

HYPERTENSION-RELATED KNOWLEDGE, PRACTICE AND DRUG ADHERENCE AMONG INPATIENTS OF A HOSPITAL IN SAMARKAND, UZBEKISTAN

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ABSTRACT

Hypertension is one of the most important preventable causes of premature morbidity and mortality in the world. Many people with hypertension both in developing and developed countries have no adequate control of their blood pressure (BP). Hypertension-related knowledge and practice of patients play an important role in controlling hypertension and in preventing its long-term complications. The objective here was to study hypertension-related knowledge, practice and drug adherence of inpatients, and to examine an association between the knowledge regarding hypertension with BP control status and drug adherence. We studied hypertension-related knowledge, practice and drug adherence of patients in a hospital setting. A cross-sectional study was conducted among 209 patients with the diagnosis of primary hypertension at the Samarkand State Medical Institute. The study was conducted from June to September 2012. Drug adherence was studied using the Morisky 4-item self-report measure of medication-taking behavior. The reasons for drug non-adherence were assessed using a self-administered questionnaire. Odds ratio (OR) and 95% confidence interval (CI) were estimated by a logistic model. The BP control rate and drug adherence of the patients were suboptimal (24.4% and 36.8%, respectively). Overall, 64.6% of patients had good or adequate and 35.5% had inadequate knowledge about hypertension. Good knowledge of patients was significantly associated with controlled BP (OR=5.4, 95% CI, 1.7–16.2) and drug adherence (OR=3.8, 95% CI, 1.4–10.8). In conclusion, the inpatients of the secondary hospital had sufficient general knowledge about hypertension, but they had inadequate knowledge about specific issues such as treatment for and symptoms of hypertension. Both drug adherence and BP control rate were suboptimal and significantly associated with hypertension knowledge. This study specifies potential areas of hypertension education that could be improved by patients' knowledge of hypertension.

Key Words: Hypertension knowledge, Uncontrolled blood pressure, Drug adherence

INTRODUCTION

Due to its high prevalence, severe complications and lack of adequate control, hypertension is a major health problem throughout the world. Globally, hypertension affects over one billion people, seven million of whom die annually as a direct result of the disease.¹⁾ Almost three-quarters of

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those suffering from hypertension (639 million people) live in developing countries with limited health resources, and people have a very low awareness of the disease.²⁾ In the lower-income countries of Europe and Central Asia, hypertension has been the cause of more than one-third of all deaths.³⁾ Although the recent advances in the diagnosis and treatment of hypertension have been shown to prevent cardiovascular diseases and to extend life,⁴⁾ hypertension still remains an inadequately managed worldwide disease. Even in developed countries, 62–67% of hypertensive patients being treated have no adequate control of their diseases. The corresponding number in developing countries varies from 66 to 70%.⁵⁾

The cause of uncontrolled hypertension is multifactorial.⁶⁾ Several studies throughout the world have shown that lifestyle, such as physical activity and nutrition, plays an important role in controlling hypertension and preventing its long-term complications.⁷⁾ In order to actively improve their lifestyle, patients must have knowledge and understanding of hypertension and the potential health risks associated with the condition, as well as the potential positive effects of lifestyle modification.⁸⁾ Inadequate patient knowledge and awareness about blood pressure (BP) are also potential causes for non-adherence to taking antihypertensive drugs, and consequently, high rates of uncontrolled BP.⁹⁾ Patients with hypertension should have the knowledge they need to take care of themselves, to be able to define their condition, to evaluate risk factors, and to appreciate the significance of lifelong medical control.^{10,11)} Furthermore, patients with a good knowledge of their disease are more motivated to practice home blood pressure monitoring, which significantly improves medication adherence and blood pressure control.¹²⁾

There have been a limited number of studies on hypertension control and disease awareness among the population in Uzbekistan. A recent study found that general practitioners did not sufficiently inform patients with hypertension about the disease, lifestyle, and the treatment and side effects of medications.¹³⁾ Since no study has been conducted to assess knowledge of hypertension, nor the attitude and adherence to antihypertensive drugs, we conducted a cross-sectional study of those factors in a hospital setting. The objective was to study the hypertension-related knowledge, practice, and drug adherence of inpatients, and to examine the association of knowledge regarding hypertension with BP control status and drug adherence.

MATERIALS AND METHODS

Subjects were patients with primary hypertension hospitalized in the first and second internal medicine departments of the Samarkand State Medical Institute, from June to September 2012. All patients with a primary hypertension diagnosis who were older than 30 years of age, and who gave their consent to participate in the study, were considered eligible for participation. The patients' reasons for hospital admission were both cardiovascular diseases and diseases of other systems. Twenty patients with hypertension were selected randomly per week by a computer program in the hospital from all eligible patients.

Pre-tested, semi-structured questionnaires were used to conduct the study. Incomplete questionnaires missing information for key study questions were excluded. Systolic blood pressure (SBP) and diastolic blood pressure (DBP) from the last two readings within 6 months before the questionnaire's collection were abstracted from outpatient recordings of the subjects. Body mass index (BMI) was calculated as body weight in kilograms divided by the square of height in meters taken from inpatient medical records.¹⁴⁾ Uncontrolled BP was defined as follows: SBP \geq 140 mmHg and/or DBP \geq 90 mmHg in a general definition, and SBP \geq 130 mmHg and/or DBP \geq 80 mmHg in a disease-specific definition for those with chronic kidney disease or diabetes mellitus. Drug adherence was assessed by using the Morisky 4-item self-report measure

of medication-taking behavior, and reasons for non-adherence were assessed by a self-administered questionnaire.¹⁵⁾ Physical activity levels were measured by International Physical Activity Questionnaire,¹⁶⁾ and alcohol drinking by Assessed Rapid Alcohol Problems Screen.¹⁷⁾ Both of these methods were used to assess patients' physical activity and alcohol drinking before hospitalization. Patients who currently smoked at least one cigarette a day were considered smokers. Total knowledge of patients was divided into 3 levels: those who correctly answered less than 6 of 12 hypertension knowledge questions were considered to have inadequate knowledge, those who answered 6 to 9 of questions as having adequate knowledge, and those who answered more than 9 as having good knowledge.¹⁸⁾

All analyses were performed using SPSS (SPSS Inc., Chicago, IL) version 20.0. Chi-square tests were used to examine the association between two categorical variables. Multiple logistic regression models were used to calculate the odds ratio (OR) and 95% confidence interval (CI). Institutional Review Board of the Samarkand State Medical Institute approved the protocol of the study.

RESULTS

In total, 226 subjects were sampled by the computer program from June to September, 2012. After excluding questionnaires missing essential data concerning drug adherence, BP readings and BP check-up, 93% (209 subjects) remained for analysis. Table 1 shows the demographic characteristics and other factors of the 209 subjects. Most of the subjects (71.8%) were 50–69 years old. The mean \pm standard deviation of age was 60.0 ± 6.8 years. Among all subjects, 57.9% were males (121) and 42.1% were females (88). The majority of subjects (77.5%) were from rural areas, 29.7% had an education beyond high school level, 81.3% had a sedentary life, 19.1% were current smokers, and 17.2% were alcohol drinkers. The BP control rate was 24.4%, and males had higher BP control (26.4%) than females (21.6%). However, there were no significant associations of hypertension control status with demographic characteristics and other factors.

Table 2 describes the age-gender-adjusted OR and 95% CI of BP control for hypertension knowledge and practice. The majority of participants correctly identified normal SBP (76.6%) and DBP (78.9%) levels, but significantly more patients from the BP controlled group knew the normal DBP level, as compared with patients from the uncontrolled BP group (90.2% vs 75.3%, OR=2.9, 95% CI 1.0–8.0). More controlled patients knew the importance of taking drugs (90.2% vs 65.2%, OR=3.8, 95% CI 1.5–9.5) and the necessity to medication for a long time (70.6% vs 28.5%, OR=6.1, 95% CI 3.0–12.3) than uncontrolled patients. About two-thirds of patients (65.1%) were aware of at least 3 of the most common complications of high BP. Most of the patients (60.8%) thought that high BP was a very dangerous condition for health. Almost 60% of respondents said that hypertension is a lifelong disease, more than half (55.0%) thought regular BP monitoring is very important for BP control, 51.7% considered that lowering daily salt intake reduced BP, and 72.2% of the patients knew that a person with high BP should change lifestyle. The proportion of hypertension-controlled patients who indicated that they were managing their conditions was significantly higher than that of hypertension-uncontrolled patients (62.7% vs 42.2%, OR=2.3, 95% CI 1.2–4.3). Only 33.3% of hypertension-controlled, and 29.1% of uncontrolled group patients knew that even a person with high BP might not feel any symptoms. Furthermore, the hypertension-controlled patients were significantly more adherent to antihypertensive drugs than uncontrolled patients (80.4% vs 22.8%, OR=15.5, 95% CI 6.9–34.9). Among all patients only 44.0% monitored their BP at home, 42.5% monitored their weight. However, the majority of patients (81.8%) reduced their daily salt intake.

Table 1 Demographic characteristics and other factors of subjects according to blood pressure control

	Total		Controlled		Uncontrolled	
	n	(%)	n	(%)	n	(%)
Age						
30–49 yr	40	(19.1)	8	(15.7)	32	(20.3)
50–59 yr	76	(36.4)	18	(35.3)	58	(36.7)
60–69 yr	74	(35.4)	20	(39.2)	54	(34.2)
70– yr	19	(9.1)	5	(9.8)	14	(8.9)
Gender						
Male	121	(57.9)	32	(62.7)	89	(56.3)
Female	88	(42.1)	19	(37.3)	69	(43.7)
Residence						
Rural	162	(77.5)	38	(74.5)	124	(78.5)
Urban	47	(22.5)	13	(25.5)	34	(21.5)
Education level						
High school	147	(70.3)	39	(76.5)	108	(68.3)
Short time collage	25	(12.0)	5	(9.8)	20	(12.7)
University	37	(17.7)	7	(13.7)	30	(19.0)
Physical activity						
Sedentary	170	(81.3)	40	(78.4)	130	(82.3)
Moderately active	27	(12.9)	7	(13.7)	20	(12.7)
Extremely active	12	(5.7)	4	(7.8)	8	(5.1)
Body mass index (kg/m ²)						
Normal (18.5–24.9)	105	(50.2)	30	(58.8)	75	(47.5)
Overweight (25–29.9)	80	(38.3)	14	(27.5)	66	(41.8)
Obese (30 ≤)	18	(8.6)	7	(13.7)	11	(7.0)
Smoking						
No	169	(80.9)	44	(86.3)	125	(79.1)
Yes	40	(19.1)	7	(13.7)	33	(20.9)
Alcohol consumption						
No	173	(82.8)	46	(90.2)	127	(80.4)
Yes	36	(17.2)	5	(9.8)	31	(19.6)
Total	209	(100)	51	(100)	158	(100)

Table 3 shows the result of a multiple logistic regression model on 5 items such as patient's knowledge of the importance of a regular BP check-up, which was a significant factor for BP control that was reported in a previous study.¹²⁾ and other 4 items which were significant ones from Table 2. Subjects who considered that hypertension patients should take drugs for a long time (OR=5.5, 95% CI 2.6–11.6), and that drug taking lowers BP (OR=3.8, 95% CI 1.0–14.6), as well as subjects having confidence in managing their own condition (OR=2.1, 95% CI 1.1–4.5) were most likely to have controlled BP.

Table 4 shows the associations of total knowledge regarding hypertension with BP control status and drug adherence, respectively. Overall, 10.0% of patients had good, 54.6% had adequate, and 35.5% had inadequate knowledge of hypertension. Patients' knowledge levels were significantly associated with BP control status and drug adherence. Compared to those with an inadequate knowledge level, the OR of controlled hypertension was 2.9 (95% CI 1.3–6.5) for the adequate level and 5.4 (95% CI 1.7–16.2) for a good knowledge level. The OR of drug adherence was 2.1 (95% CI 1.1–4.1) and 3.8 (95% CI 1.4–10.8), respectively.

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Table 2 Age-gender-adjusted odds ratio (OR) and 95% confidence interval (CI) of hypertension knowledge and practice for blood pressure (BP) control

Knowledge/practice		Total		Controlled		Uncontrolled		OR	95% CI
		N	(%)	N	(%)	N	(%)		
Knowledge									
Knows normal systolic BP	No	49	(23.4)	7	(13.7)	42	(26.6)	1	Ref.
	Yes	160	(76.6)	44	(86.3)	116	(73.4)	2.2	0.9–5.3
Knows normal diastolic BP	No	44	(21.1)	5	(9.8)	39	(24.7)	1	Ref.
	Yes	165	(78.9)	46	(90.2)	119	(75.3)	2.9**	1.0–8.0
Knows that taking medicine is the most important factor to control BP	No	60	(28.7)	5	(9.8)	55	(34.8)	1	Ref.
	Yes	149	(71.3)	46	(90.2)	103	(65.2)	3.8*	1.5–9.5
Knows that persons with hypertension often should take tablets for many years	No	128	(61.2)	15	(29.4)	113	(71.5)	1	Ref.
	Yes	81	(38.8)	36	(70.6)	45	(28.5)	6.1*	3.0–12.3
Knows at least 3 complications of hypertension	No	73	(34.9)	15	(29.4)	58	(36.7)	1	Ref.
	Yes	136	(65.1)	36	(70.6)	100	(63.3)	1.3	0.7–2.7
Thinks that hypertension is very dangerous to health	No	82	(39.2)	15	(29.4)	67	(42.4)	1	Ref.
	Yes	127	(60.8)	36	(70.6)	91	(57.6)	1.7	0.9–3.4
Thinks that high BP is a life-long disease	No	84	(40.2)	17	(33.3)	67	(42.2)	1	Ref.
	Yes	125	(59.8)	34	(66.7)	91	(57.6)	1.4	0.7–2.8
Knows importance of regular BP check up	No	94	(45.0)	20	(39.2)	74	(46.8)	1	Ref.
	Yes	115	(55.0)	31	(60.8)	84	(53.2)	1.3	0.7–2.5
Knows that eating less salt usually makes BP lower	No	101	(48.3)	20	(39.2)	81	(51.3)	1	Ref.
	Yes	108	(51.7)	31	(60.8)	77	(48.7)	1.6	0.9–3.1
Knows that lifestyle change is important for BP control	No	58	(27.8)	14	(27.5)	44	(27.8)	1	Ref.
	Yes	151	(72.2)	37	(72.5)	114	(72.2)	1.0	0.4–2.0
Thinks that BP can be managed	No	110	(52.6)	19	(37.3)	91	(57.6)	1	Ref.
	Yes	99	(47.4)	32	(62.7)	67	(42.2)	2.3**	1.2–4.3
Thinks that people with hypertension never or rarely feel symptoms	No	146	(69.9)	34	(66.7)	112	(70.9)	1	Ref.
	Yes	63	(30.1)	17	(33.3)	46	(29.1)	1.2	0.6–2.3
Practice									
Regularly took prescribed drugs for the last 6 months	No	132	(63.2)	10	(19.6)	122	(77.2)	1	Ref.
	Yes	77	(36.8)	41	(80.4)	36	(22.8)	15.5*	6.9–34.9
Regularly check up BP	No	117	(56.0)	94	(59.5)	23	(45.1)	1	Ref.
	Yes	92	(44.0)	64	(40.5)	28	(54.9)	1.8	1.0–3.5
Regularly check weight	No	114	(54.5)	25	(49.0)	89	(56.3)	1	Ref.
	Yes	95	(42.5)	26	(51.0)	69	(43.7)	1.3	0.7–2.5
Reduced salt intake	No	38	(18.2)	9	(17.6)	29	(18.4)	1	Ref.
	Yes	171	(81.8)	42	(82.4)	129	(81.6)	1.1	0.5–2.4

*p value < 0.05 **p value < 0.01

Table 3 Multiple logistic regression analysis of selected knowledge factors for controlled blood pressure (BP)

Knowledge		OR ¹	95% CI ²
Knows normal diastolic BP	No	1	Ref.
	Yes	1.1	0.2–4.6
Knows that taking medicine is the most important factor to control BP	No	1	Ref.
	Yes	3.8*	1.0–14.6
Knows that persons with hypertension often should take tablets for many years	No	1	Ref.
	Yes	5.5**	2.6–11.6
Knows importance of regular BP check up	No	1	Ref.
	Yes	1.3	0.6–2.7
Thinks that BP can be managed	No	1	Ref.
	Yes	2.1*	1.1–4.5

¹ Odds ratio adjusted for age, gender, and items listed² Confidence interval

*p value < 0.05 **p value < 0.01

Table 4 Total knowledge of patients regarding hypertension association with blood pressure (BP) control status and drug adherence

Knowledge level ¹	n (%)	BP control status		OR ²	95% CI ³	Drug adherence		OR ²	95% CI ³
		Yes	No			Yes	No		
		n (%)	n (%)			n (%)	n (%)		
Inadequate	74 (35.4)	9 (17.6)	65 (41.1)	1	Ref	19 (24.7)	55 (41.6)	1	Ref.
Adequate	114 (54.6)	33 (64.8)	81 (51.3)	2.9**	1.3–6.5	47 (61.0)	67 (50.8)	2.1*	1.1–4.1
Good	21 (10.0)	9 (17.6)	12 (7.6)	5.4**	1.7–16.2	11 (14.3)	10 (7.6)	3.8*	1.4–10.8

¹ Inadequate knowledge; correctly answered less than 6, adequate knowledge; correctly answered 6 to 9 and good knowledge; correctly answered more than 9 of 12 hypertension knowledge questions

² Odds ratio adjusted for age and gender

³ Confidence interval

*p value < 0.05 **p value < 0.01

Table 5 Reasons of 132 non-adherent subjects stated in a multiple selection questionnaire

Reasons of non-drug adherence	Responses	
	n	(%)
Psychology and knowledge factors		
Takes medicines when feels rise in BP	59	(44.7)
Prefers traditional medicine	19	(14.4)
Is afraid of being addicted to drugs	17	(12.9)
Doesn't like side effects of drugs	10	(7.6)
Forgets to take medicine on time	10	(7.6)
Social-economic factors		
Doesn't afford the cost of drugs prescribed	19	(14.4)
Medication is not easily available	13	(9.8)
Therapy related factors		
Doesn't like to take medication regularly, for a long time	21	(15.9)
Treatment regime is complex (more than 2 drugs)	15	(11.4)

The reasons for 132 subjects' non-adherence are stated in a multiple selection questionnaire described in Table 5. The most essential reasons were factors associated with patients' psychology and knowledge about drug taking such as taking drugs when having felt an elevation in BP (44.7%), switching to traditional therapy (14.4%), being afraid of addiction (12.9%), effects of medications (7.6%) and forgetting to take the drugs (7.6%). Socioeconomic factors like medication costs (14.4%), availability of drugs (9.8%), and therapy-related factors such as complexity of the treatment (11.4%) and duration of therapy (15.9%), were also strong reasons for non-adherence.

DISCUSSION

First of all, both previous studies^{19,20} and our study obtained similar results indicating that although patients scored high knowledge of hypertension, BP control rate remained suboptimal. Therefore, we think that not only good hypertension knowledge but also patients practice had a significant positive impact on BP control. Several studies throughout the world have demonstrated that demographic factors and other conditions such as age, low education status, high BMI, sedentary lifestyle, and excessive alcohol drinking increase the risk of uncontrolled hypertension

among hypertensive patients.^{21,22)} However, our study didn't reveal any significant associations of hypertension control status with demographic characteristics and lifestyle factors such as smoking and alcohol drinking, because of the small sample size (n=51) in the hypertension control group. Our investigation showed that the majority of patients were overweight and physically less active. Other studies which respondents were not hypertension inpatients but a general population demonstrated that overweight people were usually less active than people of normal weight^{23,24)} and that increasing physical activity might reduce BP through decreased body weight or favorable changes in body fat distribution.²⁵⁾ These findings also point out that the importance of having health education concerning physical activity and maintenance of normal body weight for patients with high BP.

Second, both previous studies^{26,27)} and our study showed a significant association between BP control and knowledge about normal BP. Moreover, our study showed knowledge about normal BP was higher in the BP controlled group compared to the uncontrolled group. More than half of the patients in this study knew the importance of a regular BP check-up and lifestyle change for better hypertension control. The American Heart Association recommends home BP monitoring for all people with hypertension and also that they keep their healthcare providers aware of their actual BP levels so as to rule out white coat syndrome. In our study more than half of patients considered regular BP monitoring to be important for controlling BP, only 44.0% of them had regularly checked their BP at home for the last month. However, when asked about home BP monitoring records, only a few of them could produce a BP diary tracking BP levels and medication usage. We could not find any significant association between BP control and home BP monitoring. This finding contradicted a study carried out in Nepal, where the authors found a significant positive association between BP control status and BP monitoring.²⁸⁾ A recent study showed improvement in both BP control and drug adherence when patients were taught to measure their own BPs and chart it, along with their drug-taking schedule.²⁹⁾ Another study from Canada found a positive impact of BP tracker and a patient education booklet on hypertension knowledge.³⁰⁾

Third, our study showed that many patients did not know the necessity of taking drugs for a long time, were not aware that high BP might be asymptomatic, and had no confidence in managing their condition. Since hypertension is mostly a chronic asymptomatic condition, patients may not feel any physical symptoms from it, and without knowing the need to take drugs regularly for a long time, they may forget to take their medicine or feel that there is no need to take them. Also patients' knowledge about taking drugs for a long time had the highest OR for BP control compared to the other knowledge items.

Fourth, our research showed various reasons for patients not taking antihypertensive drugs. As above mentioned, the majority thought taking drugs was unnecessary, if they were not experiencing symptoms. Some of them preferred traditional medicines, or were afraid of drug addiction. This showed poor knowledge of antihypertensive drugs and their usage for the control of BP. A paper that reviewed adherence to cardiovascular medications in developing countries from among 76 studies showed similar findings that the most common predictors of poor drug adherence were poor knowledge, negative perception about medication, side effects, and high medication cost.³¹⁾ Another systematic review that included 37 qualitative studies also reported that patients found drugs undesirable; many of them feared dependence and tolerance.³²⁾ Socioeconomic factors of drug non-adherence, such as medication cost and lack of availability of drugs, were also essential factors for drug adherence. In Uzbekistan, supplies of medications are limited at all care levels and patients often have to buy medicines out-of-pocket. The study showed that drug adherence could be improved by enhancing access to drugs by sustainable financing, affordable prices and reliable supply systems, particularly in poorer segments of the population.³²⁾

There are several limitations to this study. Our BP control group had a small study population, which may not fully exhibit characteristics of the general hypertensive population. Second, the subjects were all hospitalized patients who might have had resistant BP or other co-morbidities, and those might have been the reasons for their suboptimal BP control. Lastly, provider-related factors such as the amount of prescribed medicines, duration of prescription, communication skills or positive reinforcement, were not examined in this study.

In conclusion, this study revealed that the inpatients of a secondary hospital had sufficient general knowledge of hypertension, but inadequate knowledge about specific issues such as duration of treatment and symptoms of hypertension. Both drug adherence and the BP control rate were suboptimal and significantly associated with hypertension knowledge. This study specifies potential areas where appropriate education of not only hypertension but also BP control could be an apt tool for the improvement of hypertension knowledge of patients. In addition to strategies for improving knowledge among patients, access to drugs, reliable drug supply systems and provision of BP diary by healthcare providers should be considered at the national level.

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