Pakistan
Journal of Biological Sciences

Self Care Behaviors among Elderly with Chronic Heart Failure and Related Factors

[1]Ahmad-Ali Akbari Kamrani, [1]Mahshid Foroughan, [1]Zohreh Taraghi, [2]Jamshid Yazdani,
[1]Ali-reza Kaldi, [3]Nafiseh Ghanei and [3]Razieh Mokhtarpour
[1]Department of Gerontology, University of Social Welfare and Rehabilitation Sciences,
Research Center on Aging, Tehran, Iran
[2]Department of Statistic,
[3]Department of Medical Surgical Nursing,
Mazandaran University of Medical Sciences, Sari, Iran

Abstract: Self Care Behaviors (SCB) is one of the most important challenges in controlling readmission and improving the elderly patients outcomes. The aims of this study were to describe the SCB among elderly with heart failure and to assess relationships between SCB, demographic characteristics, age-related characteristics and clinical characteristics. In this cross sectional study, 184 elderly (age = 60) with heart failure were selected with convenience sampling from 4 teaching hospitals. To assess SCB, the European Heart Failure Self Care Behavior Scale was used. Its validity and reliability were confirmed (CVI = 0.97 and α = 0.74). Data was collected from patients' medical record and by interviews. The highest percentage of behaviors not performing properly (score>2), were related to self reported exercise (96.2%), receiving a flu shot (89.7%) and weight monitoring (80.5%), respectively. There was significant relationship between SCB and cognitive impairment (p<0.001), serum sodium level (p<0.001), charlson co-morbidity Index (p = 0.001), ejection fraction (p = 0.002), visual impairment (p = 0.002), sleep disorders (p = 0.003), poly-pharmacy (p = 0.004), hearing impairment (p = 0.012) and systolic blood pressure (p = 0.049). Significant relationship between SCB and age-related characteristics suggests the need to design both supportive and preventive programs among elderly with heart failure.

Key words: Elderly, heart failure, self care, health behavior

INTRODUTION

Chronic Heart Failure (CHF) is a world-wild health problem that is associated with significant morbidity and mortality. Its prevalence is rising to ≥10% among 70 years of age or older persons (McMurray *et al.*, 2012) and the overall cost of managing heart failure is estimated at least 1-2% total health care expenditure (Stewart, 2005).

The constellation of symptoms associated with CHF can impact on individuals' ability in performing every day activities of daily living and contribute to the challenge of living with the syndrome (Stromberg, 2005). The results of several studies shows that patients' self care, abilities are often far from optimal (Jaarsma *et al.*, 1993, 2013) and early readmission of older patients with high heart failure symptoms (Yu *et al.*, 2006). Non-compliance in patients with heart failure rates ranging 42-64% (Cline *et al.*, 1999) and contribute to worsening heart failure symptoms and may lead to hospitalization (Van der Wal *et al.*, 2005, 2006).

Self care behaviors among older people with heart failure are further complicated due to an increasing number of co-existing co-morbidities (Van der Wal and Jaarsma, 2008; De Geest *et al.*, 2004), age related impairment such as hearing, visual and cognitive impairment and demographic characteristics such as illiteracy (De Geest *et al.*, 2004). With adequately performing self care behaviors, up to 50% readmissions of patients will be prevented (Jaarsma *et al.*, 1993; Yu *et al.*, 2006).

Although, some studies were conducted to assess self care abilities in HF patients in our country (Abootalebi *et al.*, 2012; Adib-Hajbaghery *et al.*, 2013; Shojaei *et al.*, 2009), little is known about factors affecting self care behaviors in elderly patients. The aim of this study was to determine the self care behaviors and related factors among older people with chronic heart failure.

METHODOLOGY

This cross-sectional study is a preliminary study that is conducted to determine the predictors of self care

---

Corresponding Author: Zohreh Taraghi, Department of Genotology, University of Social Welfare and Rehabilitation Sciences,
Research Center on Aging, Tehran, Iran Fax: 98-021-22180004

behaviors among elderly with heart failure. In this study, 184 patients were selected with convenience sampling from 4 teaching hospitals located in the East, the center and the West of the Mazandaran Province in Iran. Patients were included in this study between October 2013 and January 2014, when they were hospitalized for symptomatic heart failure, confirmed by the cardiologists. Inclusion criteria were the history of at least 6 months involvement with heart failure, age ≥ 60 and being stable (1-2 days after admission). Exclusion criteria were communication problems such as severe hearing impairment with no hearing aids, speech problems and severe cognitive impairment with Abbreviated Mental Test (AMT) scores<4 (Hodkinson, 1972).

The variables were collected from patients' medical records and by interviews. Demographic variables consisted of age, gender and education level.

Age-related variables consisted of hearing, visual and cognitive status, poly-pharmacy (≥ 5 different drugs) and co-morbidities (Charlson Co-morbidity Index). Cognitive status was measured by using Iranian version of Abbreviated Mental Test (Foroughan *et al.*, 2008). In this 10-item scale, a 1 score is given to each correct answer. Its ideal cut of point has reported 6 and its sensitivity and specificity have identified 85 and 99%, respectively (Foroughan *et al.*, 2008). A score 0-3 indicates severe cognitive impairment and 4-6 indicates moderate cognitive impairment. Hearing and visual impairment obtained by taking history and patients' medical records. The severity of co-morbid conditions was assessed using the Charlson Co-morbidity Index (Charlson *et al.*, 1987) which classifies co-morbidities based on the number and seriousness of 1 year survival with higher scores indicating greater risk of death. Most diseases are assigned an index of 1 but more severe conditions are given a weight score 2, 3 or 6. All weights are summed to obtain a numeric co-morbidity score for each particular patient. For each decade >40 years of age, a score of 1 is added to that score. Because each study participant had heart failure and at least 60 years of age, the minimum score was 3.

Clinical variables consisted of left ventricular Ejection Fraction (EF), severity of disease (NYHA class), sleep status, blood pressure, Body Mass Index, number of hospitalizations during past 6 months and some biochemical characteristics of the blood. Sleep status was assessed using by participant self report and Iranian version of Epworth Daytime Sleepiness scale and its chronbach's alpha is reported 0.75 (Malakouti *et al.*, 2009). This 8-item scale measures

sleepiness on a 4-point likert scale ranging from 0 (never) to 3 (high) and a total score was calculated. The cut of point 9 or more indicates sleepiness (Malakouti *et al.*, 2009).

To assess self care behaviors, the European Heart Failure Self Care Behaviors (EHFSCB) questionnaire was used (Jaarsma *et al.*, 1993). This 12-item scale measures self care behaviors on a 5-point likert scale ranging from 1 (strongly agree) to 5 (strongly disagree). A total score is calculated by summing responses from each item and lower score indicates better self care. Its validity and reliability were confirmed by two studies in Iran (Abootalebi *et al.*, 2012; Shojaei *et al.*, 2009). In this study, its Content Validity Index (CVI) was confirmed by 10 specialist persons (cardiologist and cardiac nurse) with at least 5 years job history in the field (CVI = 0.97). Its reliability was tested by Cronbach's alpha (α = 0.74).

After taking written informed consent, each patient was interviewed by an independent data collector who was not involved in care for the patient. Data gathering was done in several stages, based on patient' endurance. This study ethically complies with the Declaration of Helsinki. In our study, Heart Failure Self Care Behaviors (HFSCB) was examined before hospitalization.

Descriptive statistics were used to characterize this sample. For factors that are known to be related to self care behaviors in other studies, univariate analysis were conducted. Normality of continuous variables was assessed by kolmogorov-smirnov test. Independent t test and ANOVA were used for data analysis. All analyses were performed with SPSS version 16.0.

RESULTS

Self care behaviors: The mean of self care scores was 31.86±8.09 (minimum 13 and maximum 54) and with 95% CI 30.68-33.04. The majority of elderly (56.5%) took care of themselves moderately (scores 29-44), 38% (70) took care well (scores 12-28) and 5.5%(10) took care improperly (scores 45-60).

Table 1 describes the results of the scoring on the separate items. The highest percentage of behaviors not performing properly (score>2) were related to self reported exercise (96.2%), receiving a flu shot (89.7%) and weight monitoring (80.5%), respectively. The highest percentage of behaviors performing well (score 1 and 2) were related to taking medication as

Table 1: Self care behaviors among elderly with CHF (N = 184)

Self care behaviors	Completely agree		Agree		Moderately agree		Disagree		Completely disagree		Mean±SD	Median
	No.	%	No.	%	No.	%	No.	%	No.	%		
I weight myself every day	3	1.6	33	17.9	42	22.8	45	24.5	61	33.2	3.69±1.15	4
If I get short of breath, take it easy	33	17.9	87	47.3	33	17.9	24	13.0	7	3.8	2.37±1.04	2
If my shortness of breath increases, I contact my doctor or nurse	92	50.0	64	34.8	20	10.9	4	2.2	4	2.2	1.71±0.09	1.5
If my feet/legs become more swollen than usual, I contact my doctor or nurse	42	22.8	63	34.2	37	20.1	20	10.9	22	12.0	2.54±1.28	2
If I gain 2 kg in 1 week, I contact my doctor or nurse	30	16.3	51	27.7	35	19.0	29	15.2	39	21.2	2.97±1.39	3
I limit the amounts of fluids I drink (no more than 1.5-2 L day^{-1})	63	34.2	49	26.6	39	21.2	27	14.7	6	3.3	2.26±1.17	2
I take a rest during the day	86	46.7	77	41.8	17	9.2	2	1.1	2	1.1	1.67±0.77	2
If I experience increased fatigue, I contact my doctor or nurse	29	15.8	52	28.3	39	21.2	33	17.9	31	16.8	2.91±1.33	3
I eat a low salt diet	133	71.2	23	12.5	15	8.2	12	6.5	3	1.6	1.54±1.001	1
I take my medication as prescribed	154	83.7	20	10.9	5	2.7	3	1.6	2	1.1	1.25±0.68	1
I get a flu shot every year	10	5.4	9	4.9	12	6.5	18	9.8	135	73.4	4.40±1.15	5
I exercise regularly	2	1.1	5	2.7	11	6.0	26	14.1	140	76.1	4.61±0.8	5

Table 2: Mean of self care behaviors scores among elderly with CHF related to demographic characteristics (N = 184)

	Demographic characteristics		Self care scores		
Variables	No.	%	(Mean±SD)	Type of test	Results of test
Age (years)					
60-75	128	70.0	30.92±8.33	Independent	p = 0.018
76-94	56	30.0	33.96±7.14	t-test	t = -2.38
Gender					
Female	113	61.4	32.65±7.98	Independent	p = 0.095
Male	71	38.6	30.60±8.15	t-test	t = 1.68
Education level					
Illiterate	137	74.5	32.49±7.93	One way	p = 0.215
Under diploma	39	21.2	29.84±8.71	ANOVA	F = 1.54
Diploma or higher	8	4.3	32.50±7.01		

Table 3: Mean of self care behaviors scores among elderly with CHF regarding to age-related characteristics (N = 184)

	Age-related characteristics		Self care scores		
Variables	No.	%	(Mean±SD)	Type of test	Results
Cognitive impairment (AMT<7)					
Yes	109	59	34.01±7.56	Independent	p<0.001
No	75	41	28.73±7.85	t-test	t = 4.58
Charlson comorbidity index					
3-6	71	38.5	29.63±8.4	Independent	p = 0.003
6-12	113	61.5	33.26±7.59	t-test	t = -3.02
Poly-pharmacy					
Yes	147	80	30.98±8.02	Independent	p = 0.004
No	37	20	35.45±7.42	t-test	t = -2.92
Visual impairment					
Yes	89	48	37.77±7.74	Independent	p = 0.002
No	95	52	30.07±8.03	t-test	t = 3.17
Hearing impairment					
Yes	63	34	33.93±7.46	Independent	p = 0.012
No	121	66	30.78±8.22	t-test	t = 2.54

Table 4: Comparison of bio-chemical characteristics among elderly with good care (12-28 scores) and no good care (29-60 scores)

	Good care	No good care	
Biochemicals	--------------- (Mean±SD) ---------------		p-value
Sodium	137.82±3.38	140.17±3.79	<0.001
Potassium	4.28±0.58	4.45±0.69	0.106
Creatinin	1.30±0.87	1.40±0.87	0.441
Urea	38.41±16.7	37.74±16.11	0.870
BUN	36.80±19.31	34.37±22.12	0.723
FBS	145.41±77.56	132.03±70.01	0.236
Cholesterol	172.58±48.38	162.94±44.5	0.247
Triglyceride	164.07±130.24	124.41±61.71	0.128
Hemoglobin	11.34±2.23	11.48±1.94	0.666

BUN: Blood urea nitrogen, FBS: Fasting blood sugar

prescribed (94.6%), contact their doctor if shortness of breath increases (84.8%) and adherence of low salt diet (83.7%).

Demographic characteristics: In this study, 61.4% of participants (113) were female and 38.6% (71) were male. 70% of elderly (128) were in the 60-75 year age group, 29% (54) were in the 75-90 year age group and 1% (2) were in the 90-94 year age group. The mean age in women and men were 70.7±8.35 and 70.01±8.99, respectively (p = 0.595).

The mean of self care scores was lower among younger than older, significantly (p = 0.018). There was not significant relationships between self care scores, gender and education level (Table 2).

Age-related characteristics: Self care behaviors were better among elderly without cognitive impairment (p<0.001) without visual impairment (p = 0.002) and without hearing impairment (p = 0.012). Elderly with poly-pharmacy, who took 5 different drugs or more, took care of themselves better than elderly without (p = 0.004) (Table 3).

Among elderly in the 75-94 year age group, odds ratio of visual impairment was 1.27 (95% CI 0.82-1.96) compared to elderly in the 60-75 year age group (p = 0.275). In addition, odds ratio of hearing impairment was 1.98 (95% CI 1.3-3.02) (p = 0.002) and odds ratio of cognitive impairment was 2.11 (95% CI 1.24-3.57) (p = 0.003).

Clinical characteristics: There was not significant correlation between biochemical characteristics of the blood and self care behaviors scores, except for serum sodium level (p<0.001) (Table 4).

The mean of Charlson co-morbidity index and systolic blood pressure were lower among elderly with good care, compared to no good care, significantly (p = 0.001 and p = 0.049, respectively) (Table 5). In addition, the mean of self care behaviors scores were lower among elderly with ischemic heart disease (p<0.001), elderly with ejection fraction 40%

Table 5: Comparison of some characteristics among elderly with good care and no good care

Variables	Good care ---------- (Mean±SD) ----------	No good care	p-value
No. of HF hospitalization during past 6 months	1.84±1.59	2.20±2.32	0.364
Charlson comorbidity index	6.01±1.67	6.86±1.71	0.001
Systolic blood pressure	117.54±15.28	123.10±20.14	0.049
Diastolic blood pressure	73.40±8.93	72.45±13.2	0.596
Body mass index	26.28±4.49	25.85±4.33	0.537
Epworth daily sleepiness scores	7.74±4.15	8.25±4.12	0.425

Table 6: Mean of self care behaviors scores among elderly with CHF related to clinical characteristics

Variables	Clinical characteristics No.	%	Self care scores (Mean±SD)	p-value
Ejection fraction				
<40%	100	54	33.58±8.14	0.002
40% or higher	84	46	29.82±7.59	
NYHA class				
II	22	12	34.18±6.6	0.217
III	88	47.8	31.00±8.7	
IV	74	40.2	32.17±7.66	
Sleep disorders				
Yes	77	42	33.93±8.22	0.003
No	107	58	30.37±7.69	
Hypertension				
Yes	110	60	32.75±7.97	0.072
No	74	40	30.55±8.14	
Ischemic heart disease				
Yes	108	58.5	29.48±7.26	<0.001
No	76	41.5	35.25±8.05	
Anemia (Hg <12)				
Yes	107	58	32.73±8.27	0.084
No	77	42	30.64±7.72	
Overweight (BMI >25)				
Yes	95	52	31.61±8.01	0.662
No	89	48	32.13±8.16	
Diabetes				
Yes	90	49	31.65±8.46	0.733
No	94	51	32.06±7.76	
Renal problems				
Yes	18	10	31.44±6.38	0.818
No	166	90	31.79±8.27	
Gastrointestinal problems				
Yes	13	7	35.61±8.13	0.083
No	171	93	31.57±8.04	

or higher (p = 0.002) and elderly without sleep disorders (p = 0.003), significantly (Table 6).

DISCUSSION

Self care behaviors: In this study, the highest percentage of behaviors not performing properly were related to self reported exercise (96.2%), receiving a flu shot (89.7%) and weight monitoring (80.5%), respectively. The results of a study that performed in 15 countries worldwide showed following results; low rates of exercise from 36% in one of the samples in Germany to 90% in of the Italian samples, not getting an annual flu shot in 16-75% patients and not weighting daily in 24% (Australian samples) to 95% patients (Hong Kong samples) (Jaarsma *et al.*, 2013).

Lower rates of exercise among older people in this study may be due to nearly high occurrence of ischemic heart disease (58.5%) among our participants. In addition, a significant part of them (40.2%) was in NYHA class IV. According to the current guidelines, to achieve the modest breathlessness during exertion is advised at least 20 min, minimum of three times a week (Lainscak *et al.*, 2011). Environments that are safe, have walkable spaces or feature age-appropriate exercise equipment and activities that help to facilitate adherence to regular exercise (Rodiek and Schwarz, 2005). Although, access to health promotion activities such as exercise classes is important, access alone will not improve adherence to exercise (Becker *et al.*, 2005). Other factors associated with exercise adherence may include demographics (gender, education), mental health, cognitive status, psychosocial factors such as motivation (Resnick and D´Adamo, 2011).

Lower rates of getting an annual flu shot, in this study, is probably related to their poor literacy and unawareness of the risks of influenza complications or unawareness of the relationship between the flu and deterioration of HF (Jaarsma *et al.*, 2013). In addition, the patients aren't routinely reminded to get a flu shot by their primary provider (Krum *et al.*, 2011; Li and Liu, 2009).

Demographic characteristics: The results of this study showed no significant relationship between education level and self care behaviors. This finding is consistent with the finding of some studies (Dunlay *et al.*, 2011; Chriss *et al.*, 2004; Huyen *et al.*, 2011), however, in a similarly designed cross sectional studies, other researchers found significant relationship between these variables (Shojaei *et al.*, 2009; Abootalebi *et al.*, 2012; Rockwell and Riegel, 2001; Riegel *et al.*, 2009). Low literacy has been reported in 27-54% patients with HF (Laramee *et al.*, 2007; Morrow *et al.*, 2006; Dewalt *et al.*, 2006). Individuals with inadequate literacy and chronic conditions such as HF may be at increased risk for poor self care (Evangelista *et al.*, 2010; Wolf *et al.*, 2005; Dennison *et al.*, 2011), increased hospital admissions (Baker *et al.*, 2002) and increased mortality (Baker *et al.*, 2007). In our study, the majority of participants (74.5%) were illiterate. The relative low sample size and likely good social support from family members or friends may be contribute in this no relationship between education level and self care behaviors.

The mean of self care scores were lower among men, compared to women but there was not significant relationship. No significant relationship between gender and self care behaviors, in this study, is consistent with some studies (Abootalebi *et al.*, 2012; Huyen *et al.*, 2011;

Rockwell and Riegel, 2001; Riegel *et al.*, 2009; Gallagher *et al.*, 2011) and is contrast with the other ones (Shojaei *et al.*, 2009; Dunlay *et al.*, 2011; Chriss *et al.*, 2004). Higher self care scores in women, in this study, may be due to more low education level, more housekeeping activities and less opportunity to carry out appropriate self care.

Age-related characteristics: The results of this study showed that young elderly took care of themselves better than old ones. This finding is consistent with the finding of some studies (Van der Wal and Jaarsma, 2008; Cocchieri *et al.*, 2014) and is contrast with the other ones (Evangelista *et al.*, 2003; Dunlay *et al.*, 2011). Decreased self care ability may be due to increasing visual and hearing impairment with age, loss of depth perception, impaired visual contrast and decreased vision with age, these factors may cause HF self care more difficult. It can affect activities such as reading medication names and learning new materials those are reading based (Moser and Watkins, 2008). Daily weighing is difficult for those with impaired vision and balance (Timiras, 2007). Hearing impairment may also make problems related to communication with health professional and resulted in poor self care (De Geest *et al.*, 2004).

With increasing of age, probability of cognitive impairment is increased. In our study, the mean of self care behaviors scores was better among elderly without cognitive impairment. Chronic HF increases the odds for cognitive impairments two fold after controlling for other known risk factors (Cacciator *et al.*, 1998). Although, further studies are needed to explore the potential mechanisms, lowering EF, hypo-oxygenation of brain vessels and factors indirectly link to heart failure such as poly-pharmacy, sleep disorders, nutritional deficiencies and depression could be related to cognitive impairment in HF (Riegel *et al.*, 2002).

Surprisingly, the mean of self care behavior scores was better among elderly with poly-pharmacy than elderly without poly-pharmacy. Poly-pharmacy is a worrisome problem in view of the increased risk for adverse events and non-adherence (De Geest *et al.*, 2004). In this study, the type of taken drugs had not been registered and poly-pharmacy may be related to supplement and minerals consumption.

The mean of Charlson Co-morbidity Index among elderly with good care was lower than elderly without. The presence of co-morbidities, especially if symptoms are similar to those of heart failure, makes difficult the recognition and subsequent management of symptoms (Moser and Watkins, 2008; Macinnes, 2008).

Clinical characteristics: In this study, the mean of systolic blood pressure and serum sodium level were lower among elderly with good care than elderly without. Control of blood pressure is important in prevention of heart failure (Pocock *et al.*, 2006). The hypertension in the very old Trial (HYVET) is the first study that clearly demonstrated the benefits of anti-hypertensive therapy in older patients. In that study, lowering BP in patients with hypertension (mean age 84 years) lowered the risk of both stroke and all-cause mortality (Beckett *et al.*, 2008). Hyponatremia is one the negative prognostic factors in HF (Pocock *et al.*, 2006). Multiple studies have shown that hyponatremia in patients with heart failure is an independent predictor of mortality and repeated hospitalizations for de-compensation (Klein *et al.*, 2005; Gheorghiade *et al.*, 2007; Aronson *et al.*, 2014). The results of a large study among 6,55,493 patients with non-dialysis-dependent chronic kidney disease showed the association of serum sodium level with mortality was U-shaped and the lowest mortality was seen in patients with sodium level of 140 mEq L^{-1} and both lower and higher levels showed significant associations with increased mortality (Kovesdy *et al.*, 2012). In our study, although the mean of serum sodium level was within the normal range, it was lower 140 mEq L^{-1} among elderly with good care. This may be due to consumption of diuretics or strict dietary sodium restriction. Sodium determines body fluid volume and therefore sodium restriction might be beneficial (Lainscak *et al.*, 2011). But strict sodium restriction can be harmful through hypovolemia and increased neuro-hormonal activities (Konerman and Hummel, 2014).

There was significant difference between ejection fraction among elderly with and without good care. But there was not significant difference between NYHA class among elderly with and without good care. This finding is consistent with the findings of some studies (Chriss *et al.*, 2004; Gallagher *et al.*, 2011) and is contrast with the other ones (Rockwell and Riegel, 2001; Riegel *et al.*, 2009). In a large study, among 7599 patients with HF left ventricular ejection was more powerful predictor than NYHA class, for CV death/HF hospitalization (Pocock *et al.*, 2006).

In this study, the mean of self care behaviors scores was lower among elderly with ischemic heart disease than elderly without. But the mean of self care behaviors scores was higher among elderly with hypertension and anemia than elderly without. Although, presence of co-morbidities makes the recognition and subsequent management of symptoms difficult, the results of some studies showed that they correlate with good care (Artinian *et al.*, 2002; Riegel *et al.*, 2007). Occurrence of

chest pain and fear of myocardial infarction may be resulted in better self care behaviors among elderly with ischemic heart disease.

CONCLUSION

In this study, some clinical and age-related characteristics had a negative effect on self care behaviors. Interventions to improve self care behaviors among elderly with heart failure should target both clinical and age-related characteristics, as the synergistic effects of these factors may lead to greater health risks in this population. Following suggestions may be resulted in better SCB among elderly with heart failure:

- Regularly assessment of hearing, visual and cognitive status of older people with heart failure
- Using of teaching material with bigger font size, speaking slower and repeating several times
- Development of enriched environment in order to stimulate all of the sensory organs
- Motivational interviewing in order to persuade regularly physical activity and proper nutrition
- Supervision and control of cardiovascular risk factors such as hypertension
- Social support both behalf of family members and professional health care

ACKNOWLEDGMENT

REFERENCES

Abootalebi, G., N. Vosooghi, E.M. Nejad, M. Namadi and M.A. Kaji, 2012. Study of the self-care agency in patients with heart failure. Iran. J. Crit. Care Nursing, 4: 203-208.

Adib-Hajbaghery, M., F. Maghaminejad and A. Abbasi, 2013. The role of continuous care in reducing readmission for patients with heart failure. J. Caring Sci., 2: 255-267.

Aronson, D., W. Darawsha, M. Promyslovsky, M. Kaplan and Z. Abassi *et al.*, 2014. Hyponatraemia predicts the acute (type 1) cardio-renal syndrome. Eur. J. Heart Fail., 16: 49-55.

Artinian, N.T., M. Magnan, M. Sloan and M.P. Lange, 2002. Self-care behaviors among patients with heart failure. Heart Lung: J. Acute Crit. Care, 31: 161-172.

Baker, D.W., J.A. Gazmararian, M.V. Williams, T. Scott and R.M. Parker *et al.*, 2002. Functional health literacy and the risk of hospital admission among medicare managed care enrollees. Am. J. Pub. Health, 92: 1278-1283.

Baker, D.W., M.S. Wolf, J. Feinglass, J.A. Thompson, J.A. Gazmararian and J. Huang, 2007. Health literacy and mortality among elderly persons. Arch. Internal Med., 167: 1503-1509.

Becker, D.M., L.R. Yanek, W.R. Johnson, D. Garrett and T.F. Moy *et al.*, 2005. Impact of a community-based multiple risk factor intervention on cardiovascular risk in black families with a history of premature coronary disease. Circulation, 111: 1298-1304.

Beckett, N.S., R. Peters, A.E. Fletcher, J.A. Staessen and L. Liu *et al.*, 2008. Treatment of hypertension in patients 80 years of age or older. N. Eng. J. Med., 538: 1887-1898.

Cacciator, F., P. Abete, N. Ferrara, C. Calabrese and C. Napoli *et al.*, 1998. Congestive heart failure and cognitive impairment in an older population. Osservatorio Geriatrico Campano study group. J. Am. Geriatr. Soc., 46: 1343-1348.

Charlson, M.E., P. Pompei, K.L. Ales and C.R. Mackenzie, 1987. A new method of classifying prognostic comorbidity in longitudinal studies: Development and validation. J. Chron. Dis., 40: 373-383.

Chriss, P.M., J. Sheposh, B. Carlson and B. Riegel, 2004. Predictors of successful heart failure self-care maintenance in the first three months after hospitalization. Heart Lung: J. Acute Crit. Care, 33: 345-353.

Cline, C.M.J., A.K. Bjorck-Linne, B.Y.A. Israelsson, R.B. Willenheimer and L.R. Erhardt, 1999. Non-compliance and knowledge of prescribed medication in elderly patients with heart failure. Eur. J. Heart Fail., 1: 145-149.

Cocchieri, A., B. Riegel, F. D'Agostino, G. Rocco, R. Fida, R. Alvaro and E. Vellone, 2014. Describing self-care in Italian adults with heart failure and identifying determinants of poor self-care. Eur. J. Cardiovasc. Nursing. 10.1177/1474515113518443

De Geest, S., E. Steeman, M.E. Leventhal, R. Mahrer-Imhof and B. Hengartner-Kopp *et al.*, 2004. Complexity in caring for an ageing heart failure population: Concomitant chronic conditions and age related impairments. Eur. J. Cardiovasc. Nursing, 3: 263-270.

Dennison, C.R., M.L. McEntee, L. Samuel, B.J. Johnson, S. Rotman, A. Kielty and S.D. Russell, 2011. Adequate health literacy is associated with higher heart failure knowledge and self-care confidence in hospitalized patients. J. Cardiovasc. Nursing, 26: 359-367.

Dewalt, D.A., R.M. Malone, M.B. Bryant, M.C. Kosnar and K.E. Corr *et al.*, 2006. A heart failure self-management program for patients of all literacy levels: A randomized, controlled trial. BMC Health Serv. Res., Vol. 6. 10.1186/1472-6963-6-30

Dunlay, S.M., J.M. Eveleth, N.D. Shah, S.M. McNallan and V.L. Roger, 2011. Medication adherence among community-dwelling patients with heart failure. Mayo Clin. Proc., 86: 273-281.

Evangelista, L.S., K.D. Rasmusson, A.S. Laramee, J. Barr and S.E. Ammon *et al.*, 2010. Health literacy and patient with heart failure-Implications for patient care and research: A consensus statement of the Heart Failure Society of America. J. Card. Fail., 16: 9-16.

Evangelista, L.S., L.V. Doering, K. Dracup, C. Westlake, M. Hamilton and G.C. Fonarow, 2003. Compliance behaviors of elderly patients with advanced heart failure. J. Cardiovasc. Nursing, 18: 197-208.

Foroughan, M., Z. Jafari, P. Shirinbayan, Z.G. Magham and M. Rahgozar, 2008. Standardizing of abbreviated mental test and its correlation with mini mental state examination test. Proceedings of the Third Congress of Aging Issues in Iran and other Countries, February 25-27, 2008, Tehran, Iran.

Gallagher, R., M.L. Luttik and T. Jaarsma, 2011. Social support and self-care in heart failure. J. Cardiovasc. Nursing, 26: 439-445.

Gheorghiade, M., W.T. Abraham, N.M. Albert, W. Gattis Stough and B.H. Greenberg *et al.*, 2007. Relationship between admission serum sodium concentration and clinical outcomes in patients hospitalized for heart failure: An analysis from the OPTIMIZE-HF registry. Eur. Heart J., 28: 980-988.

Hodkinson, H.M., 1972. Evaluation of a mental test score for assessment of mental impairment in the elderly. Age Aging, 1: 233-238.

Huyen, N.N., P. Jullamate and W. Kangchai, 2011. Factors related to self-care behaviors among older adults with heart failure in Thai Nguyen general hospital, Vietnam. Proceedings of the 1st International Conference on Interdisciplinary Research and Development, May 31-June 1, 2011, Thailand, pp: 7.1-7.5.

Jaarsma, T., A. Stromberg, J. Martensson and K. Dracup, 1993. Development and testing of the European heart failure self-care behaviour scale. Eur. J. Heart Fail., 5: 363-370.

Jaarsma, T., A. Stromberg, T. Ben Gal, J. Cameron and A. Driscoll *et al.*, 2013. Comparison of self-care behaviors of heart failure patients in 15 countries worldwide. Patient Educ. Counseling, 92: 114-120.

Klein, L., C.M. O'Connor, J.D. Leimberger, W. Gattis-Stough and I.L. Pina *et al.*, 2005. Lower serum sodium is associated with increased short-term mortality in hospitalized patients with worsening heart failure: Results from the outcomes of a prospective trial of intravenous milrinone for exacerbations of chronic heart failure (OPTIME-CHF) study. Circulation, 111: 2454-2460.

Konerman, M.C. and S.L. Hummel, 2014. Sodium restriction in heart failure: Benefit or harm? Curr. Treat. Options Cardiovasc. Med., Vol. 16. 10.1007/s11936-013-0286-0078

Kovesdy, C.P., E.H. Lott, J.L. Lu, S.M. Malakauskas, J.Z. Ma, M.Z. Molnar and K. Kalantar-Zadeh, 2012. Hyponatremia, hypernatremia and mortality in patients with chronic kidney disease with and without congestive heart failure. Circulation, 125: 677-684.

Krum, H., M.V. Jelinek, S. Stewart, A. Sindone and J.J. Atherton, 2011. Update to national heart foundation of Australia and cardiac society of Australia and New Zealand guidelines for the prevention, detection and management of chronic heart failure in Australia, 2006. Med. J. Aust., 194: 405-409.

Lainscak, M., L. Blue, A.L. Clark, U. Dahlstrom and K. Dickstein *et al.*, 2011. Self-care management of heart failure: Practical recommendations from the patient care committee of the heart failure association of the European society of cardiology. Eur. J. Heart Fail., 13: 115-126.

Laramee, A.S., N. Morris and B. Littenberg, 2007. Relationship of literacy and heart failure in adults with diabetes. BMC Health Serv. Res., Vol. 7. 10.1186/1472-6963-7-98

Li, Y.C. and C.M. Liu, 2009. Threat-responsiveness and the decision to obtain free influenza vaccinations among the older adults in Taiwan. BMC Public Health, Vol. 9. 10.1186/1471-2458-9-275

Macinnes, J., 2008. Factors affecting self-care in heart failure: A literature review. Br. J. Card. Nursing, 3: 293-299.

Malakouti, S.K., M. Foroughan, M. Nojomi, M.F. Ghalebandi and T. Zandi, 2009. Sleep patterns, sleep disturbances and sleepiness in retired Iranian elders. Int. J. Geriatr. Psych., 24: 1201-1208.

McMurray, J.J., S. Adamopoulos, S.D. Anker, A. Auricchio and M. Bohm *et al.*, 2012. ESC guidelines for the diagnosis and treatment of acute and chronic heart failure 2012 the task force for the diagnosis and treatment of acute and chronic heart failure 2012 of the European society of cardiology. Developed in collaboration with the Heart Failure Association (HFA) of the ESC. Eur. Heart J., 33: 1787-1847.

Morrow, D., D. Clark, W. Tu, J. Wu, M. Weiner, D. Steinley and M.D. Murray, 2006. Correlates of health literacy in patients with chronic heart failure. Gerontologist, 46: 669-676.

Moser, D.K. and J.F. Watkins, 2008. Conceptualizing self-care in heart failure: A life course model of patient characteristics. J. Cardiovasc. Nursing, 23: 205-218.

Pocock, S.J., D. Wang, M.A. Pfeffer, S. Yusuf and J.J.V. McMurray *et al.*, 2006. Predictors of mortality and morbidity in patients with chronic heart failure. Eur. Heart J., 27: 65-75.

Resnick, B. and C. D'Adamo, 2011. Factors associated with exercise among older adults in a continuing care retirement community. Rehabil. Nursing, 36: 47-53.

Riegel, B., A. Driscoll, J. Suwanno, D.K. Moser and T.A. Lennie *et al.*, 2009. Heart failure self-care in developed and developing countries. J. Cardiac Fail., 15: 508-516.

Riegel, B., B. Carlson, Z. Kopp, B. LePetri, D. Glaser and A. Unger, 2002. Effect of a standardized nurse case-management telephone intervention on resource use in patients with chronic heart failure. Arch. Internal Med., 162: 705-712.

Riegel, B., V.V. Dickson, L.R. Goldberg and J.A. Deatrick, 2007. Factors associated with the development of expertise in heart failure self-care. Nursing Res., 56: 235-243.

Rockwell, J.M. and B. Riegel, 2001. Predictors of self-care in persons with heart failure. Heart Lung: J. Acute Crit. Care, 30: 18-25.

Rodiek, S. and B. Schwarz, 2005. The Role of the Outdoors in Residential Environments for Aging. Haworth Press, USA., ISBN-13: ISBN-13: 978-0789032447, Pages: 294.

Shojaei, F., S. Asemi, A. Njafiarandi and F. Hoseini, 2009. Self-care behaviour of patients with heart failure. Q. J. Paiesh, 8: 361-369.

Stewart, S., 2005. Financial aspects of heart failure programs of care. Eur. J. Heart Fail., 7: 423-428.

Stromberg, A., 2005. The crucial role of patient education in heart failure. Eur. J. Heart Fail., 7: 363-369.

Timiras, P.S., 2007. Physiological Basis of Aging and Geriatrics. 4rd Edn., Informa Healthcare USA. Inc., New York, USA., ISBN-13: 978-0849373053, Pages: 536.

Van der Wal, M.H.L. and T. Jaarsma, 2008. Adherence in heart failure in the elderly: Problem and possible solutions. Int. J. Cardiol., 125: 203-208.

Van der Wal, M.H.L., T. Jaarsma and D.J. van Veldhuisen, 2005. Non-compliance in patients with heart failure; how can we manage it? Eur. J. Heart Fail., 7: 5-17.

Van der Wal, M.H.L., T. Jaarsma, D.K. Moser, N.J.G.M. Veeger, W.H. van Gilst and D.J. van Veldhuisen, 2006. Compliance in heart failure patients: The importance of knowledge and beliefs. Eur. J. Heart Fail., 27: 434-440.

Wolf, M.S., J.A. Gazmararian and D.W. Baker, 2005. Health literacy and functional health status among older adults. Arc. Int. Med., 165: 1946-1952.

Yu, D.S.F., D.R. Thompson and D.T.F. Lee, 2006. Disease management programmes for older people with heart failure: Crucial characteristics which improve post-discharge outcomes. Eur. Heart J., 27: 596-612.