Original Article

Medication Adherence and its Predictors among Patients with Heart Failure

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Abstract

Background: Medication adherence is a complex behavioral pattern affecting treatment success. A stepping stone to improve medication adherence is to determine its contributing factors. **Objectives:** This study intended to evaluate medication adherence and its predictors among patients with heart failure in Mazandaran Heart Center, Sari, Iran. **Methods:** This cross-sectional study was conducted on 300 patients with heart failure who were hospitalized from January to March 2015. Sampling was done through the census method. Data were collected using the Morisky Medication Adherence Scale and were analyzed using the Chi-square test and logistic regression analysis. **Results:** The mean score of treatment adherence was 5.82 ± 2.54. Medication adherence had a significant correlation with education level (P = 0.012), number of children (P = 0.013), comorbidity (P = 0.002), ejection fraction (P = 0.046), and the number of tablets used per day (P = 0.001). However, it was not significantly correlated with age, gender, employment status, place of residence, income level, and the number of hospitalizations for heart failure (P > 0.05). Logistic regression analysis showed that none of the demographic and clinical characteristics was a significant predictor of medication adherence. **Conclusion:** Medication adherence is affected by different factors such as education level, number of children, comorbidity, disease severity, and the number of tablets used per day. Nurses need to take these factors into account when developing care plans and patient education programs.

Keywords: *Heart failure, Medication adherence, Nursing, Patients*

Introduction

Medication therapy plays a significant role in treating heart failure. Medications reduce re-hospitalization and mortality rates and increase the quality of life among patients with heart failure.[1] These patients usually take medications from different classes. Medication adherence is a significant predictor of treatment success[2] and is defined as the extent to which patients follow medication-related orders and use medications prescribed by health-care providers.[2,3] Good medication adherence is defined as the consumption of >80% of the prescribed medications.[4] Despite its importance to treatment success, medication adherence is as low as about 25%–50%.[5]

Medication adherence is lower among patients with chronic diseases.[6,7] The World Health Organization statistics also show that, in developed countries, only 50% of chronically-ill patients adhere to their prescribed medications, and this rate is lower in developing countries.[8]

Currently, medication nonadherence is a major health challenge, particularly for patients with chronic conditions. It is associated with negative patient outcomes including disease recurrence, greater need for medication therapy,[9] frequent hospitalizations,[5,6] and increased health-care costs.[5]

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Medication adherence is a complex behavioral pattern which is affected by modifiable and nonmodifiable factors such as personal characteristics, physician–patient relationship, and health-care system characteristics.[8,9] A number of studies are available on medication adherence and related factors, but these studies were mostly conducted in a Western context and resulted in controversial findings.[1,4,10-12] Considering the importance of medication adherence for patients with chronic diseases, especially heart failure in the treatment process, improved quality of life and decreased frequency of hospitalization, and reduced cost, the present study intended to explore medication adherence in patients with heart failure and its related factors.

Objectives

This study intended to evaluate the rate of medication adherence and its predictors among patients with heart failure in a large referral heart center in Northern Iran.

Methods

This cross-sectional study was conducted on 300 patients with heart failure who were hospitalized from January to March 2015 in Mazandaran Heart Center, Sari, Iran. Sampling was done through a census to recruit all eligible patients during the course of the study. Eligibility criteria were as follows: age older than 18 years, having received a definitive diagnosis of heart failure, being able to communicate in Persian, receiving treatments for heart failure for at least 6 consecutive months, taking at least one medication for heart problems at the time of the study, being in the Class II or III of heart failure according to the New York Heart Association Classification, having an ejection fraction of >30%, and suffering from no sensory perception disorder.

Instrument

Data collection instrument consisted of two parts. The first part consisted of questions on patients' demographic and clinical characteristics such as age, gender, income level, number of children, place of residence, comorbidity (i.e. simultaneous affliction by diseases such as diabetes mellitus or hypertension or both), number of tablets used per day, and marital, educational, and employment status. The second part was the Morisky Medication Adherence Scale (MMAS). MMAS has seven dichotomous Yes/No questions as well as one item with a five-point Likert-type scale. "Yes" and "No" answers to the dichotomous items are, respectively, scored 0 and 1, except for the item five which is scored reversely. Moreover, the possible responses to the 8th item include "Never", "seldom", "sometimes", "often" and "always" which are scored 1, 1, 1, 0, and 0, respectively. The total MMAS scores are 0–8; scores lower and higher than 6 interpreted as low and high medication adherence, respectively. Furthermore, MMAS was reported to have a Cronbach's alpha of 0.83.[13]

Ethical considerations

This study was approved by the Applied Research Council and the Ethics Committee of Mazandaran University of Medical Sciences (with the ethical approval code of IR.MAZUMS.REC.94.1991). Patients were briefed about research objectives and were assured of the confidentiality of their personal data. All questionnaires were anonymoused; written consent was obtained from all patients.

Data analysis

The data were analyzed using the SPSS software, version 16.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics (such as frequency, percentage, mean, and standard deviation) were calculated. The Chi-square test was used to examine the relationship of treatment adherence with demographic and clinical characteristics. Variables with a *P* value of less than 0.2 were included in logistic regression analysis.[14]

Results

From 300 patients who participated in the study, 150 (50%) were male. Participants' mean age was 64.15 ± 11.47. Most of them aged 55–74 (57%), had low income (49.3%), lived in urban areas (63.7%), had been hospitalized for their heart problems 2–5 times (53.7%), and were married (97%), illiterate (50.3%), and housewives or retired (60%). Only 40% of them were employed. The percentages of patients with hypertension, diabetes mellitus, or hypertension and diabetes mellitus were 31%, 23%, and 25.7%, respectively. Moreover, most patients had an ejection fraction of 50%–60% (41.3%) and took 5–10 tablets per day (47.7%).

The mean score of medication adherence was 5.82 ± 2.54. Most patients (i.e., 181 ones or 60.3%) obtained a MMAS score of <6, denoting that they had low medication adherence. Moreover, medication adherence was significantly correlated with educational status, number of children, comorbidity, ejection fraction, and the number of tablets used per day, while it had no significant correlation with age, gender, employment status, place of residence, income level, and the number of hospitalizations for heart problems [Table 1]. Multivariate regression analysis also indicated that none of the demographic and clinical characteristics was a significant predictor of medication adherence [Table 2].

Table 1: The relationship between medication adherence with demographic and clinical characteristics

Characteristics	Medication adherence, *n* (%)	Medication nonadherence, *n* (%)	Test results
Age (year)			
35-44	7 (50)	7 (50)	χ^2=6.785
45-54	19 (38)	31 (62)	*P*=0.148
55-64	48 (48.5)	51 (51.5)	
65-74	25 (34.7)	47 (65.3)	
>74	20 (30.8)	45 (69.2)	
Gender			
Male	55 (36.7)	95 (63.3)	χ^2=1.128
Female	64 (42.7)	86 (57.3)	P=0.288
Education level			
Illiterate	48 (31.8)	103 (68.2)	χ^2=10.985
High-school and lower	37 (42)	51 (58)	*P*=0.012
High-school diploma or some college degree	27 (57.4)	20 (42.6)	
Bachelor degree or higher	7 (50)	7 (50)	
Employment status			
Employee	17 (50)	17 (50)	χ^2=5.005
Worker	11 (36.7)	19 (63.3)	*P*=0.415
Farmer	7 (28)	18 (72)	
Housewife	49 (36.3)	86 (63.7)	
Self-employed	14 (45.2)	17 (54.8)	
Retired	21 (46.7)	24 (53.3)	
Number of children			
<2	15 (50)	15 (50)	χ^2=8.713
2-5	82 (43.9)	105 (56.1)	*P*=0.013
>5	22 (26.5)	61 (73.5)	
Place of residence			
Urban areas	73 (38.2)	118 (61.8)	χ^2=0.460
Rural areas	46 (42.2)	63 (57.8)	*P*=0.498
Income level			
Low	50 (33.8)	98 (66.2)	χ^2=4.383
Average	61 (44.9)	75 (55.1)	*P*=0.112
Good	8 (50)	8 (50)	
Number of hospitalizations for heart problems			
<2	24 (52.2)	22 (47.8)	χ^2=3.595
2-5	61 (37.9)	100 (62.1)	*P*=0.166
>5	34 (36.6)	59 (63.4)	
Comorbidity			
Diabetes mellitus	26 (37.7)	43 (62.3)	χ^2=14.635
Hypertension	36 (38.7)	57 (61.3)	*P*=0.002
Diabetes and hypertension	21 (27.3)	56 (72.7)	
None	36 (59)	25 (41)	
Ejection fraction (%), disease severity			
50-60	59 (47.6)	65 (52.4)	χ^2=6.165
40-50	40 (36.4)	70 (63.6)	*P*=0.046
30-40	20 (30.3)	46 (69.7)	
Number of tablets used per day			
<5	45 (52.3)	41 (47.7)	χ^2=14.513
5-10	58 (40.6)	85 (59.4)	*P*=0.001
>10	16 (22.5)	55 (77.5)	

Discussion

The result showed that a majority of patients with heart failure had low medication adherence. Previous studies also reported low medication adherence among patients with hypertension, diabetes mellitus, and other chronic diseases.[15-17] However, the results of a

Table 2: Predicting factors of medication adherence in patients with heart failure

Personal characteristics	OR	CI	*P*
Age (year)			
35-44	-	-	-
45-54	1.38	0.30-6.21	0.674
55-64	0.41	0.08-2.02	0.276
65-74	0.63	0.12-3.29	0.589
>74	0.61	0.11-3.14	0.557
Education level			
Illiterate	2.53	0.50-12.58	0.257
High-school and lower	1.50	0.36-6.09	0.571
High-school diploma or some college degree	0.87	0.22-3.45	0.850
Bachelor degree or higher	-	-	-
Employment status			
Employee	-	-	-
Worker	1.00	0.22-4.45	0.997
Farmer	1.23	0.27-5.44	0.783
Housewife	0.74	0.20-2.66	0.646
Self-employed	1.21	0.34-4.24	0.766
Retired	1.24	0.36-4.27	0.732
Number of children			
<2	-	-	-
2-5	0.86	0.29-2.52	0.789
>5	1.45	0.43-4.85	0.540
Income level			
Low	0.98	0.25-3.76	0.984
Average	0.90	0.26-3.03	0.864
Good	-	-	-
Number of hospitalizations for heart problems			
<2	-	-	-
2-5	1.47	0.65-3.34	0.348
>5	1.01	0.40-2.51	0.978
Comorbidity			
Diabetes mellitus	1.81	0.79-4.13	0.154
Hypertension	1.70	0.76-3.79	0.194
Diabetes and hypertension	2.40	0.91-6.27	0.074
None	-	-	-
Ejection fraction (%)			
50-60	-	-	-
40-50	1.06	0.55-2.02	0.857
30-40	1.31	0.60-2.83	0.486
Number of tablets used per day			
<5	-	-	-
5-10	1.25	0.63-2.48	0.508
>10	2.34	0.86-6.34	0.094

CI: Confidence interval, OR: Odds ratio

study in Iran illustrated that patients with heart failure had good medication adherence and low physical activity adherence.[17] This conflicting finding can be attributed to the differences in the sociocultural contexts, measurement tools, and disease severity in the studies.

In line with previous studies,[10,18] the present study showed that patients from different age groups had similar medication adherence. However, Platt *et al*. noted that older patients had lower medication adherence,[19] while another study reported that medication adherence increased with age.[17] Explanations for these conflicting findings may be the differences among the studies respecting sample sizes, measurement tools, and the definitions of age group.

Study findings also showed no significant relationship between medication adherence and gender. An earlier study also reported the same finding,[17] while several studies showed that men had higher adherence than women.[20,21] Jin *et al*. also reported gender as a predictor of medication adherence.[22] This contradiction may be due to the differences among different cultures and societies respecting men's and women's roles, and it is caused by that women are the main caregivers of the family; thus, they dedicate less time to themselves.

Findings also indicated that medication adherence was directly correlated with education level. Other studies also reported the same finding.[19,23] People with higher education levels have greater health-related knowledge and therefore adhere to their treatments more strictly.[18,19,23] Contrarily, some studies reported that people with lower education level had higher treatment adherence because they had greater trust in medical recommendations,[24,25] while Fuster found no significant relationship between medication adherence and educational status.[26]

We also found that medication adherence had no significant correlation with employment status and income level. Another study also reported that income was not a predictor of medication adherence,[27] while some other studies showed that medication adherence was significantly correlated with income and employment status.[23,24] Another study reported that medication adherence among unemployed or retired patients was higher than the employees.[19] It seems that, due to their heavy workload, employees may do not take their medications. Similarly, another study reported that homemakers were more adherent because they could manage their time more effectively.[28] Income is an important factor in medication adherence and is affected by socioeconomic status. The difference in results might be attributed to the fact that most of our participants had low income and this variable might affect the findings.

Another finding of the study was the significant correlation of treatment adherence with the number of children so that patients with fewer children had a higher medication adherence. Another study also showed that

medication adherence reduced by increasing the number of family members.[11] It seems that greater family size increases patients' concerns and preoccupations and thus negatively affects their treatment adherence. However, inconsistent with our findings, a previous study reported that patients with heart failure who lived with other people had higher medication adherence than patients who lived alone.[1]

We also found no significant correlation between medication adherence and history of hospitalizations. Contrarily, a study showed that medication adherence was higher among patients with the previous history of hospitalization.[1]

The results also revealed a significant correlation between medication adherence and comorbidity so that study participants who suffered from both hypertension and diabetes mellitus had lower adherence. Correspondingly, two studies reported that patients with heart failure who simultaneously suffered from hyperlipidemia, asthma, chronic obstructive pulmonary disease, and myocardial infarction were more likely to be nonadherent to their medications.[20,29] These findings show that comorbidity, which is associated with frequent medical visits and polypharmacy, can exhaust patients and therefore undermine their ability to adhere to their medications. Contrarily, a study indicated that comorbidity was associated with higher medication adherence.[30]

The results of the present study were also indicative of an indirect relationship between disease severity (as determined by ejection fraction) and medication adherence. The results of previous studies regarding the relationship of adherence with disease severity are contradictory. An earlier study also reported that more severe symptoms increased medication adherence,[29] while other study showed that medication adherence is not correlated with disease severity.[20]

Another finding of the study was the indirect correlation between medication adherence and the number of tablets used per day. Most previous studies reported the same finding.[17,29,31] Polypharmacy can impair patients' ability to manage their multiple medications and thereby reduce their medication adherence.[31] However, a study showed that a higher number of tablets were associated with higher medication adherence.[32]

Finally, study findings indicated that none of patients' demographic and clinical characteristics was a significant predictor of medication adherence. Inconsistent with this finding, previous studies reported that medication adherence was significantly correlated with variables such as gender, satisfaction with treatment,[15] age, gender, educational status,[16,33] and executive and language functions.[12]

It is better to engage patients' relatives in care of patients in order to increase medication adherence in patients with chronic diseases. This study was made in only one health-care center. Multicenter studies are needed to produce sufficient evidence relating to the predictors of medication adherence. Moreover, the study instrument did not evaluate various aspects of medication adherence such as the time and the dose of medications. Another limitation was that the data on medication adherence were collected through a self-report questionnaire. Qualitative studies are suggested to be done on the patients' lived experiences of the factors affecting medication adherence. Moreover, it is recommended to conduct studies to define the role of education in increasing medication adherence in patients with heart failure.

Conclusion

Medication adherence is a multidimensional behavior which is affected by different factors such as educational status, number of children, comorbidity, disease severity, and the number of tablets used per day. Medications adherence has the key role in treating patients with heart failure and can reduce the mortality rate, decrease hospitalization, and increase the quality of life. Nurses need to take these factors into account when developing care plans and patient education programs to enhance medication adherence among patients with heart failure.

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Conflicts of interest

There are no conflicts of interest.

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