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## An Analytical Assessment of Medication Adherence among Patients with Hypertension

Mohammad Edris Arbabshastan<sup>1</sup>, Sedigheh Iranmanesh<sup>2\*</sup> and Mahlagha Dehghan<sup>3</sup>

<sup>1</sup>MSc in Nursing Education, Faculty of Nursing and Midwifery, Iranshahr University of Medical Sciences, Iranshahr, Iran

<sup>2</sup>Assistant Professor, Department of Medical Surgical Nursing, Faculty of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran

<sup>3</sup>Assistant Professor, Department of Medical Surgical Nursing, School of Nursing and Midwifery, Kerman University of Medical Sciences, Kerman, Iran

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### ABSTRACT

Hypertension is one of the major health problems in many countries. Medicinal treatments and lifestyle modification have so far failed to effectively influence blood pressure control. One of the main reasons behind such inefficiency is the poor adherence of patients to anti-hypertensive therapy regimen. Hence, this study intended to analytically assess the medication adherence among hypertensive patients in Zahedan during 2015. This was a descriptive, analytical, cross-sectional study. The population consisted of all health centers and doctors' offices for internal medicine and heart diseases based in Zahedan. The sample included a total of 400 hypertensive patients who were selected through convenient sampling. Data were collected through a medication adherence questionnaire for hypertensive patients. Moreover, the findings were analyzed through the Mann-Whitney U test and Kruskal-Wallis test as well as descriptive statistics including frequency and frequency percentage. Based on the results, there was a significant difference between the mean values of medication adherence among skeptical, uninterested, hesitant and accepting. Furthermore, the mean of medication adherence among the subjects was  $15.26 \pm 3.48$  (a scale ranging from score 9 (full adherence) up to 36), suggestive of moderate medication adherence regimen. Additionally, there was a significant relationship between demographic characteristics of hypertensive patients and the medication adherence scores. Overall, the results suggested that there is moderate medication adherence in this population unlike most other populations. This can provide an opportunity for nurses, health care administrators etc. to take improvement measures in the treatment of hypertensive patients.

**Keywords:** hypertension, medication adherence

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### INTRODUCTION

High blood pressure is a major cause of cardiovascular diseases worldwide. Recent studies have indicated that there is a linear relationship between blood pressure and cardiovascular events[1]. Moreover, this condition is known as a major cause of disability accounting for about 11% of all deaths in the world [2]. High blood pressure is the most common cause of strokes and kidney failure. In the absence of appropriate treatment and control of hypertension, 50% of hypertensive patients will die from coronary artery disease, 33% from stroke and 10-15% from kidney failure [3].

In the Eastern Mediterranean and Middle East countries, the prevalence of high blood pressure was reported by various studies to be ranging from 10 to 17%. Moreover, the rapid social and economic changes in these countries over recent decades have led to the rising prevalence of many risk factors for cardiovascular diseases including hypertension [3]. An Iranian study reported that the prevalence of hypertension was 25% in the total population and

32% among the adults [4]. However, Ebadi et al (2012) argued that there is little accurate statistics of the prevalence of hypertension in Iran. According to previous studies, the prevalence of hypertension is 11% in Isfahan, 17%, in Chaharmahal and Bakhtiari, 12% in Gilan, 17.5% in Zanjan and 19% in Arak. The growing epidemic of hypertension in the world is a serious warning requiring more attention to this often silent disease [5].

A major concern in hypertensive patients was how to adhere to treatment programs [6]. In a study by Pang and Cheng (2001), it was found that only 30 to 39% of hypertensive patients achieved blood pressure control in line with treatment goals, while 65% discontinued medication or consumed than the recommended dose. In their study, Ezzati et al. reported that at least 50% of patients with chronic diseases sometimes failed to follow their treatment programs [7]. Therefore, adherence is a multifactor component varying from one person to another [8].

One of the behaviors associated with the disease predicting its successful treatment and curtailing the negative side effects and severity of the disease involves the medication adherence among patients. Although the doctors and people spend a great deal of time and energy on diagnostic procedures, many patients suffering from chronic diseases tend to abandon or neglect the recommended treatment regimen due to fatigue caused by long-term treatment and disappointment in decisive cure [9,10].

Defined as the level of non-adherence of individual behavior with health advice or therapy, non-adherence to medication involves a complex behavioral process affected by many factors such as the characteristics of individual patients, mutual relationship between doctors and patients and the health care system [11].

Since adherence to prescription medication and plans has become a major challenge among patients with chronic diseases, any non-adherence with treatment programs will face such patients with serious consequences, including recurrence and progression of disability, thus requiring immediate treatment and hospitalization [11]. There are numerous obstacles to medication adherence including the length of medication period, inability to buy medicines and the side effects of medicines. As the statistics represent, only 40% poorly adhere to medication regimens to control blood pressure [12]. In a study on medication adherence of hypertensive patients, it was found that 32% had low adherence, 52% had average adherence and 15.9 had high medication adherence regimens [13].

Studies have demonstrated that there is low adherence with non-medication recommendations and even prescription drugs. Non-adherence has limited the effectiveness of prevention strategies, leading to a significant increase in cardiovascular complications (Baune et al, 2005). Moreover, the results of a study in the US found that 30-60% of patients with high blood pressure do not follow the prescribed medication regimen [10].

Unlike many studies on adherence to therapy regimen, this has remained as an unresolved issue in the past four decades without (Jia-Rong et al, 2008). On the other hand, the common interventions on adherence to regimen have not successfully enhanced the patients' adherence [14].

Quoted by Jawadi, Mohammadi et al. suggested that only 5% of the total number of hypertensive patients receive regular medication while being informed of the disease as the blood pressure is under control. Poorly controlled hypertension depends on several factors such as lack of adherence to treatment [15].

Non-adherence to medication regimen is an obstacle to achieving the goals of treatment. In fact, 30-40% of patients with chronic diseases do not adhere to their medication regimen [16]. This stresses the importance of examining the cause of non-adherence and actions taken to improve adherence among these patients. It is crucial to identify the factors contributing to medication adherence conducive to health care interventions aimed to improve adherence among the patients [17]. In this light, researchers have identified and reported several factors contributing to medication adherence [18]. The reasons for non-adherence to medication regimen are highly diverse. One of these factors is the number of drugs used by patients likely to increase non-adherence to medication regimen. Medication adherence regimens depends on the importance attributed by the patients to their prescription drugs. For instance, drugs that relieves painful symptoms and bring about perceived effectiveness are more likely to be taken [19].

Therefore, the daily behavior of people is influenced by their beliefs. Individual behaviors can to a certain extent be justified by understanding their beliefs. Health beliefs involve the individual conviction about health and morbidity [20,21]. In this respect, Alhewiti (2014) conducted a study to evaluate the association between medication adherence and beliefs about medicines in patients with chronic disease (hypertension, diabetes, hyperlipidemia, hyperthyroidism and asthma). The results of this study indicated 56.9% of patients had poor adherence. Moreover, there was a positive correlation between medication adherence and individual beliefs about the importance of medicines. There was also a negative association between medication adherence and individual concerns about side effects, beliefs about the harmfulness of medicines and over-prescription. Hence, the prevalence of non-adherence to medication regimen was directly correlated with negative individual beliefs about medicines [22].

According to the latest statistics provided by the Iranian Ministry of Health, only half of the patients treated for hypertension follow their medication regimen. Beliefs about medicines and medication regimen can dramatically influence adherence and non-adherence to medication regimen among these patients. The literature review demonstrated that limited research has been conducted so far on medication adherence in hypertensive patients living in Iran. Awareness of medical practitioners about the statistics of people with hypertension and the level of belief in the medication regimen and medication adherence can not only help upgrade services and modify patient's behavior and medication reception, but also curtail the consequent mortality and disability rates. According to the facts mentioned above, this study intended to analytically assess the relationship between medication adherences in hypertensive patients in Zahedan during 2015.

## MATERIALS AND METHODS

This was a descriptive, analytical, cross-sectional research, where the samples were selected through convenient sampling according to the inclusion criteria and informed consent of 400 subjects to participate in the study. The inclusion criteria were age over 18 years, taking at least one anti-hypertension medication, essential hypertension risk according to specialist diagnosis and willingness to participate in the survey. The population comprises all health centers and clinics of internal and heart diseases under coverage of Zahedan University of Medical Sciences based in Zahedan during 2015, which were selected owing to ease of access. For ethical considerations, the researcher offered an endorsement letter from the Faculty of Nursing, Kerman University of Medical Sciences to the selected therapeutic centers, having obtained permission from the relevant authorities, this study firstly aimed to provide the population with an explanation to voluntary participation in the survey. The clients were allowed to leaving at any stage of research survey. Concentration was on local and regional culture so as to curtail stress and enhance cooperation such as creating a private location for filling out the questionnaires. In addition, they were assured that data will remain confidential and the results will be handed to medical educational centers.

Data collection instrument was a questionnaire consisting of two parts: 1) Demographic characteristics, 2) Medication Adherence Questionnaire, and 3) Hill-Bone Adherence Scale was employed to measure the level of medication adherence. Kim et al. (30) designed Scales called Hill-Bone adherence to High Blood Pressure Therapy Scale. The medication adherence subscale consists of nine items scored on a four-point scale ranging from never, sometimes, often and always, covering score of 9 (full adherence) all the way to 36. Reliability and validity of the subscale was confirmed by Kim et al.(2011) [23]. Furthermore, the questionnaire went through psychometrics in Iran, the results of which indicated adequate validity and reliability (Cronbach's alpha: 0.72) [24]. The Cronbach's alpha of the Hill-Bone medication adherence questionnaire was 0.78 while the ICC was 0.74 two weeks later. The Cronbach's alpha of the beliefs about medicines (BMQ) was 0.7 while the ICC was 0.85 two weeks later. The questionnaires therefore had adequate reliability. Data were analyzed through SPSS 19.

## RESULTS

**Table 1: Responses given by hypertensive patients to the medication adherence items**

No.	Item	Response (Frequency/Percentage)			
		Never	Sometimes	Most of the time	Always
1	How often do you forget your blood pressure medication?	154 (38.5)	178 (44.5)	66 (16.5)	2 (0.5)
2	How often do you decide not to take blood pressure medication?	218 (54.4)	157 (39.3)	8 (2)	17 (4.3)
3	How often do you forget to have your prescription extended?	119 (29.8)	193 (48.2)	80 (20)	8 (2)
4	How often do you not take blood pressure pills at all?	133 (33.2)	211 (52.8)	43 (10.8)	13 (3.2)
5	How often do you cut your blood pressure medication before going to the doctor?	223 (55.8)	162 (40.5)	13 (3.2)	2 (0.5)
6	Do you feel better when you refuse to take your medication?	220 (55)	130 (32.5)	48 (12)	2 (0.5)
7	Do you forget to take your medication when you are feeling sick?	193 (48.3)	166 (41.4)	41 (10.3)	-
8	Do you ever take other blood pressure pills?	199 (49.8)	123 (30.8)	78 (19.4)	-
9	How often do you not take you blood pressure pills because of negligence?	176 (44)	148 (37)	76 (19)	-

In this study, the findings showed that 80.2% of patients were over 30 years of age and more than half of the subjects (56.3%) were men. The majority of participants were married (75.2%). Moreover, 32.5% of the subjects were illiterate, and only 12% were unemployed. More than half of the subjects lived in urban areas (53.5%). In

terms of family size, household population was between 4 and 7 in most of the subjects (60.8%) living mainly at home with 3-4 rooms (63.3%) and an area of 50 to 150 meters (59.8%). In terms of ethnicity, nearly 50% of patients were Baluch and more than 90% were Iranian nationals. Sunnis made up the majority of participants (64%). Regarding the characteristics of the disease, more than 95% of subjects had a history of hypertension for less than 15 years while most of them had less than ten years, taking anti-hypertension medicines (98.4%). Less than 25% of the subjects were taking hypertension medication three times a day (22.6%). Furthermore, less than 45% of subjects had hypertension accompanied by other diseases such as diabetes, kidney failure, respiratory, hematologic, and gastrointestinal and nervous system deficiencies. Table 1 displays the frequency and frequency percentage of medication adherence items among hypertensive patients.

According to Table 1, the highest full adherence was found in the item: "How often do you cut your blood pressure medication before going to the doctor?" and "Do you feel better when you refuse to take your medication?" Furthermore, there was no full medication adherence in case of three items including "Do you forget to take your medication when you are feeling sick?", "Do you ever take other blood pressure pills?" and "How often do you not take your blood pressure pills because of negligence?" Table 2 displays the level of medication adherence based on classification of subject and difference between the necessity score and concern about medication usage.

**Table 2: Medication adherence difference in classification of subjects based on the difference between the necessity score and concern about medication usage**

Variable	Medication adherence		Kruskal-Wallis test	P-value
	Mean	Standard deviation		
Skeptical (low necessity, high concern)	13.68	1.49	64.88	p<(0.001)
Indifferent/uninterested (low necessity, low concern)	10.32	0.95		
Hesitant (high necessity, high concern)	15.25	3.55		
Accepting (high necessity, low concern)	16.65	2.99		

According to the table above, there was a significant difference between the mean values of medication adherence among skeptical, uninterested, hesitant and accepting patients. Accordingly, the assessment scale indicated that lower scores represented higher adherence. Hence, indifferent/uninterested individuals tended to adhere more often to their medication, whereas the accepting individuals were less likely to adhere to their therapy regimen. Furthermore, Table 3 displays the relationship between demographic characteristics and medication adherence level.

**Table 3: The relationship between demographic characteristics and medication adherence in hypertensive patients**

Variable	Medication adherence		Test statistic*	P-value
	Mean	Standard deviation		
Age (year)			67.05	p<(0.001)
18-29	16.99	3.83		
30-39	13.68	3.52		
40-49	17.17	3.42		
50-59	15.50	3.58		
60-69	13.93	2.34		
70 and above	15.04	3.05		
Gender			-5.75	p<(0.001)
Male	14.41	3.34		
Female	16.36	3.48		
Education level			24.85	p<(0.001)
Illiterate	14.30	3.23		
Elementary	16.30	3.0		
High-school	14.73	4.4		
Academic	16.02	2.86		
Job			105.41	p<(0.001)
House-wife	15.0	3.62		
Unemployed	13.71	4.04		
Worker	16.84	2.16		
Employee	17.71	2.65		
Farmer	17.56	2.64		
Retired	13.43	2.58		
Unemployed	15.33	4.15		
Living place			17.61	p<(0.001)
Urban	14.66	3.54		
Suburban	15.85	3.39		
Rural	16.08	3.20		
Duration of experiencing hypertension (year)			16.01	p<(0.001)
0-5	15.58	3.6		
6-10	14.89	3.1		
10 and above	13.14	2.46		
Duration of taking hypertension drugs (year)				
0-5	15.52	3.55		

Variable	Medication adherence		Test statistic*	P-value
	Mean	Standard deviation		
6-10	14.53	3.08	12.22	0.002
10 and above	12.17	2.32		
Frequency of taking hypertension drugs per day			13.41	0.001
Once	14.74	3.53		
Twice	16.0	3.38		
Trice	14.47	3.35		
History of other diseases			-5.05	p<(0.001)
No	14.3	3.37		
Yes	16.03	3.38		

\*The binary variables were analyzed through Mann-Whitney U test while the variables with multiple modes were analyzed through the Kruskal-Wallis test.

According to the results presented in Table 3, the demographic variables were significantly correlated with medication adherence.

## DISCUSSION AND CONCLUSION

Based on the results obtained in relation to the overall objective of this study to determine the extent of medication adherence among hypertensive patients in Zahedan, it was found that the mean medication adherence among the subjects was  $15.26 \pm 3.48$  (scale ranging from score 9 (full adherence) up to 36), suggestive of moderate adherence to medication regimen. The highest full adherence was found in the item: "How often do you cut your blood pressure medication before going to the doctor?" and "Do you feel better when you refuse to take your medication?" In a similar study by Hadi *et al.* (2005) on the determinants of medication adherence regimen in patients with high blood pressure, it was found that about 39.6% of patients exercised good adherence to the medication regimen [25].

The results of a study based in the US by Bramley *et al.* (2006) showed that 74% of hypertensive patients had a high medication adherence regimen [26]. In a medication adherence study on patients who had undergone a kidney transplant in Tehran during 2009, it was found that 57.8% of patients did not adhere to medication [27]. The results of a similar study by Lapointe *et al.* (2011) to determine the relationship between medication adherence and acute coronary syndrome in patients believing the treatment showed that medication adherence levels over three quarters were 23%, 26% and 23%, respectively [28].

According to the research by the Center for Research on Medication Adherence in the US on the obstacles faced by patients in taking their medication, it was found that the common obstacles to adherence are patient-controlled. Moreover, doctor contribute to the low patients' adherence through the complex prescription regimens, failure to adequately explain the advantages and disadvantages, ignoring the lifestyles of patients or the cost of drugs building poor therapeutic relationships with patients [13,29].

The results of a study by Krousel *et al.* (2005) to improve medication adherence in hypertensive patients declared that despite numerous studies conducted over the past 50 years to identify the best methods to increase patient adherence, there has never been a unified ideal intervention proposed so far. They concluded that doctors were supposed to identify people who have less adherence to medication, calling for intervention on the part of physicians[30]. In a study conducted in the US by Morisky *et al.* (2008), it was found that 66% of the population under study pointed out that they prefer to lower their blood pressure without taking pills. This is due to the decrease in medication adherence [13].

Moreover, examination of the demographic characteristics and their correlation with medication adherence showed that 80.2% of subjects were over 30 years of age and more than half of the subjects were male. The majority of participants were married (75.2%). Moreover, 32.5% of the subjects were illiterate, and only 12% were unemployed. The interesting point in the survey results is the lower prevalence of hypertension among subjects under 40 years of age by about 30%. This reflects the growing risk of hypertension. The data from the study by Dennis Thomas (2011) on global statistics showed that hypertension in 2000 affected more than a quarter (24.4%) of the adult population. It is estimated this population will increase to about 60% by 2025 [31]. In a blood pressure meta-analysis study conducted in 2006, Haghdoust and Sadeghirad concluded that the level of blood pressure in Iran was higher than those in other countries, indicating the need for intervention projects. These conclusions suggested there were local variables contributing to the prevalence and control of hypertension in Iran requiring further study [32]. When a person feels happy and does not suffer from any kind of illness, has more energy to take care her/his self. When someone take care of his/her self well, he/she becomes healthier and will has a high quality life [33]. The nurses can share information with public and community to teach them about cancer prevention, cancer referrals center through social networks, then proper application of networks toward learning and teaching suggested [34].

According to the results, 17% of housewives suffered from hypertension, accounting for the highest percentage among other professions. The experience of researcher for living many years in this city proved that continuous presence at home, lack of entertainment centers in the city and the lack of regular outings could be key factors contributing to greater risk of hypertension among housewives. In a study conducted in Koohrang (Chaharmahal and Bakhtiari Province) during 2007, inactivity was raised as one of the major risk factors for hypertension ( $P < 0.05$ ) [35].

Furthermore, the results of this study indicated that medication adherence levels among the age group 30-39 and 60-69 were more than those of other age groups. Men are more likely than women and married couples than singles to adhere to medication regimen. Egan et al (2010) conducted a study to assess the prevalence, awareness, treatment and control of hypertension in the US between 1988 and 2008. The results showed that a total of 50.1% of hypertensive patients in the study had controlled hypertension, while most of this improvement happened after 1999-2000. Control of hypertension was significantly lower among young people than middle aged and older people as confirmed by the results[36]. It seems that implications of this study involved an assessment of adherence among hypertensive patients and medication usage in order to identify the level of adherence and identifying beliefs and the factors contributing to adherence, thus provide the necessary health and nursing services to remove barriers.

### Clinical Implications

It additional implication was to assess the adherence of hypertensive patients and its relationship with medication beliefs in order to identify the level of adherence and identifying beliefs as well as the factors influencing adherence, thus providing the necessary health and nursing services to remove barriers. New technology such as notification via phone, personal digital assistance and pill boxes equipped with a paging system (verbal call) may help patients who have more difficulty achieving regimen goals.

Moreover, the results of this research can be useful for detailed content formulation of educational interventions in hypertensive patients. Relying on the results of this research can lead to better planning for different ethnicities and religions, greater medication adherence regimen, so as to curtail deaths related to chronic diseases, especially hypertension. Moreover, it can reduce the financial burden of chronic disease costs imposed on the health care community. The proper use of the results can help patients and their families with less medication adherence regimens, so as to enhance adherence with medication regimens and control the disease. A person with hypertension under control is less likely to experience serious complications from the disease. It is suggested that similar studies examine the relationship between medication adherence and quality of life among hypertensive patients, comparison of medication adherence in hypertensive patients living in provincial capitals and evaluating the impact of beliefs about medicines on medication adherence in hypertensive patients.

The limitations of this study included the inability to use blood pressures of patients due to excessive stress during interview or inconvenience of being with a doctor. Finally, poor cooperation with regard to age and gender of the subjects who were convinced through talking and presentation of statistics on patients who refused to adhere and suffered the consequences.

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