Global Journal of Health Science; Vol. 9, No. 5; 2017
ISSN 1916-9736 E-ISSN 1916-9744
Published by Canadian Center of Science and Education

Factors Affecting Adherence to Antihypertensive Medication: Results from a Rural Population Study in East of Iran

Reza Esmaeili[1], Mohammad Matlabi[1], Abduljavad khajavi[2], Ehsan Aliasghari[3] & Moosa Sajjadi[4]

[1] Assistant Professor, Department of Public Health, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Iran

[2] Assistant Professor, 22-Bahman Medical Center, Gonabad University of Medical Sciences, Gonabad, Iran

[3] MSc Student, Department of Health Education and Health Promotion, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Iran

[4] Assistant Professor, Department of Nursing, School of Nursing and Midwifery, Gonabad University of Medical Sciences, Gonabad, Iran

Correspondence: Mohammad Matlabi, Department of Public Health, School of Public Health, Gonabad University of Medical Sciences, Gonabad, Khorasan Razavi Province, Iran. Fax: 98-515-722-3401. E-mail: mohammad_matlabi1344@yahoo.com

Received: July 25, 2016 Accepted: September 30, 2016 Online Published: October 28, 2016

doi:10.5539/gjhs.v9n5p286 URL: http://dx.doi.org/10.5539/gjhs.v9n5p286

Abstract

Introduction: Medication therapy is one of the most important interventions for the control of hypertension and its complications, but patient nonadherence to prescribed antihypertensive medication is a challenge. This study was conducted to measure medication adherence and examine its determinants in patients with hypertension in a rural population of Iran.

Methods: This cross-sectional study was conducted on 422 patients with hypertension covered by the healthcare network of Bajestan, Razavi Khorasan Province, Iran. Medication adherence was measured by using the Persian version of the 8 items Morisky Medication Adherence Scale (MMAS-8). The Chi-square test and Spearman's correlation coefficient were used to examine the relationship between the determinants of medication adherence in SPSS.

Results: The mean age of the patients was 65.02±8.88 years. Of the total of 422 patients, 299 (70.9%) were female. Based on the MMAS-8, medication adherence was high in 39.6% of the patients, moderate in 10.9% and low in 49.5%. The variables that correlated significantly with the level of medication adherence included age (P=0.032), education (P=0.022), income (P=0.001), the satisfaction of patients-physician communication (P=0.006), physician based education (P= 0.003), occupation, time interval of physician's consultation (P=0.001), medication regime complexity (P=0.001), medications meals frequency (P=0.001), side effects (P=0.081) duration of the disease (P=0.015), comorbidities (P=0.001), smoking (P=0.047), patient's ability to read medication instruction (P=0.011), the patient's beliefs about the effectiveness of medications (P=0.001) and the patient's beliefs about the effectiveness of health system (P=0.001). The variables of gender (P=0.147), marital status (P=0.054), and distance problems to the health center (P=0.181) were not significantly correlated with the level of medication adherence.

Conclusion: The results of the present study revealed a low medication adherence in half of the patients with hypertension due to various personal and socioeconomic determinants as well as factors associated with the health system, therapy-related factors, disease-related factors and patient-related factors. Purposeful interventions therefore appear essential to improving medication adherence in rural populations with a focus on the effect of each determinant of medication adherence.

Keywords: adherence to treatment**,** hypertension**,** blood pressure control, rural health

1. Introduction

Hypertension is a major challenge to global public health (WHO, 2015). It is the main cause of cardiovascular diseases (CVD) and is responsible for 90 million (6%) disability-adjusted life years (DALYs) across the world

(Lawes et al., 2008). Approximately 40% of the world's population aged 25 and over (one billion) had hypertension in 2008 (WHO, 2015). Based on a large cohort study conducted in Iran, 41.8% of the population aged over 40 has hypertension, only 46.2% of whom are aware of their disease and a mere 17.6% receive antihypertensive drugs (Malekzadeh et al., 2013). Review of literatures (Haghdoost et al., 2008) shows that hypertension is significantly considerable in Iran, thus it's control and treatment is a major priority.

The successful control of hypertension contributes significantly to reducing morbidity, mortality and the costs of treatment (Elliott, 2003; Ho et al., 2009). The results of the PURE study of high/middle/low-income countries showed that, although 87.5% of the patients with hypertension had received medication therapy, the disease was only controlled in a mere 32.5% (Chow et al., 2013). Medication adherence is one of the main interventions for the control of hypertension, and medication non-adherence is the cause of failure in disease control (Fahey et al., 2005; Gwadry-Sridhar et al., 2013). Despite the significant effectiveness of medication therapy in the control of hypertension, the World Health Organization's statistics show that only 50% of chronic patients adhere to their medication regimen in developed countries, and the rate is even lower in developing countries (Sabaté, 2003). A meta-analysis of 569 studies conducted over a 50-year period from 1948 to 1998 shows that medication adherence varies between 4.6% and 100% (DiMatteo, 2004). Medication non-adherence has significant effects on the health outcomes, the use of healthcare services and the health care expenditure on both a personal and social level (Tsiantou et al., 2010; Iuga & McGuire, 2014).

Various factors determine medication adherence (Sabaté, 2003; Vlasnik et al., 2005; Brown & Bussell, 2011). The World Health Organization classifies the determinants of poor medication adherence into five categories, including socioeconomic factors, factors associated with the health system, disease-related factors, therapy-related factors, and patient-related factors (Sabaté, 2003). Understanding the effect of each determinants can guide the development of interventions that may improve medication adherence effectively. The present study was conducted to measure medication adherence and to examine its determinants in patients with hypertension in a rural population of Iran.

2. Methods

2.1 Objectives

The objective of this study was to measure medication adherence and to examine its determinants in patients with hypertension in a rural population of Iran.

2.2 Study Design

Cross-sectional, 2015.

2.3 Sample Selection

The sample consisted of 422 patients with hypertension in a rural area of Iran covered by the health network of Bajestan, Razavi Khorasan Province, Iran. We used systematic sampling (Cunningham et al., 2013) to select participants from the list of patients admitted to the Non-Communicable Diseases Unit of the health network.

2.4 Data Collection and Tools

A questionnaire consisting of three parts was used to collect the data. The first part covered the patients' demographic and socio-economic characteristics. The second part included the Persian version of MMAS-8, in which a score of zero indicates a high medication adherence, a score of 1 or 2 a moderate adherence and a score above 2 a poor adherence. Numerous studies have confirmed the validity and reliability of the Persian version of the MMAS (Moharamzad et al., 2014). The last part of the questionnaire consisted of disease-related and therapy-related items.

2.5 Ethical Considerations

This study is part of a master's thesis approved under the ethics code GMU.REC.1392.132

2.6 Data Analysis

The data were analyzed in SPSS-22. The Chi-square test and Spearman's correlation coefficient were used to examine the correlation between the independent variables and medication adherence level.

3. Results

This study was conducted on 422 patients with a mean age of 65.02 (and a standard deviation of 8.88). A total of 70.9% of the patients (n=299) were female. Based on the (MMAS-8), 39.6% of the patients had a high medication adherence, 10.9% had a moderate adherence and 49.5% a low adherence. The mean duration of medication therapy

was 6.7 years. A total of 33.4% of the patients used only one medication, while the rest used two or more medications. A total of 15.2% of the patients used only one meal of the medication every day, 74.9% used two meals and 10% used three meals. Table (1) presents the correlation the independent variables and medication adherence level.

Table 1. Independent variables and medication adherence level

No	Independent Variables		Frequency (percent)	Medication Adherence Level			Significance Level
				low	Medium	High	
	A. Socio-economic factors						
1	Gender	Male	122 (29.1)	70 (56.9)	12 (9.8)	41 (33.3)	P= 0.147
		Female	299 (70.9)	139 (46.5)	34 (11.4)	126 (42.1)	
2	Age	60>	115 (27.5)	49 (42.6)	9 (7.8)	57 (49.6)	P= 0.032
		>60	307 (72.5)	160 (52.1)	37 (12.1)	110 (35.8)	
3	Education	Literate	217 (51.5)	94 (43.3)	24 (11.1)	99 (45.6)	P=0.022
		Illiterate	205 (48.5)	115 (56.1)	22 (10.7)	68 (33.2)	
4	Income Quintile	1 (Poorest)	100 (23.7)	65 (65)	15 (15)	20 (20)	P=0.001
		2	100 (23.7)	55 (55)	17 (17)	28 (28)	
		3	103 (24.4)	56 (54.4)	5 (4.9)	42 (40.8)	
		4	62 (14.7)	23 (37.1)	3(4.8)	36 (58.1)	
		5 (richest)	57 (13.5)	10 (17.5)	6 (10.5)	41 (71.9)	
5	Marital Status	Single/Divorced/Widow	33 (7.8)	23 (79.7)	2 (6.1)	8 ()24.2	P=0.054
		Married	389 (92.2)	186 (47.8)	44 (11.3)	159 (40.9)	
6	Distance Problems	Exist	111 (26.3)	58 (52.3)	16 (14.4)	37 (33.3)	P= 0.181
		Not Exist	311 (73.7)	151 (48.6)	30 (9.6)	130 (41.8)	
	B. Health system-related factors						
7	Doctor-patients Communication Satisfaction	Yes	391 (92.7)	186 (47.6)	42 (10.7)	163 (41.7)	P= 0.006
		Not	31 (7.3)	23 (74.2)	4 (12.9)	4 (12.9)	
8	Physician Based Education	Yes	348 (82.2)	159 (45.7)	40 (11.5)	149 (42.8)	P= 0.003
		Not	74 (17.5)	50 (67.6)	6 (8.1)	18 (24.3)	
9	Consultations Interval	2 Month ≤	127 (30.1)	51 (40.1)	9 (7.1)	67 (52.8)	P= 0.001
		> 2 Month	295 (69.9)	158 (53.6)	37 (12.5)	100 (33.9)	
	C. Therapy-related factors						
10	Complexity of the medical regime	One Drug	141 (33.6)	69 (48.9)	13 (9.2)	59 (41.8)	P=0.001
		Two	262 (62.1)	126 (48.1)	32 (12.2)	104 (39.7)	
		Three	19 (4.5)	14 (73.7)	1 (5.3)	4 (21.1)	
11	Medications Meals	One	64 (15.2)	22 (34.4)	3 (4.7)	39 (60.9)	P=0.001
		Two	316 (74.9)	159 (50.3)	37 (11.7)	120 (38)	
		Three	42 (10)	28 (66.7)	6 (14.3)	8 (19)	
12	Side Effect	Yes	94 (22.3)	53 (56.4)	13 (13.8)	28 (29.8)	P=0.081
		No	328 (77.7)	156 (47.6)	33 (10.1)	139 (42.4)	
	Duration of the	r=-0.012					P=0.015

	Disease						
	D. Condition-related factors						
13	Co-Morbidity	Yes	160 (37.9)	87 (54.4)	26 (16.2)	47 (29.4)	P=0.001
		No	262 (62.2)	122 (46.6)	20 (7.6)	120 (45.8)	
14	Smoking	Yes	33 (7.8)	23 (69.7)	3 (9.1)	7 (21.1)	P=0.047
		No	389 (92.2)	186 (47.8)	43 (11.1)	160 (41.1)	
	E. Patient-related factors						
15	The Ability to Read Medical Instructions	Yes	201 (47.6)	85 (42.3)	22 (10.9)	94 (46.8)	P=0.011
		No	221 (52.2)	124 (56.1)	24 (10.9)	73 (33)	
16	Belief in Medication Effectiveness	Yes	396 (93.8)	189 (47.7)	40 (10.1)	167 (42.2)	P=0.001
		No	26 (6.2)	20 (76.9)	(23.1)	0 (0)	
17	Belief in Health System Effectiveness	Yes	381 (90.3)	174 (47.7)	42 (11)	165 (43.3)	P=0.001
		No	41 (9.7)	35 (85.4)	4 (9.8)	2 (4.9)	

4. Discussion

The present study was conducted to measure medication adherence and to examine its determinants in patients with hypertension in a rural population of Iran.

The results showed that 49.5% of the patients had low medication adherence. Since the low medication adherence correlates with poor control of hypertension (Fahey et al., 2005; Gwadry-Sridhar et al., 2013), the percentage is considerable. A study conducted in several cities of Iran (Moharamzad et al., 2014) showed that 54% of the patients have a low medication adherence. In another study, Kamran et al. measured medication adherence and its contributing factors in patients with hypertension in rural areas of Ardabil Province in Iran and found that only 24% of the patients have a high medication adherence (Kamran et al., 2015). The study of Ma et al. examined patients with hypertension in rural areas of China and showed the rate of medication adherence as 21.3% and the rate of non-adherence as 78.3% (Ma, 2016). Medication adherence has a more striking role in rural population's health as they are often faced with obstacles in seeking proper and timely access to healthcare services. International evidence suggests that hypertension awareness, treatment and control are often lower in rural populations, especially in low and middle-income countries, compared to in urban populations (Chow et al., 2013).

Of the socioeconomic factors examined in this study, age, the income quintile and education correlated significantly with medication adherence; however, no significant correlations were observed between medication adherence and gender, marital status and distance to the health center. Older age, low income and a low level of education are characteristic of rural populations in most countries and their significant correlation with medication adherence indicates the higher vulnerability of rural populations in this regard and necessitates the health systems to provide active care to these populations.

All the three variables representing the health system, including the satisfaction of patients-physician communication, physician-to-patient instructions and intervals between physician's appointments correlated significantly with medication adherence. The characteristics of the health system providing services to the patients affect medication adherence, and the quality of care provided by physicians, especially family physicians, contributes significantly to reduce the incidence of cardiovascular diseases in patients with hypertension (Fahey et al., 2005). In the Republic of the Congo, the failure to give instructions to patients in health centers also correlated significantly with medication non-adherence (Lulebo et al., 2015). Some researches proposed the strengthening of family medicine in Iran (Esmaeili et al., 2014) and the adoption of per capita payment systems for primary healthcare services (Esmaeili et al., 2016) for facilitating longitudinal patients' communication with their physician and other health personnel.

Of the therapy-related factors, the medications complexity and medication meals correlated significantly with medication adherence level, while duration of the disease and medication side-effects did not correlate significantly with adherence. Different studies have proposed the complexity of medication regimens as a potential

determinant of medication adherence (Ingersoll and Cohen, 2008). McDonald et al., carried out a systematic review of the interventions designed to increase medication adherence and concluded that medication adherence decreased with an increase in the complexity of medication regimen (McDonald et al., 2002). In contrast, Yue et al. did not find the relationship between the number of drugs and frequency of drugs to be significant (Yue et al., 2015). The results of the study by Lulebo et al. conducted in the Republic of the Congo showed a significant correlation between the medication side-effects experienced and medication non-adherence. Reducing dosages and enhancing the healthcare services provided when the duration of the disease increases should be on the healthcare agenda of the country (Lulebo et al., 2015). Meanwhile, enlightening the patients of the side-effects of medications may lead to their greater welcoming of medication regimens.

As for the disease-related factors, the two variables of comorbidities and smoking were analyzed and their correlation with medication adherence was found to be significant in the case of the former and not significant in the case of the latter. In a study in Iraq, Shakour et al. also found a significant correlation between comorbidities and low medication adherence (Shakor and Qader, 2014). Numerous studies, such as the one by Demoner et al. have shown that patients who smoke do not adhere to their medication regimens (Demoner et al., 2012). It appears that smoking is not only a major risk factor for hypertension, but is also a potential barrier to antihypertensive medication adherence.

All the three patient-related variables, including the patient's ability to read medication orders, the patient's belief in the effectiveness of medications and the patient's belief in the effectiveness of the health system, correlated significantly with the level of medication adherence. Chummun and Boland analyzed the existing evidence on patients' beliefs and their medication adherence and argued that a better communication with the healthcare providers and their participation in the decisions made about their prescriptions are significantly correlated with eliminated misconceptions, improved beliefs and ultimately a better medication adherence (Chummun & Bolan, 2013).

5. Conclusion

The low medication adherence in half of the rural population with hypertension and the determining role of different personal and socioeconomic determinants, the health system, therapy-related factors and disease-related factors indicate the need for the health policymakers and planners to design and implement effective interventions for improving medication adherence in the rural populations of the country. Similar studies are recommended to be conducted in other rural areas of Iran so as to evaluate the external validity of the findings of this study. Considering the significant role of medication adherence in public health, researchers of this field are also recommended to carry out studies on medication adherence in urban populations of Iran.

Acknowledgements

This paper is the result of an MSc thesis in health education and health promotion at Gonabad University of Medical Sciences. Hereby, the authors would like to express their gratitude to all those who helped with the implementation of this research project, especially Bajestan health Network

Funding

This study was funded by Gonabad University of Medical Sciences.

Competing Interests Statement

The authors declare that there is no conflict of interests regarding the publication of this paper.

References

Brown, M. T., & Bussell, J. K. (2011). Medication adherence: WHO cares? *Mayo Clinic Proceedings, 86*, 304-314. http://dx.doi.org/10.4065/mcp.2010.0575

Chow, C. K., Teo, K. K., Rangarajan, S., Islam, S., Gupta, R., Avezum, A., Bahonar, A., Chifamba, J., Dagenais, G. & Diaz, R. (2013). Prevalence, awareness, treatment, and control of hypertension in rural and urban communities in high-, middle-, and low-income countries. *Jama, 310*, 959-968. http://dx.doi.org/10.1001/jama.2013.184182

Chummun, H., & Bolan, D. (2013). How patient beliefs affect adherence to prescribed medication regimens. *British Journal of Nursing, 22*. http://dx.doi.org/10.12968/bjon.2013.22.5.270

Cunningham, C. J., Weathington, B. L. & Pittenger, D. J. (2013). *Understanding and conducting research in the health sciences*, John Wiley & Sons.

Demoner, M. S., Ramos, E. R. D. P. & Pereira, E. R. 2012. Factors associated with adherence to antihypertensive treatment in a primary care unit. *Acta Paulista de Enfermagem, 25*, 27-34. http://dx.doi.org/10.1590/S0103-21002012000800005

Dimatteo, M. R. (2004). Variations in patients' adherence to medical recommendations: a quantitative review of 50 years of research. *Medical care, 42*, 200-209. http://dx.doi.org/10.1097/01.mlr.0000114908.90348.f9

Elliott, W. J. (2003). The economic impact of hypertension. *The Journal of Clinical Hypertension, 5*, 3-13. http://dx.doi.org/10.1111/j.1524-6175.2003.02463.x

Esmaeili, R., Hadian, M., Rashidian, A., Shariati, M. & Ghaderi, H. (2014). Family medicine in Iran: facing the health system challenges. *Global journal of health science, 7*(3), 260-266. http://dx.doi.org/10.5539/gjhs.v7n3p260

Esmaeili, R., Hadian, M., Rashidian, A., Shariati, M. & Ghaderi, H. (2016). The Experience of Risk-Adjusted Capitation Payment for Family Physicians in Iran: A Qualitative Study. *Iranian Red Crescent Medical Journal*, 18. http://dx.doi.org/10.5812/ircmj.23782

Fahey, T., Schroeder, K. & Ebrahim, S. (2005). Educational and organisational interventions used to improve the management of hypertension in primary care: A systematic review. *Br J Gen Pract, 55*, 875-882. PMC1570766.

Gwadry-Sridhar, F. H., Manias, E., Lal, L., Salas, M., Hughes, D. A., Ratzki-Leewing, A. & Grubisic, M. (2013). Impact of interventions on medication adherence and blood pressure control in patients with essential hypertension: a systematic review by the ISPOR medication adherence and persistence special interest group. *Value in Health, 16*, 863-871. http://dx.doi.org/10.1016/j.jval.2013.03.1631

Ho, P. M., Bryson, C. L. & Rumsfeld, J. S. (2009). Medication adherence its importance in cardiovascular outcomes. *Circulation, 119*, 3028-3035. http://dx.doi.org/10.1161/CIRCULATIONAHA.108.768986

Ingersoll, K. S. & Cohen, J. (2008). The impact of medication regimen factors on adherence to chronic treatment: a review of literature. *Journal of behavioral medicine, 31*, 213-224. http://dx.doi.org/10.1007/s10865-007-9147-y

Iuga, A. O. & Mcguire, M. J. (2014). Adherence and health care costs. *Risk management and healthcare policy, 7*, 35-44. http://dx.doi.org/10.2147/RMHP.S19801

Kamran, A., Ahari, S. S., Biria, M., Malpour, A. & Heydari, H. (2015). Determinants of patient's adherence to hypertension medications: Application of health belief model among rural patients. *Annals of medical and health sciences research, 4*, 922-927. http://dx.doi.org/10.4103/2141-9248.144914

Lawes, C. M., Vander Hoorn, S. & Rodgers, A. (2008). Global burden of blood-pressure-related disease, 2001. T*he Lancet, 371*, 1513-1518. http://dx.doi.org/10.1016/S0140-6736(08)60655-8

Lulebo, A. M., Mutombo, P. B., Mapatano, M. A., Mafuta, E. M., Kayembe, P. K., Ntumba, L. T., Mayindu, A. N. & Coppieters, Y. (2015). Predictors of non-adherence to antihypertensive medication in Kinshasa, Democratic Republic of Congo: a cross-sectional study. *BMC research notes, 8*, 526. http://dx.doi.org/10.1186/s13104-015-1519-8

MA, C. (2016). A cross-sectional survey of medication adherence and associated factors for rural patients with hypertension. *Applied Nursing Research, 31*, 94-99. http://dx.doi.org/10.1016/j.apnr.2016.01.004

Malekzadeh, M. M., Etemadi, A., Kamangar, F., Khademi, H., Golozar, A., Islami, F., Pourshams, A., Poustchi, H., Navabakhsh, B. & Naemi, M. (2013). Prevalence, awareness and risk factors of hypertension in a large cohort of Iranian adult population. *Journal of hypertension, 31*, 1364. http://dx.doi.org/10.1097/HJH.0b013e3283613053

Mcdonald, H. P., Garg, A. X. & Haynes, R. (2002). Interventions to enhance patient adherence to medication prescriptions: Scientific review. *JAMA, 288*, 2868-2879. http://dx.doi.org/10.1001/jama.288.22.2868

Moharamzad, Y., Saadat, H., Nakhjavan Shahraki, B., Rai, A., Saadat, Z., Aerab-Sheibani, H., Naghizadeh, M. & Morisky, D. E. (2014). Validation of the Persian version of the 8-item Morisky Medication Adherence Scale (MMAS-8) in Iranian hypertensive patients. *Global journal of health science, 7*(4):173-83. http://dx.doi.org/10.5539/gjhs.v7n4p173

Haghdoost, A. A., Sadeghirad, B., & Rezazadehkermani, M. (2008). Epidemiology and heterogeneity of hypertension in Iran: a systematic review. *Archives of Iranian medicine, 11*, 444-452.

Sabate, E. (2003). *Adherence to long-term therapies: evidence for action*. World Health Organization.

Shakor, J. K. & Qader, S. S. (2014). Drug Adherence among Diabetic and Hypertensive Patients in Association with Demographic and Healthy Behavior. *International Journal of Science and Research, 3*.

Tsiantou, V., Pantzou, P., Pavi, E., Koulierakis, G. & Kyriopoulos, J. (2010). Factors affecting adherence to antihypertensive medication in Greece: results from a qualitative study. *Patient Prefer Adherence, 4*, 335-343. http://dx.doi.org/10.2147/PPA.S12326

Vlasnik, J. J., Aliotta, S. L. & Delor, B. (2005). Medication adherence: factors influencing compliance with prescribed medication plans. *The Case Manager, 16*, 47-51. http://dx.doi.org/10.1016/j.casemgr.2005.01.009

WHO. (2015). *A global brief on hypertension: silent killer, global public health crisis*. World. Geneva: World Health Organization.

Yue, Z., Li, C., Weilin, Q. & Bin, W. (2015). Application of the health belief model to improve the understanding of antihypertensive medication adherence among Chinese patients. *Patient education and counseling, 98*, 669-673. http://dx.doi.org/10.1016/j.pec.2015.02.007