



Research Paper: The Effects of Illness Perception on Diet Adherence in Patients With Hypertension



Leila Rouhi Balasi¹, Arsalan Salari¹, Abdolhosein Emami Sigaroudi^{1*}, Asieh Ashouri^{1,2}, Fatemeh Moaddab¹, Fatemeh Zaer Sabet¹, Azam Nourisaeed³

1. Cardiovascular Diseases Research Center, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran.
2. Research Center of Health and Environment, School of Health, Guilan University of Medical Sciences, Rasht, Iran.
3. Department of Psychology, School of Literature and Humanities, Islamic Azad University of Guilan, Rasht, Iran.



Citation Rouhi Balasi L, Salari A, Emami Sigaroudi A, Ashouri A, Moaddab F, Zaer Sabet F, et al. The Effects of Illness Perception on Diet Adherence in Patients With Hypertension. Caspian Journal of Health Research. 2021; 6(2):65-72. <https://doi.org/10.32598/CJHR.6.2.3>

Running Title Diet Adherence and Illness Perception

doi <https://doi.org/10.32598/CJHR.6.2.3>



ABSTRACT

Background: The role of nutrition is undeniable in controlling hypertension; diet is among the most effective non-pharmaceutical methods. The current study aimed to determine the role of illness perception on diet adherence in patients with hypertension.

Materials & Methods: This cross-sectional study examined 268 patients with hypertension. The study sample was selected by convenience sampling method. The study tool consisted of the patients' individual, social, and clinical factors, illness perception about hypertension, and adherence to the diet. The necessary data were analyzed using multiple logistic regression models.

Results: The Mean±SD score of illness perception was measured as 37.09±4.91 out of 56. Adherence to the recommended diet was relatively desirable in the majority of the examined patients (62%). Multiple logistic regression analysis data revealed no significant relationship between the scores of illness perception and dietary adherence (Adjusted OR=1.038, 95%CI: 0.974-1.105, P=0.250). The main predictor of dietary adherence was having hypertension dietary knowledge (OR=2.198, 95%CI: 1.198-4.035, P=0.011).

Conclusion: Our study data revealed that increasing awareness among patients with hypertension complications can improve self-care behaviors, including adherence to standard diets. Therefore, emphasis on increasing awareness among these patients and their continued follow-up seems necessary.

Keywords: Adherence, Diet, Hypertension, Perception

Article info:

Received: 15 Jan 2021

Accepted: 10 Apr 2021

Published: 01 Jun 2021

* Corresponding Author:

Abdolhosein Emami Sigaroudi, PhD.

Address: Cardiovascular Diseases Research Center, School of Medicine, Guilan University of Medical Sciences, Rasht, Iran.

Tel: +98 (013) 33555058

E-mail: emamisig@gums.ac.ir

1. Introduction

Hypertension is among the main risk factors of cardiovascular disease worldwide [1-3]. According to statistics in industrial countries, 25% of adults and 60% of individuals aged >60 years encounter hypertension [4, 5]. Studies in Iran also indicated a high prevalence of hypertension [5, 6]; about 50% of individuals aged over 55 years present hypertension in Iran [7].

Hypertension is a risk factor for cardiovascular diseases. It is a silent disease that may not manifest any symptoms but can lead to fatal complications if not properly treated. Thus, treatment adherence is a key factor in controlling hypertension [3, 6]. The World Health Organization defines adherence as an agreement between drug-related behaviors and compliance with dietary and lifestyle changes recommended by healthcare providers [8]. In developing countries, improving the control of hypertension over the past 50 years has led to a significant reduction in overall mortality. Additionally, evidence from a large clinical trial indicated a 40% reduction in stroke and at $\geq 25\%$ reduction in myocardial infarction, along with treatment and hypertension control [9].

Moreover, the first-line treatment for hypertension is to make preventive lifestyle modifications and pharmacotherapy. Besides, poor hypertension control is attributed to inappropriate dietary regimens [10, 11]. Important changes that should be considered in lifestyle to help to decline blood pressure include adopting Dietary Approaches to Stop Hypertension (DASH); reducing sodium in dietary regime; weight loss in obese and overweight patients along with regular exercise; consuming enough fruits and vegetables, and reducing saturated fats intake [3, 12]. Among these characteristics, the role of nutrition in controlling this disease is undeniable. Furthermore, diet is among the most effective non-pharmaceutical methods in this respect [6, 13]. Dietary modifications that effectively decrease hypertension include reduced salt intake, increased potassium intake, moderated alcohol consumption, and a public healthy diet pattern [6].

However, previous studies suggested that most patients neglect nutritional instructions; only a small proportion of them have accepted the correct nutritional regimen as part of their treatment [3, 6, 8, 11, 12]. Based on the prior studies, various factors, such as demographic and socioeconomic characteristics and the illness perception of hypertension can affect the follow-up of patients [3, 8, 11, 12]. A major relevant factor is the role of illness per-

ception and the relationship between illness perception and treatment adherence, i.e., supported in different studies [1]. Adherence to secondary prevention behaviors depends on the perception of patients about their conditions, the treatment, and the benefits of lifestyle reforms [7, 14-16]. Thus, health beliefs, such as understanding the seriousness of the disease, encountering complications, and the efficacy of treatment can predict better compliance in patients [14].

Given the importance of dietary adherence in controlling hypertension and the lack of knowledge in this regard, the present study aimed to determine the role of illness perception on adherence to diet in patients with hypertension.

2. Materials and Methods

This cross-sectional and descriptive-analytical study investigated the extent of diet adherence and the role of illness perception on it. The research population was patients with hypertension referring to a healthcare center in Rasht City, Iran, in 2018. The sample size was determined as 268 subjects with 95% confidence and an estimation error limit of 5% and proportion of dietary compliance equal to 0.225 [17]. The study samples were selected by convenience sampling method. The inclusion criteria of the study were the absence of mental illness, the occurrence of hypertension according to medical records, using antihypertensive drugs, being over 21 years old, and providing consent to participate in the study. The exclusion criteria were a history of chronic renal diseases and hemodialysis, and no consent to participate in the study.

The study tool consists of 3 parts, as follows: individual, social and clinical factors i.e., age, gender, marital status, educational level, occupational status, economic status, living location, a family history of hypertension, underlying disease, the number of patient's household, the duration of hypertension disease, hypertension knowledge status, diet knowledge status, information source, and systolic and diastolic blood pressure; illness perception tools about hypertension disease; and adherence to the diet.

The Illness Perception Questionnaire (IPQ) (to measure hypertension) disease consisted of 14 items, in two domains, i.e., answered based on a 4-point Likert-type scale (totally agree, agree, disagree, totally disagree). The total score ranged from 14 to 56. The Persian version of the IPQ has been validated by Kamran. The relevant Cronbach alpha coefficient was computed as 0.833 [7].

The Perceived Dietary Adherence Questionnaire (PDAQ) contained 34 questions about the patient's food basket, fat and salt intake, and the frequency of meal consumption of 30 main food items. The responses were classified in a 5-point Likert-type scale, ranging from never, 1-2 times in a month, 1 to 2 times in a month, 1-2 times in a week, and 3-4 times in a week, to daily consumption. The items were scored in a range of 0-100 according to the food type. For example, for white meat consumption, the daily intake was scored 50, the 3-4 times a week scored 100, 1-2 times a week scored 75, 1-2 times a month scored 25, and no use was scored 0. For egg consumption, daily consumption was scored 0, 3-4 times a week scored 50, 1-2 times a week scored 100, 1-2 times a month scored 75, and not use scored 25. Subsequently, the scores of all these sections were generally calculated. Next, the degree of adherence to the diet was categorized into 3 classes of undesirable adherence (total score: <1500), relative adherence (1500-2250), and desirable adherence (>2250). The reliability of the questionnaire was confirmed using the test-retest reliability method ($r=0.83$) [18, 19].

The obtained data were analyzed using SPSS. To describe the collected data, frequency, percentage, mean, Standard Deviation (SD), median, and range were used. To assess the normality distribution of quantitative characteristics, the Kolmogorov-Smirnov test was used. Except for hypertension disease duration, all variables presented a normal distribution. In the univariate analyses, to evaluate the association between qualitative individual, social, and clinical factors, and dietary adherence, a Chi-squared test was applied. Moreover, to evaluate the association between quantitative individual, social, and clinical factors, and dietary adherence, Analysis of Variance (ANOVA) was conducted. In the Multivariable Analysis of Variance (MANOVA), to determine the relationship between the examined patients' illness perception and dietary adherence, for controlling individual, social, and clinical factors, a multiple logistic regression model was performed. All individual, social, and clinical factors with a significant level of 0.1 in the univariate analyses were entered in the MANOVA model. Additionally, to identify the most powerful predictors of dietary adherence, a stepwise odds ratio selection method was used. $P<0.05$ was considered significant.

3. Results

The Mean \pm SD age of the research participants was 58.9 \pm 10.32 years. Most of the study patients were female (59%) and living with their spouses (85%). The median of hypertension disease duration was equal to

60 months (1-480 months). The majority of the study patients reported a prior knowledge about hypertension disease (51.7%) and hypertension diet (64.3%); they referred to physicians and nurses as the source of information (63.4%). Table 1 presents the details of patients' individual, social, and clinical characteristics.

The Mean \pm SD score of illness perception was measured to be 37.09 \pm 4.91 out of 56, i.e., on the scale of 0 to 100, the mean score equaled 55 (Table 2). The details of illness perception items indicated that the majority of respondents (96%) had a suitable attitude toward the restriction of salt in their dietary meals. However, the weakest attitude was toward the treatment of disease; 79% stated that hypertension is a curable disease and 97% agreed or quite agreed that the disease will be treated by pharmacotherapy or other therapeutic regimens.

Moreover, the obtained data revealed that dietary adherence was desirable in only 80 (38%) patients (Table 2). The dietary adherence-related data suggested that more than half of the examined patients reported having both low-fat and low-salt diets (52%); 71% had 3 meals per day; 40% had liquid meals at nights (soup & broth), and 45% added less than one teaspoon salt to the meal while cooking.

Respecting the univariate analyses results, except prior hypertension dietary knowledge ($P=0.013$), none of the other individual and clinical characteristics were significantly related to dietary adherence. Of patients who presented prior hypertension dietary knowledge, 45% had desirable dietary adherence; however, in patients without prior hypertension dietary knowledge, the frequency of diet adherence was calculated as 27%. The lowest dietary adherence concerned the consumption of wholemeal bread and the avoidance of high-fat yogurt and buttermilk. Moreover, 68% of the explored patients stated never to use wholemeal bread and 169 (67%) patients stated that they eat more than the daily recommended unit of high-fat yogurt and buttermilk.

In the univariate analysis, patients' illness perception demonstrated a significant relationship with dietary adherence ($P=0.029$). The Mean \pm SD scores of illness perception in the patients with desirable and relatively desirable adherence were calculated as 37.9 \pm 4.95 and 36.3 \pm 5.22, respectively. However, in the multivariable analysis, multiple logistic regression results revealed that adjusting for patient's prior hypertension dietary knowledge, there was no significant correlation between illness perception and dietary adherence (OR=1.04, 95%CI: 0.97-1.11, $P=0.250$). Only prior knowledge of patients about hypertension diet was associated with

Table 1. The study patients' individual, social, and clinical characteristics (n: 268)

Characteristic		Mean±SD(Range) / No.(%)
Age (y)		58.9 (10.32, 29-85)
Gender	Male	110 (41)
	Female	155 (58)
Marital status	Married	227 (85)
	Widowed	37 (14)
	Single	1 (0.4)
	Divorced	2 (0.7)
Educational level	Illiterate	99 (37)
	Below diploma	99 (37)
	Diploma or above	68 (26)
Occupational status	Employed	68 (26)
	Unemployed	199 (74)
Income	≤1 Million Toman	87 (75)
	>1 Million Toman	29 (25)
Living place	Urban	175 (65)
	Rural	93 (35)
	Family history of heart disease	152 (57)
	Other underlying diseases	193 (76)
Number of household members		3.3 (1.6)
Duration of hypertension disease in a month, median (range)		60 (1-480)
Having hypertension disease knowledge	Yes	136 (52)
	No	127 (48)
Having hypertension dietary knowledge	Yes	171 (64)
	No	95 (36)
Information source	Physician/Nurse	113 (63)
	Family/Friends/Media	67 (37)
	Systolic blood pressure in mmHg	137.2 (21.6)
	Diastolic blood pressure in mmHg	69.6 (16.7)

SD: Standard Deviation; The difference from the total of 268 patients in each characteristic is due to missing data.

Table 2. The study patients' illness perception and dietary adherence description

Characteristic	Mean±SD (Range) /No. (%)
Illness perception	37.09 (4.91, 23-51)
Dietary adherence	
Undesirable adherence	0 (0)
Relative adherence	132 (62)
Desirable adherence	80 (38)
Total	2174 (167, 1625-2550)

Illness perception scores ranged from 14 to 56 and dietary adherence scores ranged from 0 to 3000.



The difference from the total of 268 patients is due to missing data.

dietary adherence (OR=2.198, 95%CI: 1.198-4.035, P=0.011). The odds of having desirable dietary adherence was 2.198 times higher in patients with hypertension dietary knowledge than those without such an awareness (Table 3).

4. Discussion

Hypertension is highly prevalent around the world. The introduction of its serious complications on the body has made it a global health concern. Thus, the present study explored the relationship between illness perception and dietary adherence status in patients with hypertension.

The patient's denying or adherence to hypertension treatment is a common phenomenon that reflects their informed choice based on their knowledge and understanding of the medical and therapeutic conditions. Therefore, there is a need to change the perception of hypertension as a disease process [20]. In our study, the dietary adherence status was undesirable in most exam-

ined patients. This finding was consistent with those of Khodadadi et al. who studied the progressive development of self-care awareness in patients with the acute coronary syndrome [21]. Moreover, our data were in line with those of Leong et al.'s study, titled "the follow-up of health recommendations after cardiac rehab after MI who had high levels of dietary compliance [22]. Van der Wal et al. (2010) reported a high level of dietary adherence in cardiac patients [23]; however, this finding was not consistent with those of their 2005 research, indicating that most explored patients manifested a low dietary adherence [24]. Differences in symptoms and their severity in patients with hypertension may cause differences in dietary adherence in observed studies.

In our study, the average score for the illness perception of hypertension was low; only 1.3% of the examined patients provided a good understanding of their illness. This finding was consistent with those of numerous studies that reported a low level of awareness in cardiac patients [24, 25]. According to Kamran et al., the knowl-

Table 3. The relationship between illness perception and dietary knowledge on dietary adherence using the logistic regression analysis model

Models		OR (95%CI)	P
Model 1*	Illness perception	1.038 (0.974-1.105)	0.250
	Dietary knowledge	1.849 (0.942-3.629)	0.074
Model 2**	Dietary knowledge	2.198 (1.198-4.035)	0.011

OR: Odds Ratio; CI: Confidence Interval.



* Model was reported adjusted odds ratio and 95% confidence interval of having hypertension dietary adherence by patient's illness perception, adjusting for patient's dietary knowledge status.

** Model was reported the most powerful predictors of having hypertension dietary adherence in a backward stepwise likelihood ratio selection method.

edge and understanding of the disease can predict 47.2% of changes in sodium intake in the control group. There was also a significant correlation between the knowledge and understanding of the disease and sodium intake in patients with uncontrolled hypertension [8]. Considering that nutritional knowledge and illness perception may predict a high degree of sodium intake, it is critical to pay more attention to improving information and understanding of patients about hypertension, especially among those with uncontrolled hypertension [8].

Our study results indicated no significant relationship between the level of illness perception and the extent of dietary adherence. This finding was inconsistent with those of the study by Taheri et al., which found that those who had a better understanding of their illness were more likely to follow the regimen [1]. Chen et al. argued that illness perception was more consistent with treatment in patients [26]. Our findings suggested that increasing the perception of individuals at high risks of hypertension does not necessarily lead to improved preventive and self-care behaviors, including adherence to appropriate diets.

Another crucial finding was that, based on the multiple logistic regression model data, the level of dietary adherence was only related to dietary knowledge. Similarly, Moghadam et al. declared that increasing the level of awareness of cardiovascular risk factors leads to an improvement in daily functions for preventing CAD [27]. However, the results of the study of Mazloomi et al., contrary to our results, signified no correlation between awareness and self-care behaviors [28]. Nieuwenhuis et al. also documented no significant relationship between knowledge and dietary adherence [29]. Furthermore, another study revealed that only a few patients who had the required dietary knowledge complied with it [30]. Our study reminds us that increasing awareness among individuals at high risk of hypertension complications can improve self-care behaviors, including adherence to standard diets. The limitations of this research were to use the interview method; thus, the mental status of the patients under investigation during the interview as well as the willingness of patients to participate in the interview can affect the responses.

5. Conclusion

Based on the current research results, the role of awareness is essential to the adherence of patients to hypertension. Additionally, due to the lack of a continuous follow-up of these patients in society, despite the chronicity of the disease process, there is a need for planning

to increase the level of awareness in this population. The increased awareness of patients can improve self-care in patients; thus, such measures reduce the complications of the disease.

Ethical Considerations

Compliance with ethical guidelines

The present study was approved by the Institutional Ethics Committee of Guilan University of Medical Sciences, Iran (Code: IR.GUMS.REC.1397.533).

Funding

This article is the results of a research project approved by the Guilan University of Medical Sciences and the Cardiovascular Diseases Research Center in Guilan University of Medical Sciences. Also, this study was supported by Guilan University of Medical Sciences (Grant No. 93120403).

Authors' contributions

All authors equally contributed to preparing this article.

Conflict of interest

The authors declared no conflicts of interest.

Acknowledgements

The Researchers appreciate the Cardiovascular Diseases Research Center in Guilan University of Medical Sciences for supporting this research.

References

- [1] Taheri-Kharamah Z, Hazavehei SMM, Ramezani T, Vahedi A, Khoshro M, Sharififard F. [The assessment of illness perception and adherence to therapeutic regimens among patients with hypertension (Persian)]. *J Educ Community Health*. 2016; 3(2):9-15. [DOI:10.21859/jech-03022]
- [2] Milani RV, Lavie CJ, Bober RM, Milani AR, Ventura HO. Improving hypertension control and patient engagement using digital tools. *Am J Med*. 2017; 130(1):14-20. [DOI:10.1016/j.amjmed.2016.07.029] [PMID]
- [3] Elbur AI. Level of adherence to lifestyle changes and medications among male hypertensive patients in two hospitals in Taif, Kingdom of Saudi Arabia. *Int J Pharm Pharm Sci*. 2015; 7(4):168-72. <https://www.researchgate.net/publication/274377455>

- [4] Azizi A, Abasi MR, Abdoli GR. [The prevalence of hypertension and its association with age, sex and BMI in a population being educated using community-based medicine in Kermanshah: 2003 (Persian)]. *Iran J Endocrinol Metab*. 2008; 10(4):323-9. <http://ijem.sbmu.ac.ir/article-1-578-fa.html>
- [5] Meraci MR, Feizi A, Bagher Nejad M. [Investigating the prevalence of high blood pressure, type 2 diabetes mellitus and related risk factors according to a large general study in Isfahan-using multivariate logistic regression model (Persian)]. *J Health Syst Res*. 2012; 8(2):193-203. <http://hsr.mui.ac.ir/article-1-391-en.html>
- [6] Mirkarimi AS, Khoddam H, Vakili MA, Sadeghi MB, Modanloo M. Assessment of dietary adherence in hypertensive patients referred to Shahid Sayyad Shirazi Teaching Hospital in Gorgan. *J Res Dev Nurs Midwifery*. 2016; 13(1):39-46. [DOI:10.18869/acadpub.jgbfnm.13.1.39]
- [7] Kamran A, Sharifirad GR, Mohebi S, Mahaki B, Iranpour S, Abdoli R, et al. [Psychometric assessment of nutritional knowledge, illness perceptions and dietary adherence in hypertensive patients - Ardabil 2013 (Persian)]. *J Health Syst Res*. 2013; 9(14):1774-85. <https://eprints.arums.ac.ir/5412/1/perception.pdf>
- [8] Kamran A, Azadbakht L, Sharifirad GR, Mahaki B, Sharghi A. Sodium intake, dietary knowledge, and illness perceptions of controlled and uncontrolled rural hypertensive patients. *Int J Hypertens*. 2014; 2014:245480. [DOI:10.1155/2014/245480] [PMID] [PMCID]
- [9] Kayima J, Wanyenze RK, Katamba A, Leontsini E, Nuwaha F. Hypertension awareness, treatment and control in Africa: A systematic review. *BMC Cardiovasc Disord*. 2013; 13:54. [DOI:10.1186/1471-2261-13-54] [PMID] [PMCID]
- [10] Fang J, Moore L, Loustalot F, Yang Q, Ayala C. Reporting of adherence to healthy lifestyle behaviors among hypertensive adults in the 50 states and the District of Columbia, 2013. *J Am Soc Hypertens*. 2016; 10(3):252-62.e3. [DOI:10.1016/j.jash.2016.01.008] [PMID] [PMCID]
- [11] Mahmoud MIH. Compliance with treatment of patients with hypertension in Almadinah Almunawwarah: A community-based study. *J Taibah Univ Med Sci*. 2012; 7(2):92-8. [DOI:10.1016/j.jtumed.2012.11.004]
- [12] Sutar PA, Shah HK. A study of adherence pattern toward antihypertensive therapy (antihypertensive drugs, dietary habits, and physical activity) and certain factors affecting it. *Int J Med Sci Public Health*. 2017; 6(3):463-71. [DOI:10.5455/ijmsph.2017.0847930082016]
- [13] Azadbakht L, Izadi V, Ehsani S, Esmailzadeh A. Effects of the Dietary Approaches to Stop Hypertension (DASH) Eating Plan on the Metabolic Side Effects of Corticosteroid Medications. *J Am Coll Nutr*. 2016; 35(4):285-90. [DOI:10.1080/07315724.2014.991459] [PMID]
- [14] Mosleh SM, Almalik MM. Illness perception and adherence to healthy behaviour in Jordanian coronary heart disease patients. *Eur J Cardiovasc Nurs*. 2016; 15(4):223-30. [DOI:10.1177/1474515114563885] [PMID]
- [15] Shaikh MA, Dur-e-Yakta, Sadia, Kumar R. Hypertension knowledge, attitude and practice in adult hypertensive patients at LUMHS. *J Liaquat Univ Med Health Sci*. 2012; 11(02):113-6. <https://www.lumhs.edu.pk/jlumhs/Vol-11No02/pdfs/v11n2oa04.pdf>
- [16] Iyalomhe GBS, Iyalomhe SI. Hypertension-related knowledge, attitudes and life-style practices among hypertensive patients in a sub-urban Nigerian community. *J Public Health Epidemiol*. 2010; 2(4):71-7. https://academicjournals.org/article/article1379344129_Iyalomhe%20and%20Iyalomhe.pdf
- [17] Khan MS, Bawany FI, Mirza A, Hussain M, Khan A, Lashari MN. Frequency and predictors of non-compliance to dietary recommendations among hypertensive patients. *J Community Health*. 2014; 39(4):732-6. [DOI:10.1007/s10900-014-9819-9] [PMID]
- [18] Masror Roudsari DD, Dabiri Golchin M, Parsa Yekta Z, Haghani H. [Relationship between adherence to therapeutic regimen and health related quality of life in hypertensive patients (Persian)]. *Iran J Nurs*. 2013; 26(85):44-54. <http://ijn.iuims.ac.ir/article-1-1684-en.html>
- [19] Sanaie N, Bahramnezhad F, Zolfaghari M, Alhani F. The effect of family-centered empowerment model on treatment plans adherence of patients undergoing coronary artery bypass graft. *J Crit Care Nurs*. 2016; 9(3):e6494. <http://jccnursing.com/article-1-343-en.html>
- [20] Anthony H, Valinsky L, Inbar Z, Gabriel Ch, Varda Sh. Perceptions of hypertension treatment among patients with and without diabetes. *BMC Fam Pract*. 2012; 13:24. [DOI:10.1186/1471-2296-13-24] [PMID] [PMCID]
- [21] Khodadadi A, Sayadi AR, Smaeli H. [Evolution of knowledge of the principles of self care in acute coronary syndrome patients admitted to Aliebn Abitaleb Rafsanjan University Hospital during 2009 (Persian)]. *Community Health J*. 2010; 5(1):8-16. http://chj.rums.ac.ir/article_45584.html
- [22] Leong J, Molassiotis A, Marsh H. Adherence to health recommendations after a cardiac rehabilitation programme in post-myocardial infarction patients: The role of health beliefs, locus of control and psychological status. *Clin Eff Nurs*. 2004; 8(1):26-38. [DOI:10.1016/j.cein.2004.02.001]
- [23] van der Wal MHL, van Veldhuisen DJ, Veeger NJGM, Rutten FH, Jaarsma T. Compliance with non-pharmacological recommendations and outcome in heart failure patients. *Eur Heart J*. 2010; 31(12):1486-93. [DOI:10.1093/eurheartj/ehq091] [PMID]
- [24] van der Wal MHL, Jaarsma T, Moser DK, Veeger NJGM, van Gilst WH, van Veldhuisen DJ. Compliance in heart failure patients: The importance of knowledge and beliefs. *Eur Heart J*. 2006; 27(4):434-40. [DOI:10.1093/eurheartj/ehi603] [PMID]
- [25] Strömberg A. Patient-related factors of compliance in heart failure: some new insights into an old problem: The opinions expressed in this article are not necessarily those of the editors of the European Heart Journal or of the European Society of Cardiology. *Eur Heart J*. 2006; 27(4):379-81. [DOI:10.1093/eurheartj/ehi664] [PMID]
- [26] Chen SL, Tsai JC, Chou KR. Illness perceptions and adherence to therapeutic regimens among patients with hypertension: A structural modeling approach. *Int J Nurs Stud*. 2011; 48(2):235-45. [DOI:10.1016/j.ijnurstu.2010.07.005] [PMID]
- [27] Baghiani Moghadam MH, Mirzaei M, Rahimdel T. [Role of health beliefs in preventive behaviors of individuals at risk of cardiovascular diseases (Persian)]. *J Health Syst Res*. 2013; 8(7):1151-8. <http://hsr.mui.ac.ir/article-1-500-en.html>
- [28] Mazloomi SS, Mirzaei A, Afkhami Ardakani M, Baghiani Moghadam MH, Fallahzadeh H. [The role of health beliefs in preventive behaviors of individuals at high-risk of type 2 diabetes mellitus (Persian)]. *J Shahid Sadoughi Univ Med Sci*. 2010; 18(1):24-31. <http://jssu.ssu.ac.ir/article-1-1006-en.html>



- [29] Nieuwenhuis MMW, Jaarsma T, van Veldhuisen DJ, van der Wal MHL. 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. [DOI:10.1007/s12471-012-0283-9] [PMID] [PMCID]
- [30] 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. [DOI:10.1111/j.1751-7117.2008.04628.x] [PMID]