Factors Associated with Drug Adherence among Hypertensive Patients in a Public Hospital in Eastern Ethiopia

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Abstract

Hypertension is among the new health threats to most African countries. Good adherence to prescribed medications and a healthy lifestyle are important for controlling blood pressure. This study measured adherence to antihypertensive medications and investigated the factors affecting it. This was a single institution-based cross-sectional study of hypertensive individuals on antihypertensive drug treatment at Dilchora Hospital, Dire Dawa, Ethiopia. Self-reported drug adherence was measured using the eight-item Morisky Medication Adherence Scale (MMAS) to label the patient as adherent or non-adherent. Bivariate logistic regression and multivariate logistic regression were used to determine associations between drug adherence and other variables. Variables with p-values<0.2 in the bivariate analysis were candidates for multivariate logistic regression. Finally, variables with p-values<0.05 in multivariate logistic regression were considered statistically significant. The mean ($\pm$SD) age of the respondents was 58.6 ($\pm$12.8) years. 227 (56.6%) respondents had stage I hypertension, and 66.3% reported comorbidities.65.6% of patients were adherent to antihypertensive drugs but, during enrolment, only 89 (22.2%) of respondents met JNC7 blood pressure control criteria. Age, distance from hospital, years after diagnosis, family history, knowledge about hypertension, regular visits to facilities, and khatchewing were significantly associated with adherence to antihypertensive medications. Adherence to antihypertensive medication was low in this population. Strategies to improve adherence should include nearby services and awareness creation about hypertension and its complications.

Introduction

Hypertension is becoming a pressing public health concern in most low and middle-income countries. Arterial blood pressure can be considered normal when the systolic blood pressure (SBP) is between 90 and 139 mmHg and diastolic blood pressure (DBP) is between 60 and 89 mmHg. A patient can therefore be considered hypertensive when their SBP is$\geq$140 mmHg or DBP is$\geq$ 90 mmHg or if they report use of antihypertensive medications[1-3].

Hypertension is the number one cardiovascular risk factor and it affects nearly one billion adults globally. Despite advances in technology and healthcare, its prevalence is increasing, as are the consequent morbidity and mortality. Although there are disparities between study results, one meta-analysis estimated that the

national prevalence of hypertension in Ethiopia was 19.6%[4, 5]. Nevertheless, awareness about hypertension tends to be low due to its silent natural history, and less than half of affected individuals are aware of their condition.

Eventhough hypertension represents a preventable cause of cardiovascular disease, it causes 7.1 million deaths annually, 13% of all deaths. Nearly 62% of the cerebro vascular disease and 49% of the ischemic heart disease burden worldwide are caused by hypertension[2,5-9]. Hypertension is therefore a manageable risk factor for coronary heart disease (CHD), stroke, congestive heart failure (CHF), end-stage renal disease, and peripheral vascular disease [2, 8, 10, 11].

Fortunately, hypertension and its related complications can be successfully treated and prevented with multi-faceted management. The contemporary approach to treat hypertension involves maintaining a healthy lifestyle, which can reduce or even eliminate the need for antihypertensive drug treatment in hypertensive patients. Initially, all individuals diagnosed with hypertension receive recommendations to perform regular physical activity, reduce salt intake, moderate alcohol intake, lose weight, stop or not start smoking, and follow a healthy diet to effectively lower their blood pressure [1, 7, 12, 13].

The ultimate goal of hypertension treatment is to control blood pressure to within normal limits (below 140/90 mmHg), except in patients with diabetes and renal disorders in whom the target blood pressure is below 130/80 mmHg. Adequate blood pressure control has been associated with mean reductions of >50% in the incidence of CHF, >20% in the incidence of myocardial infarction, and >35% in the incidence of stroke [12, 14-16]. Nevertheless, less than quarter of hypertensive patients meet this target [17-20]. Even with established and effective management, uncontrolled hypertension challenges clinical practice worldwide.

Non-adherence to antihypertensive therapy is the main reason for uncontrolled blood pressure [21, 22]. Some studies have shown that good adherence to antihypertensive therapy is related to good knowledge about hypertension[23], with poor adherence usually related to a lack of knowledge about hypertension and its treatment, complex drug regimens, and low socioeconomic level. In case of Ethiopian setting, inconsequential information source regarding drug adherence among hypertensive patients and no study is conducted in the current study area. This study was aimed to measure the proportion of adherence and associated factors among hypertensive patients.

Materials and Methods

Study area and period

This study was conducted in Dilchora Hospital, Dire Dawa Administrative Council. Dire Dawa Administrative Council is one of the two administrative councils of the Federal Democratic Republic of Ethiopia. It is located in the eastern part of Ethiopia, 515 km from Addis Ababa. According to the 2007 national census, the total population of the Council was 341,834. The administrative Council contains four private hospitals, one governmental hospital, nine health centres, and one private higher clinic[24],[25]. This study was conducted in one governmental hospital between May 1 and May 30, 2015.

Study design and sampling

This was a hospital-based cross-sectional study of hypertensive patients taking any antihypertensive drug. Study subjects were selected by systematic random sampling (every other hypertensive patient visiting the hospital). Hypertensive patientsaged≥18 years and visiting Dilchora Hospital were considered for the sample. All subjects knew about their condition and were taking hypertensive medications for at least one year prior to data collection. Patients with pregnancy-related hypertension, the critically ill, and hypertensives not on antihypertensive drugs for at least 12 months were excluded.

Sample size calculation and sampling procedure

The sample size was calculated using a single population proportion formula with consideration of 50% adherence, 5% margin of error, and 95% confidence intervals (CI). Assuming a 10% non-response rate, the final computed sample size was 422.Every other hypertensive patient at tending hospital for their regular follow-up was selected by the data collectors.

Data collection tools and procedure

Structured questionnaires consisting of open and closed-ended questions were developed from the WHO STEPwise approach to Surveillance (STEPS) questionnaire with minor amendments[26]. It was used to collect sociodemographic, anthropometric, and blood

pressure-related lifestyle data. An eight-item Morisky Medication Adherence Scale (MMAS) was also used to measure adherence status of the subjects. The Cut-off values of MMAS mean scores≥3 and <3 to label patients as adherent or non-adherent, respectively [27].

Data were collected by four trained nurses. Blood pressure was measured using a mercury sphygmomanometer with cuff size of 23 × 12.5 cm and stethoscope after the participants had rested for 10 minutes. All measurements were performed in a similar position for all participants.

Dependent and independent variables

The dependent variable was antihypertensive drug adherence. The socio-demographic characteristics, physical characteristics(weight and height), and blood pressure-related conditions(blood pressure, duration, blood pressure control, family history, social support, co-morbidity, number of pills, counselling, knowledge, Information about hypertension, use of alternative medicines, follow-up, and *Khat* chewing were independent variables considered for analysis.

Operational definitions

Adherent: respondent who scored six and above in the eight-item MMAS [27]. Controlled hypertension: average blood pressure reading less than 140/90 mmHg at the time of data collection, irrespective of measurements at other times. Khatis an indigenous plant whose leaves and stem tips are used as a stimulant. Its use is deeply rooted in the regional customs and traditions.

Quality control

The questionnaire first developed in English was translated into local language (Amharic and Oromifa). Data collectors were professional nurses and speakers of the local language. They were given two days training regarding the questionnaire, the objective of study, and the process of data collection. Pretesting was conducted at Harar General Hospital in hypertensive patients prior to the actual data collection. Consistency and validity of the tools were checked, and amendments were made based on pretesting. To preserve the validity of the data collection instruments (weight, height, and blood pressure), measurements were checked with the same

instruments during pretesting. To gather reliable data, blood pressure was measured twice in the sitting position. Principal investigator closely supervised the data collection.

Data processing and analysis

Data were entered into Epi Data v3.1 and exported to SPSS v25 for analysis. Descriptive statistics were used to describe the frequency, median, mean, and SD. To determine associations, bivariate logistic regression and multivariate logistic regression were carried out. Variables with p-values<0.2 in the bivariate analysis were candidates for multivariate logistic regression. In multivariate logistic regression, p-values<0.05 were considered statistically significant.

Ethical considerations

Ethical clearance was obtained from Haramaya University, College of Health and medicine, Institutional Health Research and Ethics Review Committee and the letter was submitted to Dire Dawa City Administrative Health Bureau and Dilchora Hospital. Informed written consent was obtained from each respondent prior to data collection. Confidentiality of the information obtained from respondents was maintained at all times.

Results and Discussions

Demographics

Of the total invited participants, 401provided complete information.63.1% of the respondents was female. The mean (±SD) age of the respondents was 58.6 (±12.8) years ranging from 20-90. 70.6% of respondents were married, and over half identified as Orthodox by religion. Nearly half (189, 47.1%) of respondents were illiterate. 171(42.7%) resided less than one kilometre from their corresponding follow-up hospital (Table 1).

Of the total, 182 (45.4%) participants condition was diagnosed within the last five years. A majority (227, 56.6%) of respondents had stage I blood pressure during data collection. At enrolment, only 89(22.2%) of respondents metJNC7 blood pressure control criteria. 266 (66.3%) respondents reported comorbidities, especially diabetes mellitus, renal disease, and peptic ulcers (Table 2).

Table.1 Socio-demographic characteristics of hypertensive patients attending Dilchora Hospital from May 9 to June 8, 2016. N=401

Variables		Frequency	Percentage
Age (years)	18-39	22	5.5
	40-60	167	41.6
	60+	212	52.9
Marital status	Single	10	2.5
	Married	283	70.6
	Divorced	25	6.2
	Widowed	70	17.5
	Separated	13	3.2
Religion	Muslim	153	38.15
	Protestant	40	10
	Orthodox	207	51.6
	Others	1	0.25
Ethnicity	Amhara	196	48.9
	Harari	63	15.7
	Oromo	121	30.17
	Other	21	5.23
Educational status	Illiterate (cannot read and write)	129	32.1
	Illiterate (can read and write)	60	15
	Primary (1-8)	114	28.4
	Secondary (9-12)	76	19
	College/University	22	5.5
Job	Governmental organization	68	17
	Non-governmental organization	33	8.2
	Housewife	144	35.9
	Farmer	36	9
	Merchant	41	10.2
	Daily labourer	27	6.7
	Student	2	0.5
	Other	50	12.5
The distance of residence from hospital	Less than 1km	171	42.6
	1km to 2.99km	115	28.7
	3km and above	115	28.7
Cost sharing	Governmental organization	300	74.8
	Nongovernmental organization	14	3.5
	Self and family	87	21.7
Monthly income	Less than 300 birrs	144	35.9
	300 to 700 birrs	161	40.2
	700 birr and more	96	23.9

Table.2 Blood pressure and related conditions among hypertensive patients attending Dilchora Hospital from May 9 to June 8, 2016. N=401

Variables		Frequency	Percentage (%)
Years after diagnosis	1-5 years	182	45.4
	6-10 years	142	35.4
	Over 10 years	77	19.2
Current BP category	Normal	45	11.2
	Prehypertension	61	15.2
	Stage 1	227	56.6
	Stage 2	68	17.0
BP control	Controlled	89	22.2
	Not controlled	312	77.8
Family/friend support	Not at all	56	14.0
	A little	65	16.2
	Somewhat	114	28.4
	A lot	166	41.4
Comorbidity	None	135	33.7
	One	192	47.9
	Two or more	74	18.4
No of pills for hypertension	One	180	44.9
	Two	182	45.4
	More than two	39	9.7
Knowledge	Good	336	83.8
	Poor	65	16.2
Information about hypertension	Have	371	92.5
	Havenot	30	7.5
Visit hospital	Sometimes	43	10.7
	Always	358	89.3
Use alternative medicine	Yes	27	6.7
	No	374	93.3
Khat chewing	Yes	135	33.7
	No	266	66.3

Table.3 Comparison of socio-demographic and health-related characteristics with medication adherence among hypertensive patients attending Dilchora Hospital from May 9 to June 8, 2016. N=401

Variables		Medication adherence		cOR (CI)	aOR	p-value
		Adherent	Non-adherent			
Age	18-39	17	5	1.00	1.00	
	40-60	116	51	0.70(0.23-1.91)	0.38(0.10-1.42)	0.150
	60+	130	82	0.47(0.17-1.31)	0.21(0.05-0.84)	0.027**
Sex	Male	90	58	0.72(0.47-1.10)	1.24(0.66-2.33)	0.510
	Female	173	80	1.00	1.00	
Educational status	Illiterate/cannot read	71	58	0.70(0.28-1.78)	1.20(0.35-4.09)	0.773
	Illiterate/can read	43	17	1.45(0.51-4.07)	1.80(0.50-6.64)	0.368
	Primary	81	33	1.40(0.54-3.66)	0.97(0.29-3.19)	0.957
	Secondary	54	22	1.40(0.52-3.81)	1.03(0.31-3.43)	0.96
	Collage/university	14	8	1.00	1.00	
Distance from hospital	Less than 1km	129	42	1.00	1.00	
	1-3km	74	41	0.59(0.35-0.99)*	0.66(0.34-1.27)	0.213
	3km and more	60	55	0.36(0.21-0.59)	0.46(0.23-0.91)	0.025**
Years after diagnosis	1-5	109	73	1.00	1.00	
	6-10	96	46	1.40(0.88-2.21)	1.95(1.06-3.61)	0.033**
	Over 10 years	58	19	2.04(1.13-3.71)*	2.05(0.93-4.56)	0.073
BP control	Controlled	71	18	1.00	1.00	
	Uncontrolled	192	120	0.41(0.23-0.71)*	0.57(0.27-1.19)	0.132
Family history	Yes	60	48	1.00	1.00	
	No	114	46	1.98(1.19-3.31)	2.02(1.02-3.98)	0.043**
	Don't know	89	44	1.62(0.96-2.73)	1.45(0.72-2.93)	0.295
Family or friend support	No	27	29	0.37(0.20-0.69)*	0.47(0.21-1.08)	0.074
	A little	39	26	0.59(0.33-1.08)	0.48(0.22-1.05)	0.065
	Somewhat	78	36	0.86(0.51-1.44)	0.95(0.49-1.86)	0.885
	A lot	119	47	1.00	1.00	
Co-morbidity	No	98	37	1.00	1.00	
	One	118	74	0.60(0.37-0.97)*	0.60(0.32-1.14)	0.118
	Two/more	47	27	0.66(0.36-1.21)	0.52(0.22-1.23)	0.137
No of pills	One	133	47	1.00	1.00	
	Two	107	75	0.50(0.32-0.79)*	0.62(0.35-1.11)	0.111
	Three/more	23	16	0.51(0.25-1.04)	1.11(0.44-2.86)	0.822
Knowledge	Poor knowledge	18	47	0.14(0.08-0.26)	0.26(0.11-0.59)	0.001**
	Good knowledge	245	91	1.00	1.00	
Information about hypertension	Havenot	13	17	0.37(0.17-0.79)*	0.99(0.34-2.87)	0.986
	Have	250	121	1.00	1.00	
Visit to hospital	Sometimes	6	37	0.06(0.03-0.16)	0.08(0.03-0.24)	0.000**
	Always	257	101	1.00	1.00	
Use alternative	Yes	10	17	0.28(0.13-0.63)*	0.63(0.21-1.86)	0.402
	No	253	121	1.00	1.00	
Khat chewing	Yes	60	75	0.25(0.16-0.39)	0.25(0.14-0.44)	0.000**
	No	203	63	1.00	1.00	
*cOR, Statistically significant			**aOR= statistically significant, p<0.05.			

Table.4 Commonly reported reason for missing the prescribed medication among hypertensive patients attending Dilchora Hospital from May 9 to June 8, 2016. N=226

Reported reason	Frequency	Percent
Forgetting to take medicine	136	60.2
Not take medicine when feeling well	44	19.5
Missed the dose due to being far from home	21	9.3
Not taking medicine due to its side effects	7	3.1
No money to buy the drug	16	7.0
Other	2	0.9

Antihypertensive medication adherence

263 (65.6%) respondents were adherent to medication according to the MMAS. In univariate analysis, age, distance from the hospital, years after diagnosis, family history of hypertension, having good knowledge about hypertension, regular visits to the hospital, and khat chewing were associated with adherence to drug treatment of HTN (p value <0.2). Multivariate logistic regression showed that respondents aged 60 years and older were 79% less likely to adhere to antihypertensive drugs compared to those aged 18-40 years (aOR0.21, 95% CI 0.05-0.84, p=0.027). Respondents whose residence was 3km or more from the hospital were 54% less likely to adhere to an antihypertensive drug compared to respondents whose residence was less than 1 km from the hospital (aOR0.46, 95% CI 0.23-0.91, p=0.025). Respondents who were diagnosed five or more years ago were nearly twice as likely to adhere to medication compared to those whose diagnosis of hypertension was one to five years ago (aOR1.95, 95% CI 1.06-3.61, p=0.033). Respondents from non-hypertensive families were twice as likely to adhere to medication compared to those from hypertensive families (aOR2.02, 95% CI 1.02-3.98, p=0.043). Respondents who had poor knowledge of hypertension were 74% less likely to adhere to an antihypertensive drug compared with those who had good knowledge of hypertension (aOR0.26, 95% CI 0.11-0.59, p=0.001). Respondents who sometimes visited hospital were 92% less likely to adhere to an antihypertensive drug compared to those who visited their appointments regularly (aOR0.08, 95% CI 0.03-0.24, p=0.001).Respondents who chewed khat were 75% less likely to adhere to an antihypertensive drug compared with non-khat chewers (aOR0.25, 95% CI 0.14-0.44, p=0.001) (Table 3).

The commonly reported reasons for not taking the prescribed medications were for getting the drug, feeling well, or being far from home (Table 4).

Poor adherence to treatment is the main reason for uncontrolled hypertension and the consequent serious complications and wastage of healthcare resources. Ensuring adherence to antihypertensive therapy is proven to prevent these sequelae. Here we assessed factors that might impact adherence in a population in Ethiopia.

Here, adherence to antihypertensive medications was 65.6%,significantly lower compared to the desired index of 80% medication adherence[9]. This is also lower than previously reported in Turkey (72%), Pakistan (77%), and Kuwait (88.6%)[28-30]. It might be due to better access to healthcare, educational status, and level of awareness of risk of hypertension complications of patients in those countries. Socio-cultural differences and associated substance misuse, as revealed by significant association of khatchewing with antihypertensive medications, may also have influenced adherence. The adherence seen here was more consistent with studies conducted in Gonder (64.6%) and Addis-Ababa (69.3%) in Ethiopia[31, 32], which have socio-cultural similarities, geographical proximity, and the same healthcare policy. However, our adherence levels were higher than those reported in India (50%), Pakistan (48.3%), Iraq (54.6%), and Nigeria (33%)[6, 33-35], perhaps because 75% of respondents' healthcare costs were shared by the government in Ethiopia.

Respondents aged 60 years and older were 79% less likely to adhere to antihypertensive drugs than those aged 18-40 years. This result contradicts findings from China, Pakistan, and Iraq[30, 33, 36]. Possible reasons for this might include the inability to self-care by older patients

and the nature of old-age care in these different countries. Even though there was no significant association between sex and adherence, females were more adherent than males (68% vs. 61%), consistent with the findings from Gonder and Addis Ababa [31, 32]. Only 22.2% of respondents had controlled blood pressure, similar to in Pakistan (25.8%)[35]. Furthermore, respondents attending clinic from a distance of 3km and above were 64% less likely to adhere to antihypertensive drugs compared to those who lived less than 1 km away, similar to in Gonder [32]. This might be due to transportation costs, the time needed to commit to attending, plus the symptom-free nature of the disease, which decreases patient consideration of treatment and adherence to it. Respondents with hypertension for over ten years were twice as likely to adhere as those who had the disease for less than five years. This is in contrast to the finding from Addis Ababa, in which respondents with hypertension for five or more years were 88% less likely to adherent to drug treatment[31]. This might be due to more experience of non-adherence-related complications of hypertension in elders. However, this finding is similar to findings from Pakistan and Iraq, in which respondents with hypertension for over ten years were more adherent[33, 35].In our study, respondents who attended appointments regularly were 12-times more adherent to a recommended healthy lifestyle than those who only attended infrequently. This might be because regularly followed patients received more counselling and did not miss scheduled doses of medication and, conversely, the symptom-free nature of the condition might have reduced the incentive to regularly take medicine. Khat chewing significantly affected adherence to the drug; respondents who chewed khat were 75% less likely to adhere to antihypertensive drugs compared with those who did not chew. This may be due to its effect on the central nervous system;in the study conducted in Addis Ababa, khat chewing significantly affected blood pressure [37], and therefore also perhaps its control.

Availability of data and materials

The data and materials of the current study are available from the corresponding author on reasonable request.

Consent for publication: Not applicable

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