Berry JD, Borden WB, et al. Heart disease and stroke

- statistics-2013 update: a report from the American Heart Association. *Circulation*; 127(1): e6-e245. PMID: 23239837.
3. Swedberg K, Cleland J, Dargie H, Drexler H, Follath F, Komajda M, et al. Guidelines for the diagnosis and treatment of chronic heart failure: executive summary (update 2005): The Task Force for the Diagnosis and Treatment of Chronic Heart Failure of the European Society of Cardiology. *Eur Heart J* .2005; 26(11):1115-40. PMID: 15901669.
 4. Wright SP, Verouhis D, Gamble G, Swedberg K, Sharpe N, Doughty R. Factors influencing the length of hospital stay of patients with heart failure European. *Eur J Heart Fail*.2003; 5(2): 201-9. PMID: 12644013.
 5. Gauí EM, Klein CH, Oliveira GM. Mortality due to heart failure: extended analysis and temporal trend in three states of Brazil. *Arq Bras Cardiol* .2010; 94(1): 55-61. PMID: 20414527.
 6. Cook C, Cole G, Asaria P, Jabbour R, Francis DP. The annual global economic burden of heart failure. *Int J Cardiol*. 2014; 171(3): 368-76. PMID: 24398230.
 7. Holland R, Battersby J, Harvey I, Lenaghan E, Smith J, Hay L. Systematic review of multi disciplinary interventions in heart failure. *Heart*. 2005; 91(7): 899- 906. PMID: 15958358.
 8. LeeShC, Carlson B, Riegel B. Heart failure self-care improves economic outcomes, but only when self-care confidence is high. *J Card Fail*.2007; 13(6):S75.
 9. Roger VL, Weston SA, Redfield MM, Hellermann-Homan JP, Killian J, Yawn BP, et al. Trends in heart failure incidence and survival in a community-based population. *JAMA*. 2004; 292(3): 344 -50. PMID: 15265849.
 10. Eftekhari H, Mohammad K, Tavafian S, Mirkarimi K, Ramezanzadeh A. The perceived of self-care among general people living in south of Tehran, Iran. *Iran J Epidemiol* 2009; 5 (1): 33-9 (Persian) .
 11. Riegel B, Moser DK, Anker SD, Appel LJ, Dunbar SB, Grady KL, et al. State of the science: promoting self-care in persons with heart failure: a scientific statement from the American Heart Association. *Circulation*. 2009; 120(12): 1141-63. PMID: 19720935.
 12. Molloy GJ, O'Carroll RE, Witham MD, McMurdo ME. Interventions to enhance adherence to medications in patients with heart failure: a systematic review. *Circ Heart Fail* 2012; 5(1): 126-33. PMID: 22253407.
 13. Nieuwenhuis MM, Jaarsma T, van Veldhuisen DJ, van der Wal MH. Self-reported versus 'true' adherence in heart failure patients: a study using the Medication Event Monitoring System. *Neth Heart J*. 2012; 20(7-8): 313-9. PMID: 22527915.
 14. Dickson VV, Deatríck JA, Riegel B. A typology of heart failure self-care management in non-elders. *Eur J Cardiovasc Nurs*. 2008; 7(3):171-181. PMID: 18178132.
 15. Angelidou D. Caring for the heart failure patient: Contemporary nursing interventions. *Hospital chronicles*. 2010, supplement: 1-8.
 16. Khoshtarash M, Momeni M, Ghanbari A, Salehzadeh A, Rahmatpour P. Self-care behaviors and related factors in patients with heart failure referring to medical educational center of heart in Rasht .*Holist Nurs Midwifery*. 2013; 23 (1): 22-9 (Persian).
 17. Lennie TA, Song EK, Wu JR, Chung ML, Dunbar SB, Pressler SJ, et al. Three gram sodium intake is associated with longer event-free survival only in patients with advanced heart failure. *J Card Fail*. 2011; 17(4): 325-30. PMID: 21440871.
 18. Frediani JK, Reilly CM, Higgins M, Clark PC, Gary RA, Dunbar SB. Quality and adequacy of dietary intake in a southern urban heart failure population. *J Cardiovasc Nurs*. 2013; 28(2): 119-28. PMID: 22343212.
 19. Lennie TA, Worrall-Carter L, Hammash M, Odom-Forren J, Roser LP, Smith CS, et al. Relationship of heart failure patients' knowledge, perceived barriers, and attitudes regarding low-sodium diet recommendations to adherence. *Prog Cardiovasc Nurs*. 2008; 23(1): 6-11. PMID: 18326994.
 20. Abootalebi Daryasari G, Vosooghi Karkezloo N, Mohammad Nejad E, Namadi M, AkbariKagi M. Study of the self-care agency in patients with heart failure. *Iran J Crit Care Nurs*. 2012; 4(4):203-20 (Persian).
 21. Anker SD, John M, Pedersen PU, Raguso C, Ciccoira M, DardaiE, et al. ESPEN guidelines on enteral nutrition: cardiology and pulmonology. *Clin Nutr*. 2006; 25(2): 311-318. PMID: 16697084.
 22. Shojaei F, Asemi S, NjafiarandiA, HoseiniF. Self – care behavior of patients with heart failure. *Quarterly journal of paiesh*. 2009; 8(4): 361-69 (Persian).
 23. Conard MW, Haddock CK, Poston WS, Spertus JA. Cardiovascular Outcomes Research Consortium. The impact of smoking status on the health status of

- heart failure patients. *Congest Heart Fail.* 2009; 15(2): 82-6. PMID: 19379454
24. Huyen NN, Jullamate P, Kangchai W. Factors related to Self-care Behaviors among Older Adults with Heart Failure in Thai Nguyen General Hospital, Vietnam. Proceedings of the First International Conference on Interdisciplinary Research and Development, 31 May-1 June 2011, Thailand. 2011; 7.1-7.5.
25. Butler J, Arbogast PG, Daugherty J, Jain MK, Ray WA, Griffin MR. Outpatient utilization of angiotensin-converting enzyme inhibitors among heart failure patients after hospital discharge. *J Am Coll Cardiol.* 2004; 43(11): 2036-43. PMID: 15172409.
26. Muzzarelli S, Brunner-La Rocca H, Pfister O, Foglia P, Moschovitis G, Mombelli G, et al. Adherence to the medical regime in patients with heart failure. *Eur J Heart Fail.* 2010; 12(4): 389-96. PMID: 20172940.
27. Jaarsma T¹, Halfens R, Tan F, Abu-Saad HH, Dracup K, Diederiks J. Self-care and quality of life in patient with advanced heart failure: the effect of a supportive educational intervention. *Heart Lung.* 2000; 29(5): 319-30. PMID: 10986526.
28. Abbasi A, Asaiesh H, Hosseini S, Qorbani M, Abdollahi A, Rouhi G, et al. The relationship between functional performance in patients with heart failure and quality of life (QOL). *Iran South Med J.* 2010; 13(1): 31-40 (Persian).
29. Van der Wal MH, Jaarsma T, Van Veldhuisen DJ. Noncompliance in patients with heart failure: how can we manage it? *Eur Heart J.* 2005; 7(1): 5-17.
30. Alizadeh Z, Ashktorab T, NikravanMofrad M, Zayeri F. Correlation between perceived social support and self-care behaviors among patients with heart failure. *JHPM* 2014; 3 (1): 27-34 (Persian).
31. Sebern M, Riegel B. Contributions of supportive relationships to heart failure self-care. *Eur J Cardiovasc Nurs.* 2009; 8(2): 97-104. PMID: 18706865.
32. Masterson Creber R, Topaz M, Lennie TA, Lee CS, Puzantian H, Riegel B. Identifying predictors of high sodium excretion in patients with heart failure: A mixed effect analysis of longitudinal data. *Eur J Cardiovasc Nurs.* 2014; 13(6): 549-58. PMID: 24366985.
33. Riegel B, Carlson B. Facilitators and barriers to heart failure self-care. *Patient EducCouns.* 2002; 46(4): 287-295. PMID: 11932128.
34. Martínez-Selles M, Garcia Robles JA, Munoz R, Serrano JA, Frades E, Dominguez Munoa M, et al. Pharmacological treatment in patients with heart failure: patients knowledge and occurrence of poly pharmacy, alternative medicine and immunizations. *Eur J Heart Fail.*2004; 6(2): 219-26. PMID: 14984730.
35. Carlson B, Riegel B, Moser DK. Self-care abilities of patients with heart failure. *Heart Lung.* 2001; 30(5): 351-359. PMID: 11604977.