ORIGINAL ARTICLE

Barriers to Medication Adherence among Hypertensive Patients in Deprived Rural Areas

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ABSTRACT

***BACKGROUND:** Poor adherence to medication regimen leads to poor health outcomes, increased medical costs and increased death rate due to hypertension. The aim of this study was to evaluate baseline barriers to medication adherence among hypertensive patients in deprived rural areas.*
***METHODS:** A cross-sectional study was conducted on 238 hypertensive patients living in deprived rural areas of Iran. Data were collected using a questionnaire consisting of demographic information, Morisky medication adherence scale and the barriers to medication adherence that were reliable and valid.*
***RESULTS:** The results of the study showed that medication adherence was significantly decreased and had a significant positive correlation with gender and economic status, while it had a negative correlation with age. Medication Adherence had a positive correlation with the duration of hypertension, while it had a negative correlation with the number of medications used and concurrently with other diseases.*
***CONCLUSIONS:** Based on the present study it can be concluded that enhanced knowledge about illness and treatment in rural communities is improves the medical adherence. Financial supports along with the reduced number of prescribed drugs are also found to be the determining factors in the medical adherence.*
***KEYWORDS:** Medication Adherence, Morisky scale, Hypertension, Barriers (OS)*

INTRODUCTION

Hypertension is one of the most important risk factors for atherosclerosis, heart failure, stroke and renal failure. This disease usually does not have any symptoms, and little equipment is required for its detection that can be prevented, treated and controlled with medicines (1). Control of blood pressure (BP) through pharmacological treatment leads to major benefits in preventing cardiovascular morbidity and mortality. Accordingly, medication adherence is an important factor in achieving blood

pressure control (2). medication adherence is defined as: "the degree to which the person's behavior corresponds with the agreed recommendations from a health care provider" (3).

Today, the National Association of American Nurses accepted the poor adherence to medication regimen as a nursing diagnosis (4). Unfortunately, poor adherence to medicines is prevalent (5). This fact leads to poor health outcomes and increased medical costs of drug-related morbidity (6).

Several studies have been conducted on factors associated with medication nonadherence. Some studies have identified barriers to medication adherence and classified them as patient-related factors (e.g., disease-related knowledge, health literacy, and cognitive function) and drug-related factors (e.g., adverse effects and polypharmacy). Other factors, such as the patient-provider relationships, the cost of medications and regimen complexity have received less attention (7).

Medication adherence is associated with high necessity and concern about treatment. In nursing practice, it is important to understand the specific barriers to adherence and engage patients in the implementation of strategies to improve adherence (8).

Because barriers to medication adherence can vary widely among individuals and different cultures, many researchers have concluded that person-specific barriers should be identified through individualized screening techniques and interventions customized to address the needs of each individual (9). On the other hand, deprived rural areas often receive less attention due to low access to transport (10). Therefore, this study aimed to investigate the barriers to medication adherence among hypertensive patients in deprived rural areas in Iran.

MATERIALS AND METHODS

Study design: A descriptive cross-sectional study was conducted on 238 diagnosed hypertensive patients in five deprived rural areas of Iran.

Sampling method: The convenience sampling method was used in this study and all patients in the 5 zones are available to researchers were included in the study.

Socio-demographic characteristics: Demographic characteristics included age, gender, marital status, height and weight (for calculation of body mass index (BMI)) level of education, and few clinical information, such as diseases and disabilities, lipids level, duration of treatment, blood pressure and the total number of medications per day.

Medication adherence scale: Medication adherence was measured using the structured self-report 8-item Morisky Medication Adherence Scale (MMAS-8) (10). This adherence measure was designed to facilitate the identification of barriers to and behaviors associated with adherence to chronic medications. MMAS-8 scores range from 0 to 8. The score of 8 is considered as high medication adherence, 6 to less than 8 as medium medication adherence, and less than 6 as low medication adherence.

In previous validation studies, MMAS-U score less than 6 was associated with uncontrolled blood pressure. MMAS-8 score less than 6 has also been shown to be associated with poor antihypertensive medication pharmacy fill rates (11). The MMAS-8 has been validated in outpatient settings with several groups of patients, which demonstrated good reliability (α=0.83) and validity in measuring adherence. It has been widely used in various other studies to measure medication adherence (12). Because the MMAS-8 was quick and easy to complete, it was used in this study. A validated Persian version of the MMAS was available. Persian version of the MMAS has excellent stability (intraclass correlation = 0.95) and good acceptability of internal consistency (α = 0.80) (13).

Medication adherence barriers scale: To assess self-reported medication barriers, we used a multi-item scale that was developed by a researcher who used the results of previous studies (14). The multi-item scale addresses common barriers, including having too much medication to take, forgetting whether medication was taken at a particular time and delaying taking pills to avoid side effects at an inconvenient time. Patients in the original measure were presented with 7 items and were asked whether the items were true or false. Patients were not advised to consider a specific medication; rather, the measure holistically assessed barriers. The items were as follows: (1) "I am not taking medications to avoid having side effects"; (2) "I'm taking medicine only when I feel discomfort"; (3)

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"I forgot my medications because of a lot of overwork"; (4) "I do not have the cost of providing medications"; (5) "There is no one to help me keep track of when to take my medication"; (6) "I believe that taking off and not taking medication did not have any effect on recovery"; and (7) "I have too much medication to take." Response options included "definitely false," "probably false," "probably true," and "definitely true" (coded 1 to 4). Summing responses to all items formed a summary score; higher scores correspond to more barriers.

The scales used were valid and reliable. Their validity was proven by ten experts and their corrective comments were made. Cronbach's alpha reliabilities of the instrument were found 0.86 and 0.89 for medication adherence and their barriers, respectively.

Statistical analysis: All data were analyzed using SPSS version 21. Descriptive statistics, including means and proportions, were used to summarize the patients' baseline socio-demographic and clinical characteristics. Simple linear regression was used to compare scores of medication treatment barriers for patients who were classified as nonadherent versus adherent.

Ethical issues: After obtaining both the code of ethics (IR.SBMU.RETECH.REC.1395.605), and informed consent from the study participants, this study was conducted in the five deprived rural areas of Iran. Scale use permission was obtained before conducting the study.

RESULTS

Demographic characteristics and health status: Demographic characteristics of subjects are shown in Table 1. The participants' mean age was 57.40 years (SD= 15.52), and 67.6% of the sample were females. The average number of antihypertensive medications used was 1.58 (SD 0.87), and 67.6% of the patients received only one antihypertensive drug. The average duration of antihypertensive drugs use was 2.14 years (SD= 0.73). Mean systolic and diastolic blood pressure in patients were 155.08 mm Hg (SD= 22.5) and 97.00 mm Hg (SD= 12.89), respectively. The mean score of the MMAS-8 was 6.56 (SD 1.56). Low adherence was seen in 18% of the patients, while medium and good adherence were observed in 43.6% and 38.2%, respectively. As shown in Table 1, the average BMI was 23.4 (SD =6.73).

Hypertensive patients' adherence to medication in deprived rural areas: The medication adherence rate in hypertensive patients in deprived rural areas was assessed using 8 items in 2-level spectrum. The results showed that the mean medication adherence was 0.69 so that most of the respondents had medium adherence (Table 2).

Barriers to hypertensive patients' adherence to medication in rural and deprived area: The significance of barriers to medication adherence among hypertensive patients in rural deprived areas was measured by a 5-point Likert scale. Detailed results are given in Tables 3 and 4. As shown in Table 3, according to the respondents, in terms of barriers, "I do not have the cost of providing medications", "There is nobody to help me keep track of when to take my medication", and "I am taking medicine only when I feel discomfort" was very important. Barriers, "I am not taking medications to avoid having side effects (such as dizziness and headache)", and "The number of my medications is high and I do not know whether they are taking it or not", are of lower importance from the respondents' points of view.

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Table 1: Demographic characteristics and health status.

Variables	Overall sample
Male gender, %	67.6 female
Mean age in years, SD	57.40 (15.52)
Marital status, %	
Unmarried	1.3
Married	79
Divorced/Separated	0.8
Widowed	18.9
Educational degree, %	
None	86.6
Primary school	7.4
Middle school	5.5
High school	0.5
University	0
BMI, SD	22.4 (9.7)
Lipids level. Mean score (SD)	
LDL	153.12 (38.13)
HDL	49.58 (13.06)
TG	248.56 (102.46)
Cholesterol	200.60 (64.88)
Other disorders, %	
None	36.5
Diabetes	10.5
Cardiovascular	9.2
Gastro enteric diseases	20.6
Musculoskeletal	8.4
Respiratory	4.6
Other	10.2
Mean n. of prescribed drugs (SD)	1.58 (0.87)
Duration of antihypertensive drugs used (years) (SD)	2.14 (0.73)
MMAS-8 adherence score. Mean score (SD)	6.56 (1.56)
Low adherence (scores 1–5), %	18.1
Medium adherence (scores 6–7), %	43.6
High adherence (score 8), %	38.2

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Table 2: Hypertensive patients' adherence to medication in deprived rural areas

Medication adherence	Mean Rank	SD
1. Do you sometimes forget to take your hypertensive pills?	0.70	0.46
2. People sometimes miss taking their medications for reasons other than forgetting. Thinking over the past two weeks, were there any days when you did not take your hypertensive medicine?	0.68	0.47
3. Have you ever cut back or stopped taking your medication without telling your doctor, because you felt worse when you took it?	0.64	0.48
4. When you travel or leave home, do you sometimes forget to bring along your hypertensive medication?	0.66	0.47
5. Did you take your hypertensive medicine yesterday?	0.69	0.46
6. When you feel like your hypertensive is under control, do you sometimes stop taking your medicine?	0.65	0.48
7. Taking medication every day is a real inconvenience for some people. Do you ever feel hassled about sticking to your hypertensive treatment plan?	0.72	0.45
8. How often do you have difficulty remembering to take all your medications?	0.63	0.48
***Description of the spectrum: Items 1 through 7 adherence1 and non-adherence 0. For item 8, if a patient chooses response ‘‘0”, the score is ‘‘1” and if they choose response ‘‘4”, the score is ‘‘0”. Responses ‘‘1, 2, 3” are respectively rated as ‘‘0.25, 0.50, 0.75”**		

Table 3: Barriers to hypertensive patients' adherence to medication and Frequency of this barriers

Barriers of medication adherence	Mean Rank	SD	CV	Definitely true n (%)	Probably true n (%)	Probably false n (%)	Definitely false n (%)
I do not have the cost of providing medications	4.24	1.29	0.30	8 (3.4)	59 (24.8)	17 (7.1)	154 (64.7)
there is no body to help me keep track of when to take my medication	4.13	1.48	0.36	112 (47.1)	42 (17.6)	20 (8.4)	64 (26.9)
I am taking medicine only when I felt discomfort	4.03	1.28	0.32	66 (27.7)	24 (10.1)	46 (19.3)	102(42.9)
I believe that drug intake does not affect my disease.	3.49	1.38	0.40	94 (39.5)	27 (11.3)	39 (16.4)	78 (32.8)
I forget to take medications because of my busy task.	3.12	1.22	0.39	139 (58.4)	30 (12.6)	23 (9.7)	46 (19.3)
I do not taking medications to avoid having side effects (such as dizziness and headache)	2.30	1.54	0.67	122 (51.3)	61 (25.6)	6 (2.5)	49 (20.6)
the number of my medications is high and I do not know whether they are taking it or not	2.29	1.45	0.64	35 (14.7)	35 (14.7)	37 (15.5)	131 (55)

*Description of the spectrum: Absolutely opposed 1..... Absolutely agree 5

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The relationship between the degree of medication adherence and the socio-demographic characteristics of the respondents: The Pearson Correlation test was used to examine the correlation between socio-demographic characteristics (such as age, gender, education level, marital status, income, employment) and the degree of medication adherence. Detailed results are presented in Table 4.

As can be seen from Table 4, there was a significant positive relationship between the socio-demographic characteristics (such as gender, educational level and monthly household income) and the degree of medication adherence, but a significant negative relationship existed between age and medication adherence. There was no statistically significant relationship between the variables of marital status and employment and medication adherence.

Table 4: Correlation and Significant Level (the p value) of medication adherence and socio-demographic characteristics and treatment-related factors.

Socio-demographic characteristics	r	P value
Gender	0.41	<0.001
Age	-0.33	0.009
Education level	0.69	<0.001
Marital status	0.01	0.920
Monthly household income	0.46	0.001
Duration of drug used	-0.27	0.031
Systolic blood pressure	0.11	0.100
Diastolic blood pressure	0.18	0.067
treatment related Factors		
duration of hypertension	0.79	<0.001
number of medications used	-0.55	<0.001
concurrently with other diseases	-0.78	<0.001

The relationship between medication adherence and treatment-related factors: Pearson correlation test was used to examine the association between the variables of treatment-related factors (such as duration of hypertension, the number of medications used and concurrently with other diseases) and the degree of medication adherence. Detailed results are presented in Table 4 above. As can be seen from Table 4, there was a significant positive relationship between the duration of hypertension and the degree of medication adherence. However, a significant negative relationship was found between the number of medications used and concurrently with other diseases and the degree of medication adherence.

Demographic characteristics affecting the medication adherence: After entering all independent variables, a significant correlation was found between the regression relationship and the degree of medication adherence, which indicated that the level of education, economic status, and gender significantly associated with 53% of the total amount of changes in medication adherence (Tables 5 and 6). Therefore, other variables were not statistically significant.

Treatment-related factors that affect medication adherence: After entering all the independent variables of treatment-related factors showing a significant correlation, the results showed that the duration of hypertension, the number of medications used and concurrently with other diseases significantly decreased to 76% of the total amount of medication adherence (Tables 5 and 6).

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Table 5: F test results from regression analysis of the variables explaining the degree of medication adherence.

Demographic characteristics					
	sum of squares	Degrees of freedom	Mean of squares	F	p value
Regression	24.33	3	8.11	91.15	<0.001
Residual	20.81	234	0.08		
Total	45.14	237			
R= 0.73 R2=0.54 Adjusted R Square=0.53					
Treatment-related factors					
regression	34.55	3	11.51	254.36	<0.001
residual	10.59	234	0.045		
Total	45.14	237			
R= 0.87 R2=0.76 Adjusted R Square=0.76					

Table 6: Regression coefficients of the variables affecting the medication adherence in step 3.

Demographic characteristics					
	B	Std.Error	Beta	t	p value
Constant	0.19	0.09	-	1.96	0.050
level of education	0.21	0.02	0.55	10.92	<0.001
economic status	0.08	0.02	0.19	3.92	<0.001
gender	-0.13	0.04	-0.15	-3.17	0.010
treatment-related factors					
Constant	0.59	0.07	-	8.24	<0.001
duration of hypertension	0.16	0.01	0.47	11.34	<0.001
number of medications used	-0.20	0.02	-0.42	-9.09	<0.001
concurrently with other diseases	-0.04	0.02	-0.09	-2.38	0.020

DISCUSSION

Exploring barriers to medication adherence among hypertensive patients is important for several reasons. First of all, missing medical treatment can have serious consequences for health and result in increased morbidity and mortality. This study found a high percentage of medium adherence (43.6% of patients) and showed that socioeconomic factors and treatment-related factors were effective in medication adherence.

The results of this study showed that the cost of drug and difficult access to medication are important barriers to medication adherence in deprived patients. These barriers can be remedied by changing health facilities in deprived areas and considering medicines subsidies for this people.

In addition to receiving inadequate health services for patients living in deprived areas, they are even neglected in the field of research. We conducted this study because of our experiences of consecutive years of volunteering in deprived areas. Our study had a number of limitations. Firstly, it was difficult to reach all of hypertensive patients residing in deprived areas, and we randomly selected only 5 areas. The samples knew that the researchers were healthcare providers, so the results could be affected. Most of the samples did not have the necessary literacy to complete the questionnaires, and the researcher's native language was different from the patients'. All of the above limitations can cause bias.

Generally, medication adherence varies from 20 to 80 percent in hypertensive patients (15). According to the World Health Organization, it may vary according to how this parameter is measured (16). Durand reposted that the most important reason for the difference in medication

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adherence (mean 31.2% and from 3.3 to 86.1%) was the use of different tools that self-expression tools had the highest degree (14). In this study, the percentage of medium medication adherence observed was higher than that in other studies (4, 17), which might be attributed to many of factors in the context of community.

This study showed that socioeconomic factors and treatment-related factors were effective in medication adherence. Several studies have been conducted on the causes of medication no adherence and demonstrated that these causes are patient-related factors (less information about health, less involvement in decision-making process) physician-related factors (multidrug regimens, communication barriers, side effects of medications, and a different multidisciplinary perspective), healthcare systems related factors (visit time constraints, care limitation, lack of health information technology) (18). In a review study, socio-economic factors, healthcare team-related factors, context-dependent factors, treatment-related factors, and patient-related factors were effective in medication adherence (19).

In this study, economic status was one of the factors affecting medication adherence that showed a significant positive relationship. A review of studies conducted in low- and middle-income countries showed that medication adherence among hypertensive patients was 36 to 65 percent, and approximately 80% of the deaths which occurred in these countries were due to complications from hypertension(20), which are consistent with the findings of this study and the similarity of the field of study can be helpful in comparing the results. These cases reflect the modifiability of medication adherence in hypertensive patients and can be control many deaths related to hypertension. In the present study, lack of financial resources was a major barrier to medication adherence.

An interesting finding of this study was that the lack of correlation between the status of employment and marital status of hypertensive patients and their medication adherence, while Lee's study showed that patients who were non-recruited and retired had more medication adherence (21). Kang's study also demonstrated that recruited people had a small chance of medication adherence (14). On the other hand, in most countries, non-recruited people had low medication adherence due to low access to healthcare systems and low financial resources.

The duration of hypertension was a factor that showed a significant positive correlation with medication adherence. Several studies confirm that long history of hypertension is effective in medication adherence (14), and also there is a direct relationship between long history of hypertension, on average ten years, and medication adherence, which may be predictive (14). Medication adherence in a long history of hypertension can be due to high knowledge and experience about the situation, the proper relationship between the physician and the patient, and high confidence in the doctor's advice (19).

Concurrency of hypertension with other diseases showed a significant negative correlation with their medication adherence, while Spike's study showed that concurrency of other diseases with hypertension showed a low correlation that was significant with medication adherence, and also the depression symptoms, hypertension belief and social support showed no significant correlation with medication adherence (14). This difference in relationship, in addition to the type and duration of the disease, can also be related to the condition of the individual.

In this study, there was a significant negative correlation between number of drugs consumed and medication adherence. Similar to our results, other studies also found that medication adherence in patients taking two tablets per day was higher than that in those who took more than two tablets per day (14). Jankowska-Polanska study's showed that having a drug improves medication adherence (22). The reverse relationship between the number of treatments and medication adherence has been confirmed in numerous studies (14).

A review of the qualitative studies showed that in addition to the negative effects of barriers to medication adherence in hypertensive patients, self-efficacy and beliefs of individuals have critical effect on medication adherence and should be discussed with hypertensive patients regarding their beliefs about treatment, complications, and the necessity of drug use and be modified opposing opinions (23). There was an inverse relationship

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between perceived blood pressure control and medication adherence in the Patel study (24).

Sometimes, medication nonadherence is due to limited understanding of the condition of the disease and treatment (25), which may help improve patients' medication adherence by improving patients' understanding of their disease and treatment. The results of the present study also showed that in some cases, patients only used drugs when they felt uncomfortable, which might be due to their lack of familiarity with illness and treatment. However, in some studies, other methods, such as the use of software for the smartphone of patients can improve their medical adherence (26).

Our findings and also those from previous studies showed that improving patients' understanding of their disease and treatment can improve medication adherence. In addition, to prevent the hypertensive complications, financial support for medicines could be useful. On the other hand, physicians can also reduce the cost of medication and increase medication adherence by reducing the number of prescribed medications.

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