Uncontrolled Hypertension and Non-adherence to Medical Therapy in Ulaanbaatar, Mongolia

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Objectives: The purposes of this study were (1) to measure non-adherence to medical therapy in a representative sample of the hypertensive population in Mongolia; (2) to identify factors influencing non-adherence to anti-hypertensive medication; and (3) to compare non-adherence to medication in the uncontrolled and controlled hypertension groups. **Methods:** This descriptive study was a questionnaire-based cross-sectional analysis. A random sample of 735 hypertensive patients, aged 35-64 years was selected. Arterial hypertension was defined as uncontrolled if blood pressure ≥140/90 mmHg. Non-adherence to medication was assessed using the Morisky Medication Adherence Scale with a four-item questionnaire. **Results:** The study sample consisted of 265 men (36.1%) and 470 women (63.9%). The mean age of participants was 53.8 ± 8.7 years. Uncontrolled hypertension was detected in 84.7% of all hypertensive subjects. We wound 68.3% of hypertensive patient's non-adherence to medical treatment. Significant factors influencing non-adherence to anti-hypertensive medication among the hypertensive population in Mongolia were younger age (35-44), low family income, not having a regular doctor for hypertension control, behavior of irregular medication intake and mono-therapy. **Conclusion:** Non-adherence to medical treatment was significantly more common in the uncontrolled hypertension group compared with controlled the hypertension group (79.3% vs. 7.1%, p<0.001).

Keywords: Hypertension, Medication Adherence, Risk Factors

Introduction

Hypertension is one of the most preventable causes of cardiovascular disease morbidity and mortality. About 30% of the hypertensive population in Mongolia does not know their diagnosis and 90% of those do not control their blood pressure [1].

Non-adherence to medication has been and continues to be a major problem the world over. Medication non-adherence is associated with worse patient outcomes, which supports the need for interventions to improve medication adherence. The World Health Organization describes poor adherence as the most important cause of uncontrolled hypertension, estimating that 50–70% of people do not take their antihypertensive

medication as prescribed [2]. Non-adherence to treatment for hypertension increases the risk of disease complications. A recent case-control study has shown that non-adherence to therapy is associated with an increased risk of stroke in patients with hypertension.

Poor adherence to antihypertensive medications, which contributes to lack of control in more than two-thirds of these patients, is a critical determinant of response to antihypertensive therapy [3]. There are several ways to assess patients' adherence to treatment. In this perspective, the Morisky Medication Adherence Scale (MMAS), composed of four questions to identify attitudes and behavior in relation to recommendations, has been useful to identify whether patients comply with medication treatment [4].

Many studies have been conducted to discover factors related to non-compliance with antihypertensive treatment. Factors such as age, gender, low socioeconomic status and severity of disease, class of medication prescribed, number of pills per day, side effects of medication, patient's inadequate understanding of the disease and importance of the treatment co-morbid medical conditions, lack of social support, poor patient-provider relationship, cost, and forgetfulness have all been shown to affect adherence in various populations [2, 3, 5-8].

This is the first published study from Mongolia regarding the determinants of medication compliance in hypertensive patients. We have studied non-adherence to anti-hypertensive medication in uncontrolled and controlled hypertension groups. As the first step toward hypertension control, there needs to be a broader recognition of the problem of non-adherence and once identified, simple strategies should be implemented in daily practice to improve adherence.

The purposes of this study were (1) to measure non-adherence to medical therapy in a representative sample of the hypertensive population in Mongolia; (2) to identify factors influencing non-adherence to anti-hypertensive medication; and (3) to compare non-adherence to medication in the uncontrolled and controlled hypertension groups. We hypothesized that improving of adherence to anti-hypertensive medication would be essential in preventing uncontrolled hypertension and stroke.

Materials and Methods

This cross-sectional study was conducted on patients from June

to September 2012 at the outpatient clinics of 3 district health centers in Ulaanbaatar, Mongolia. The criteria for inclusion in the study were patients of age 35-64 years who had been diagnosed with "arterial hypertension" and who had taken antihypertensive treatment during the past one year and gave informed consent to participate.

The study was discussed and approved by the Scientific Council of Public Health School and Medical Ethical Review Committee of the Ministry of Health of Mongolia. After approval, data were collected with a questionnaire from a total of 735 patients. The study procedures were explained to participants and written informed consent was obtained.

The questionnaire included socio-demographic characteristics, anti-hypertensive treatment and factors that encouraged or discouraged the patient's medication taking behavior. Adherence was assessed using the MMAS, with a four-item questionnaire. It measures adherence based on forgetfulness, carelessness, discontinuation of medication when feeling better and discontinuation of medication when feeling worse. The scale scored 1 point for each 'no' and 0 points for each 'yes'. The total score ranges from 0 (non-adherent) to 4 (adherent). According to the test protocol, patients who obtained the maximum score of three or four points were adherent to treatment, while the non-adherent patients were those who scored less than three points.

Blood pressure was measured twice by the physicians using aneroid sphygmomanometers and stethoscopes. BP was measured in all subjects after they were in the resting state for 5 minutes and in a sitting position with the right arm placed at the level of the heart. Arterial hypertension was defined as controlled if BP<140/90mmHg and uncontrolled if BP≥140/90mmHg.

All statistical analyses were performed using SPSS 17.0 for Windows. Descriptive statistics, chi-square test, and multiple logistic regression were used for analysis. Descriptive statistics were used for the socio-demographic profile of study participants. The patient characteristics were described by parametric statistics and the differences between adherent and non-adherent patients were analyzed with odds ratios (with 95% confidence intervals, CI). Chi-square test was used to determine whether the association between two variables was statistically significant. A p-value of less than 0.05 was considered to be statistically significant for all analyses.

Results

A total of 735 hypertensive patients were included in this study, consisting of 265 men (36.1%) and 470 women (63.9%). The mean age of participants was 53.8 ± 8.7 years. The participants of this study according to age were divided into three groups: 35-44, 45-54 and 55-64. The educational level varied greatly: 8.3% had a primary education, 40.2% had secondary and post-

Table 1. Association between adherence to medication and socio-demographic characteristics in hypertensive patients

Characteristics	All patients (n (%))	Non-adherents (n (%))	Adherents (n (%))	Chi-square test; p -value
Gender				
Men	265 (36.1)	189 (71.3)	76 (28.7)	χ^2=1.747; 0.186
Women	470 (63.9)	313 (66.6)	157 (33.4)	
Age[a]	53.8±8.7	56.7±8.2	52.8±7.9	χ^2=216.713; <0.001
Marital status				
Married	624 (84.9)	407 (65.2)	217 (34.8)	
Single	111 (15.1)	95 (85.6)	16 (14.4)	
Education				
Bachelor	371 (50.5)	239 (64.4)	132 (35.6)	
Post-secondary	155 (21.1)	109 (70.3)	46 (29.7)	χ^2=9.452; 0.24
Secondary	148 (20.1)	115 (78.0)	33 (22.0)	
Primary	61 (8.4)	39 (63.9)	22 (36.1)	
Family monthly income				
Upper middle	95 (12.9)	50 (52.6)	45 (47.4)	
Middle	556 (75.6)	390 (70.1)	166 (29.9)	χ^2=12.823; 0.02
Low	84 (11.5)	62 (73.8)	22 (26.2)	
Health insurance				
Insured	673 (91.6)	456 (67.8)	217 (22.8)	χ^2=1.747; 0.297
Not insured	62 (9.4)	46 (74.2)	16 (25.8)	

[a]Age is mean±SD

secondary education level and 50.5% had a bachelor degree or higher. About 84% of the participants were married. Monthly income was at a middle level for 75.7% and a low level for 11.4% of participants (Table 1).

The study shows that the physician-patient relationship was good and satisfactory in 20.6% of participants and just 20.9% of participants had a regular doctor for hypertension control. We found 41.5% of patients used two or more anti-hypertensive medications and 34.6% of them changed medication regimens in the past year. More than half (58.1%) of hypertensive patients had not used medications regularly, but only for symptomatic relief. Reasons for not taking medicine regularly included feeling well (78.8%), side effects (19.9%), high costs (17.2%) and lack of access (7.2%). All hypertensive subjects were divided into two groups: controlled (15.3%) and uncontrolled (84.7%).

According to recommendations for the MMAS test, the sum of scores revealed that patients who are taking anti-hypertensive medications presented a score < 3, which indicates non-adherence to medication regimen.

In our study, non-adherence and adherence to medical treatment were found in 502 of hypertensive patients (68.3%) and in 233of hypertensive patients (31.7%), respectively. Men (71.3%) are more likely than women (66%) to not adhere to an anti-hypertensive medication regimen, but there was no statistically significant difference. The association between non-adherence to medical treatment and age is shown in Figure 1. Non-adherence was common in younger patients (35-44).

Association between non-adherence to anti-hypertensive medication and socio-demographic characteristics of the participants is shown in Table 1. Factors found to be significantly
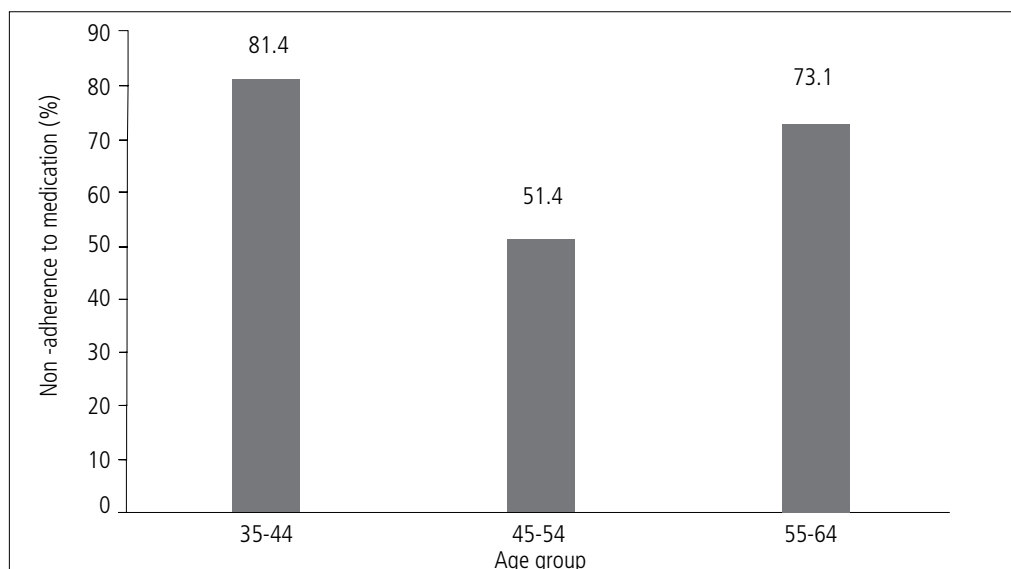
Figure 1. Distribution of hypertensive patients regarding non-adherence to medication according to age.

associated with non-adherence on bivariate analysis were: age (x^2=216.713, p<0.001) and marital status (x^2=18.004, p<0.001). Gender, level of education, family income and health insurance experienced by the patients were not significantly associated with non-adherence.

Table 2 shows that the significant factors of non-adherence to anti-hypertensive medical therapy were number of medications taken (x^2=23.425, p<0.001), frequency of medication use (x^2=90.958, p<0.001), having a regular doctor for hypertension control (x^2=30.131, p<0.001) and physician-patient relationship (x^2=17.701, p<0.001).

Table 3 shows the results of predictors of non-adherence by logistic regression analysis. Factors that were found independently associated with non-adherence to medication

**Table 2.** Association between non-adherence to medication and medication-related factors and health service

Variable	Non-adherents (n (%))	Adherents (n (%))	Chi square test; p-value
Types of antihypertensive medications taken			
Diuretics	23 (65.7)	12 (34.3)	x^2=11.311; 0.16
Beta blocker	306 (68.6)	140 (31.4)	
ACE inhibitor	140 (66.3)	71 (33.7)	
ARBs	13 (86.6)	2 (13.4)	
Number of medications taken			
One	310 (72.1)	120 (27.9)	x^2=23.425; <0.001
Two	180 (66.9)	89 (33.1)	
Three	12 (33.3)	24 (66.7)	
Frequency of medication use			
Regularly	151 (49.0)	157 (51.0)	x^2=90.958; <0.001
For symptomatic relief	351 (82.2)	76 (17.2)	
Changes of medication regimen in past one year			x^2=3.662; 0.56
Changed	162 (63.8)	92 (36.2)	
Not changed	340 (70.7)	141 (29.3)	
Having a regular doctor for hypertension control			x^2=30.131; <0.001

were: younger age (35-44), male gender, low family income, poor physician-patient relationship, behavior of irregular medication intake and mono-therapy.

Table 3. Predictors of non-adherence to medication by multiple logistic regression analysis

Variables	Odds ratio	95% Confidence interval
Younger age (35-44)	2.37	1.66-3.89
Male gender	1.25	0.89-1.73
Marital status	0.32	0.18-0.55
Low family income	2.54	1.35-4.77
Not having a regular doctor	2.72	1.89-3.93
Poor physician-patient relationship	1.54	1.04-2.23
Behavior-not taking medication regularly	4.79	3.44-6.70
Mono-therapy	5.17	2.50-10.66

We compared non-adherence to medical therapy in controlled and uncontrolled hypertension groups (Figure 2). Non-adherence to medication in the uncontrolled hypertension group was more common (p<0.001) than in the controlled hypertension group.
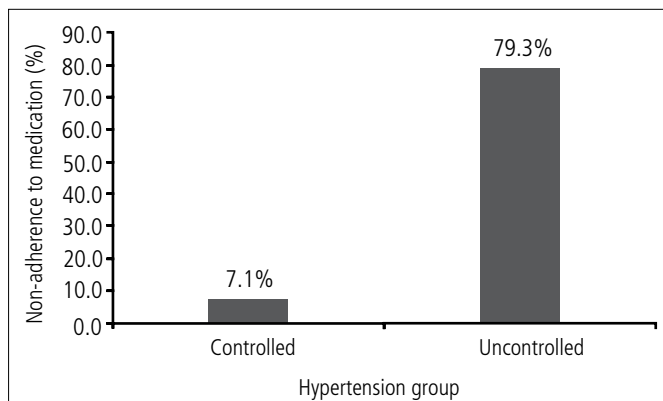
Figure 2. Non-adherence to medical therapy in controlled and uncontrolled groups.

Discussion

Sixty eight percent of our study population was non-adherent to the medical treatment which is similar to a study done in Nigeria where 69% of patients were non-adherent [3]. The non-adherence to antihypertensive treatment found in the current study was higher than what has been reported in similar studies done in Malaysia (56%), Pakistan (43%), India (28.9%), Egypt (26%) and Scotland (9%) and lower than what studies Bangladesh (87%) and Brazil (85.3%) reported [5-9].

In our study, the factors showing significant associations with adherence were younger age (35-44), male gender, low family income, poor physician-patient relationship, behavior of irregular medication intake and mono-therapy. Men were more non-adherent than women, because women are concerned more about their health than men. Age was found to be significantly and independently associated with adherence in our study, with better adherence observed in age group 45-54. According to studies done on India, Iran, and Bangladesh, significant factors for determining non-adherence to antihypertensive treatment were study site, age, levels of education, family income, insurance, level of knowledge, patient's education regarding hypertension, duration of treatment and longer time since last visit to a health care facility, while other socio-demographic factors like marital status and types of medications were not significantly associated with non-adherence [2, 5, 7].

In our study, adverse medication events were not significantly associated with non-adherence. The small proportion of respondents experiencing side effects could have been the reason why a significant association was not found. This finding is in contrast to findings in other studies in which patients who experienced side effects with antihypertensive were more likely not to adhere to treatment [2, 8].

A significant relationship was observed between adherence and number of medications prescribed in our study. Patients who have received mono-therapy were more non-adherent than patients who were taking multiple medications. One reason for our finding could be that patients on multiple medications feel that the severity of their disease is significant and hence become more cautious with their treatment compared to those on mono-therapy, who may take treatment lightly. Another reason may perhaps be that when patients have to take multiple medications, they are less likely to forget to take them compared to having to take only one medication.

In the current study, reasons for not taking medicine regularly included feeling well (78.8%), side effects (19.9%), high costs (17.2%) and lack of access (7.2%). Discouraging factors for adherence to medication in a study conducted in Pakistan were

also side effects (17%), high costs (40%) and lack of access (12%), but forgetfulness (48%) was the main discouraging reason [8]. Differences in main discouraging factors between studies might be explained by differing patients beliefs and attitudes in Mongolia versus other countries.

During the last 10 years, prevalence of stroke has been increasing in Mongolia because of high, uncontrolled hypertension. The main reason for uncontrolled hypertension is non-adherence to hypotensive medication. Compared to other studies (34-45%), uncontrolled hypertension in our study (84.7%) was high [10-12]. This difference is possibly because 58.5% of the hypertensive patients in the current study received mono-therapy.

According to some authors, despite the frequent use of MMAS in studies, some problems regarding self-information, such as omission, memory failure and failure in communication may arise. We have certain limitations to this study such as we did not focus on some specific issues (family support, patient knowledge regarding hypertension) which are the main contributory factors to non-adherence to medical therapy. Further studies are also needed to study the complexity of the relationship between time since last visit to a doctor/hospital, affordability of prescribed medications and non-adherence.

In conclusion, hypertension control and adherence to medication were inadequate among the Mongolian population with arterial hypertension. Non-adherence to medical treatment was significantly more common in the uncontrolled hypertension group compared with the controlled hypertension group. The level of adherence to medical treatment among the hypertensive patients should be improved through well-designed health promotion and education strategies to prevent poor treatment outcomes.

Conflict of Interest

The authors state no conflict of interest.

Acknowledgements

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