Perceived Benefits and Barriers to Sodium Restriction among Patients with Heart Failure in Vietnam: A Pilot Study Findings

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Abstract

Background: Non-adherence to sodium restricted diet has been observed in many patients with heart failure (HF) around the world. About 99% of the adult Vietnamese population consumes the double amount of table salt than recommended 5 g per day by the World Health Organization. Therefore, the study aimed to investigate perceived benefits and barriers to sodium restriction including associated factors in Vietnamese patients with HF. **Methodology:** The cross-sectional descriptive study, collected data with the interviewed questionnaires including demographic characteristics and clinical information, Belief about Dietary Compliance Scale, the Dutch Heart Failure Knowledge Scale, New York Heart Association Functional Classification, and the Dietary Salt Reduction Self-Care Behavior Scale. **Results:** A total of 58 patients with HF were included when the mean score of sodium restriction behavior recorded was 32.93 ± 4.66. The total perceived benefit score was 28.72 ± 4.75, whereas the total perceived barrier score was 14.21 ± 2.02. The patients with ≥ 12 months of HF duration had a significantly higher level of perceived benefits on sodium restriction than the shorter HF duration (p=0.001). Moreover, a significant positive correlation between perceived benefits score and behavior of sodium restriction (r=0.534; p<0.001) was found, whereas a negative correlation between perceived barriers score and sodium restriction behavior was evident (r=-0.453; p<0.001). **Conclusion:** The current findings supported that the Vietnamese people with HF who perceived more benefits and less barriers to sodium restriction had the better sodium restriction behavior. This information is helpful for nurses and other health care providers in the HF setting to implement tailored interventions aiming to increase perceived benefits/reduce perceived barriers, especially among people with early HF duration.

Key Words: heart failure, sodium restriction, perceived benefit, perceived barrier, health beliefs

1. Introduction

Heart failure (HF) is a global pandemic with an estimated burden of 64.3 million (Global Burden Disease Collaborators, 2018). It is a complex clinical syndrome resulting from structural or functional cardiac disorders, when the ability of the ventricles to fill with or eject blood is impaired (Yancy et al., 2013). In Vietnam, cardiovascular diseases are the largest cause of non-communicable disease, accounting for about 40% of all deaths (Alwan, Armstrong, Cowan, Riley, & World Health Organization, 2011; Vietnam Ministry of Health, 2016). Although there has not been any officially published research about the prevalence of heart failure in Vietnam, it has been estimated about 0.3 to 1.6 million people with HF (Phuong & Tung, 2019). As a primary diagnosis, HF accounts for 15% of total hospitalizations (Reyes et al., 2016).

HF imposes a huge burden not only in terms of physical and psychosocial but also in social and economic aspects (Jaarsma, Johansson, Ågren, & Strömberg, 2010). An average cost of hospitalization due to HF has reported

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to be $1000 in Vietnam (Reyes et al., 2016). The most extensive issues identified are the physical limitations upon losing energy, high fatigue, and shortness of breathing/difficulty breathing (Thomas & Clark, 2011).

In the emotional aspect, fears of death, isolation, feeling burden, and depression are known to be prevalent among the patients. Therefore, the prevention or management of conditions using medical, psychological and dietary approaches are vital.

Salt-restricted diet among people with HF in Vietnam is a concern for healthcare providers as 99% of the adult population had a salt intake higher (9.9 g) than the WHO recommendation of 5 g of salt per day (Jensen et al., 2018). About 80% is consumed as table salt or sodium-contained condiments at home (Do, 2014). This is a matter of worry because an excessive sodium intake has been identified as one of the leading precipitating factors of HF decompensation (Arcand et al., 2011; Diaz et al., 2011). The prevalence of non-adherence to the low sodium diet (LSD)remains high as evidenced among 53 % HF patients in the earlier study (Basuray et al., 2015). Similarly, non-adherence to LSD in the patients was also reported in other studies (Chung, Lennie, Mudd-Martin, & Moser, 2015; Lemon et al., 2010).

Moreover, it is to point that the greater adherence levels with dietary sodium restrictions were associated with greater "perceived benefit'" and fewer "perceived barriers" (van der Wal et al., 2006; van der Wal, Jaarsma, Moser, van Gilst, & van Veldhuisen, 2007; Walsh & Lehane, 2011). Factors such as monthly income, knowledge on heart failure, the severity of HF and the belief about the salt restriction of patients were reported to be linked positively with perceived benefits to sodium-restricted diet (SRD) (Agondi, Gallani, Rodrigues, & Cornélio, 2011; Kara, 2018; van der Wal et al., 2007).

In Vietnam, self-care behaviors among patients with HF were reported to be inadequate, in which non-adherence to SRD has been observed in many patients (Huyen, Jullamate, & Kangchai, 2011; Kieu & Nguyen, 2011; Tam, Chunlestskul, Deoisres, & Rosenberg, 2016). Specifically, a study indicated that more than half (52.5%) of the patients continued their normal salty diet after discharge (Kieu & Nguyen, 2011). Tam et al. (2016) reported that the level of adherence to the diet among patients with HF was moderate. However, there is a lack of concrete information's on perceived benefits and barriers to sodium restriction including associated factors inVietnamese HF patients.

Therefore, the aims of this pilot study were to investigate the level of perceived benefits and perceived barriers to sodium restriction; and to examine whether socio-demographic characteristics were associated with perceived benefits and barriers of sodium restriction. Furthermore, the associations between perceived benefits, perceived barriers, and sodium restriction behavior were studied. This knowledge will enable us to develop individualized behavioral strategies to support patients with HF in sodium restriction and consequently improve better health outcomes among this population.

2. Materials and methods

2.1. Study design and setting: A cross-sectional descriptive design was used in this study. Data collection was conducted at the cardiovascular clinic in Da Nang Hospital located in central of Da Nang city, central of Vietnam. It has a 1000-bed facility where patients from provinces of South Central Coast and Central Highland get health services.

2.2. Sample selection criteria's and size: The target population included those who have been diagnosed with HF and on follow up for their treatment at the study setting. Inclusion criteria were adults ≥ 18-years-old with stable health condition when determined with vital signs and symptoms such as fatigue, shortness of breath, and chest pain by the researcher. Opposite, the patients having cognitive impairment as diagnosed by the medical doctor, unwillingness for participation, incompetent to communicate in the Vietnamese language, and unable to complete the research questionnaire for any reasons were excluded from the study. A general flat rule to use at least 30 subjects or greater to estimate a variable in a preliminary study was applied (Browne, 1995). A sample size of 58 patients was used in this pilot study.

2.3. Research instruments: The self-reported questionnaire used as a research instrument in the study contained 5 sections as followed:

The demographic characteristics and clinical information developed by the researchers was used to record the patient's age, sex, educational level, employment status, income, and disease duration. The Belief about Dietary Compliance Scale (BDCS) consisted of 12-item questionnaire with 5-point response scales (from strongly disagree = 1 to strongly agree = 5) for measuring the perceived benefits and barriers to sodium restriction (Bennett, Milgrom,

Champion, & Huster, 1997). In brief, seven items on BDCS were constructed to measure perceived benefits of dietary compliance, and 5 items for barriers to compliance with dietary sodium restrictions. The scores for benefits (7 to 35) and barriers (5 to 25) were recorded on summing responses to the items for each subscale, with higher scores indicating more perceptions of benefits and more barriers, respectively. The content validity for the BDCS as evaluated by two nurses with expertise in HF was 0.81. Internal consistency reliability was estimated using Cronbach's alpha coefficient and was between 0.83 and 0.88 for the benefits subscale and between 0.66 - 0.77 for the barriers subscale (Bennett et al., 1997). The Cronbach's alpha coefficient in the current study was 0.82 for the benefits subscale and 0.71 for the barriers subscale.

The Dutch Heart Failure Knowledge Scale (DHFKS) was used to measure knowledge of the participants with HF (van der Wal, Jaarsma, Moser, & van Veldhuisen, 2005). This instrument includes 15 items divided into three parts: four questions related to HF in general, six questions on diet, fluid restriction and activity; and five questions to measure symptoms, and symptom recognition. For each question, the patients had to choose one of the three options, of which one was correct. Each correct answer was awarded with a point and 0 for incorrect or missing answer. The total score ranged from 0 to 15 when a score of less than or equal to 10 represented poor knowledge and more than 10 indicated good knowledge of the patients. The Kuder - Richardson - 20 (KR-20) was used to evaluate reliability of the DHFKS in present study. The calculation yielded a KR-20 of 0.72.

New York Heart Association Functional Classification (NYHA FC) was used to measure the severity of HF. In this measurement, the severity of HF was categorized into 4 levels based on the patient's self-reporting. The patients with no limitation of physical activity and when ordinary physical activity did not cause symptoms were categorized as class I. Next, the patients with slight limitation of physical activity and when ordinary physical activity resulted in symptoms were classed as II. Class III patients had marked limitation of physical activity and less than ordinary physical activity caused symptoms, and the patients unable to carry on any physical activity without symptoms were included in class IV.

The Dietary Salt Reduction Self-Care Behavior (DSR-SCB) Scale measured sodium restriction behavior among the patients. This instrument comprised of 9-item questionnaire with 5-point response scales (1 = never, 2 = seldom, 3 = sometimes, 4 = often, and 5 = always) (Srikan & Phillips, 2014). The potential score ranged from 9 to 45, and higher scores indicated better behavior for salt restriction. Srikan and Phillips (2014) found that the content validity of the scale was achieved at 0.80 and Cronbach's alpha of the scale was 0.88. In the current study, the Cronbach's alpha of the DSR-SCB scale was 0.87.

2.4. Instrument translation: The translation and back translation technique was applied to the instruments, as described in an earlier study (Cha, Kim, & Erlen, 2007). In brief, the instruments were separately translated into Vietnamese versions by three translators who were fluent in both English and Vietnamese languages. Then, another translator translated the Vietnamese version back to English. Finally, the back-translated versions were compared with the original English versions by a native speaker in order to validate the accuracy of the translation process.

2.5. Data collection: Upon Ethical approval and permission for the hospital, data collection was commenced at the cardiovascular clinic by setting a private room for smooth functioning and confidentiality. The researcher coordinated with the head nurse and staffs to identify eligible participants from the list of patients. The study detail was informed to the patients who were interested to participate. On meeting the criteria, the potential patients were then invited for their consent with the right to refuse participation at any time. Subsequently, the questionnaire was distributed to the patient. The time to answer all questionnaires ranged from 25 to 30 minutes, after which the completed questionnaire was dropped in a sealed collection box. Finally, brief information regarding HF management and benefits of adherence to sodium restriction was provided by the researcher.

2.6. Data analysis: Once collected, data were coded and entered into a computer spreadsheet for analysis using a Statistical Package for Social Science program (SPSS) version 23. Descriptive statistics including means, median, standard deviation, and percentages were used to define data. The Shapiro-Wilk test was applied to examine data distribution, when the total scores on the perceived benefits and perceived barriers subscales were found randomly distributed (p<0.05). The Mann-Whitney U test and the Kruskal-Wallis test were performed to describe differences in total benefits scores and total barriers scores between subgroups of the patients. Moreover, Pearson's correlation was used to examine the correlations between perceived benefits and perceived barriers on sodium restriction, and sodium restriction behavior.

2.7. Ethical considerations: The study was approved by the Ethical Committee of Human Research, Khon Kaen University (HE632150) for protecting the right of the participants, and the permission for data collection was

obtained from the Da Nang Hospital Ethical Committee (787/BVDN-HDYD). The identity of the participant was maintained confidential using codes and their information was used only for the purpose of research.

3. Findings

3.1. Demographic and clinical characteristics: A total of 58 patients with HF were included in the study. The demographic and HF related clinical characteristics of the participants are shown in Table 1. The mean age of the patients was 61.76 years (± 13.05), ranged between 31 to 103 years. There was an equal distribution of males and females in the study. More than half of the patients (56.9%) have an education level of secondary school or greater. Furthermore, the majority of the patients (79.3%) were unemployed, and monthly income was less than $235 (77.6%). HF median duration was 24 months (range 1–276) and the vast majority of the participants were in class I, II (81%) as per the NYHA FC criteria. Meanwhile, the mean score of sodium restriction behavior revealed was 32.93 ± 4.66.

Table 1 Description of participant characteristics and comparison of the perceived benefits and barriers to sodium restriction (n=58)

Variables	n(%)	Perceived benefits			Perceived barriers		
		Mean (SD)	x^2/z	p	Mean (SD)	x^2/z	p
Age (years) (Mean (SD); Min/Max= 61.76 (13.05); 31-103)							
<60	28 (48.3)	28.79 (4.43)	-0.203	0.839	14.50 (2.30)	-0.032	0.975
≥60	30 (51.7)	28.67 (5.11)			14.37 (2.41)		
Sex							
Female	29 (50)	29.48 (3.96)	-0.844	0.399	14.31 (2.30)	-0.348	0.728
Male	29 (50)	27.97 (5.39)			14.55 (2.41)		
Educational level							
No schooling	6 (10.3)	28.50 (5.47)			13.50 (2.35)		
Primary school	19 (32.8)	30.16 (3.95)			14.16 (2.57)		
Secondary school	15 (25.9)	27.07 (5.24)	3.648	0.456	15.13 (1.64)	3.060	0.548
High school	8 (13.8)	30.00 (2.39)			13.88 (2.36)		
University	10 (17.2)	27.60 (6.00)			14.90 (2.80)		
Employment status							
Employed	12 (20.7)	26.67 (5.26)	-1.688	0.091	14.25 (3.59)	-0.293	0.770
Unemployed	46 (79.3)	29.26 (4.51)			14.48 (1.94)		
Income							
<5500000 VND (≈$235)	45 (77.6)	28.93 (4.43)	-0.375	0.708	14.51 (2.01)	-0.076	0.940
≥5500000 VND	13 (22.4)	28.00 (5.87)			13.15 (3.34)		
Disease duration (Median/ Interquartile range = 24/5-63)							
< 12 months	18 (31)	25.28 (5.29)	-3.261	0.001	14.83 (2.18)	-0.034	0.973
≥ 12 months	40 (69)	30.28 (3.58)			14.25 (2.42)		
Severity of HF (NYHA FC)							
FC I	25 (43.1)	27.68 (5.35)			14.12 (2.44)		
FC II	22 (37.9)	29.23 (4.34)	1.853	0.396	14.59 (2.13)	2.045	0.360
FC III	11 (19)	30.09 (3.86)			14.82 (2.67)		
FC IV	0						
Knowledge on HF							
Good	10 (17.2)	28.60 (3.78)	-0.403	0.687	14.60 (1.89)	-0.262	0.794
Poor	48 (82.8)	28.75 (4.96)			14.40 (2.44)		
Sodium restriction behavior (Mean (SD); Min/Max = 32.93 (4.66); 23-45)							

SD: Standard deviation;Min/Max: minimum and maximum variation; x^2: Kruskal – Wallis test; z: Mann Whitney test

3.2. Perceived benefits and barriers to sodium restriction: The total perceived benefit score among the participants was 28.72 ± 4.75 (range = 17.00-35.00), whereas the mean perceived barrier score was 14.21 ± 2.02 (range = 9.00-18.00). The item mean perceived benefit score was 4.10 ± 0.68 (range = 2.43-5.00) and the item mean perceived barrier score was 2.84 ± 0.40 (range = 1.80-3.60), indicating that the subjects perceived less barriers and more benefits following a low-sodium diet (Table 2). Among the items "eating a low salt diet will keep my heart healthy" was the most commonly perceived benefit of a salt-restricted diet (4.47 ± 0.66) whereas "eating a low salt diet will help me breathe more easily" (3.84 ± 1.06) was the least. Similarly, the most common perceived barrier to a low salt diet was "food does not taste good on the low salt diet" (4.14 ± 1.07), while the minimally perceived barrier was "following a low salt diet costs too much money" (1.79 ± 0.67).

Table 2 Scores for the subscales of perceived benefits and barriers to sodium restriction (n=58)

Items	Mean (SD)	Min/Max
Perceived Benefits Subscale		
Salty food is not good for me	4.24 (0.87)	2 - 5
Eating a low salt diet will keep fluid from building up in my body	3.88 (0.99)	1 - 5
Eating a low salt diet will keep my swelling down	3.98 (0.98)	1 - 5
Eating a low salt diet will keep my heart healthy	4.47 (0.66)	3 - 5
Eating a low salt diet will keep me healthy	4.28 (0.69)	3 - 5
When I follow my low salt diet, I feel better	4.03 (0.96)	2 - 5
Eating a low salt diet will help me breathe more easily	3.84 (1.06)	1 - 5
Total	28.72 (4.75)	17 - 35
Perceived Barriers Subscale		
Food does not taste good on the low salt diet	4.14 (1.07)	1 - 5
I cannot go out to many places to eat because of the low salt diet	4.02 (0.76)	2 - 5
Following a low salt diet costs too much money	1.79 (0.67)	1 - 3
Following a low salt diet takes too much time	1.93 (0.65)	1 - 4
Following a low salt diet is too hard to understand	2.55 (0.88)	1 - 5
Total	14.43 (2.34)	9 - 20

SD: Standard deviation; Min/Max: minimum and maximum variation

3.3. Association between demographic and clinical characteristics, sodium restriction behavior with perceived benefits and barriers to sodium restriction: It was found that the patients' perceived barriers to sodium restriction did not show any significant difference in terms of demographic and clinical variables (age, sex, educational level, employment status, income, HF duration, the severity of HF, knowledge on HF) ($p>0.05$) (Table 1). The perceived benefits on sodium restriction was also not significantly different except for HF duration ($p>0.05$). The patient with a long HF duration (≥12 months) had a higher level of perceived benefits (30.28 ± 3.58) on salt restriction compared to those with a short duration of < 12 months (25.28 ± 5.29) ($p=0.001$). A significant positive correlation between the perceived benefits score and behavior of sodium restriction ($r=0.534$; $p<0.001$) was established, whereas an opposite correlation was observed between the perceived barriers score and behavior of sodium restriction ($r=-0.453$; $p<0.001$).

Table 3 Correlation between the subscales of perceived benefits and barriers on sodium restriction and sodium restriction behavior (n=58)

Variable	Sodium restriction behavior	
	Pearson's Correlation Coefficient (r)	P value
Perceived benefits	0.534	0.000
Perceived barriers	-0.453	0.000

4. Discussion

The result of preliminary analysis among 58 patients with HF showed that beliefs (perceived benefits and perceived barriers) on sodium restriction were associated with HF duration and sodium restriction behavior. Overall, more perceived benefits than perceived barriers (4.1±0.68 vs 2.84±0.4) were revealed among the patients. This finding is consistent with the earlier reports (Bennett et al., 2005; van der Wal et al., 2007).

A possible explanation for this finding may be the effectiveness of current educational programs, as many of the items on the subscale reflected the knowledge concerning sodium restrictions (Welch, Bennett, Delp, & Agarwal, 2006). Moreover, the increased concern about their health due to the COVID-19 pandemic could not be neglected.

This might have prompted the participants to seek health information related to their disease. Our results are also consistent with other studies conducted in different illness groups and cultures (Kara, 2018; Walsh & Lehane, 2011; Zengin, Oren, & Akinci, 2018).

The descriptive analysis of perceived benefits demonstrated that "eating a low salt diet will help me breathe more easily" scored the lowest (3.84 ± 1.06). Supporting our finding, a study reported that one third of the respondents in the study did not report breathing more easily upon following the low-salt diet (Bennett et al., 2005). It might be associated with the severe dyspnea experienced by the patients. To some extent, this indicates a poor compliance associated with low sodium diets. Another study conducted in patients with hypertension also found the similar result (Zengin et al., 2018).

Perceived barriers while following the recommended low sodium diet increases challenges for patients to change their behavior. As such, the highest perceived barrier to sodium restriction was "food does not taste good on the low-salt diet" (4.14 ± 1.07) in the study. This is perhaps not surprising as it has long been recognized that the taste of salt is innately appealing to humans (Mattes, 1997). Additionally, the Vietnamese diet is salty and the average daily intake of salt in adults is high at approximately 10 grams per day (Jensen et al., 2018). This highlighted how cultural factors may influence health beliefs. Our results are congruent with previous studies conducted among different populations (Agondi et al., 2011; Bennett et al., 2005; Kara, 2018; Zengin et al., 2018).

The associations among perceived benefits and barriers of sodium restriction with demographic/clinical variables of the patients showed that HF duration was positively associated with perceived benefits of sodium restriction. Our results suggest that subjects with HF duration ≥ 12 months perceived more benefits of sodium restriction than the patients with less months (p<0.05). This may be due to the fact that patients with longer duration of HF had longer time to raise their consciousness and experience for a better understanding of the importance of a sodium-restricted diet in creating change from baseline health status. However, a previous study has reported no significant differences in total scores of the perceived benefits and barriers on sodium restriction subscales between patients with the longer (>6 months) compared with the shorter HF duration (≤6 months) (van der Wal et al., 2007). This difference when compared to current findings might be due to the difference in study setting as our patients were selected from a specialized cardiovascular clinic rather than a general hospital. Thus, further researches are needed to approve our findings.

In addition, a statistically significant positive association was found between the behavior of sodium restriction and perceived benefits thus indicating that better behavior of sodium restriction was associated with more perceived benefits (r = 0.534, p<0.001). Contrarily, a negative association was found between the behavior of sodium restriction and perceived barriers thus indicating that the better behavior of sodium restriction was associated with fewer perceived barriers (r = -0.453, p<0.001). Similar conclusions were formulated in an earlier study of van der Wal et al, (2007), showing that compliance with the sodium-restricted diet was associated with fewer barriers (OR = 0.91; CI 0.87–0.95) and more benefits about compliance (OR = 1.17; CI 1.11–1.23) (van der Wal et al., 2007). Other studies conducted in different populations have also revealed similar results (Agondi et al., 2011; Kara, 2018; Walsh and Lehane, 2011). This suggests that strategies to improve sodium restriction should be directed towards increasing perceived benefits and decreasing perceived barriers.

This study has some limitations. Most importantly, the findings of the pilot study are based on a small sample size and patient's self-reported data. Also, the cause-effect relationship between variables could not be established due to the cross-sectional of the design. Nevertheless, the findings are crucial for nurses and other health care providers in the HF setting for implementing tailored interventions in order to increase perceived benefits/reduce perceived barriers, especially in early HF duration.

5. Conclusions

The current findings indicate that the HF patients perceived more benefits and fewer barriers to sodium restriction. More benefits on sodium restriction were perceived by patients with the longer HF duration (≥ 12 months). Also, increasing perceived benefits and reducing perceived barriers were associated with better behavior of sodium restriction.

Acknowledgement

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